

Fine
WoodWorking

The best router lifts
and router tables, p. 40



Tools & Shops

ANNUAL ISSUE

**Dream shops
small and large**

**Build a wall cabinet
for your hand tools**

**Tablesaw fence
works wonders**

**Organize your shop
with smart carts**

**Fundamentals:
The essential
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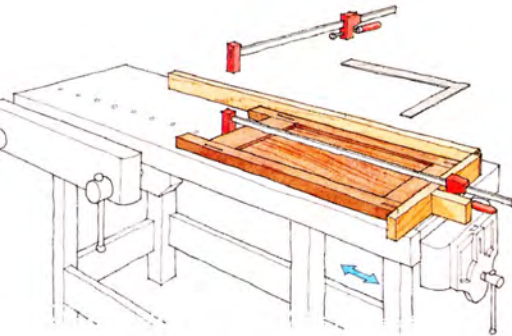
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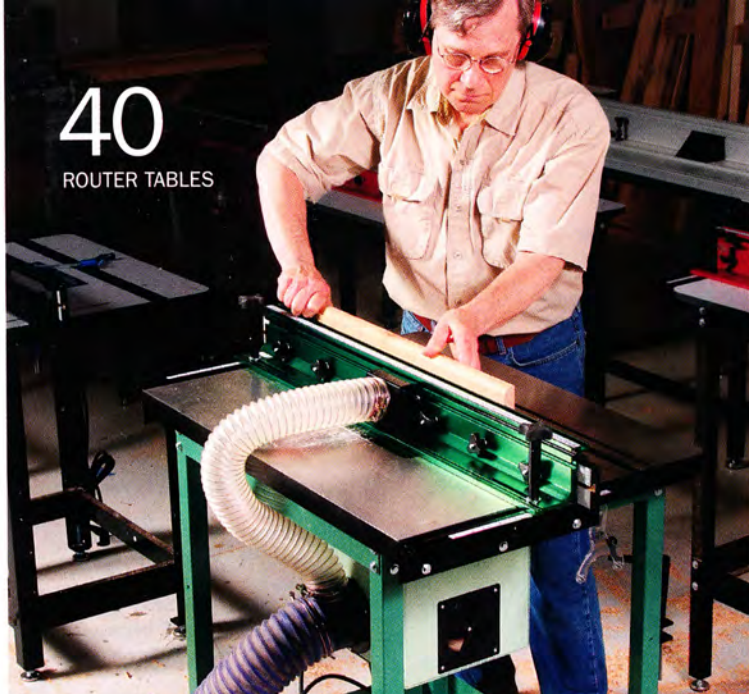
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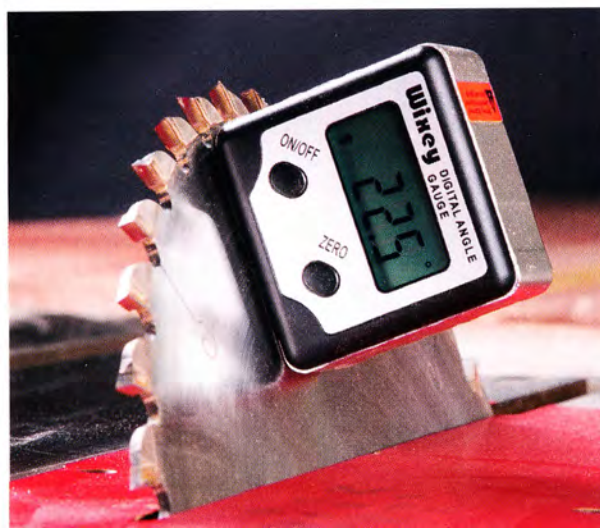


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on the web

THIS MONTH ON **FineWoodworking.com/extras**

Visit our website to access free web extras, available October 24. While you're there, don't miss our collection of free content, including tool reviews, an extensive project gallery, and must-read blogs.



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Do-It-Yourself Dust Collection

Keep wood dust and chips at bay with our step-by-step lesson on ramping up router-table dust collection.

Setting Up Your Small Shop

Short on space but big on woodworking? Catch our tips and techniques for pint-sized workshops that pack a big punch.

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The Valuable, Versatile No. 4

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

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

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

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

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contributors

When he can tear himself away from his shop, **Robert O'Brien** ("Organize Your Shop with Smart Carts") designs college and university buildings. He's co-founder of Chiang|O'Brien Architects in Ithaca, N.Y. A longtime armchair woodworker, he taught himself the craft in part by building the rolling cabinets featured on p. 66.

The difference between working on buildings and furniture? "Large buildings take years from initial design to completion—and other people build them. Furniture is very tactile and immediate, and goes from my drawings to my hands."



If you've ever attended one of The Woodworking Shows or read some of *FWW*'s tool tests, you know **Roland Johnson** (*Tool Tests: "Router Tables" and "Router Lifts"*). Rolie spends his winters as a presenter at the shows and his summers woodworking and keeping his automotive fleet in fine tune. This past summer, he and some friends have been making Windsor stools from green wood, although he says they've spent more time talking than working. **Latest automotive purchase?** "I bought a 24-ft. Safari Trek motorhome—quite a change from sports cars."



Michael Cullen (*Handwork: "Turn a carver's mallet"*), trained by English furniture maker David Powell, is part of a woodworking lineage that stretches back to Edward and Sidney Barnsley and the era of English Arts and Crafts. Cullen frequently trains apprentices in his shop in Petaluma, Calif. With 30 years in the craft, his work ranges from delicate dovetailed boxes that fit in your hand to monolithic sculptural pieces that are best lifted with a crane. **Most important woodworking lesson?** "To sharpen correctly. There's only one kind of sharp, and that's very sharp."

It's safe to say that when **Michael Pekovich** ("A Cabinet for Hand Tools") isn't actually woodworking, he's thinking about it. Whether he's teaching or working as *FWW*'s art director, Mike combines his passion for the craft with his desire to demystify the process for others. "My biggest goal is to give woodworkers the information they need to turn out good work and have fun doing it." **If you could only have one handplane, which would it be?** "Easy, my No. 4 Lie-Nielsen bronze smoother. And my low-angle block plane. And my shoulder plane."



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Spotlight

ISSUE NO. 235

September/October 2013

p. 62



GOING PRO IS SERIOUS BUSINESS

As someone who has earned a living at cabinetmaking and architectural woodwork for the past 50 years, I read with interest Jonathan Binzen's article "Dreaming of Going Pro?" Carefully absorbing the five case histories, I recognized an important message that I'd like to express directly and share with youthful entrepreneurs: A craftsman never failed at business due to his lack of craftsmanship; he failed due to his lack of business management. Every tool and machine you own, every tangible item you possess, all the hours of blood, sweat, and tears given to build that business has dollar signs attached to it. The one thing you've got going for you is that you are happy and like to get up in the morning and go to work doing your craft. But you need to remember you are working for money.

—J. WESLEY SUNDERLAND, West Baldwin, Maine

Mark parts with chalk instead of pencil

I thought I had the carpenter's triangle (Fundamentals, *FWW* #235) all figured out, but Mike Pekovich showed me some techniques that I haven't used (I will now). My suggestion is about what to use for marking. Pekovich uses a pencil. I still use one also, but on some workpieces the marks can be pesky to remove. They certainly sand or plane off easily. But when I don't have much sanding left to do, sometimes even a wipe with denatured alcohol doesn't get all the graphite out of the grain. That's why I've gone to using chalk for quite a bit of my marking. It wipes off easily, and

compressed air gets it out of the pores. I "borrowed" a couple of pieces of big "sidewalk chalk" from my grandkids, and so far one piece has lasted forever. It seems to be more durable than the smaller-diameter blackboard stuff.

—CORDELL ROY, South Jordan, Utah

Copying pieces in *FWW* for profit

With Christmas approaching, I have several friends who are interested in commissioning me to build pieces for gifts. Some of these gifts either come directly out of *Fine Woodworking* or are inspired by pieces in the magazine. Is it acceptable to make any of the items from *FWW* for limited profit? I certainly want to be ethical in my business practices, and nearly all of what I do is for my own enjoyment as a hobby. Please let me know if you have guidance on this subject and (if needed) what the process is for obtaining permission to use a few designs. Thanks for your help.

—JOHN CHATBURN, Spokane, Wash.

Editor replies: *The basic rule is copy away, but for profit you need the author's permission. Contact us, and we'll put you in touch. If it is just one piece sold to a friend, the author probably won't mind. "Inspired by" is a gray area, depending on how far your piece departs from the original. If that original piece is a traditional one, you might also be in the clear, depending on just how far that piece departs from the tradition. Bottom line: You have to make a judgment call as to whether or not you are profiting from someone else's hard-won inspiration.*

Safety comes from control

When it comes to working wood, you're either moving the wood through the machine, or you're moving the machine through the wood. During a recent class at the Marc Adams School of Woodworking, I was struck by two profound things our shop assistant said as he gave us the mandatory safety briefing for a simple chopsaw: Safety comes from control; and control gives you precision. These two very short phrases pack an enormous amount of woodworking wisdom. Precision and safety, the two most important goals in woodworking, are inexorably linked by control! Control is a complex topic, but at one time or another, we've all experienced that feeling that we're about to do something without enough of it.

—LARRY CIESLA, Millbrook, Ill.

Clarification

The website for the "roasted" maple shown in a recent Letter to the Editor (*FWW* #235) is www.Exotic-Woods.com. Don't leave out the dash.

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"... and then there's insanely sharp."

Best Tip



While working as a stockbroker in California, Richard Babbitt earned his private pilot's license, which ultimately led to a 27-year career selling private and corporate planes for Beech Aircraft. An avid woodworker, he used his knowledge of aerodynamics to solve the dust-collection problem on tablesaws ("Dust-Proof Any Tablesaw," *FWW* #205) and is now tackling the problem on bandsaws.

Smart dust collection for your bandsaw

The bandsaw generates lots of dust and particles that, if not collected, are carried into the air or the lower wheel housing to build up and deposit on tires. Most bandsaws come with a dust-collection inlet located 4 to 6 in. below the table—too far away, in my view. For better results, I designed this shopmade inlet to sit just below the table and as close to the blade as possible.

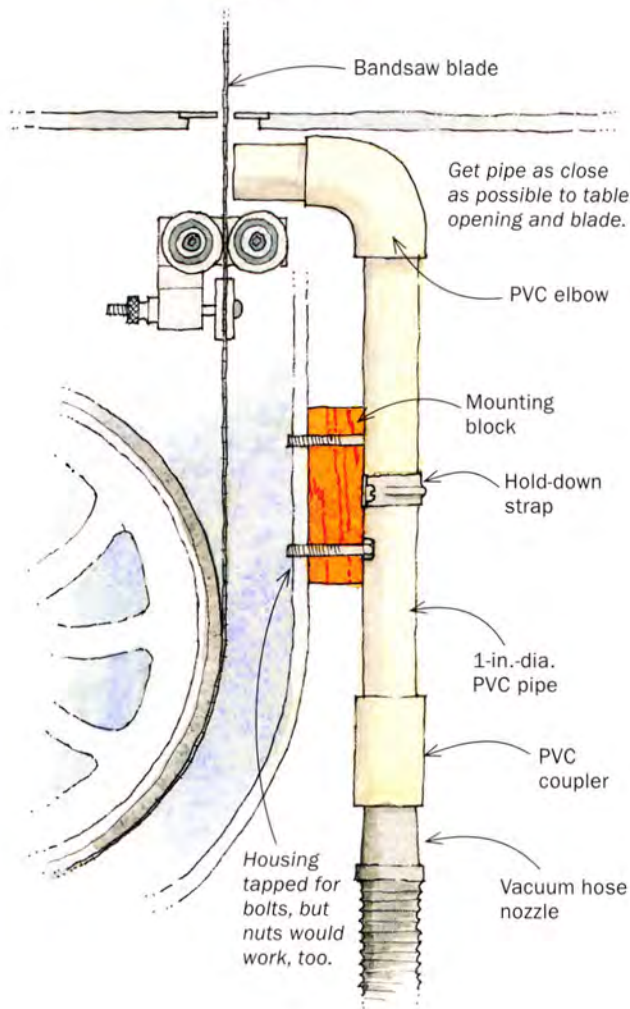
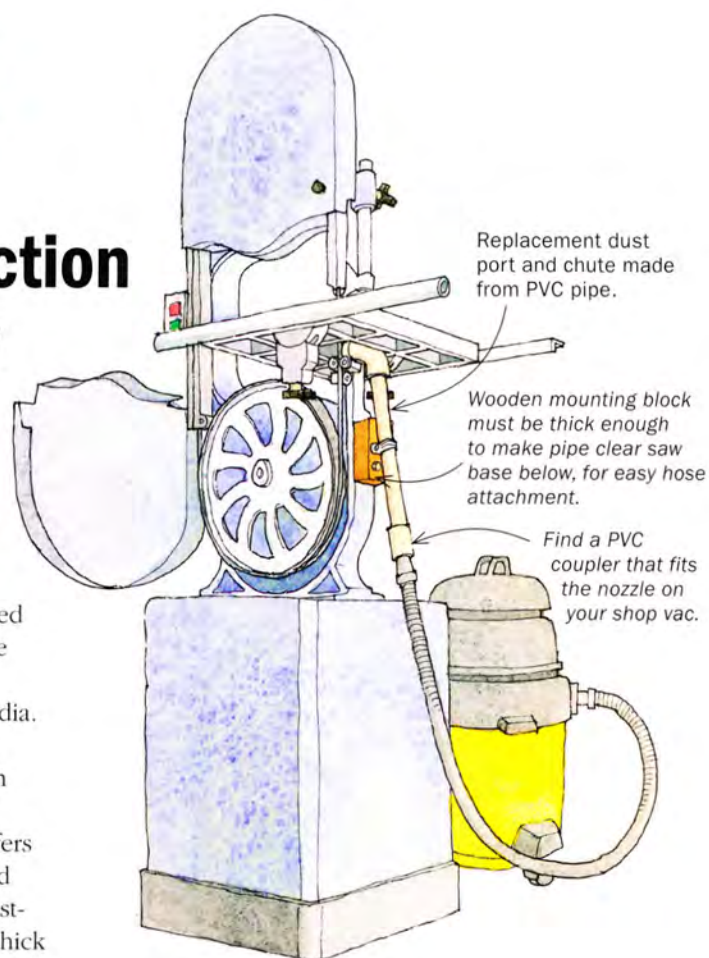
To make it, you will need a length of 1-in.-dia. schedule 40 PVC pipe, some PVC fittings (at least a coupler and an elbow), and a wooden block for attaching the pipe to the saw.

The design of the lower wheel housing differs from saw to saw, so you will need to size and shape the block to fit yours. For my 14-in. cast-iron saw, I used a 3-in. by 5-in. block, $\frac{3}{4}$ in. thick and grooved on the back to fit over a casting rib on the saw's lower wheel housing. To attach the block, I drilled and tapped machine screw holes in the wheel housing. But you can leave the holes untapped and use a nut and bolt.

Next, put together the collection pipe with an elbow and a short length of PVC at the top to position the inlet as close to the blade and the underside of the table as possible. Don't bother with cementing the pipe together. Try to match the coupler to the size of your vacuum nozzle. If needed, wrap tape around the nozzle to get a better fit.

Attach the PVC to the wooden block with hold-down straps from the front of the block. When tilting the table, you'll likely need to remove the pipe and use the factory inlet instead.

—RICHARD BABBITT, Friday Harbor, Wash.



A Reward for the Best Tip

Send your original tips to fwmow@taunton.com or to Methods of Work, *Fine Woodworking*, PO Box 5506, Newtown, CT 06470. We pay \$100 for a published tip with illustration; \$50 for one without. The prize for this issue's best tip was a router-bit set from Infinity Cutting Tools.



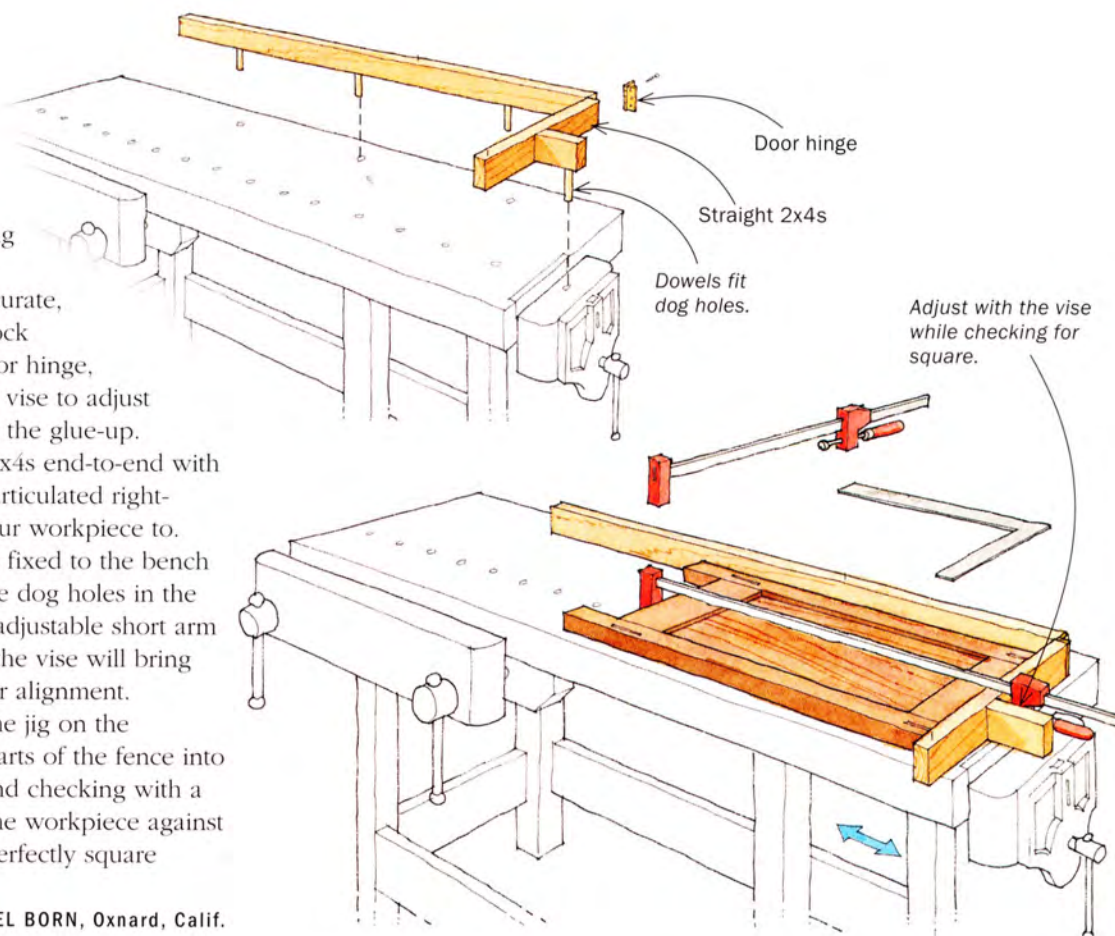
Benchtop jig ensures square glue-ups

Squaring up a carcass side or frame-and-panel assembly during glue-up can be a challenge. To make the process quick and accurate, I made a simple jig from 2x4 stock milled straight and square, a door hinge, and some dowels. I use the end vise to adjust the jig for square before starting the glue-up.

To make the jig, connect the 2x4s end-to-end with the door hinge. This makes an articulated right-angle fence that you'll clamp your workpiece to. The long arm of the assembly is fixed to the bench with dowels spaced to match the dog holes in the top. A dowel also connects the adjustable short arm to the vise. Opening or closing the vise will bring the jig into perfect perpendicular alignment.

To prepare a glue-up, install the jig on the workbench and bring the two parts of the fence into alignment by moving the vise and checking with a square. Apply glue and clamp the workpiece against the jig in both directions for a perfectly square assembly.

—MICHAEL BORN, Oxnard, Calif.



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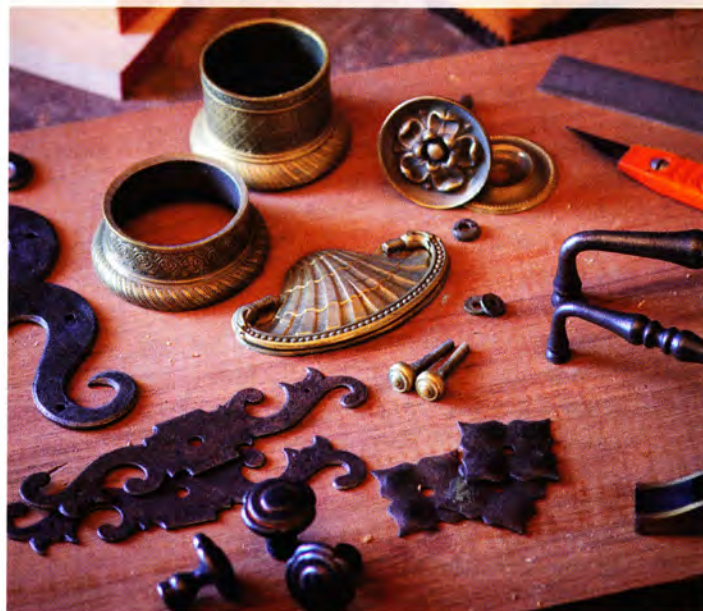
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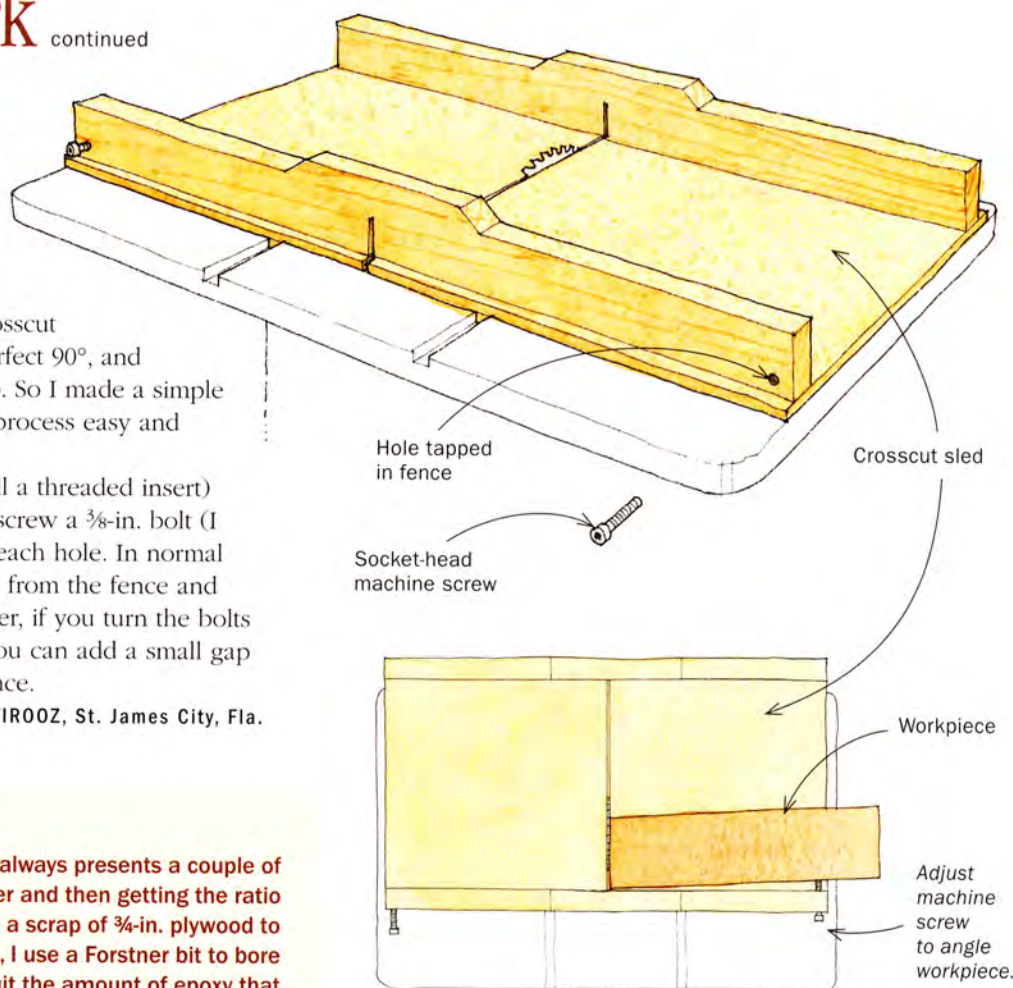
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Modified crosscut sled dials in accurate angle cuts

Recently I had to cut shelves for a built-in cabinet that was a few degrees off true 90°. I'm a big fan of my crosscut sled, which makes it easy to crosscut multiple pieces to precise length at a perfect 90°, and I wanted to get that accuracy for this job. So I made a simple modification to the sled that makes the process easy and repeatable.

Drill and tap a threaded hole (or install a threaded insert) near each end of the sled's fence. Now screw a $\frac{3}{8}$ -in. bolt (I use a socket-head machine screw) into each hole. In normal operations, these bolts will not protrude from the fence and therefore the angle of cut is 90°. However, if you turn the bolts to come through the front fence a bit, you can add a small gap between the board to be cut and the fence.

—KAMRAN FIROOZ, St. James City, Fla.



Quick Tip

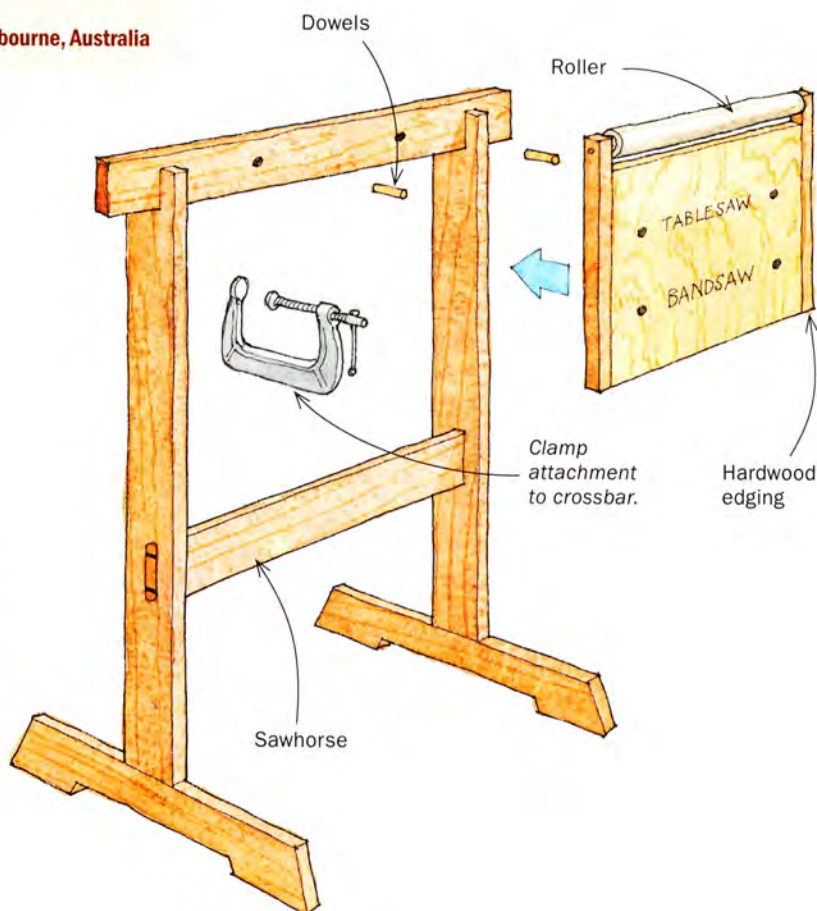
Mixing two-part epoxy in small quantities always presents a couple of small headaches: finding a small container and then getting the ratio correct. To overcome both problems, I use a scrap of $\frac{3}{4}$ -in. plywood to create a small container. At the drill press, I use a Forstner bit to bore a stopped hole roughly large enough to suit the amount of epoxy that I need. To mix the epoxy, I count the veneers to measure the amounts of Part A and Part B that I'm adding to the reservoir. Then I simply mix the epoxy with a small stirring stick and the job's done.

—BOB CARTER, South Melbourne, Australia

Sawhorse-mounted outfeed roller

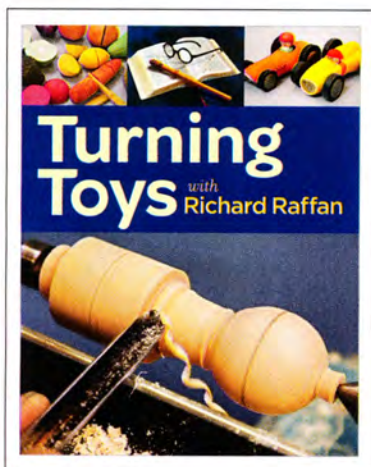
Having neither the room in my shop nor the patience for setting up a traditional roller stand, I came up with a light little attachment that clamps to the rail of my James Krenov-inspired sawhorse. It's basically a scrap piece of plywood edged with two hardwood strips with a roller mounted between them. Dowels plugged into the rail of the horse provide registration for the roller stand's height. Different pairs of holes in the plywood put the roller attachment at the right height for different machines. I don't glue the dowels into the sawhorse because the holes in the horse act as a drilling jig when I want to do the initial indexing for another machine.

—JASON STRAW, Gainesville, Fla.



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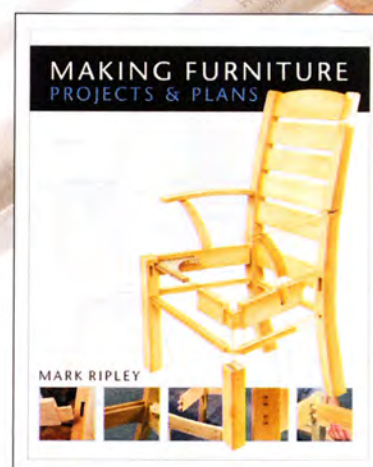
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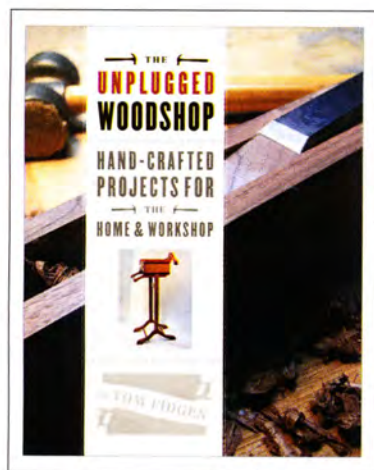
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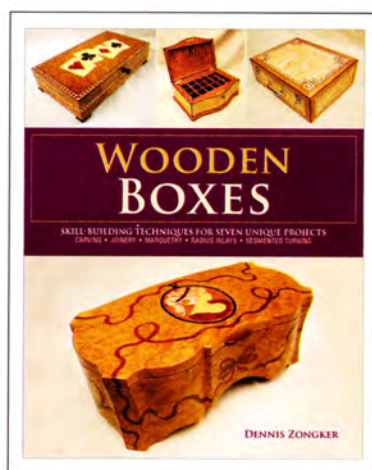
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■ BLADES

Rip and crosscut blades are a fantastic value

I UNDERSTAND WHY COMBINATION TABLESAW BLADES are so popular. For many home shops, they offer an affordable way to get both ripcuts and crosscuts with one blade. But I find that even an expensive combo blade has compromised performance in either one or both jobs. That's why I use dedicated rip and crosscut blades.

Now, with its Marples line, Irwin is making thin-kerf dedicated blades that make having two more affordable. Both the rip and crosscut blades are impressive. The rip blade easily



Table saw blades by Irwin

\$36 for rip (24 teeth)

\$60 for crosscut (80 teeth)

rockler.com



handled hundreds of feet of 8/4 hickory, cutting smoothly with clean results. The crosscut blade also was a smooth operator, cutting everything from dense hardwoods to thin veneered plies to manmade materials such as MDF and melamine with virtually no tearout or burning.

The carbide tips on both blades are large enough for several resharpenings, which makes the price of each blade even more reasonable. For convenience, the Irwin website (irwin.com) will help you find a local sharpening service. All in all, these blades are a very good deal.

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

■ ACCESSORIES

Transform your toggle clamps into workbench holdfasts

LEE VALLEY HAS PUT A NEW TWIST on the traditional holdfast by making a bench-friendly mounting plate for Bessey's innovative auto-adjust toggle clamps (see our review in Tools & Materials, *FWW* #224). The plate is fitted to a 3/4-in.-dia. post. It works like a traditional holdfast, but instead of a hammer blow to wedge the post in place, you simply lock down the clamp lever to get the same effect. Plus, the 5-in.-long post increases the capacity of the clamps: To hold down thicker parts, you simply raise the post out of the hole. This ingenious and versatile system gives you the means to hold a workpiece anywhere you have a dog hole.

—Mario Rodríguez helps run the Philadelphia Furniture Workshop (philadelphiafurnitureworkshop.com).



Toggle Clamp Plate
by Lee Valley

\$21.50

leevalley.com

■ MACHINES

Drill press has every feature a woodworker wants

POWERMATIC'S NEW 18-IN. DRILL PRESS

was designed with the fine woodworker in mind. With a 1-hp motor and weighing in at around 250 lb., this machine is a heavyweight, with a big, cast-iron table and a sturdy, usable fence. The table (14 in. deep by 20 in. wide) has a 1½-in. rib-free ledge around the perimeter, perfect for clamping. It also features a square insert that's easy to replace when it gets worn out. The fence features a T-track along the top edge for hold-downs or jigs and comes with an adjustable flip-stop for repeatable drilling in multiples.

A labor-saving feature is the 6 in. of quill travel with one revolution of the handle. That

means for most jobs you won't have to reposition your hands while drilling to depth. In

a nod to lefties, the feed handles can be set up for right- or left-handed operation.

Speed changes are a breeze, with no belt changes needed. You just crank a handwheel to go from 250 to 3,000 rpm. A prominent LED readout on the front announces the setting.

The Powermatic has the best task lighting I've seen on any drill press. Bright dual LED lights are placed in front of and behind the quill, so there is no shadow no matter what type of drill bit is used. Another bright point is the laser guides for locating a bit on the workpiece. They're fully adjustable if things go awry, and bright enough to read even with the task lights on. The laser guides are accurate even when the table is tilted out of 90°.

The ⅝-in. chuck is high quality with virtually no runout. But I am disappointed that it's a keyless chuck. Because I use the machine for drilling in steel as well as wood, I'd prefer a keyed chuck to ensure that the bit won't spin when the going gets tough.

Another minor quibble: The table tilt requires loosening a knife-blade handle and then loosening a large bolt holding the table to its mount (per the owner's manual). It's kind of tedious, but fortunately it's not a job that most woodworkers will need to do frequently.

My minor quibbles aside, I find that the gobs of vibration-free power, accurate speed control, and awesome task lighting make this a wonderful woodshop companion. The long quill stroke and a large clamp-friendly table create a drill press that isn't just a rehash of a machine-shop tool—this one is for us.

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



Micro Plunge Base by Micro Fence

\$300

microfence.com

■ POWER TOOLS

Cutting-edge plunge base for rotary tools

I'VE ALWAYS ENJOYED WORKING

WITH INLAYS but have struggled with finding a precise way to remove the background material. I like using a Dremel, but its base lacks an accurate plunge mechanism and doesn't give a great view of the work. A unique solution is the Micro Plunge Base, which packs all the features of a high-quality plunge router into a smaller package.

Along with an included LED light, the opening in the 4-in.-dia. base provides great sightlines, and the plunge mechanism is smooth and accurate with the ability to set stops in three different positions. The base also is compatible with Porter-Cable guide bushings. The base lets you rout close to your scribe lines and is useful for both inlay and hinge mortises.

The base fits any Dremel, as well as the Proxon rotary tool. Though there are less-expensive accessory plunge bases out there, none has all the features of the Micro Plunge Base in one package. If inlay is your thing, the base is a worthwhile investment. It will make your life easier and your work better and more precise.

—R.J.

Drill press from Powermatic

Model PM2800B

\$1,400

rockler.com

■ SHARPENING

Convenient case for waterstones

OVER THE YEARS I'VE TRIED SEVERAL METHODS for storing, mounting, and using my waterstones. While the methods have worked, none have been ideal. When I saw the Norton IM 83 waterstone case, it appeared to be just what I had been looking for.

The two-tier case is compact. The bottom section holds accessories like extra stones, lapping plates, and honing guides. The upper section has a rotating triangular block that clamps three waterstones. The case is designed to fit Norton stones, which are 1 in. thick by 3 in. wide by 8 in. long, but stones that approximate these same dimensions will work too.

The upper section is filled with water so the stones always stay moist, and an internal gasket keeps it in the box. As

you rotate through the sharpening grits from coarse to fine, the stones continually lubricate in the water and rinse clean. Thanks to four sticky rubber feet on the bottom, the case remains stationary as you go through your sharpening regimen.

The Norton waterstone case worked as

well as I had hoped, making the task of storing, accessing, and using the stones a snap.

The only downside is that it's an inconvenient system for combination (two-sided) stones.

—Chris Gochmour is a professional woodworker in Salt Lake City.

Waterstone case
by Norton Abrasives

Model IM 83
\$50
Amazon.com



Grr-Rip push block
by Micro Jig

\$30
woodcraft.com



■ ACCESSORIES

Great push pads with smart hooks

A PUSH PAD OR BLOCK IS ESSENTIAL to working safely on the jointer or router table. For years, I've used inexpensive foam-backed versions that I buy online. These pads work OK, but they lose traction over time, and I lose peace of mind. Now Micro Jig has changed the game with its Grr-Rip Block.

This puppy has bite. The bottom is a durable, studded rubber surface that holds strong. But for added pushing power, the block has hooks on each end that automatically lower to lip over and grab the back end of a workpiece. The hooks can be removed or retracted and locked so they won't get in the way when jointing thin stock. An accessory blade and bit guard is available for \$13. You'll pay three times as much for these push blocks as you will for the cheaper versions, but they are well worth it.

—Tom McKenna is managing editor.

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Essential milling machines

A SUCCESSFUL WOODWORKING PROJECT BEGINS WITH STOCK PREPARED AT THE JOINTER, PLANER, AND TABLESAW

BY TOM BEGNAL

Imagine trying to build a skyscraper from bent or twisted beams. It would be an overwhelming challenge, if not downright impossible. Woodworkers face the same dilemma when they try to work with boards that have more curves than straight lines. It's a common problem, because almost all boards we bring home from the lumberyard or home center have at least some measure of warp. And once they acclimate to the humidity level in your shop, they tend to warp even more.

So before you begin any project, some preliminary work is in order. That work, called milling, is done with the jointer, planer, and tablesaw. When you're done, the six surfaces of each board—two faces, two edges, and two ends—should be flat and straight, with all the corners perfectly square.

By the way, that is Marcia Ryan in the photos, a former editor.

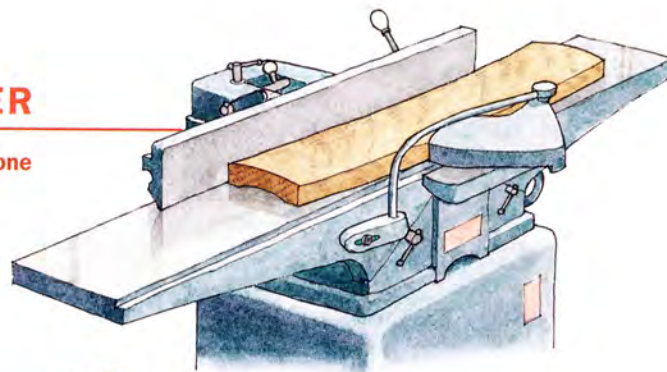
Select flat, square stock and cut it longer and wider than you need

To make the milling process as easy as possible, begin thinking about flat, straight, and square stock when you're selecting the wood, no matter if it has been planed already or is still rough-sawn. Avoid badly warped stock. You'll have to remove far too much material from a board with a big bend or a substantial twist to get it flat, straight, and square.

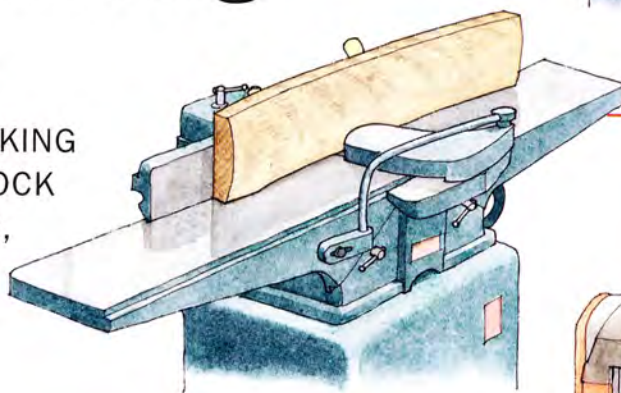
And even if the boards look good, buy them somewhat thicker, wider, and longer than the final dimensions you need. That way, when you do mill away some extra material to remove whatever warp

JOINTER

1 Flatten one face.

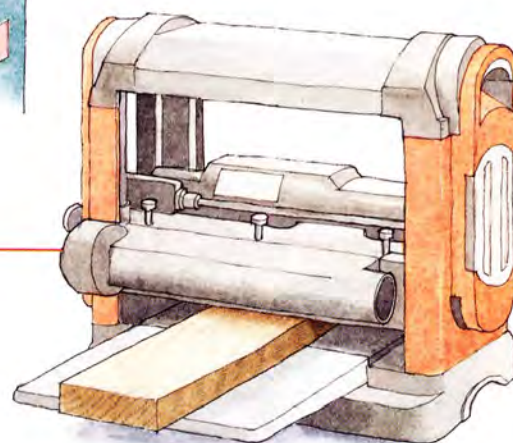


2 Square one edge to the flat face.



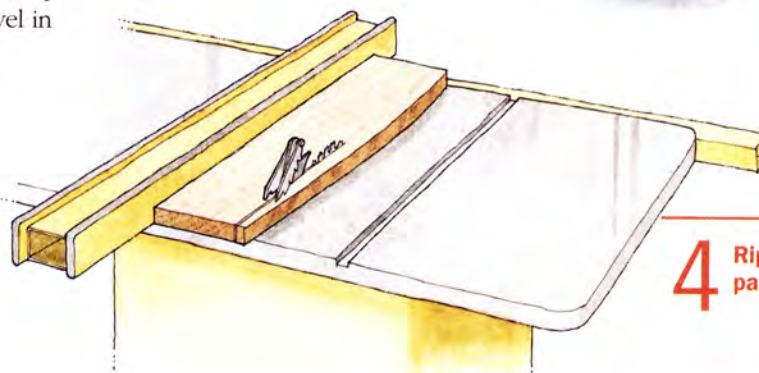
PLANER

3 Surface the second face.

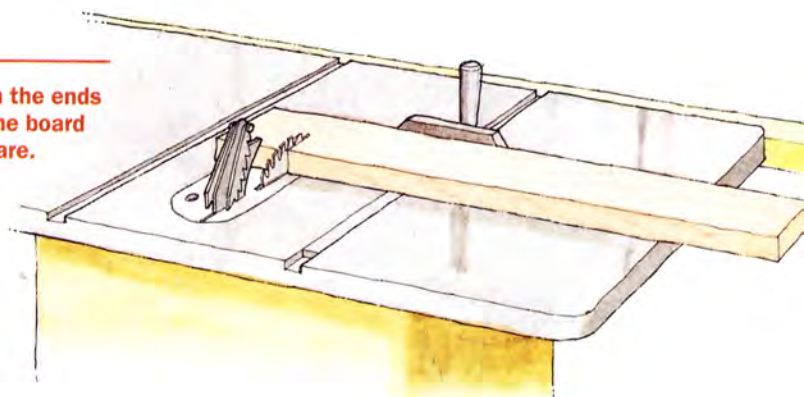


TABLESAW

4 Rip the remaining edge parallel to the first edge.

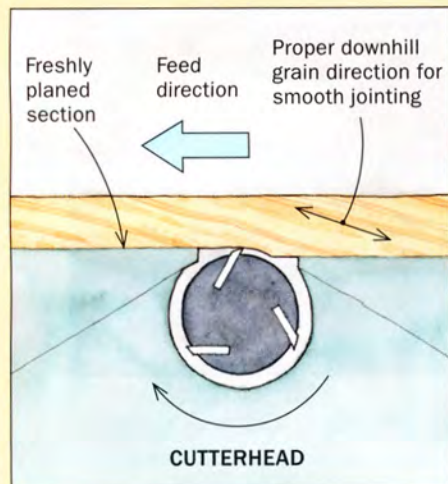


5 Trim the ends of the board square.



1 FLATTEN A FACE ON THE JOINTER

The milling process starts on the jointer. To minimize tearout or splintering, take a reading of the grain direction by looking at the edge of the board. If it tends to run more in one direction than another, feed it into the planer with that grain direction in mind.



is there, you'll have enough stock remaining to provide the right-sized board.

As a general rule, I start by cutting each board to a manageable length and width. I cut the board about an inch longer than its approximate final length. Then I use a bandsaw to rip the boards to their approximate final width. The bandsaw is safer than the tablesaw when cutting warped stock. Depending on the width, I allow an extra $\frac{1}{4}$ in. to $\frac{1}{2}$ in. of stock during this initial cut. Keep in mind, though, that the maximum width is limited by the size of your jointer. If you need to end up with a 10-in.-wide board and you have a 6-in. jointer, you'll want to rip two pieces of stock to about $5\frac{1}{2}$ in. wide and edge-glue them after they've been milled.

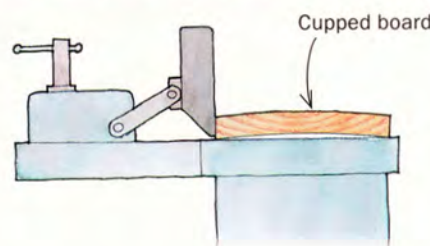
First flatten one face on the jointer

The next step is to flatten one face of each board. The jointer gets that job. For safety, always use push blocks when planing a face surface.

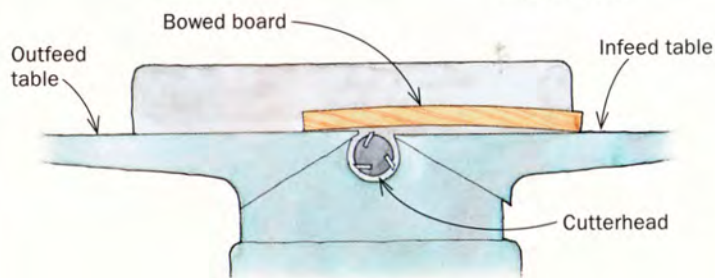
I generally take light cuts, no more than $\frac{1}{32}$ in. If I have a lot of material to remove, I might increase the next couple of cuts by an additional $\frac{1}{64}$ in., but rarely do I remove more than a fat $\frac{1}{32}$ in. with a single pass. A cut that's too heavy requires you to

HOW THE JOINTER FLATTENS LUMBER

The infeed and outfeed table surfaces are flat and parallel to each other. All the cutterhead knives are flush with the top of the outfeed table. The infeed table is set slightly below the outfeed table. As the board travels from the infeed table to the higher outfeed table, the knives shave an amount equal to the difference in table height.



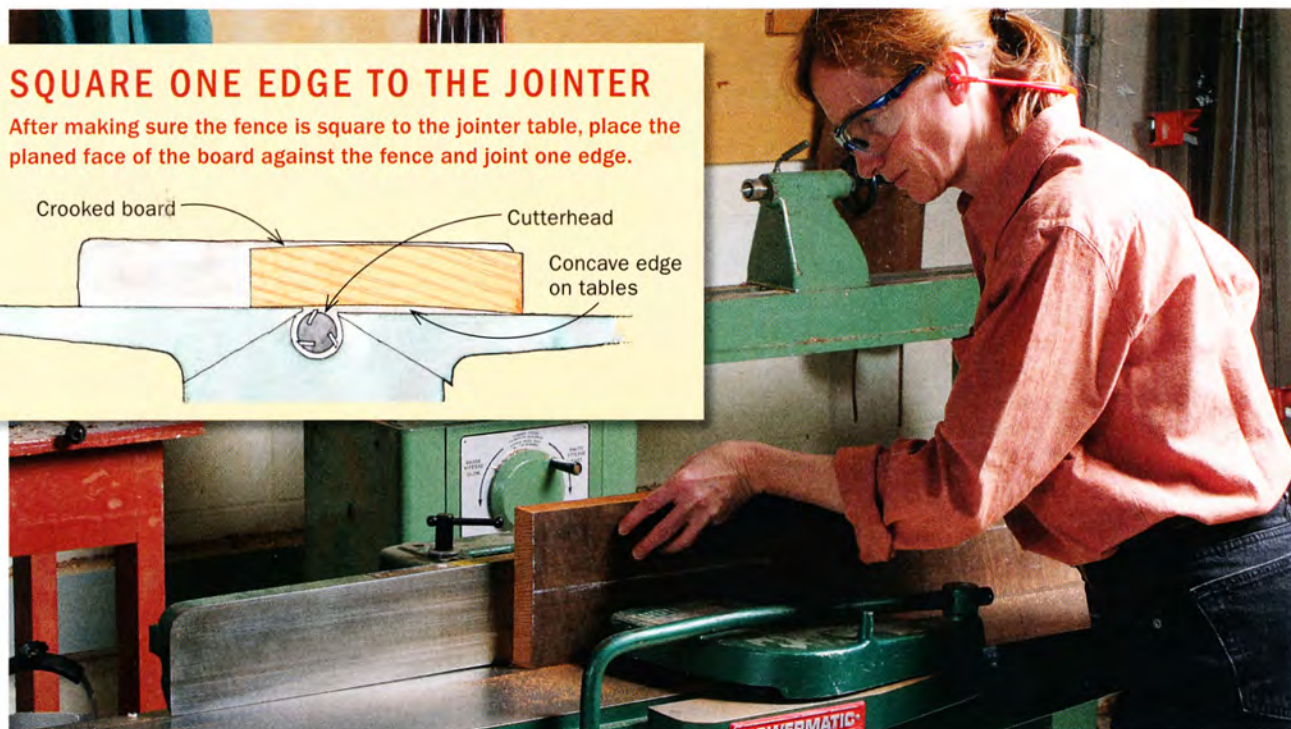
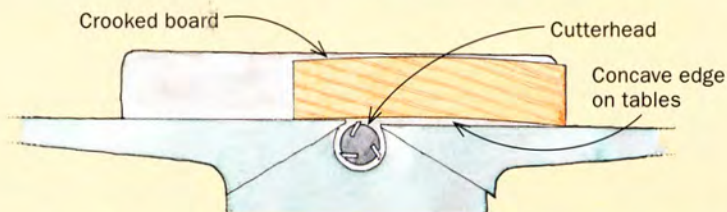
With the bowed, cupped, or crooked (see p. 22, step 2) surface facedown, the board rests steady on two points. The flattened area gets wider with each pass over the cutterhead until the entire surface is flat.



2

SQUARE ONE EDGE TO THE JOINTER

After making sure the fence is square to the jointer table, place the planed face of the board against the fence and joint one edge.



exert more pushing force on the board and is likely to produce tearout or splintering.

To plane the face, place the board on the infeed table with one edge against the fence. Using a push block in each hand, feed the board into the knives. Once the knives start cutting, I use the push block in my left hand to apply downward pressure to the lead end of the board, pressing it against the outfeed table while pushing it forward.

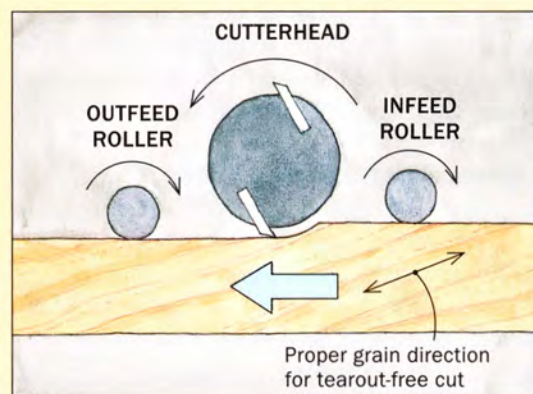
As soon as I get 12 in. or so of the board on the outfeed table, the push-block in my right hand joins the one in

my left at the outfeed table. Then, with both hands in line on the board, and positioned toward the front of the outfeed table (but not over the knives), I push the boards forward. At this point, all the downward and forward pressure from the push block is over the outfeed table, just past the knives. To keep the board moving, I pick up my lead hand and place it behind the other one and keep repeating the process until the board has cleared the knives. Use extra care as

3

PLANE THE SECOND FACE PARALLEL TO THE FIRST

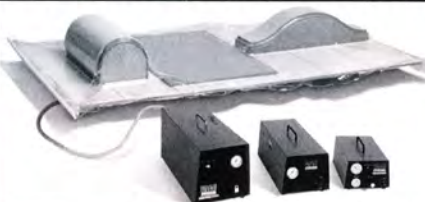
With the previously flattened face against the bed of the thickness planer, feed the board through the machine to plane the other face.



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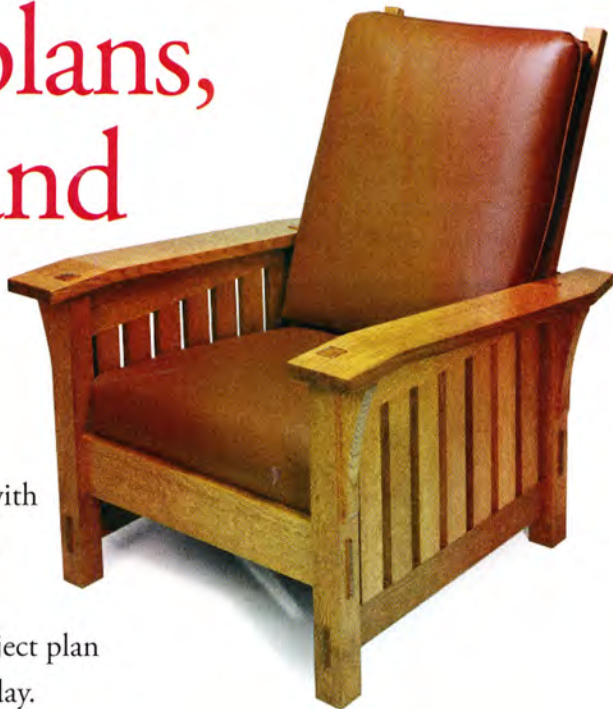
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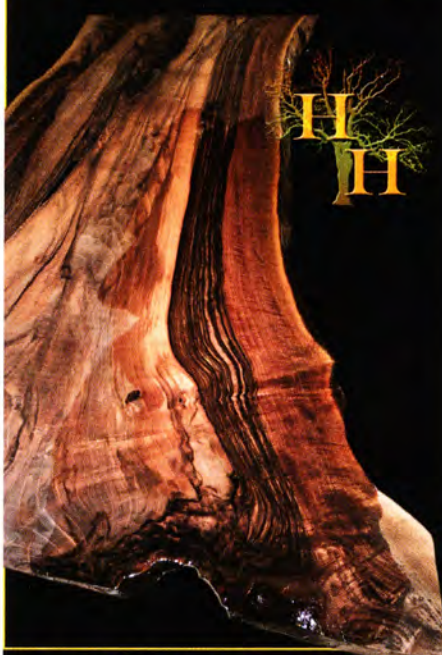
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fundamentals continued

the board exits the infeed table because, for an instant, the guard doesn't cover the spinning knives.

Keep making passes until the entire surface is planed. At that point, your stock is perfectly flat on one face.

The jointer also mills the first edge

Now, use the jointer to straighten and smooth one edge of the board, making it square to the face you just planed. The planed face goes against the fence. If the edge has a front-to-back bend (called crook), be sure to place the concave edge against the jointer table. This ensures that the board won't rock because two points are always in contact with the table.

For safety's sake, I never push with my fingers over the blade area. Continue making passes until the board is planed along its entire length.

A planer makes parallel faces

Now it's time to work on the remaining face. It should be flat and straight, parallel to the opposite face. Your first instinct might be to use the jointer again. After all, it excels at making boards flat and straight. But unless you are very lucky, the jointer won't make the second face parallel to the first. Only a thickness planer can do that.

Once again, check the grain direction (see drawing, p. 22). I make light cuts, typically no more than 1/32 in. Feed the board with the unplanned surface faceup. Make passes until the entire surface is planed and reduced to the desired thickness.

Cut the second edge and the final length

The board now has both faces flat, straight, and parallel, and one edge that's flat, smooth, and square to the faces. The tablesaw handles the last assignment, cutting the second edge parallel to the first and square to the face surfaces.

Make the ripcut first. If you want a smoother edge, cut the board a little wide and then edge-joint it to the final width.

With two faces and two edges of the board now flat, straight, and square to each other, you can cut the board to length. First, trim one end to make sure it's square. Then, measuring from the trimmed and squared end, mark the final length. Now, crosscut the second end at the marked line. The board is ready to be used on your project. □

Tom Begnal, a former associate editor at Fine Woodworking, is enjoying his retirement.

4 RIP TO WIDTH ON THE TABLESAW

Place the planed edge against the tablesaw fence, then rip the board to final width. The tablesaw is the machine of choice here because it cuts an edge parallel to the opposite edge.



5 CUT TO LENGTH

Use the tablesaw and miter gauge to cut one end square. Measure from the trimmed end of the board, then cut it to final length on the tablesaw.



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Turn a carver's mallet

SHOPMADE TOOL IS THE PERFECT FIT FOR HAND-CARVED DETAILS

BY MICHAEL CULLEN

Every woodshop needs at least two mallets. A traditional square-faced mallet like the one I described making in *FWW* #230 (Handwork: "Make a mallet") is great for dovetailing and mortising, where heavy striking is required and the chisel moves only slightly between blows. But when it comes to carving and other tasks where a light touch and much movement of the chisel is required, a turned mallet is the one to use. Its tapered, cylindrical head and compact size permit you to approach the chisel handle from any angle while still ensuring perfect contact. And yet it's not a light-duty tool. The solid, one-piece construction packs enough power to drive a large chisel or gouge. And turning your own mallet means you can contour the grip to fit your hand exactly.

Pick the wood and make a blank

Look for a chunk of dense wood that is relatively easy to turn, such as hard maple,



black locust, oak, or eucalyptus—species that will stand up to the rigors of banging against tool handles year after year. I used teak for this mallet. I save cutoffs from other projects for this type of turning, but logs or firewood can also yield great mallet wood. Be sure to choose a piece of wood that is straight-grained, since slanting grain could create weakness in the handle.

When you've found just the right piece of stock, saw out a blank that is at least $\frac{3}{4}$ in. longer than the finished mallet will be and at least $\frac{1}{4}$ in. wider than the finished diameter of the head. Chuck the blank between centers in the lathe and start turning. Even if you're not much of a wood turner, this mallet is straightforward to make.

The head comes first

Turn the square stock to a cylinder using a $1\frac{1}{2}$ -in. or 2-in. roughing gouge. Then, for a finer cut, switch to a 1-in. spindle gouge and turn the entire cylinder down to its largest diameter, $3\frac{1}{4}$ in. At that point, turn off the lathe and make pencil marks at the four key spots that will guide your transitions: the two ends of the mallet, the base of the head,



Rough out a cylinder

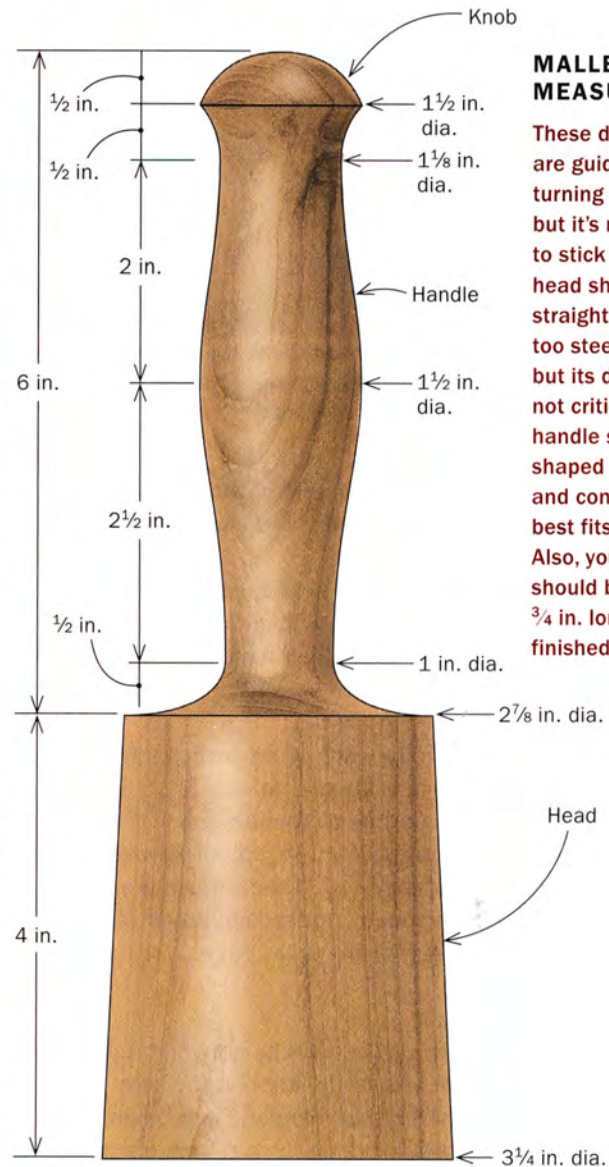


Big gouge does the heavy work. Knock off the corners of the blank and bring it to a cylinder with a large roughing gouge. To guide the work, use calipers set to the mallet's largest dimension.

Lay out the key parts



Mark and measure. Pencil marks define the high point on the knob, the ends of the mallet, and the lower end of the head. Use calipers and a parting tool to define these four diameters.



MALLET MEASUREMENTS

These dimensions are guidelines for turning the mallet, but it's not essential to stick to them. The head should be a straight taper at not too steep an angle, but its diameter is not critical. And the handle should be shaped to a length and contour that best fits your grip. Also, your blank should be at least ¾ in. longer than the finished mallet.

Shaping

Head first. Taper the mallet head with a spindle gouge (1), creating a smooth, straight taper. Rough out the knob next (2). After using a parting tool to relieve the waste ends of the mallet down to roughly 1 in. dia., use the gouge to cut a rough cylinder at the high point of the knob.



Make quick work of the handle. After turning the handle down to a cylinder equal to its largest finished diameter, use a spindle gouge to create the shoulder at the base of the mallet head.

Nearing the perfect grip. Carefully turn the contours of the handle, stopping the lathe occasionally to see how it fits in your hand. Adjust the shaping accordingly.

and the high point of the knob at the end of the handle. With the lathe spinning again, touch the pencil to each mark so the lines wrap around the cylinder.

The next step is to set several pairs of calipers to the sizes you'll need. The calipers are very handy, but don't let them completely dictate the turning—you don't have to stick to precise diameters; it's more important to get smooth curves and transitions.

Use a parting tool to define the ends of the mallet, turning each end down until the stock is about 1 in. dia. Next, define the taper of the head with a parting tool, cutting in at the transition to the handle. Then use the 1-in. spindle gouge to create the tapered surface of the head. If the surface is a little rough or not quite straight enough, you can smooth it out by taking light passes with a skew chisel or a gouge.

Make the handle fit your grip

Start turning the handle with a ½-in. spindle gouge, roughing in a cylindrical shape that's the size of the knob at the base—the largest diameter of the finished handle. Then begin shaping the handle's contours, working inward from either



Flatten the top. As you define the top of the mallet's head, be sure to make it flat or slightly concave. A rounded head won't be stable standing on the workbench. Use a gouge after the parting tool to create a clean surface.



At last, define the knob. Use a skew chisel to shape the bottom of the knob, coming to within ¼ in. or so of parting it off.

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Finish

Sand between centers.

Sand the mallet with the lathe running (right), being sure to round the sharp edges at the top and bottom of the head. Then turn off the lathe and wipe on a thin coat of shellac (below), and follow that with a coat of wax.



Cut it loose. A few strokes of the saw will cut the mallet free. Use a chisel and sandpaper to smooth away the sawmarks or nubs.

end with the 1/2-in. gouge, switching to a 3/8-in. detail gouge if necessary. I use Thompson detail gouges, which are stouter and tougher than regular spindle gouges.

When you turn the steep curve that forms the transition from the head to the handle, be sure to tilt the gouge on its side so that it enters the wood without any flutter or hesitation. Hold the gouge firmly to keep it from slipping out of the cut and marring the mallet head. Use the same technique to define the concave upper side of the knob. Then create the tapering curve that forms the bulb in the middle of the handle. Continue sculpting the handle so that the curves flow into each other to make a pleasing shape. Turn the lathe off periodically and check the fit of the handle against your grip.

Back at the top of the mallet, use a parting tool to create the end surface of the head, and use a gouge to clean up any tearout caused by the parting tool. Since the mallet will be stored on its head, make sure the top end is flat and not domed—otherwise, it will fall off your bench.

The last curve to cut is the bottom face of the knob at the base of the handle, which you can turn with a small detail gouge or a skew chisel. Keep rounding until there's about 1/4 in. diameter left at the bottom. Complete the turning by rounding the corners of the head and the transition points so that they won't be damaged when you're using the mallet. You can use a gouge for this task, or sandpaper as shown in the photo above.

Finishing up

It's simplest to finish the mallet while it is still on the lathe. I use a pad to apply a thin coat of shellac, and after a quick buffing of the surface with steel wool, I finish with a coat of wax.

Free the mallet by cutting through the ends with a handsaw. Then you can smooth any nubs with sandpaper and a chisel, and touch up those spots with shellac and wax. □

Michael Cullen makes custom furniture in Petaluma, Calif.

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1. Publication title: *Fine Woodworking*. 2. Publication number: 561-410. 3. Original filing date: September 30, 2013. 4. Issue frequency: bi-monthly plus extra issue. 5. Number of issues published annually: 7. 6. Annual subscription price: \$34.95. 7. Complete mailing address of known office of publication: 63 South Main St; P.O. Box 5506; Newtown, CT 06470-5506; Contact person: Susan Johnson (646) 439-2155. 8. Complete mailing address of headquarters or general business office of publisher: same as no. 7. 9. Full names and complete mailing addresses of the publisher, editor, and managing editor: President, Tim Rahr; Editor, Asa Christiana; Managing Editor, Thomas McKenna; all at 63 South Main St; P.O. Box 5506; Newtown CT 06470-5506. 10. Owner: The Taunton Press, Inc.; 63 South Main St; P.O. Box 5506; Newtown CT 06470-5506. 11. Known bondholders, mortgages, or other security holders owning or holding 1% or more of total amount of bonds, mortgages, or other securities: None. 12. N/A. 13. Publication Title: *Fine Woodworking*. 14. Issue date for circulation data below: September/October 2013. 15. Extent and nature of circulation:

	Average no. copies each issue during preceding 12 mos.	Actual no. copies of single issue published nearest to filing date
A. Total no. copies	265,519	258,501
B. Paid circulation:		
1. Mailed outside-county paid subscriptions:	140,629	138,903
2. Mailed in-county paid subscriptions:	0	0
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E. Total free or nominal rate distribution:	2,997	2,955
F. Total distribution:	181,285	175,438
G. Copies not distributed:	84,233	81,063
H. Total:	265,519	256,501
I. Percent paid:	98.3%	98.3%

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but design the inside around your tools

BY MICHAEL PEKOVICH



Big storage in a small space.
Swing-out panels in the doors and upper case let you pack in more tools without taking up any more wall space.

When I stop to think about it, I probably spend as much time in my shop with power tools as I do with hand tools. But when the dust and noise from milling parts finally settles and I head to my bench, that's when the fun begins—when I feel like I'm really woodworking. And that's why my cobbled-together hand-tool cabinet was always the heart of my shop. Over the years, though, as my tool collection grew, I finally had to admit that I had outgrown my old friend and it was time to build a new one.

Space is limited in my shop, so I needed a way to pack more storage into the new cabinet without taking up more wall space than the old one. I solved the problem in two ways. First, I made the case deeper, giving me more room for handplane storage in the lower portion and enough depth for swing-out panels above. Also, I built the doors as shallow boxes instead of flat panels, an idea I borrowed from contributing editor Chris Becksvoort (see his tool cabinet on p. 54). These deeper doors combine shelf space for smaller planes and swing-out panels for extra space to hang tools. After some careful design and layout, I now have all my hand tools in one easy-to-reach place—and the cabinet looks great, too.

Tools drive the design

Designing a tool cabinet can be a challenge. It's not just the number of tools. You have to figure out ways to store tools of varied sizes and shapes. Even a bigger cabinet would not have room for every tool I own, so I took a hard look at my collection to determine which tools I use regularly, which ones I use only occasionally, and which ones simply gather dust. I wanted to make sure that the tools I use most are always within easy reach; that the tools I use once in a while, like carving gouges, are stored in less accessible parts of the cabinet; and that the dust gatherers find a home somewhere else. By the way, I also built in a little extra space for new tools I have my eye on. To help with the design, I made a full-sized mock-up out of plywood scraps. This gave me a better idea of the space I had and how to use it to its fullest. To customize the cabinet for your tools, I'd recommend you do the same.

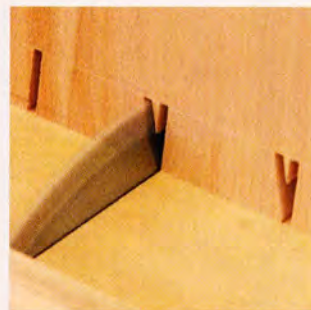
Exposed joinery is beautiful and strong

I'm not big on dressing up most shop cabinets, but I think a tool cabinet deserves

A dovetailed case



Tablesaw makes quick work of tails. Pekovich attaches a sled with a tall fence to a pair of miter gauges to cut the tails. With the blade tilted, he makes a pass at each pin location and then rotates the board to complete the pin socket.



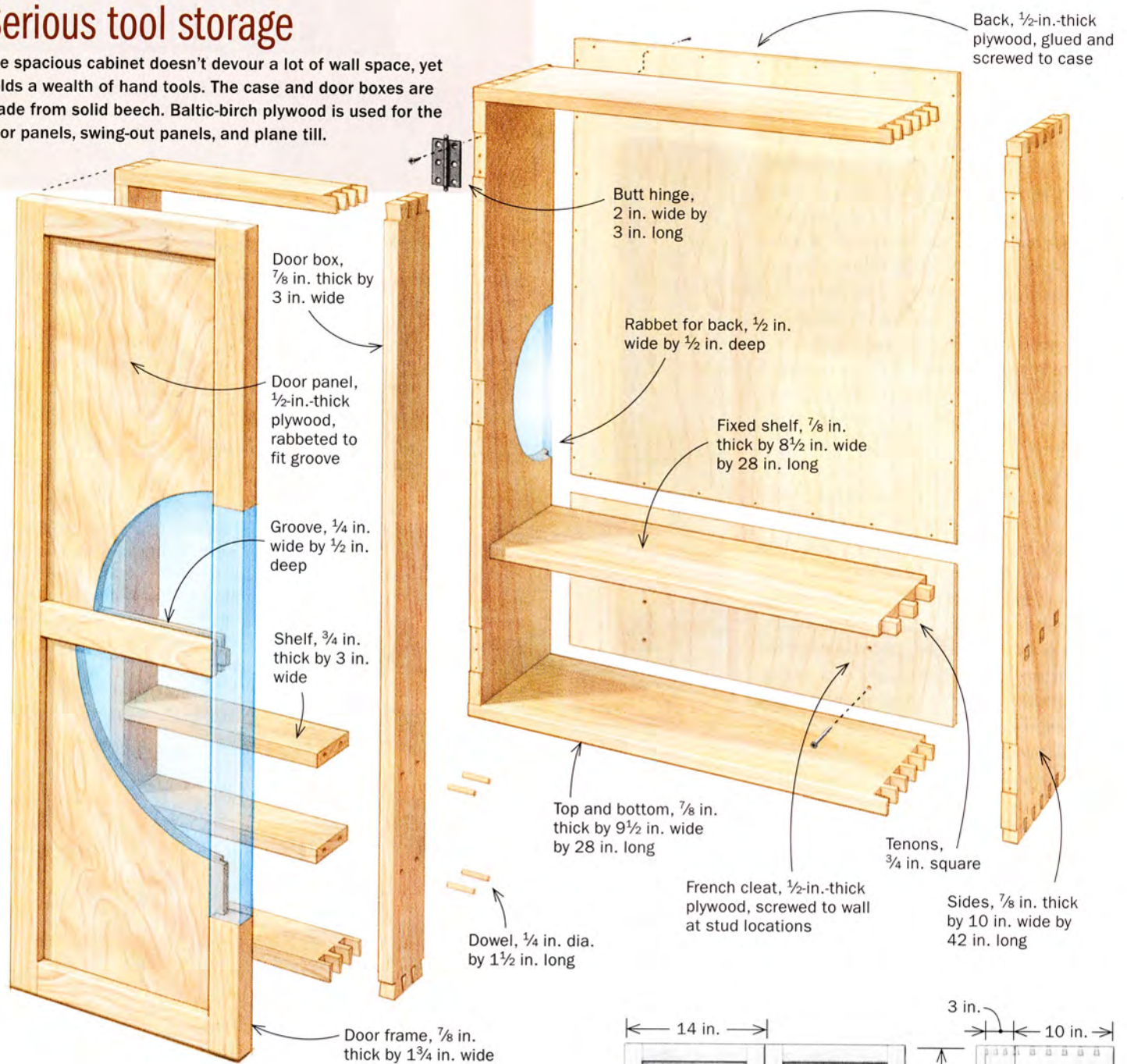
A custom blade leaves clean corners. The top of each tooth is ground to $7\frac{1}{2}^\circ$. When the blade is tilted to the same angle, it creates a flat-top cut, leaving just a sliver of waste in the middle.

The pins are next. Start by scribing the pins from the tails board (right). After sawing to the scribe lines with a backsaw (below), remove the waste in between the pins with a router equipped with a spiral straight bit. Pekovich uses a simple box (below right) to bring the workpiece to a comfortable height for routing.



Serious tool storage

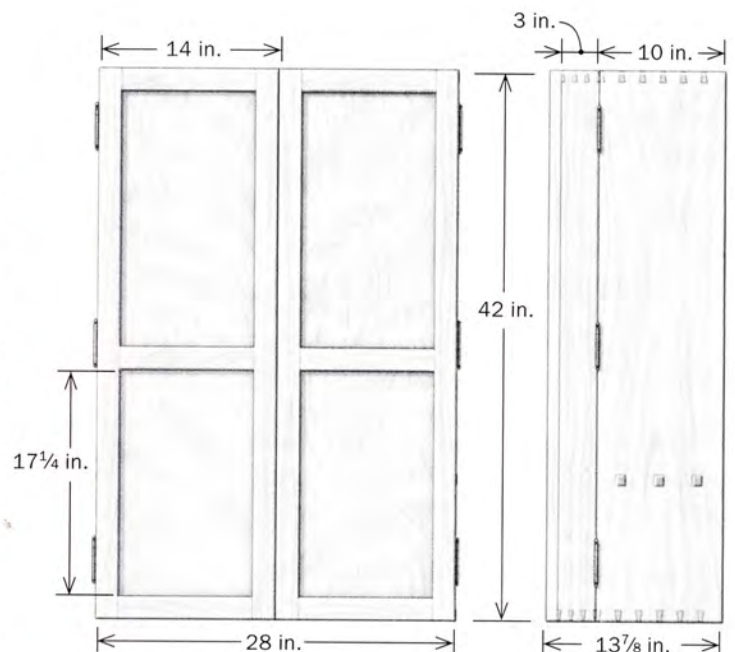
The spacious cabinet doesn't devour a lot of wall space, yet holds a wealth of hand tools. The case and door boxes are made from solid beech. Baltic-birch plywood is used for the door panels, swing-out panels, and plane till.

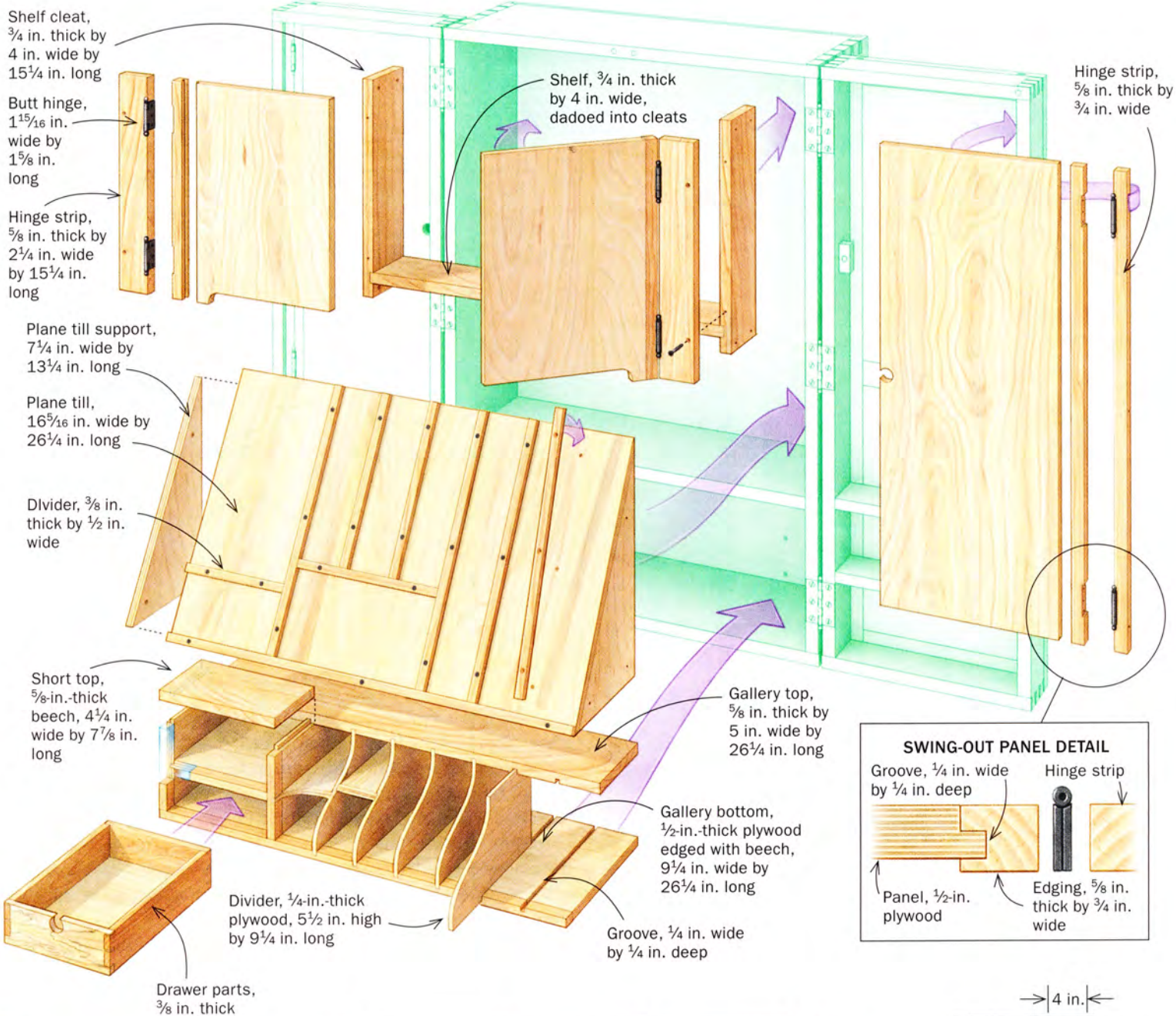


some extra attention. For me, that means a solid-wood case with dovetails at the corners, and frame-and-panel doors mounted with mortised butt hinges. Still, I made good use of Baltic-birch plywood in the back and door panels as well as in the interior of the case. It provides a solid surface for mounting tool holders and its thin, void-free plies mean that the exposed edges look nice. You could certainly build the whole cabinet from plywood or go to the other extreme by adding veneer or marquetry. It's a great place to show some flair and dress up your shop, or you can keep it simple.

I cut the dovetails on the tablesaw (see Steve Latta's article "Table-sawn Dovetails," *FWW* #152). Then I cut the pins with a handsaw, hogging out the waste between pins with a router and paring to the line with chisels.

To give the case more rigidity, I joined the fixed shelf to the sides with through-tenons. Normally I start by cutting the mortises, but in





To purchase digital plans and a complete cutlist for this tool cabinet and other projects, go to FineWoodworking.com/PlanStore.

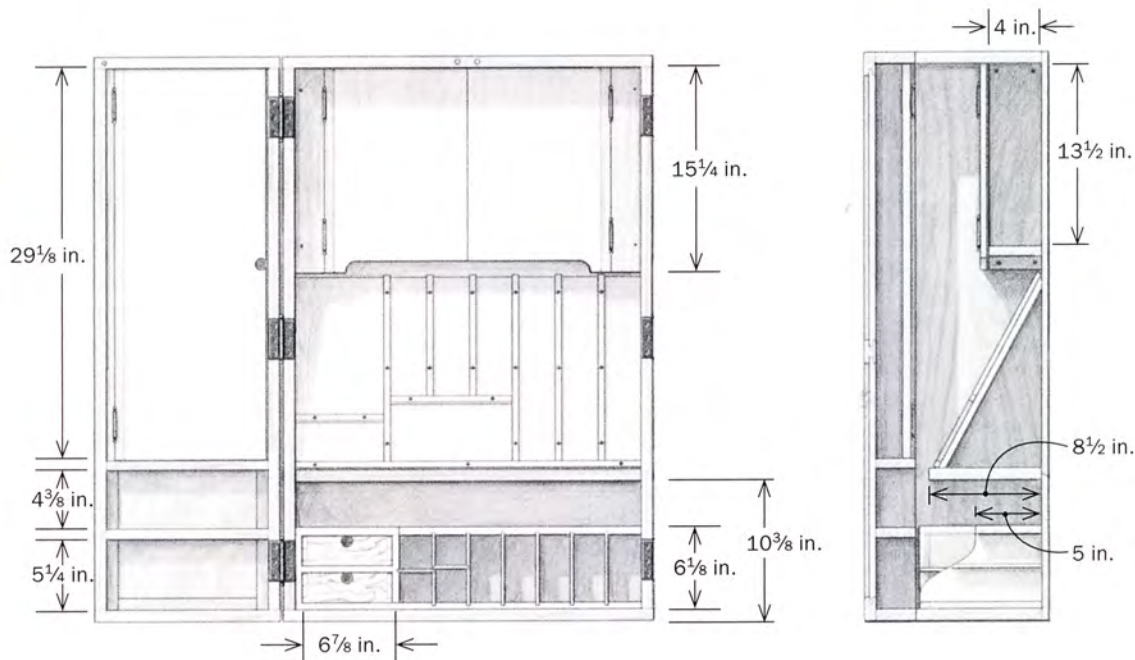
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Add the fixed shelf

CUT TENONS FIRST



Cut the shoulders. Use a marking gauge to scribe shoulder lines on the shelf and then mark the tenon locations with a pencil. Set the blade height to the scribe line to form the tenons.



Cheeks next. Bury a portion of the sawblade in a sacrificial fence to cut the shallow rabbet that forms the cheeks.



Clean up the waste. Bandsaw most of the waste and then chisel to the baseline. To ensure a tight fit, chop halfway down, undercutting the joint slightly, then flip and work from the other side in the same way.

THEN CHOP THE MORTISES

Scribe the mortise locations.

Stand the shelf in place, using a square to align it flush with the back edge. Knife around each tenon and repeat on the opposite face of the case side.



Drill and chop.

Remove most of the waste on the drill press. Then use a chisel to chop out the rest, working back to the scribe lines gradually. Chop halfway down, undercutting slightly, then flip to complete the cut.



this case it was easier to transfer the tenon layout to the mortises rather than vice-versa (see photos, left).

First I cut the tenon shoulders using the tablesaw. I formed the cheeks by cutting a shallow rabbet, with the blade buried in a sacrificial fence. The rabbet has three benefits. First, it provides a consistent shoulder line to pare to when removing waste between the tenons. Second, it obscures any gap at the mortise. And finally, I can give a shelf a final handplaning without affecting the thickness of the tenons.

For the mortises, I started by marking the shelf location on the back edges of the sides and then carried those lines across the faces. Next, I stood the shelf on each case side to mark the mortises on the inside and outside faces. I roughed out the mortises on the drill press and squared them up with a chisel.

Once the joinery was completed, I dry-fitted the case, making sure the assembly was square. I also lightly chamfered the ends of the dovetails and through-tenons with a block plane because I planned to leave them proud instead of trimming them flush after glue-up. After gluing up the case, I made and installed the plywood back panel. I cut it and the lower French cleat from the same piece, beveling their mating edges at 45°. The bevel cut is hidden by the fixed shelf and centered in its thickness. Then I assembled the doors and the door boxes (see photos, above).

Inside, planes get priority

With the case complete, it was time to work on the storage components. I started at the heart of the cabinet with the plane till and the gallery, designed to hold my collection of handplanes. The till not only displays the larger planes nicely but it also makes them easily accessible because it tilts back at 30°. Triangular cleats screwed to the case sides support the till.

Assembly tips



Big glue-up made easier. To provide clearance for the proud dovetails and the through-tenons, Pekovich elevates one side using wood strips (left). Then he assembles the main carcass, checking it for square. Once the case is dry, he attaches the back with glue and nails (above). Screws add a little extra security.



Add a frame-and-panel front to the doors. The plywood panels are glued into a stub-tenon frame (above). This creates a handsome yet rigid assembly that helps keep the door from sagging while providing a solid, flat surface for attaching tool holders. The frame-and-panels attach to the door boxes (right) with a simple glue joint.



The planes are separated by a series of dividers screwed to the till. I used the actual planes and a 1/4-in.-wide spacer strip to locate the dividers.

At the bottom of the cabinet I created a gallery that also includes a couple of drawers, useful for everything from drill bits to tape measures. The whole section slides in and out as a unit and is screwed to the base of the cabinet at the back.

The gallery is narrower at the top than at the bottom, and the dividers are curved. This allows easier access to the handplanes. The 1/4-in.-thick plywood dividers slide into dados in the 1/2-in.-thick top and bottom. I added hori-

zontal dividers to two of the partitions to double-up block plane storage, gluing in stops to keep the smaller planes from sliding in too far.

Doors within doors double the storage area—At the top of the cabinet, just above the plane till, I added cleats to the cabinet sides. These not only support a small shelf but also act as a place to attach a pair of swing-out plywood panels made from 1/2-in.-thick Baltic-birch plywood. I relieved the bottoms of each panel so they wouldn't block access to the planes below. I also added swing-out panels to the inside of each cabinet door. The panels give me



VIDEO WORKSHOP

Watch Pekovich build this tool cabinet from start to finish in a members-only video at FineWoodworking.com/extras.

Customize the interior

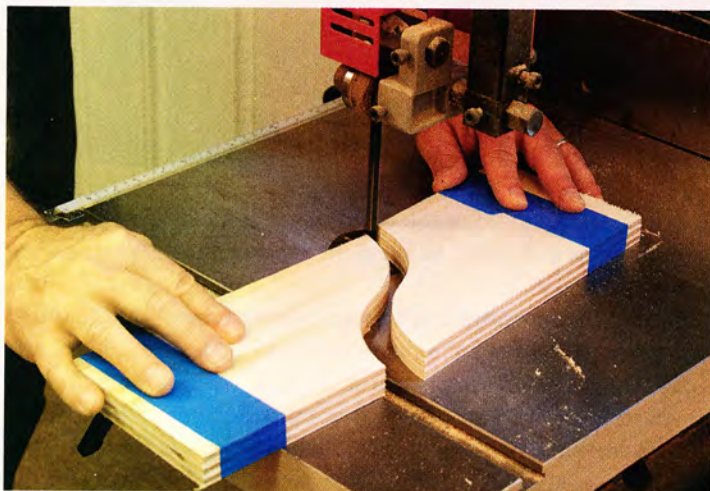
PLANE TILL AND GALLERY



Build the dividers around your tools. The plane till is simply a plywood panel screwed to triangular cleats mounted to the case sides. It's easier to add the plane dividers before installation. Set each plane in place and slide a 1/4-in.-thick shim against it to create some wiggle room. Screw down the dividers without glue to make future alterations easier.



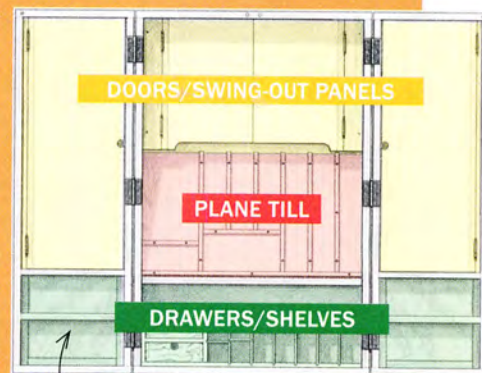
Clean dadoes for the gallery dividers. Cut the dadoes for the dividers with a dado blade and a crosscut sled. A fresh plywood base taped to the sled eliminates tearout.



Six dividers, one cut. Tape the dividers into a single stack and cut all the profiles at once. A symmetrical curve creates offcuts with the same profile.

MAKE IT YOUR OWN

The interior is divided into three basic zones that can be customized to fit anyone's tool collection. The vertical surfaces are great for saws, spokeshaves, chisels, screwdrivers, and layout tools. The angled till keeps handplanes within easy reach. The shelves at the bottom can be outfitted with dividers for even more plane storage or filled with drawers for screws, hardware, router bits, and small tools.



Leave out the shelves in the doors and extend the swing-out panels for even more vertical storage space.

another strong surface to attach tool holders, helping the cabinet pack in even more storage in a shallow space.

Neat tricks for customized tool storage—The final step of the construction was to create a safe, secure home for each tool in the cabinet. Some solutions, like chisel racks, fit a variety of tools. Others, such as holders for marking gauges and saws, are customized for each tool. Finding the right solution for each tool is half the fun.

My chisels hang on a holder with concentric-sized holes that accommodate a variety of handle diameters. I have several spokeshaves of various shapes and sizes, but a pair of racks



Glue up the gallery and slide it in as a unit. The left side of the gallery is outfitted with a pair of drawers for odds and ends. The shelves are for block planes.



SWING-OUT PANELS

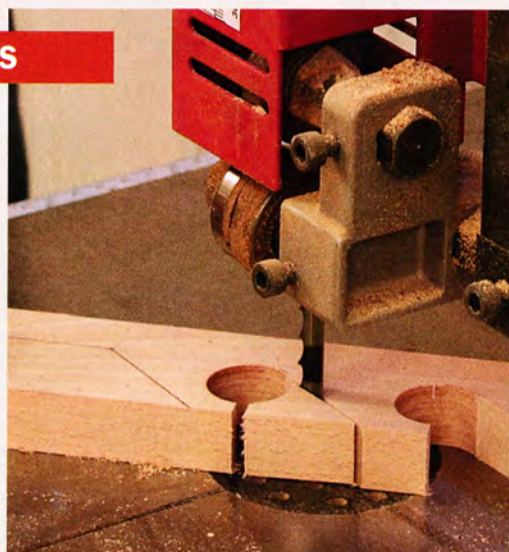
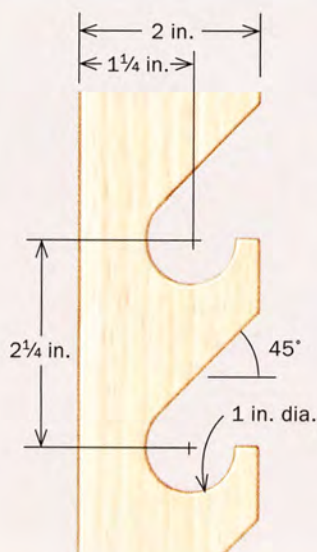


Add the door shelves. Use spacer blocks to locate each shelf while you drill and pin them in place. You can change the location of the shelves later by drilling out the pins.



A swing out panel increases storage. The 1/2-in. plywood panel is edged with a thicker hardwood strip on one side to allow for hinge mortises. The panel is attached to a cleat that is mounted to the drawer box.

TOOL HOLDERS



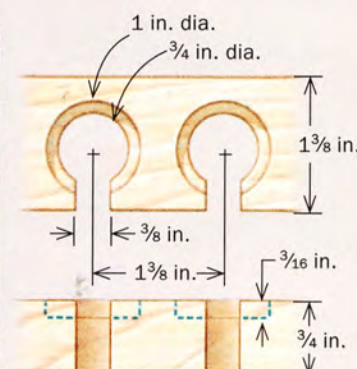
Simple spokeshave rack. A pair of uprights hold the shaves securely. Start by drilling holes, then finish the profile at the bandsaw.



with upward-angled arms handles all of them. Squares can be secured with a simple slotted block of wood. Handsaws require a custom-fit holder. I started by making a block to fit the opening in the handle, then screwed on a pivoting tab to hold the saw in place. Rare-earth magnets set into blocks help keep long tools from swinging. For the finish, I kept it simple. I just wiped on a few coats of shellac to give the case a little protection and make it easier to clean.

To hang the cabinet, start by attaching the French cleat to the wall with 3-in. screws at the stud locations. Rest the cabinet on the cleat and screw through the back of the case into the studs. □

Michael Pekovich is FWW's art director and a longtime furniture maker.



Versatile holder for chisels and gouges. The stepped holes fit handles large and small. After drilling, cut the access slots on the tablesaw.

Router Tables

The best offer flat tables, versatile fences, and good dust collection

BY ROLAND JOHNSON

What about the router? Three options

There are three ways to equip a router table. First, you could bolt a fixed-base or plunge router to a router plate and drop it in the table. But then you're left reaching under the table to make height adjustments, and pulling the motor out to change bits. Instead, consider setting up the table in one of the two other ways. You can use a router with built-in above-the-table height adjustments. These routers also raise the collet high enough for above-the-table bit changes. Or, best of all, get a router lift and clamp a router motor in it.

There seems to be no limit to what the router can do. That's why just about every woodworker has one. But if you are using the router only as a handheld tool, you're not taking full advantage of its versatility. Mounted in a table, the router becomes a super-accurate joinery machine that can spin out perfect sliding dovetails, and tenons that fit their mortises straight from the table. You can also rout more consistent edge profiles because the router won't tip.

It's not hard to make a router table in your shop. All you need is a piece of plywood or MDF for the top and a straight piece of wood for the fence. Bolt the router to the top and you're good to go. But there are problems with shopmade tables. If you go the simplest route and bolt a fixed-base router to the table, you're stuck reaching underneath to adjust the bit height, and removing the router altogether to change bits. Even using a router with above-the-table adjustments, you probably won't be able to change the bit that way because the table will be too thick to allow the collet to get above it. And a simple fence will be hard to adjust.

So, if you are looking for a new router table, it makes sense to get a manufactured one. You'll get a smooth, durable top, a rigid fence that's easy to adjust, and built-in dust collection. The top will also accommodate a router lift, which makes it a snap to change bits and bit height from above the table. Add one of those (see p. 46) and a powerful router, and you have a tool that adjusts like a shaper, setting up precisely for any task in just a minute or two.

With this in mind, the editors at *Fine Woodworking* asked me to review the manufactured router tables currently available. For accurate work, the table's flatness is critical. So I eliminated tops with MDF cores, because past testing has shown that they are more prone to sagging. That left only tables made from cast iron, solid phenolic, and aluminum. I'll tell you how I

Accuracy is critical

The heart of any router table is its top and fence. If these essential surfaces aren't flat, straight, and square to one another, smooth edge profiles and accurate joinery become much harder to create.



Perfectly flat is hard to find. Most of the tables had a dip, but the cast-iron tables had a slight crown. In practice, a crown is better than a dip.



All of the fence faces were square. The T-tracks above them are set back slightly. This decreases the fence's effective height, but eliminates potential problems with aligning the fence face and T-track.



They were straight, too. All types of fences and fence faces were flat.

NOT IDEAL

FIXED ROUTER



BETTER

PLUNGE ROUTER WITH ABOVE-TABLE ADJUSTMENTS



BEST

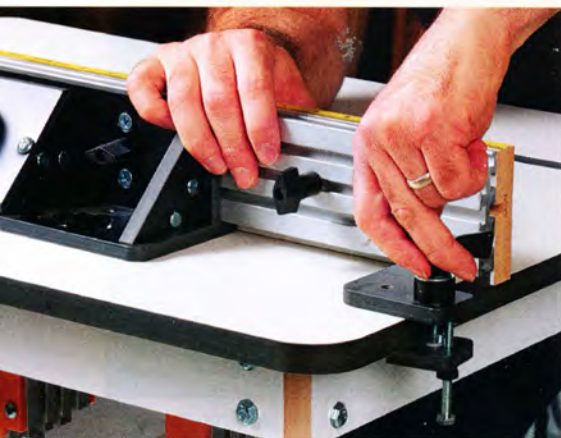
ROUTER LIFT/ROUTER MOTOR



Features that add convenience

TOOL-FREE FENCE LOCKS

Because it's used to guide parts through the bit, the fence simply cannot move during use. All of the clamping systems worked great, but some were easier to use.



Clamp the table's edge. Only the Woodhaven fence locked down this way, but the lock was easy to use and made it a snap to quickly pull the fence off the table for pattern routing.



Lock down to a T-track. The Excalibur (shown) and JessEm fences slid easily in the T-track, and you don't have to reach down behind the fence to loosen and tighten them.



Through a slot in the table. Because of this system, the Rockler and Bench Dog fences were more difficult to move forward and back than other fences.

tested them, which one came out on top, and which one proved itself to be the best value.

A crown in the table is better than a dip

A router table should remain flat when weighed down by your router (and a lift, possibly). One that dips is difficult to work with, because you'll have to force boards down into the valley to get consistent edge profiles—and there's sure to be some boards that won't bend easily. A dipping top also makes it hard to rout accurate joinery. Even with a flat router plate, an overall dip in the table around it will create problems.

I checked the flatness of all of the tables with a straightedge and feeler gauges. The tests were done with the two most likely router configurations for a table. For one test, I used a standard router plate and a Triton M0F001 2-hp router (which has integrated above-the-table adjustments). I did the second test with a lift and a Porter-Cable 7518 3¼-hp motor. However, two tables did not accommodate plates and lifts. Instead, they are predrilled for specific routers. I used the Triton TRC001 with the Sommerfeld table, and the Festool OF 1400 router with the Festool CMS table.

So how much dip is too much? In my opinion, a top that dips more than 0.030 in. (just less than 1/32 in.) would create significant

FENCE FACES THAT OPEN AND CLOSE

It's not safe to have big gaps between the fence faces and the bit, so the faces should be able to slide side-to-side to accommodate bits of different diameters.



Slots in the fence for adjustments. On JessEm's fences, loosening three knobs on the back lets you slide the fence.



T-tracks in the fence face work, too. The only downside is that replacement fences need the T-track, too. That means you need a special router bit. (Rockler's Pro Phenolic table is shown.)



A less convenient approach. The fence on Sommerfeld's table requires the use of an Allen wrench (provided) to loosen screws before the faces can be adjusted.

T-TRACKS FOR HANDY ACCESSORIES

Clamping a featherboard to the top or a stop to the fence is a hassle. T-tracks allow you to do the same thing much faster.



Use the track on the fence for stops. The fence is also a good place to attach hold-down-style featherboards and bit guards.

problems for edge profiles and joinery. But of course, the less the better. All of the tables, except for the two cast-iron ones, dipped somewhat, but not more than 0.030 in. Both of the cast-iron tops actually had a crown, which is better than a dip, because as long as you keep downward pressure on the workpiece right at the bit, you'll get accurate profiles and joinery.

Fence should be straight, square, and strong

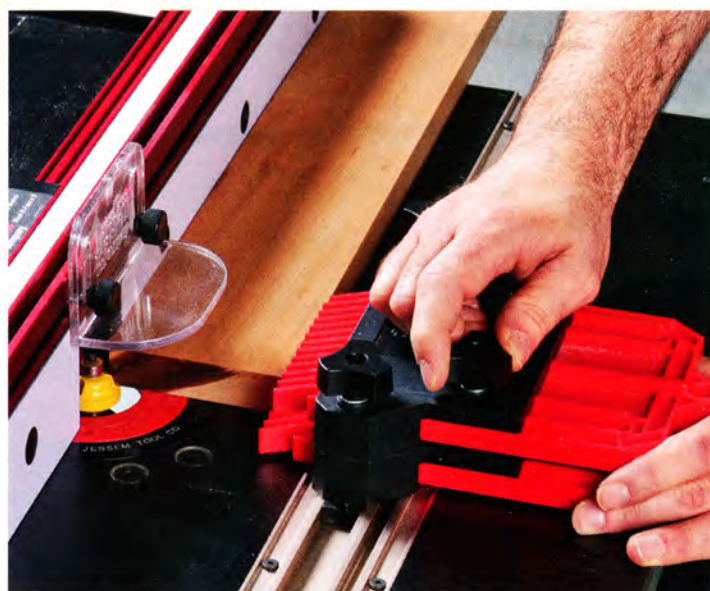
Every router table needs a fence, preferably one that adjusts easily and accommodates featherboards, auxiliary fence faces, and other accessories. Like the table, the fence needs to be flat (no bow) along its length and square to the table when locked in place.

I used a long straightedge to check the fences for flatness. All of them were flat. And because the foundation of each fence is an aluminum extrusion, they are extremely rigid and won't bow when you press workpieces against them. Also, all of the fences were square to the table and did not move after they were locked in place, even using all the brute strength I could muster.

Another important feature of a router-table fence is ease of adjustment. All of the fences are easy to lock and unlock, and to move back and forth. However, I prefer the fences that mount to T-tracks attached to the table's edges; they slide with a bit less resistance. They're on the Excalibur, JessEm, and Sommerfeld tables.

Get better dust collection with an enclosed router

When upside down in a router table, routers tend to leave piles of chips and dust on the floor. All of the tables I tested have a dust-collection port behind the bit opening in the fence. They do a decent job above the table, keeping the chips mostly out of the way. But on their own they leave some chips on the table and a large pile on the ground. The two Excalibur tables and the Benchdog take dust collection to another level, collecting nearly all of the chips. That's because in addition to the fence port, they



Track in table holds more than a miter gauge. Use it for a featherboard, which presses the stock against the fence, for smoother edge profiles.

DUST COLLECTION

Good dust collection improves both accuracy and air quality. The best tables collect dust from above and below.



Every fence has built-in dust collection. These ports did a very good job of keeping the table clean, but can't catch everything on their own—a fair amount falls straight to the floor.



A router enclosure makes a big difference. The Excalibur (shown) and Bench Dog tables have ports that collect dust as it falls into a small cabinet around the router. They caught nearly everything the fence port missed.

Online Extra

For a step-by-step lesson on router-table dust collection, go to FineWoodworking.com/extras.

Router tables, head to head



EXCALIBUR 40-200C



Street price: \$760

Source: general.ca

Flatness with plate and router: 0.008-in. crown

Flatness with lift and router: 0.008-in. crown

Dust collection: Excellent

This table has it all: a cast-iron top that doesn't sag, a versatile and stout fence, a remote power switch, and the best dust collection. The fence is easily positioned with adjustable scales on the mounting brackets. The fence faces are easily adjusted and can be easily replaced with shopmade sacrificial fences. A scale on the top of the fence can be quickly set for any bit application and there are plenty of T-track slots to add jigs or featherboards. A single 4-in. dust port collects from both the router-enclosing cabinet and the fence. Router power is supplied through a push-button switch that can be mounted on either front leg, easily reached by knee or knuckle. Rounding out the assembly is a three-wheeled mobility kit that keeps all four legs firmly on the floor when the single steering wheel is raised.

also have a router enclosure with a 4-in. port. This allows them to catch the chips that escape the fence port and fall beneath the table.

The base should have a power switch

A stationary power tool—and a router table is one—should have a power switch that you can easily reach. You shouldn't be reaching under the table to turn the motor on and off. The tables from Excalibur and Festool handle this with a remote power switch mounted to the base. For the others, you'll need to buy one as an accessory (Kreg's PRS3100 is a solid choice for \$32 online).

A clear winner, and a great value

After all of the testing was completed, it wasn't hard to pick the Excalibur 40-200C as the Best Overall router table. Its cast-



JESSEM MAST-R-TOP WITH ROUT-R-FENCE AND ROUT-R-STAND



Street price: \$560

Source: jessemdirect.com

Flatness with plate and router: 0.010-in. dip

Flatness with lift and router: 0.015-in. dip

Dust collection: Fair

This table has a good stand and a solid top, but its fence really shines. It has T-tracks on the front, top, and back, making it a snap to attach accessories like featherboards and stops. Edge-banded MDF faces can be adjusted quickly and easily replaced with wood or MDF when sacrificial faces are needed. Mounting brackets on the table's edge slide and lock nicely. However, there are no scales on the fence mounts or on the fence. There is a dust-collection port in the fence, but not beneath the table. These missing conveniences can be overlooked when you get such a strong performer at a great price.

iron top has a 0.008-in. crown, which is very slight and preferable to a slight dip. The fence is versatile, stout, and easy to adjust. Those features alone would make it a great router table. Add excellent dust collection and you have a combination that can't be beat.

The JessEm Mast-R-Top paired with JessEm's heavy-duty stand is the Best Value. The stand is stout and makes a nice base for the solid phenolic top, which was nearly dead flat—it dipped just 0.010 in. when weighed down by a router plate and router. But what really makes this table great is the Rout-R-Fence, which has plenty of T-tracks for attaching accessories and is easy to adjust precisely. □

Roland Johnson is a contributing editor, and an unabashed tool junkie and gearhead. He lives in Sauk Rapids, Minn.

BENCH DOG CAST-IRON ROUTER TABLE WITH STEEL CABINET



Street price: \$1,000

Source: rockler.com

Flatness with plate and router: 0.005-in. crown

Flatness with lift and router: 0.005-in. crown

Dust collection: Good

The base offers great storage and good dust collection, but doesn't come with an external power switch, which is a hassle, because to control the motor you must open the cabinet and router enclosure doors. Rockler sells an accessory switch, however. This table fits only Benchdog and Rockler plates and lifts.

EXCALIBUR 40-200P



Street price: \$695

Source: general.ca

Flatness with plate and router: 0.021-in. dip

Flatness with lift and router: 0.022-in. dip

Dust collection: Excellent

This table is identical to the 40-200C, but has a solid phenolic top, rather than a cast-iron one. The phenolic top had a slight dip. The version with the cast-iron top costs only \$65 more, and has a crown rather than a dip, so we recommend it over this one.

JESSEM MAST-R-TOP WITH MAST-R-FENCE II AND ROUT-R-STAND



Street price: \$630

Source: jessemdirect.com

Flatness with plate and router: 0.025-in. dip

Flatness with lift and router: 0.0028-in. dip

Dust collection: Fair

This table is identical to the router table chosen as Best Value, but with a slightly taller fence. There also are scales on the mounting brackets, which make it easier to set the fence's distance from the bit and to keep the fence parallel to the miter slot, which is helpful when you're routing cope-and-stick joints with a sled.

JESSEM MAST-R-LIFT EXCEL II



Street price: \$1,050

Source: jessemdirect.com

Flatness with small motor: 0.002-in. dip

Flatness with large motor: 0.008-in. dip

Dust collection: Fair

This unique table has a router lift integrated into it and a phenolic top. Height adjustments are instant using a wheel attached to the base. It also has an under-table dust port. However, this port did not collect enough falling chips to prevent a pile from forming on the floor. This table also has the Mast-R-Fence II.

ROCKLER PRO PHENOLIC TABLE WITH STEEL STAND



Street price: \$500

Source: rockler.com

Flatness with plate and router: 0.020-in. dip

Flatness with lift and router: 0.021-in. dip

Dust collection: Fair

This is a light but strong table. The fence is solid, and has plenty of T-track for accessories. It was easy to move, lock down, and adjust the fence faces. The base is sturdy, but has no power switch. This table fits only Rockler and Benchdog plates and lifts.

WOODHAVEN 8243K



Street price: \$596

Source: woodhaven.com

Flatness with plate and router: 0.026-in. dip

Flatness with lift and router: 0.029-in. dip

Dust collection: Fair

This table's fence clamps easily and securely to the table, and has plenty of T-tracks for accessories, featherboards, and the like. However, the base is made from flat aluminum extrusions (for the legs) and MDF (for the aprons), which make it unstable during heavy use.

FESTOOL CMS GE BASIC



Street price: \$1,200

Source: festoolusa.com

Flatness with Festool router: 0.002-in. dip

Dust collection: Fair

This compact router table is a great option for the job site. Also, the fence allows you to offset the infeed and outfeed tables with the turn of a dial. It fits only the Festool OF 1010 and OF 1400 routers, which claim above-the-table height changes. However, changing the bit from above the table was difficult.

SOMMERFELD TOOLS ROUTER TABLE



Street price: \$670

Source: sommerfeldtools.com

Flatness with Triton router: 0.018-in. dip

Dust collection: Fair

This table's top is made from three pieces of aluminum bolted together. It takes some work, but once together it's solid, and the base is, too. The top is pre-drilled for two routers: the Triton TRC001 and Milwaukee 5625-20, both of which have above-the-table adjustments. It has the tallest fence in the group, which is nice for routing boards on edge.

Router Lifts

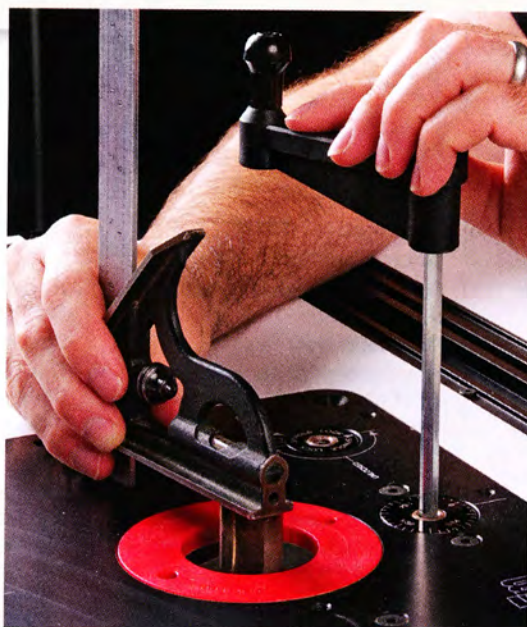
Above-table adjustments
and bit changes are
just the beginning

BY ROLAND JOHNSON



Lifts make life easier

All it takes is the turn
of a crank above the
table to raise and
lower a router that's
installed in a lift
plate. That means bit
changes and height
adjustments are fast.



No need to reach underneath. To adjust the bit height, simply insert the wrench and turn. Rotate it fast for big changes. Go slow to creep up on the final height, and your setting will hold. To change the bit, there's no need to remove the motor from the table. Just raise the motor so that you can get wrenches on the collet.

Features that matter

MOTOR CLAMPS

It's best to have a motor dedicated to your lift, but even so, mounting one shouldn't be a struggle.

Rockler's clamp is the easiest to use. A simple flip of the handle pulls the lift housing tight around the motor.



JessEm gets the clamp right, too. The same big Allen wrench used to make height adjustments is used to open and close the motor clamp.

A simple job made difficult. The Excalibur lift requires two wrenches, and the mechanism is in a tight space. Clamping the motor into the lift was difficult and time consuming, so it's best to dedicate a router to this lift.



THE HEIGHT CRANK

Sometimes you need to move the bit a great distance (to change it), but more often you want very fine control, so you can fine-tune the cut for perfect joinery and profiles.



All-in-one adjustments. All of the lifts except one use a wrench to turn a lead screw, moving the motor up and down for bit changes and to adjust bit height. One rotation of the wrench moves the bit $\frac{1}{16}$ in.



The Woodpeckers lift is unique. A lift wrench is used to disengage the lead screw so that the motor can be pulled up or pushed down quickly, perfect for bit changes (left). A thumbwheel in the plate is used to dial in the bit's cutting height; a full rotation adjusts the bit just $\frac{1}{32}$ in. (above).

No matter what job you're doing with your router table—profiling edges or cutting rabbets, dados, or dovetails—there are two things that you end up doing a lot: changing bits and adjusting the bit height. Both tasks can be frustrating, requiring you to reach under the table to remove the router for bit changes, or to unlock it for height adjustments. And you may struggle with accuracy.

The solution is a router lift with a router motor clamped into it. With a lift, you can raise and lower the motor to make bit-height adjustments from above the table. There is also enough vertical movement to get the collet above the table so you can change bits without removing the motor.

If you don't have a router lift, consider getting one. To save you from having to wade through countless online reviews and search results, *FWW's* editors asked

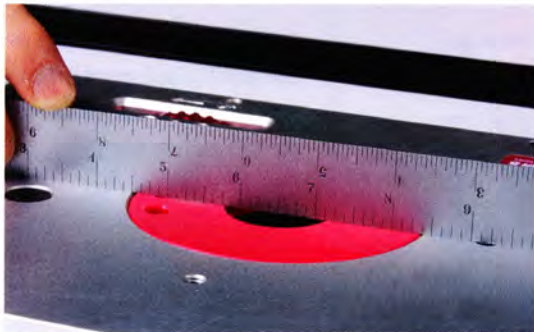
me to test the lifts currently on the market. I got seven lifts into the shop and examined them side-by-side. I'll tell you which lift proved to be better than the rest and which is the best option for woodworkers on a tight budget.

Convenience is the main reason to get a router lift. The ability to change the bit and adjust bit height precisely without reaching under the table will cut your setup time in half, and make everything you do at the

Features continued

INSERT RINGS

The throat in a lift plate must be big to accommodate large-diameter bits, but that's a liability when you're using smaller bits. Insert rings effectively shrink the hole so that it's always tight around the bit.



Level is what you want. This allows the board to slide accurately through the bit.

Changes should be easy

The rings must be removed every time you change the bit, so it shouldn't be a hassle.



Twist and lock works well. Most of the lift plates use a spanner wrench to lock and unlock the insert ring. It's a fast and easy system.



Snap-in rings are even easier. The insert rings for the Woodhaven EZ Lift have a rubber O-ring around them that keeps them in place. A screwdriver removes the ring.



Screw-down inserts are a hassle. The lifts from Rockler and Bench Dog have rings that are held in place by screws. Removing and replacing them is a slower process.

router table much faster. Every lift I tested performed both tasks very well.

For most lifts, vertical misalignment and backlash are not a problem

Mounted in a router lift and a good table, a router is capable of amazing precision, and difficult joints like sliding dovetails become easier to get right. But accurate joinery is possible only if the bit is square to the table, and if there is no slop in the mecha-

nism, which can allow the bit's height to change during use. Even a slight change in bit height can affect the fit of a joint. That's why I mounted a router in the lifts and tested for vertical misalignment and play in the height-adjustment mechanism.

I checked for vertical misalignment first, measuring how far out of square the router's collet was to the router plate. More than 0.010 in. of vertical misalignment is too much, because it can cause problems

such as poorly fitting joinery and bit chatter, which can result in tearout. All of the lifts had very little misalignment, or could be adjusted to compensate for it.

I used two tests to check for vertical play in the lead screw—a measurement of more than 0.005 in. is too much. First, I simply set the router collet (without a bit) to a specific height and then tried to push the motor down by pressing on the collet. Most of the lifts showed less than 0.003 in. of change. I then put a big bit in the router, measured the motor's height relative to the table, and took a full cut with it. After the cut, I measured the motor's height again. All of the lifts did very well on this test, moving less than 0.002 in.

Three lifts, the Woodpeckers PRL-V2 and the two from JessEm, have height-adjustment locks. I tested these lifts with the lock both engaged and disengaged. The locks did not make a difference, and it's not necessary to use them.

Ease of use matters, too

After testing the lifts for functionality, I turned my attention to the small things that can make a big difference in a tool. I first looked at how easy it was to install the motor and to level the lift plate in the table. You should only have to do it once. All of these lifts provide a means for doing this. Don't worry about it beyond that.

As for installing the motor, you should only have to do that once, too. One big reason for a lift is convenience, and there is nothing convenient about switching a motor between your table and a base for handheld use. So, get a motor that you can dedicate to the lift. I recommend a 15-amp motor. They are often advertised as 3-hp motors, and you can buy them without a base. A 12-amp, 2-hp motor works well, too.

This advice aside, some woodworkers will use the same router in their table and handheld. It's easiest to remove and replace the motor with the Rockler Router Lift FX. It has a nice cam lock on the lift and the motor can be put in or removed in a matter of seconds. The rest of the lifts required a tool (usually an Allen wrench) to lock the motor into the lift—not hard but not as convenient.

Another key feature in any router-table plate is the insert rings that fit around the bit, closing down the throat opening so that it's close to the bit. However, every time you change bits, you have to remove and then

Router lifts, head to head



EXCALIBUR 40-125



Street price: \$370

Source: general.ca

Vertical misalignment: 0.002 in.

Vertical play: 0.000 in.

Insert ring alignment: -0.003 in.

The Excalibur is a rock-solid lift that's easy to adjust. The lift mechanism, which comprises four posts connected by a chain and sprockets, is precise, with zero backlash. The insert rings twist and lock into place with a spanner wrench, a simple and effective system. The lift is designed for large routers, but can accommodate smaller ones with the addition of a reducer sleeve that fits around the motor.



JESSEM ROUT-R-LIFT IIV



Street price: \$180

Source: jessemdirect.com

Vertical misalignment: 0.002 in.

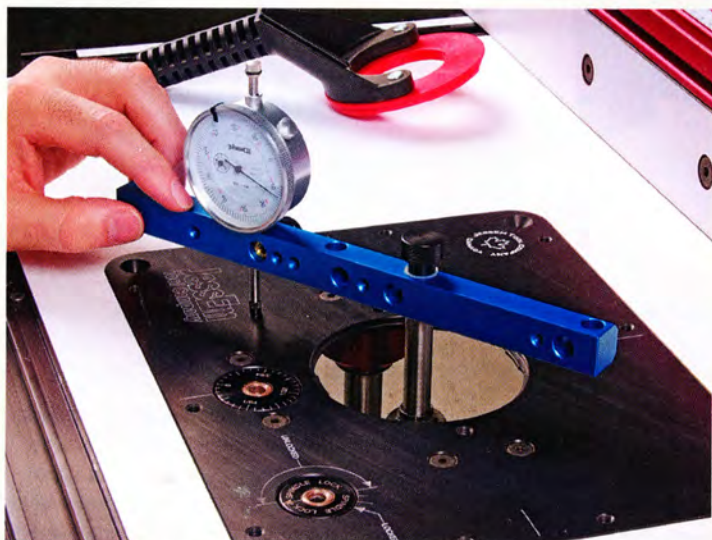
Vertical play: 0.001 in.

Insert ring alignment: -0.005 in.

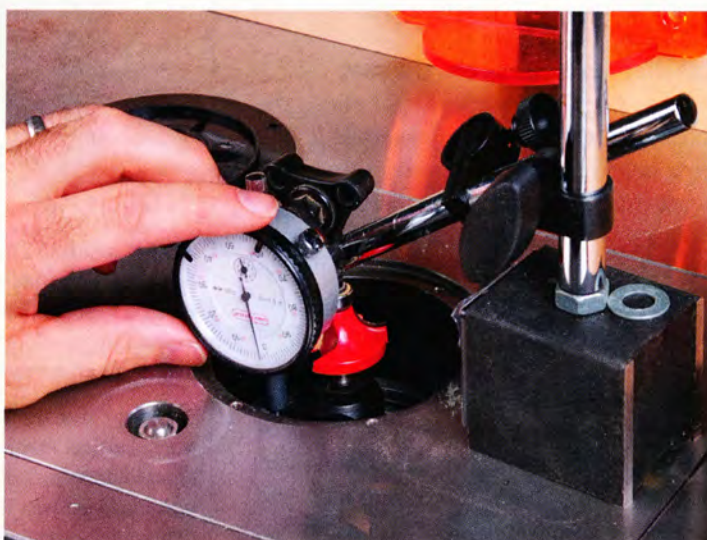
Designed for routers with 3½-in.-dia. motors (up to 2¼ hp), this lift has all of the features and accuracy of its bigger brethren, but in a slimmer package. It's easy to install the motor, adjust bit height, and change bits. The insert rings twist into place with a spanner wrench. Once set, height and alignment were very stable. If you never plan to get a big router for your table, this is the lift to have.

Bottom-line accuracy

Router lifts are fantastic tools, but only if the bit cuts square to the table and doesn't drop during use.



Vertical alignment is critical. A dial indicator attached to a Betterley Una-Gauge allowed Johnson to determine whether the lifts held the motor square to the plate. Most did.



Does the lift hold its settings? To find out, Johnson used a dial indicator to measure the motor's height relative to the lift plate before and after he pushed down on the collet. We called this "vertical play."

Router lifts, head to head continued

BENCH DOG 40-150



Street price: \$350
Source: rockler.com
 Vertical misalignment: 0.001 in.
 Vertical play: 0.000 in.
 Insert ring alignment: -0.002 in.

A cast-iron plate, accurate height adjustments, and a stout lift mechanism make this a great router lift. The crank handle is a speed wrench, which is nicer than the handles on the other lifts, but there was too much play in it during use.

JESSEM MAST-R-LIFT II



Street price: \$350
Source: jessemdirect.com
 Vertical misalignment: 0.001 in.
 Vertical play: 0.002 in.
 Insert ring alignment: -0.006 in.

Height adjustments on the Mast-R-Lift are easy. The plate is simple to level and has adjustable "snuggers" to ensure that it fits tightly in the table opening. This motor-clamping mechanism can be adjusted to fit just about any router motor on the market.

ROCKLER ROUTER LIFT FX



Street price: \$207
Source: rockler.com
 Vertical misalignment: 0.006 in.
 Vertical play: 0.007 in.
 Insert ring alignment: -0.009 in.

A nifty cam lock made quick work of taking the motor in and out. Height adjustments were no problem, and there was very little vertical play. But the insert ring is held in place by screws, and that's a hassle on a tool that is supposed to be all about convenience. It works only with medium-size routers.

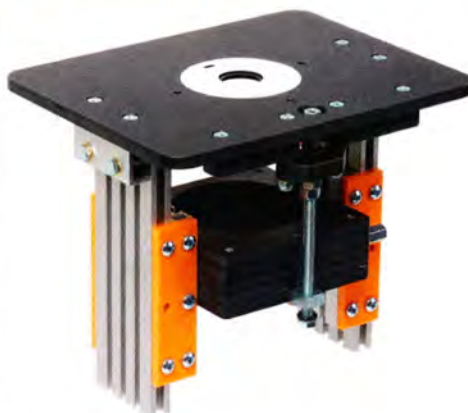
reinstall the insert rings. If that's hard, you'll get frustrated. The easiest are inserts that twist into the throat and lock in place. They come with a spanner wrench that's easy to use, and I like this system. Ideally, the insert is flush with the surrounding plate, but if it's not, an insert that's slightly below the plate is better than one that's above.

Excalibur is a cut above the rest

After testing these router lifts, I chose the Excalibur 40125 as Best Overall. It had very little vertical misalignment and zero vertical play. Height adjustments and bit changes were a snap. The lift mechanism itself is stout, more than sturdy enough to handle the weight and power of a big 3-hp router. But it is also the most expensive lift in the group. If you're looking for a more affordable lift that still does a great job, the JessEm Rout-R-Lift is for you. It's the least expensive lift I tested, but it had better vertical alignment than the Excalibur. It had almost no backlash. However, the JessEm fits only medium-size router motors. □

Roland Johnson is a contributing editor.

WOODHAVEN EZ LIFT



Street price: \$237
Source: woodhaven.com
 Vertical misalignment: 0.016 in.
 Vertical play: 0.019 in.
 Insert ring alignment: -0.000 in.

Out of the box, the Woodhaven lift had too much vertical misalignment, but the lift is constructed from aluminum track, phenolic parts, and screws. This means that you can adjust the vertical alignment. The throat inserts were easy to use, as they snap into the opening and are held in place by an O-ring.

WOODPECKERS PRL-V2



Street price: \$350
Source: woodpeck.com
 Vertical misalignment: 0.005 in.
 Vertical play: 0.001 in.
 Insert ring alignment: -0.001 in.

A thumbwheel for fine height adjustments combined with a spring-loaded lift handle for big changes results in a lift that's easy and quick to set up. The thumbwheel, which changes the bit's height $\frac{1}{32}$ in. with every full rotation, allows for finer adjustments than all the others, and lightning-fast bit changes.



Go for the gusto: Buy a lift/table combo

Making a router table seems to be a rite of passage for woodworkers. You might gain some pride, but you're going to spend a lot of time making the table, and more money than you think on quality materials. And, to be blunt, it's tough to beat the factory when it comes to quality and features. So, if you're looking for your first router table or want to replace an existing one, consider getting a lift and manufactured table for the ultimate in speed and convenience.

We tested 10 router tables at the same time as these lifts (see pp. 40-45). You could mix and match many of these lifts with the tables, but there is no need. The Best Overall table and lift combination is the Excalibur 40-200C table paired with the Excalibur 40-125 lift. The cast-iron table has no sag, great dust collection, and a fantastic fence. The lift is a top performer.

If that package is outside your budget, then you'll find a great value in the JessEm Rout-R-Lift II complete table system, which includes the lift, the Mast-R-Top, Rout-R-Fence, a sturdy stand, a power switch, and even some featherboards. You'll even save money on the router, because the lift fits only medium-size routers, like the Porter Cable 690, Bosch 1617, and DeWalt 610. Not only are they less expensive than routers with more horsepower, there's also a good chance you already have one and can use it in the table.



Make Better Use of Your



BY ASA CHRISTIANA

Large

Even if you have a roomy shop space, thoughtful organization will save you some walking, make dust collection easier, and leave open areas for lumber handling, assembly, and more.

Since workspaces vary so widely—from cavernous lofts in industrial buildings to the corners of basements and garages, down to hallways and closets (I've seen it!)—it's hard to make definitive statements about shop layout. Except one: It matters, a lot.

Just like having a workspace that is too hot, too cold, or too dark, a disorganized floor plan means woodworking won't be as much fun. With too much fussing between every task, your frustration level will mount. Ever wonder why you are hesitating to head out to the shop? If it's not plain laziness, it might be one of the culprits listed above.

I can't help with chronic lassitude, but I can give some advice on shop layout, with help from a few of my friends. To fathom the feng shui of an efficient shop, I reached out to a number of *FWW* authors with well-organized workspaces, and settled on three that reflect the most common situations.

I discovered a number of common themes. For one, while shop spaces range widely, most of us end up with a similar set of equipment. Most also need some storage space for lumber, power tools, and other sup-

plies; a router-table solution; and at least one other waist-high work surface, aside from the workbench.

Another common theme is that each of these woodworkers took the time to think about how he works and what he uses most often. In all cases the table-saw and workbench were placed first, since they are used the most and require the most elbow room. But after that, these guys came up with a variety of smart layout solutions. Also, space needs vary for hobbyists vs. professionals. That's because time is money for the latter. The rest of us can live with a bit of shuffling to make things work.

One last note: If you choose to work with hand tools only, many of these rules don't apply. Even if you make exceptions for a jointer and bandsaw to speed things up, you'll be able to work comfortably in much less space, with only a workbench and tool cabinet to accommodate.

Asa Christiana is editor of Fine Woodworking. Christian Becksvoort, Michael Pekovich, and Rob Porcaro assisted with this article, with Jacques Breau providing the online extra.

Space

Smart floor plans for workshops of all sizes

Medium

Most of us fall into this category, with roughly the space of a two-car garage or less. With a smart layout, good storage solutions, and a ruthless eye for superfluous tools, this is all the space a serious hobbyist needs.



Small

Even if you only have a single room in your house, or a corner of the basement, you can be very happy and productive. The key is choosing your compromises wisely, and maximizing every foot of vertical and horizontal space.

Online Extra

To read how one woodworker gets by in an even smaller shop, and to use our free shop-layout program, go to FineWoodworking.com/extras.

Large

Working pro needs extra space, but layout still matters



Christian Becksvoort, professional furniture maker
New Gloucester, Maine

OUTBUILDING, 24x40



Hand tools within easy reach. One corner of Becksvoort's shop is dedicated to benchwork. His custom-height bench is located near his wall-mounted tool cabinet. And counter-height cabinets along the wall provide ample storage for handheld power tools.

Chris Becksvoort built his shop in the early 1980s out of lumber from the local sawmill. He did most of the framing and installed the floor, which is 1½-in.-thick hemlock. A few friends helped with the main support beam down the center of the shop, and the roof shingles. An electrician did the 120/240 wiring. This year Becksvoort updated the roof to standing-seam metal, and reports that “snow slides off in a hurry.”

The center of the shop is obstructed by a support post and a set of stairs, which lead up to his lumber loft and can be folded upward if necessary. But Becksvoort has never had to do that. Instead, he parked three machines around the stairs, and tucks scrap bins and other items below.

Becksvoort keeps his big Lie-Nielsen workbench out in the open, and most of his work happens on or around it. Nearby is a long counter with storage for routers and bits, sanders, clamps, fasteners, a Bose audio system, and the phone (“It’s a dial phone with a really loud bell I can hear when machinery is running”). Above the countertop and close at hand for benchwork is his big wall-mounted tool cabinet (see *FWW* #153).

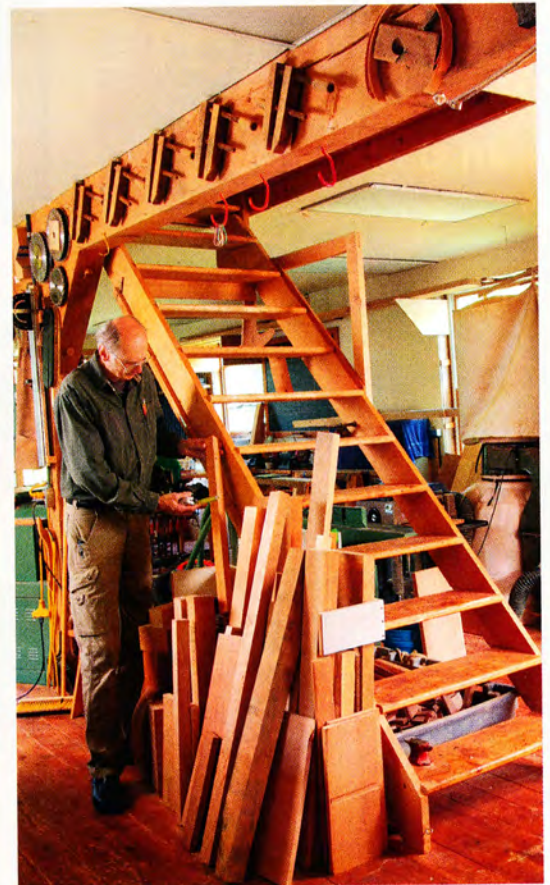
The other dedicated workstation that juts into the shop is Becksvoort’s 7-ft. glue-up table with slotted rails for bar clamps. Most everything else in this shop is along the walls, leaving plenty of assembly and work space in the middle, critical for a working pro. Like many woodworkers, Becksvoort realized that his tablesaw doesn’t need any extra room on the extension end, so he parks that against a wall, leaving plenty of room for infeed and outfeed on both sides. His lathe sits in front of an east-facing window, which offers wonderful light for morning turning sessions.



A corner for glue-ups. Becksvoort’s solid-cherry Shaker furniture usually starts with glued-up panels, so a dedicated clamping table is a worthwhile investment in floor space. He assembles doors there, too.

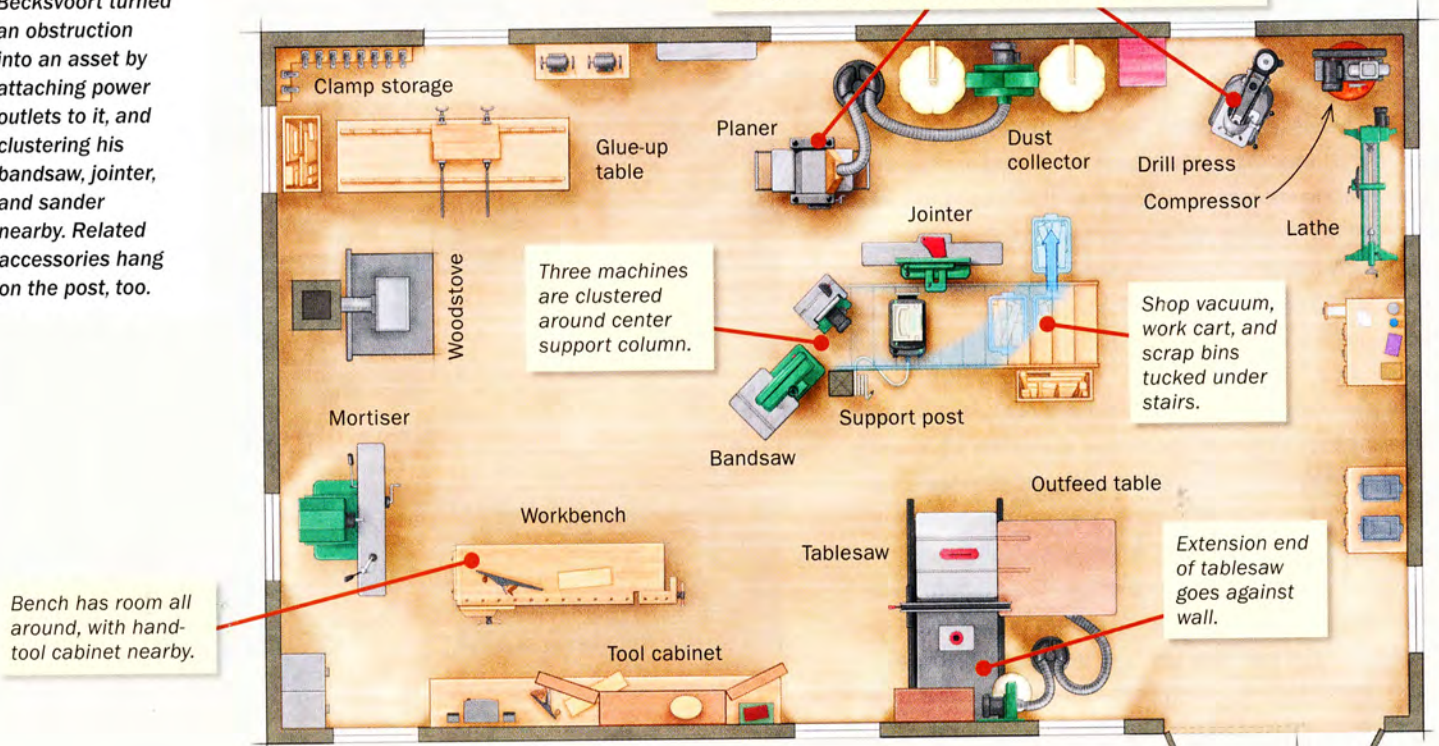


Little island at the support post. Becksvoort turned an obstruction into an asset by attaching power outlets to it, and clustering his bandsaw, jointer, and sander nearby. Related accessories hang on the post, too.



No space goes to waste. Longer scraps find a home in bins along the attic stairs, with bins for smaller scraps tucked under the staircase. The ceiling beam holds clamps and sawblades.

Other machines go along walls, with dust collector nearby, leaving plenty of open work space in the shop.



Medium

A small garage can pack a punch



Michael Pekovich,
hobbyist/part-time pro
Middlebury, Conn.

GARAGE, 20x20



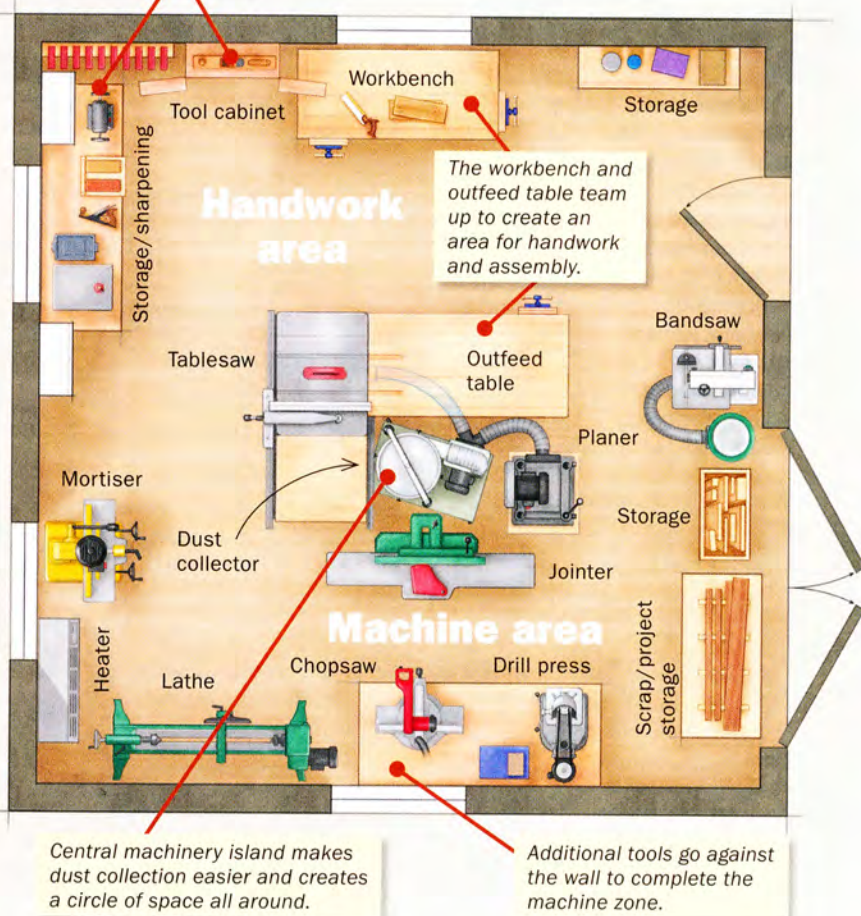
FWW art director and frequent contributor Mike Pekovich also makes furniture professionally, at least part-time, in his vintage two-car garage. The 20x20 building was small to begin with, but after insulating the cinder-block walls, the usable space was reduced to a cozy 18x18. "I knew that I had to make every inch count," Pekovich says. "That meant I had to give up on the idea of storing lots of lumber in my shop. A lumber shed is in the plans, but for now, I buy stock as projects come along, and when scraps build up too much, they go into the woodstove. Finally, anything that is only used on occasion goes up to the attic and out of my way."

Pekovich has never been a fan of mobile machines, and not just because he doesn't want to have to stop working to rearrange them. "The rolling bases I've used are too wobbly, and once the shop gets cluttered up, it's difficult to move things at all." His solution is a central machinery island, an idea favored by many woodworkers. He says the "doughnut of space" around the island serves as infeed and outfeed for the machines, and offers easy access to everything else in the shop.

But the heart and soul of the shop is the hand-tool area, Pekovich says. He is not the first to center his workbench under a window, both for the visibility and the view. And a wall-hung tool cabinet is another common touch. But his table saw's outfeed table, which has a solid maple top and cast-iron front vise, is innovative. "I use it both as a workbench and assembly table, and it's the smartest move I made in my shop." Also near the bench is a 15-drawer cabinet that holds a variety of fasteners and power tools, with the top serving as a sharpening station.

Wall cabinet keeps hand tools near bench, and sharpening station is also close by.

Double-duty outfeed table. Pekovich built his table saw outfeed table with a sturdy trestle base and solid maple top. Outfitted with a cast-iron front vise, the table serves as a second workbench and an assembly table. On large projects, even the table saw top lends a helping hand.

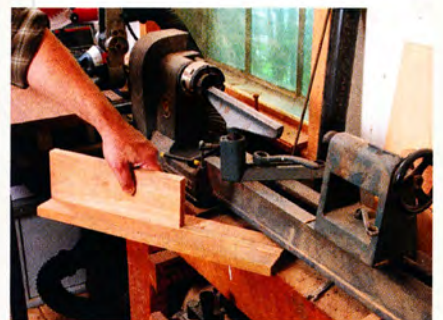




Storage, storage, storage. Hand tools are stored in a wall cabinet near the workbench. A 15-drawer cabinet, which houses hardware, router bits, and power tools, also serves as a sharpening station. Most of the wall space is taken up by hanging cabinets, shelves, and plywood backboards for hanging up jigs.



Machine central. The tablesaw, jointer, and planer are clustered in the center of the shop where a dust collector can easily pick up the chips. A shopmade stand raises the planer to allow infeed and outfeed clearance over the jointer bed in front and tablesaw outfeed table behind.



Long boards, no problem. Pekovich's chopsaw and bandsaw are centered on separate walls, allowing for maximum infeed and outfeed clearance. For additional support at the chopsaw, Pekovich slips a board rest under the lathe bed.

Small

In the smallest spaces, plan vertically and horizontally



Rob Porcaro, hobbyist/part-time pro
Medfield, Mass.

SPARE ROOM, 11x17



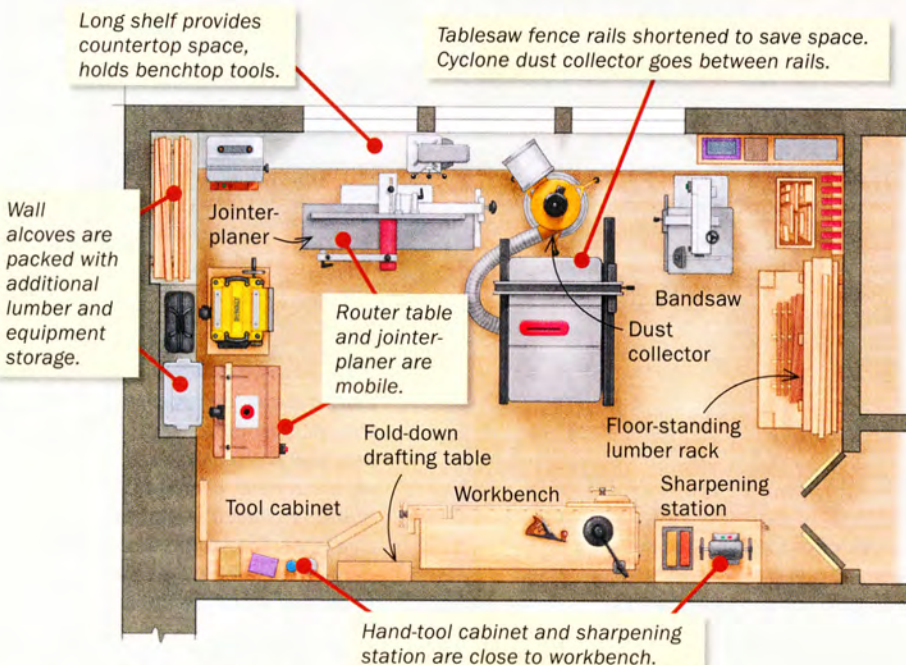
Smart tool choices. Porcaro stores his hand tools in a large floor-standing cabinet. Even so, space is limited and he says that any new tool must be an upgrade for an existing one.

Rob Porcaro is "quite proud of his little workshop," which is in a spare room of his house. That gives him the benefit of hardwood floors, climate control, and a very short commute. Acoustic paneling on the doors keeps the family happy.

To make the space work for the usual mix of hand and power tools, Porcaro has engineered almost every inch, both horizontally and vertically, the latter by closely matching infeed and outfeed surfaces, letting him place tools much closer together, and building a number of smart racks for clamps, lumber, and parts in



Flexible lighting. A desk lamp attaches to the left side of the workbench (above) for the sharpening station, and to the right for the small fold-down drafting table (below).





Dust collection is simple but effective. A portable cyclone with a single hose and slip fitting can service the tablesaw, bandsaw, and jointer/planer without being moved.



Chopped saw. Porcaro cut down the rip fence rails on his tablesaw to save floor space. The resulting 24-in. capacity is more than enough for the type of work he does. Instead of a dedicated outfeed table, he breaks out a tilt-top support stand only when needed for long rips.

progress. He has enjoyed fine-tuning the space and has covered the process extensively in his blogs at RPWoodwork.com/blog.

Porcaro began his layout like most people do, by locating the workbench. His first thought was to put it under the windows, but he decided to place it along the opposite wall for a number of reasons particular to his space. For one, he anticipated that the baseboard heater element under the windows would get packed with chips from the bench. Also, he wouldn't have as much wall space for placing his tool cabinet nearby. And last, his electrical outlets were on the window side. So it made more sense to park his machines there.

Porcaro took a calculated risk with his tablesaw, cutting down the rip fence rails to the maximum capacity he tends to use, just over 24 in. That allowed him to create more room around the other side of the saw for infeed, outfeed, and crosscuts. He says he has rarely had to move the saw. A small cyclone dust collector is tucked in near the wall between the saw's rails. One 4-in.-dia. dust hose reaches all the machines, with a simple press-fit connection. No blast gates needed. This is where having a small shop is a good thing, Porcaro points out.

He is able to keep his bandsaw in place most of the time, but his router table and 12-in. jointer/planer must be moved to work. He stores an additional thickness planer (with a Shelix cutterhead) on top of a secondary tool chest. When needed, it goes atop a Workmate stand which normally hangs on a wall. Similarly, he "muscles" a benchtop drill press and an oscillating sander onto the Workmate from their storage places on the long shelf.

To make his cozy workshop work, Porcaro keeps only what he needs: "It's like the salary cap on a pro sports team—every tool has to perform with value."



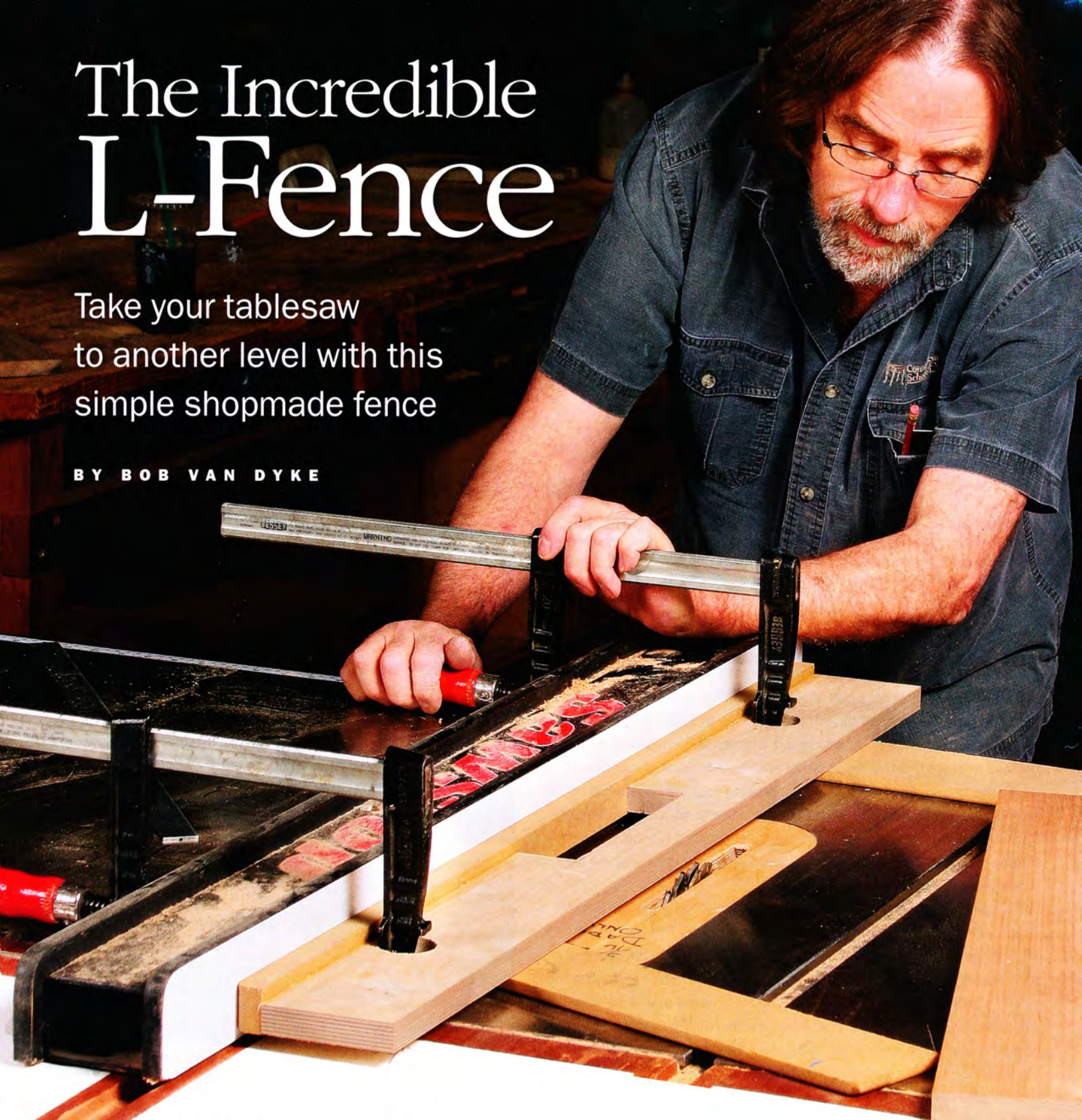
Jointer/planer packs a lot of milling into a small footprint. The 12-in. machine can handle heavy milling tasks but rolls neatly out of the way. Porcaro makes sure to tackle all of the milling tasks on a project at one time, and doesn't see the mobile machine as an inconvenience. "It forces me to really think through a project before I begin, which has increased the efficiency in my work."



The Incredible L-Fence

Take your tablesaw to another level with this simple shopmade fence

BY BOB VAN DYKE



Adding jigs and auxiliary fences is a common way to increase your tablesaw's capabilities. But the most clever tablesaw add-on might be one you've never heard of. The "L-fence" makes rabbets, tenons, and straight flush-cuts a breeze, and it will change the way you think about miters. Once you grasp the basics, the L-fence will become an indispensable fixture in your shop.

In its simplest form, the L-fence is two boards fastened along their edges at a right angle. One side is clamped flat to

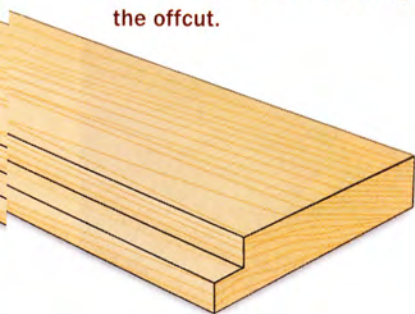
the rip fence; the other side extends horizontally for a workpiece or template to ride against. It's not hard to build (see opposite page) but once you do, it will make your tablesaw much more versatile.

Easier rabbets and tenons

The L-fence excels at partial cuts into workpieces. As opposed to a sacrificial rip fence, an L-fence remains undamaged, and

Fast rabbets and safe tenons

With the L-fence, you bury the dado blade under the fence—not in it—so you can use the fence repeatedly. It makes quick work of tenons, too, without trapping the offcut.

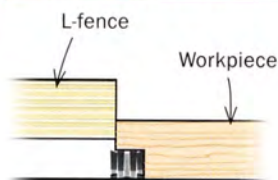


Set it straight. Set the L-fence $\frac{1}{16}$ in. to $\frac{1}{8}$ in. above the blades. Shims hold the fence parallel to the table while you tighten the clamps.



Adjust the rip fence. The width of the exposed dado set establishes the width of the rabbet. Measure from the edge of the L-fence to the outside of the blade's teeth.

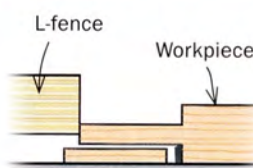
RABBETS



Run your rabbets. Keep the edge of the workpiece tight against the edge of the L-fence as you make the cut.



TENONS

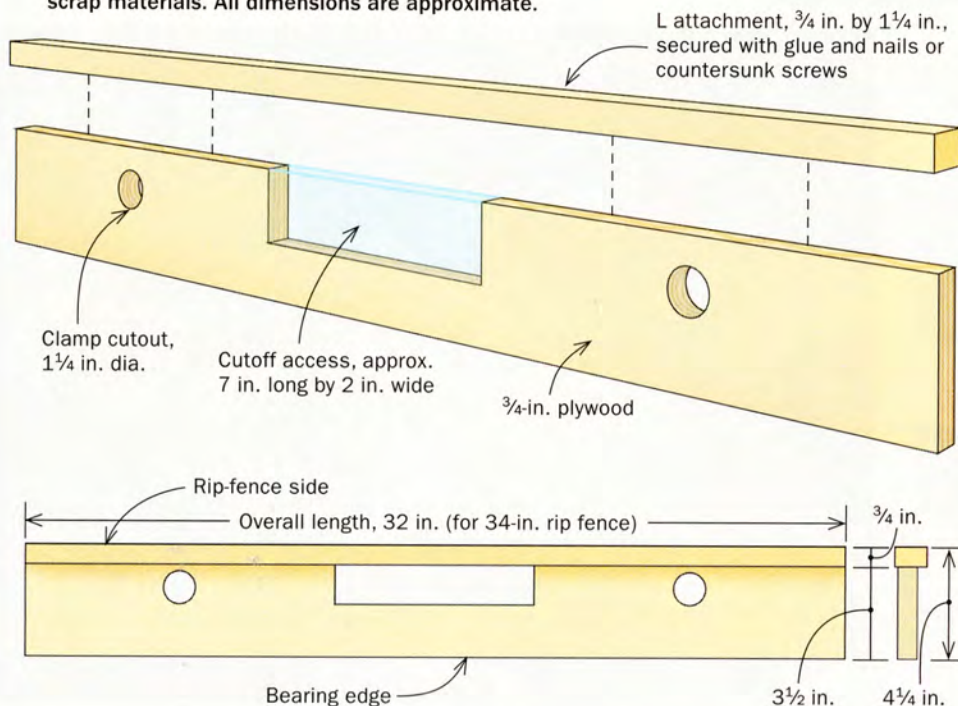


Tenons, too. After the cheek cuts, cut the shoulders with the tenon riding against the L-fence. The cutoff falls away safely.



L-fence is easy to make

You can put together this handy jig in no time, with scrap materials. All dimensions are approximate.

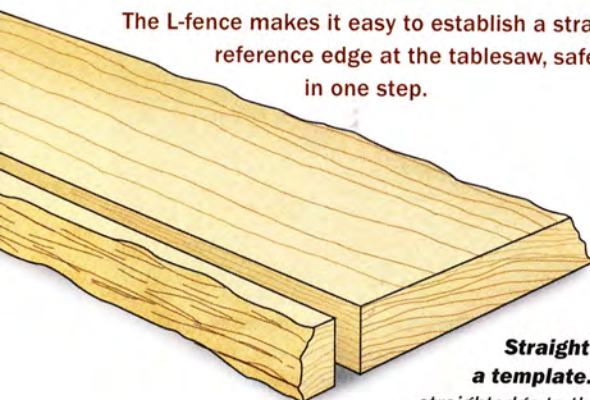


Pop, pop. Attach the two pieces with a bead of glue and a few nails (or countersunk screws).

Use it with templates

PUT A STRAIGHT EDGE ON ROUGH LUMBER

The L-fence makes it easy to establish a straight reference edge at the tablesaw, safely, in one step.



Straight board is a template. Attach a straightedge to the workpiece with double-sided tape.



Set up for a flush cut. Use a ruler to align the edge of the L-fence with the outer edge of the teeth. The L-fence should be a little above the blade, and parallel to the table.

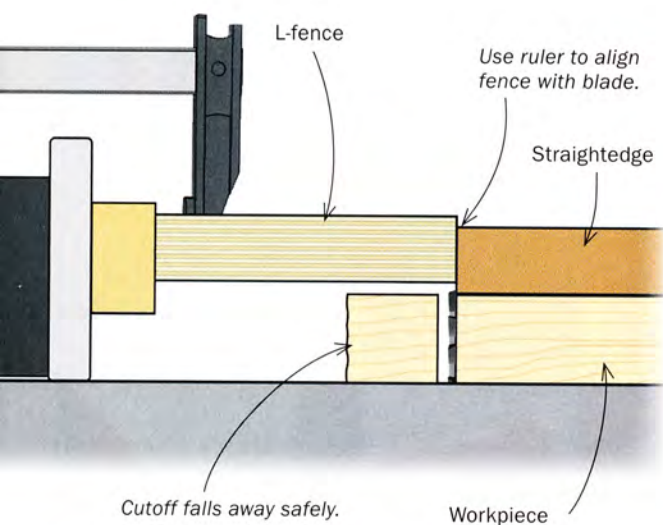


allows the offcuts to drop away harmlessly. To cut a rabbet, raise the dado blades up to the depth of the rabbet and clamp the L-fence to the rip fence, positioning it $\frac{1}{16}$ in. above the blade, parallel to the table. As with a sacrificial fence, the width of the exposed blades equals the width of the rabbet. But unlike a sacrificial fence, the L-fence doesn't need to be replaced.

You can make shoulder cuts on tenons the same way. Use the L-fence with a miter gauge (or push blocks, for wider tenons) to cut the shoulders, and the freed cutoff will fall away safely.

Add a straight edge to a wane board

Putting the first straight edge on rough lumber is usually a two-step process: Bandsaw close to a line, then run that edge over the jointer to clean up the cut. With the L-fence, you can do both steps at once. Lay out your cut line on the workpiece, then fasten a straight piece of wood on the line. Set the L-fence just above the



Rip it flush. Push the workpiece through, letting the template bear against the L-fence. The beauty of the L-fence is that if you bobble the workpiece, you're cutting into the waste, not the work. If you make a mistake, just run it again.





Trace it out. Lay the template on the workpiece and trace around it. Plywood and MDF make better templates because their dimensions stay stable over time.

CUT OUT A COMPLETE PROFILE

With the L-fence, you can use templates to reproduce any straight-sided shape. The sides of this bookcase are trapezoidal. Without parallel edges or square corners, you'd probably cut the rough shape at the bandsaw and then clean up the edges. But with the L-fence, you can cut both workpieces accurately in a fraction of the time.



Cut flush to the template. Here, instead of using double-sided tape, the template is attached with screws, located in an area that will be cut away.



Crosscuts are easy, too. Use a push block to keep the template tight to the fence as you work your way around the pattern.

MAKE PRECISE CUTS ON AWKWARD PARTS

The foot of this tea table leg must be perfectly square to the edge that will be joined to the pedestal. Using a square template (in this case, clear plastic) to cut the two straight edges on all three legs ensures that all three feet will land flat on the floor.



Two templates. Trace the leg pattern onto a square Lexan template. Then use the clear template to locate a leg on the blank and mark the straight edges.



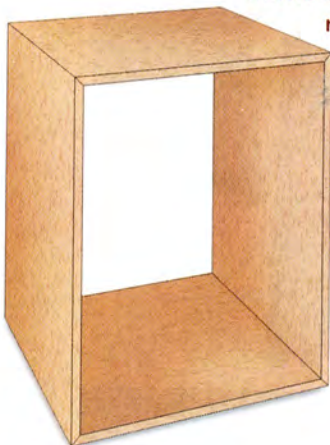
Cut the critical edges. After bandsawing away most of the waste, reattach the Lexan template (left) and use it with the L-fence to trim the critical edges (right). Afterward, use the leg pattern to mark the curves, and shape them any way you choose.



Perfect miters

ON BIG CASES

An L-fence takes the headaches out of case miters by allowing you to make cuts without trapping the case sides between the blade and the rip fence—eliminating the burning and scarring that can interfere with a clean, tight fit.

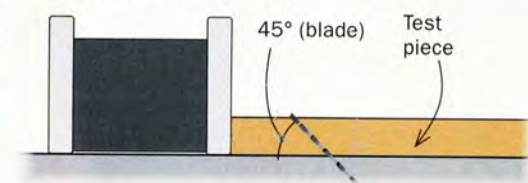


THE SETUP IS CRITICAL

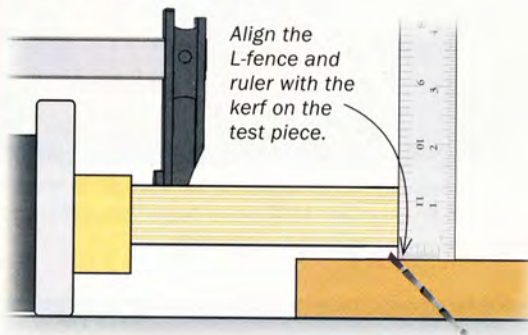


Test cut sets up L-fence. Tilt the blade to 45° toward the rip fence. Run a scrap from the case side stock halfway into the blade and hold it as you shut off the saw. Move the L-fence over the blade so its bearing edge is aligned with the kerf as shown.

1. MAKE A PARTIAL CUT



2. ADJUST THE FENCE



Attach straightedges flush. With the case sides cut to their final dimensions, attach straightedges flush to the edges of the workpieces (above) with double-sided tape (use thicker carpet tape). The other sides of the straightedges are cut at 45° so they can serve as clamping cauls during assembly.



Perfect miters come together quickly. The clamping cauls make glue-up a breeze. When the glue sets, remove the cauls. A solvent rag cleans up any lingering residue from the double-sided tape.

blade, where it will make solid contact with the straightedge. To cut flush to the straightedge, set the L-fence's bearing edge in line with the blade's teeth. Keep the straightedge tight to the L-fence as you make the cut.

Replicate any straight-sided pattern

Routers are great for pattern-cutting and trimming flush to a template, but for a pattern with straight sides, using the L-fence is often faster and more accurate. In fact, it's often the best tool for making the template in the first place.

Once you've laid out your pattern on the template stock, use a straightedge as described above, but this time reposition the straightedge multiple times for multiple cuts, until the shape is complete. Now that you have your template, you can use the L-fence—again, set up for flush-cutting—to duplicate any straight-sided part. Trace the template on the workpiece, then use a bandsaw or

AND SMALL BOXES

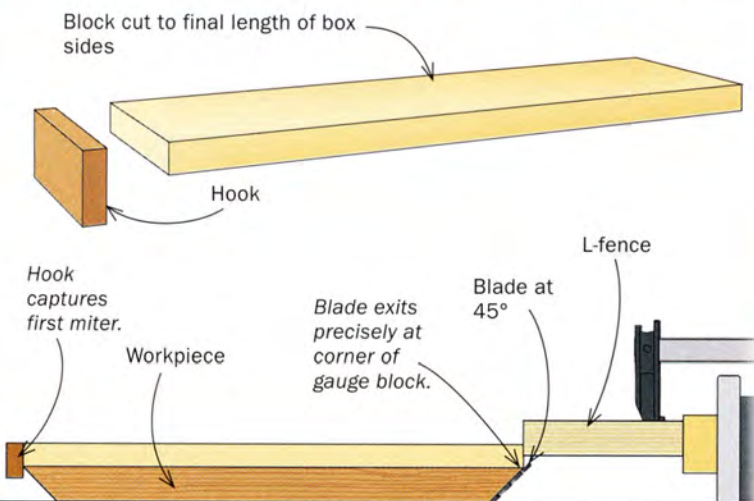
Using the same L-fence mitering setup and a simple “gauge hook” as a template, you can make endless identical box sides.



Miter one side. Before you introduce the gauge hook, cut the first miter on each workpiece with just the miter gauge.



GAUGE HOOK ENSURES PERFECT BOX SIDES



Get the hook. With the L-fence set for a mitered flush cut (see opposite page), use the gauge hook to make the second miter. Use the miter gauge and let the end of the gauge hook ride the L-fence.

jigsaw to trim the waste to within $\frac{1}{4}$ in. of the line. No need to be fussy, but keep in mind that the waste side of the cut can't be wider than the L-fence itself or the rip fence will be in the way. Big offcuts take up more space between the blade and the rip fence and need to be cleared out more often to eliminate the risk of kickback. You can use double-sided tape to attach the template, but I use screws when possible, placing them in areas that will be cut away later—like the through-mortises for the Arts and Crafts bookshelf on p. 63.

A foolproof approach to case miters

The setup for case miters is really just another kind of flush cut. Provided you used care setting up, the L-fence will help you produce accurate miters that come together effortlessly.

Cutting case miters exactly to a final dimension can be tricky, but when using the L-fence you start by cutting the parts square, then add the miter in a second step.

Once you have the fence set up as shown on the opposite page, and you've cut the sides to final size, you attach straightedges flush

to the edges. I cut the opposite side of my straightedges at 45° so they'll work as clamping cauls during assembly. With the fence and blade set up as shown, run the case sides so the straightedges bear against the L-fence.

Identical box miters made easy

For a quick and easy way to cut identical box sides, start with the same L-fence setup. Rough-cut the box sides close to the approximate final length, and use a miter gauge to miter one end. Cut gauge blocks to the finished length of the pieces you need. Tack a lip to one end of each block to create a hook. This will grab the knife edge of the first miter on each workpiece, and the block will bear against the L-fence as you make the cut on the other end.

The sides will be cut to the exact length of the block. Repeat the process with the other block, and your boxes will come together perfectly. □

Bob Van Dyke is founder and director of the Connecticut Valley School of Woodworking.



Organize Your Shop with

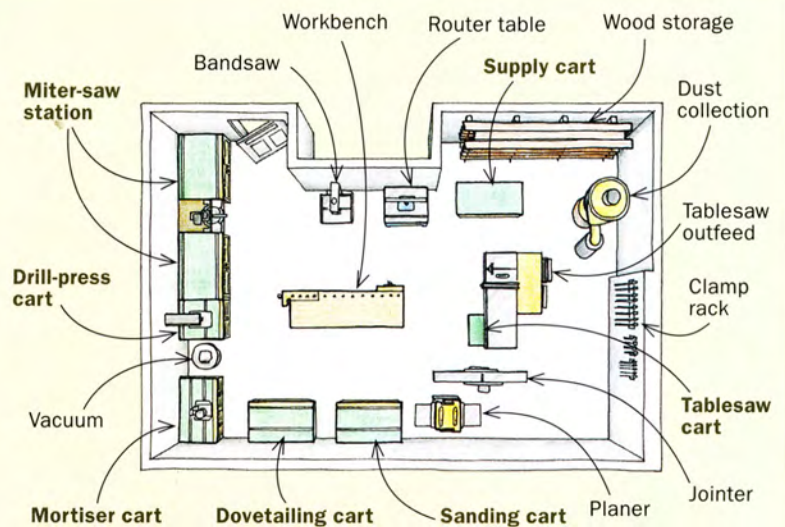
Dedicated tool cabinets
make this shop versatile,
organized, and efficient

BY ROBERT O'BRIEN

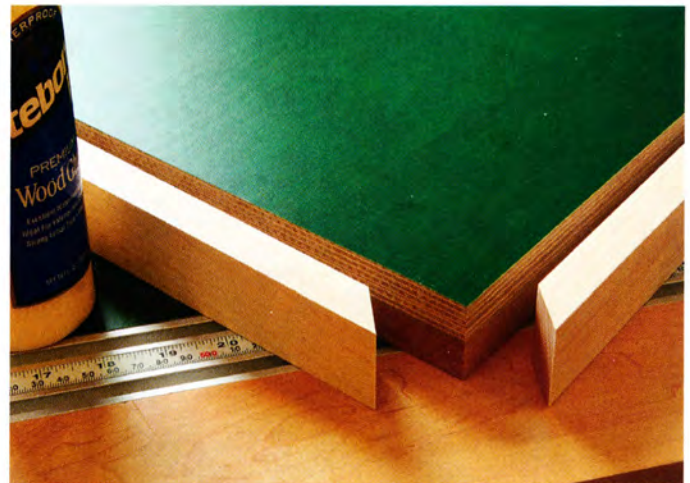
For a long time I was an armchair woodworker; I had always wanted a wood shop, but never had the space. So when I designed a new house for my wife and myself a few years ago, I included a shop. It started out modestly, with just a Sjöbergs bench in the middle of the space. Then I began fitting it out with tools and machinery. As I bought each machine, I built a dedicated station designed to hold all the accessories, tools, and hardware used with that machine. I could have built a big, central storage cabinet, but that would have meant a lot of walking back and forth; with dedicated stations, I'd have what I needed right where I was working. I decided to make the units

STARTING POSITIONS

Nearly all the storage units are on wheels, so they can travel to provide an additional work surface or infeed/outfeed support.



Tough and slick on top, mobile below



Smart Carts

mobile, allowing me the flexibility to change the configuration of the shop. That also made the carts more versatile, permitting me to use them as auxiliary work surfaces and as temporary infeed and outfeed tables.

Although I was a novice woodworker when I started work on my shop, learning new joinery and techniques with each cart I built, I am an architect by trade, and I've had decades of experience organizing spaces. I brought all that training to bear as I worked out the design of the carts, and they've proven to be a pleasure to use, almost automatically keeping my shop organized and making the workflow efficient. Looking back, I'd say the

Strong and stable. The tops of all carts are $\frac{3}{4}$ -in. phenolic plywood, with a non-stick surface that looks and wears like plastic laminate. A layer of $\frac{3}{4}$ -in. MDF below adds mass. The tops are lipped with long-wearing solid maple. Below are 5-in. double-locking casters with urethane wheels, which roll beautifully on a concrete shop floor. The positive double-locking system prevents the wheels from rolling and the casters from swiveling.

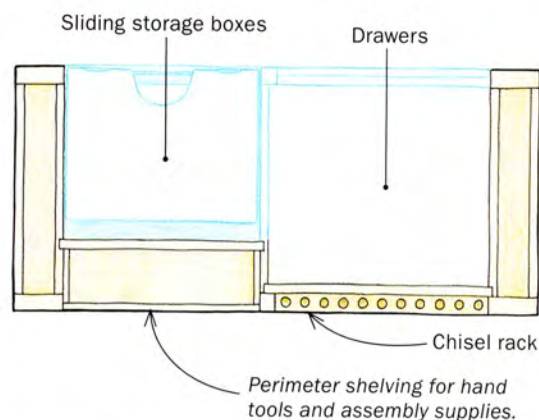
One for hand tools and hardware

With spacious drawers for hand tools, slots for hardware-organizer trays, and shallow shelves for glue-up supplies, this cart is designed to be used in tandem with the workbench.



Take-out storage. O'Brien designed this cart to fit the plastic organizers he uses to store small hardware. The cases slide on waxed maple runners and can be pulled right out of the cart (left). On three sides, the cart has shallow shelves (above) for frequently used tools.

DRAWERS WRAPPED IN SHELVING



thoughtful use of space in carts like these is more important than any specific construction approach.

Fundamental features

Although details changed from one cart to the next as I tailored them to the different machines, a number of features and materials remained constant. The main cabinet structure is a solid-wood frame with plywood panels and partitions. I used hard maple—solid and plywood—as my primary material, because it is hard, light in color, and easy to work. For extra weight and stability I gave each cart a double-thick top and bottom—a layer of $\frac{3}{4}$ -in. plywood with a bottom layer of $\frac{3}{4}$ -in. MDF. To make the tops extra tough, I used phenolic-surfaced plywood, which provides a smooth, glue-resistant surface that has proved to be quite durable. In most of the carts I set T-tracks flush into the top, giving me a way to clamp machines, fences, and workpieces firmly and quickly to the cart surface.

To make the carts mobile, I used 5-in. double-locking urethane casters, which roll smoothly and lock down securely. I finished the carts with two or three coats of satin polyurethane wiping varnish.

First cart was a general storage unit

My first cart was a place for hand tools, hardware, and small supplies. Since I anticipated using the cart while at my workbench, I made it the same height as the bench so a workpiece could span the two. I had room for two banks of drawers, but I liked organizing my hardware in Stanley storage boxes, so I incorporated them into the design in lieu of a second bank of drawers. It's great to have lidded containers for hardware that can go right where they're needed. One drawback, however: If you design around store-bought organizers, you're at the mercy of the manufacturer. In my case, Stanley discontinued some of the boxes.

Most of the cart's space was devoted to the drawers and storage boxes, but instead of having blank panels on the ends and back



Sanding and sharpening cart

This cart brings together machines and supplies for sanding and sharpening, and also serves as a planer infeed surface.



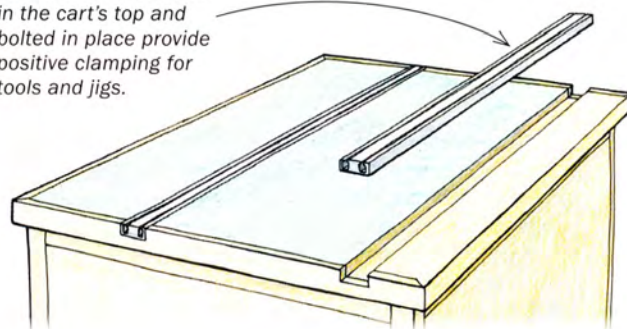
Easy access. Shallow drawers on heavy-duty slides make it easy to store and remove the sander and grinder (above). The top left drawer holds waterstones and sharpening supplies. A dedicated shop vac (left) handles sanding dust.

Lock down. Using the aluminum T-tracks, it's easy to secure the grinder anywhere along the cart's length.



T-TRACKS ADD VERSATILITY

T-tracks flush-mounted in the cart's top and bolted in place provide positive clamping for tools and jigs.



Side storage. A bank of drawers tucked behind the grinder cabinet holds stacks of abrasive disks and other sanding supplies.



And one more thing. With the machines tucked neatly inside and a row of ball-bearing work rollers locked to the T-tracks, the cart provides infeed support for O'Brien's planer.

Storage tailored to the tablesaw

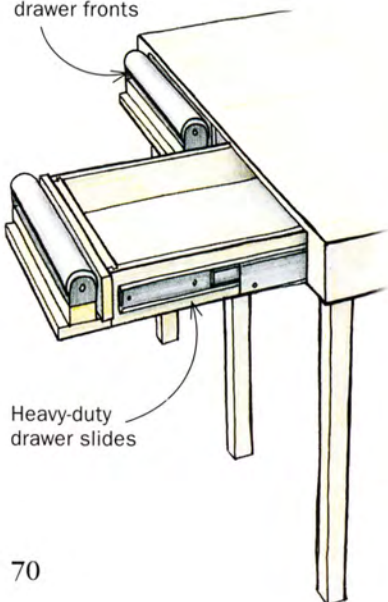


Saw supplies within reach. O'Brien's tablesaw cart, holding measuring tools, jigs, and saw accessories, slips beneath the side extension table.

Hybrid drawers do double duty. The drawers in O'Brien's short outfeed table not only hold throat plates and other saw accessories, but also extend the range of support. He attached rollers to the drawer fronts and used extra-heavy file-cabinet drawer slides to prevent sagging.

EXTRA OUTFEED SUPPORT

Rollers fixed to drawer fronts

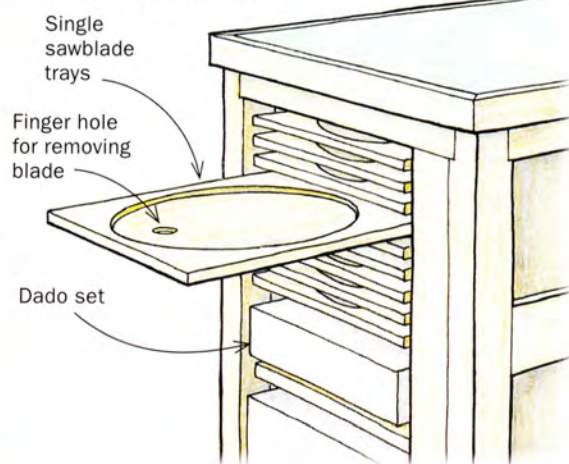


Heavy-duty drawer slides



The blades are in the back. Trays for a half-dozen sawblades slide in grooves in the back of the cart. A dado set is stored below, and cans of cleaning and lubricating products fit in the shallow side shelves.

SAWBLADE STORAGE



Custom cart for a dovetail jig



Dovetailer's dream cart. O'Brien sized the lower drawer in this cart to fit his Leigh dovetail jig, which clamps into the T-tracks on top (below). The other drawers contain routers, clamps, bits, and wrenches.



of the cart, I added shallow shelves that provide quick access to glue-up supplies and frequently used bench tools.

Next cart had specific tools in mind

I housed all my sharpening and sanding equipment and supplies in one cart. The cabinet has two main compartments with slide-out trays. On the right, I needed the full depth and height of the cart to accommodate my spindle sander. But on the left, where I store a slow-speed grinder below my waterstones and other sharpening supplies, the trays only required half the depth of the cart. I utilized the extra space behind them for a bank of drawers that pull out on the left side of the cart.

Drawers for the drill press



Every bit in its place. Shallow upper drawers provide ample storage for many sets of bits, most displayed flat for easy access and organization. Deeper drawers below contain plug-cutters, hole saws, and other large accessories for the drill press. The cabinet height is low enough to keep the drill press's base from interfering with long boards being cut on the adjacent chopsaw table.



Chopsaw station



Support plus storage. A pair of cabinets with a lowered shelf between them provides a home for the chop saw. The fence system, which fastens in the T-track, can be quickly removed. O'Brien has French-fitted the drawers to hold some of his hand tools (see below).

Custom tool-fitting system is fast and easy



FastCap's Kaizen foam inserts (fastcap.com) offer a very simple and quick way to custom-fit your tools. The foam, which comes in various thicknesses, is made up of multiple layers. To make a cavity for a tool, first trace around the tool with a permanent marker. Then use a utility knife to cut on the lines. For the blade of a tool, taking out one layer of foam might suffice (1). To make a deeper cavity for the handle, cut again and remove another layer or two. To make removing the tool easier, create finger holes by heating a copper pipe and pressing it to either side (2) of the handle cutout.

Two for the tablesaw

I built two units to make my tablesaw more functional. The first was a small cart with drawers to hold accessories like setup tools, featherboards, push sticks, and, in the deep bottom drawer, a tenoning jig. I designed this cart to tuck neatly under the saw's side extension table. I made slide-out trays in the rear of the unit to hold sawblades, a dado set, and manuals. Small side shelves hold cleaning supplies and lubricants. Pulled out from underneath and with rollers clamped to the top, the cart can serve as an infeed or left-side support for the tablesaw.

The second unit was an outfeed table that is fixed to the saw and doesn't roll. It is a shallow box attached to the rear of the saw table and on the other by 1½-in.-square legs. I built two drawers into the back to store throat plates, blade brakes, and other accessories. I fitted the drawer fronts with rollers so that when you pull the drawers open, you extend the outfeed range of the table.

The rest are dedicated

While some of my storage units serve several purposes, these last four are dedicated to single machines.

Dovetail jig needs a cart—The dovetailing cart is identical in size and detailing to the sanding/sharpening cart, but it is divided into full-width front and rear compartments. The front contains a slide-out tray across the bottom that holds a Leigh D4R Pro dovetail jig, and drawers above for routers, router bits, guide bushings, and jig accessories. When the dovetail jig is deployed, its base is flush with the front of the tabletop. I secure it with Woodpecker Universal clamps in the T-track. When not used for dovetailing, the cart provides another good surface for assembly and clamping.

Drawers for the drill press—A drill press accumulates scores of bits and accessories, and I wanted them well organized and easily accessible. The cart I built for my drill press has a shallow top drawer for drill-speed and drill-size data sheets, two drawers fitted with racks for bits and accessories, and deeper lower drawers for hole saws and hole-cutters, plug-cutters, drill sets, and jigs. I bolted the drill press to a flush-mounted aluminum T-track.

Both the drill press and the chopsaw are connected to shop vacs. Because I use these machines intermittently, I thought having local, small-volume systems would be more practical than energizing the main dust collector.

Chopsaw gets an immobile home—The miter-saw station is the only fixed-base cabinet in my shop; the saw's need for long, accurate fences made mobility impractical. The unit is composed of two wide cabinets with a lower surface suspended between them. I supported the lower surface on 1½-in. aluminum angles with hex-cap leveling bolts, which make it simple to ensure that the miter saw's table is perfectly flush with the tops of the side cabinets. A dedicated shop vac sits below the saw, connected to it with an automatic vacuum switch. The Kreg system extended fences are easy to remove when the counters are needed for another purpose.

Retrofit a router stand—I bought my router table and fence as a package that included a Kreg metal stand. To achieve effective dust collection, I enclosed the stand, building a cabinet secured with screws through the pre-drilled holes in the steel frame.

I built the top and bottom drawers to hold small parts like router chucks, throat plates, and the height-adjustment crank. The middle two are trays that hold router bits. To top off my organizational effort, I identified all the bits with labels I created on the computer and printed on pressure-sensitive clear film (Avery 15660 "Easy Peel" clear address labels; \$12 for 300, avery.com). □

Robert O'Brien is an architect in Ithaca, N.Y.

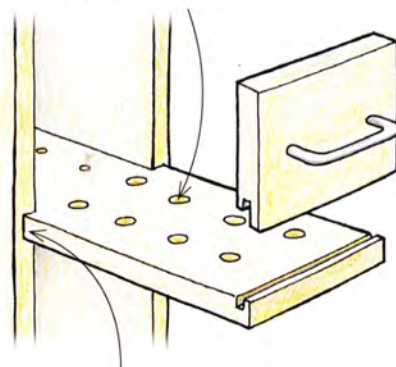
Router-table retrofit



Build a cabinet into a stand. To improve dust collection and provide a place for all his bits, O'Brien built a cabinet to fit inside the stand of his router table. The center section of the cabinet, which encloses the router, has a dust port at the back. Bits in pull-out trays are stored vertically and labeled.

PULL-OUT TRAYS

Stopped holes provide vertical bit storage.

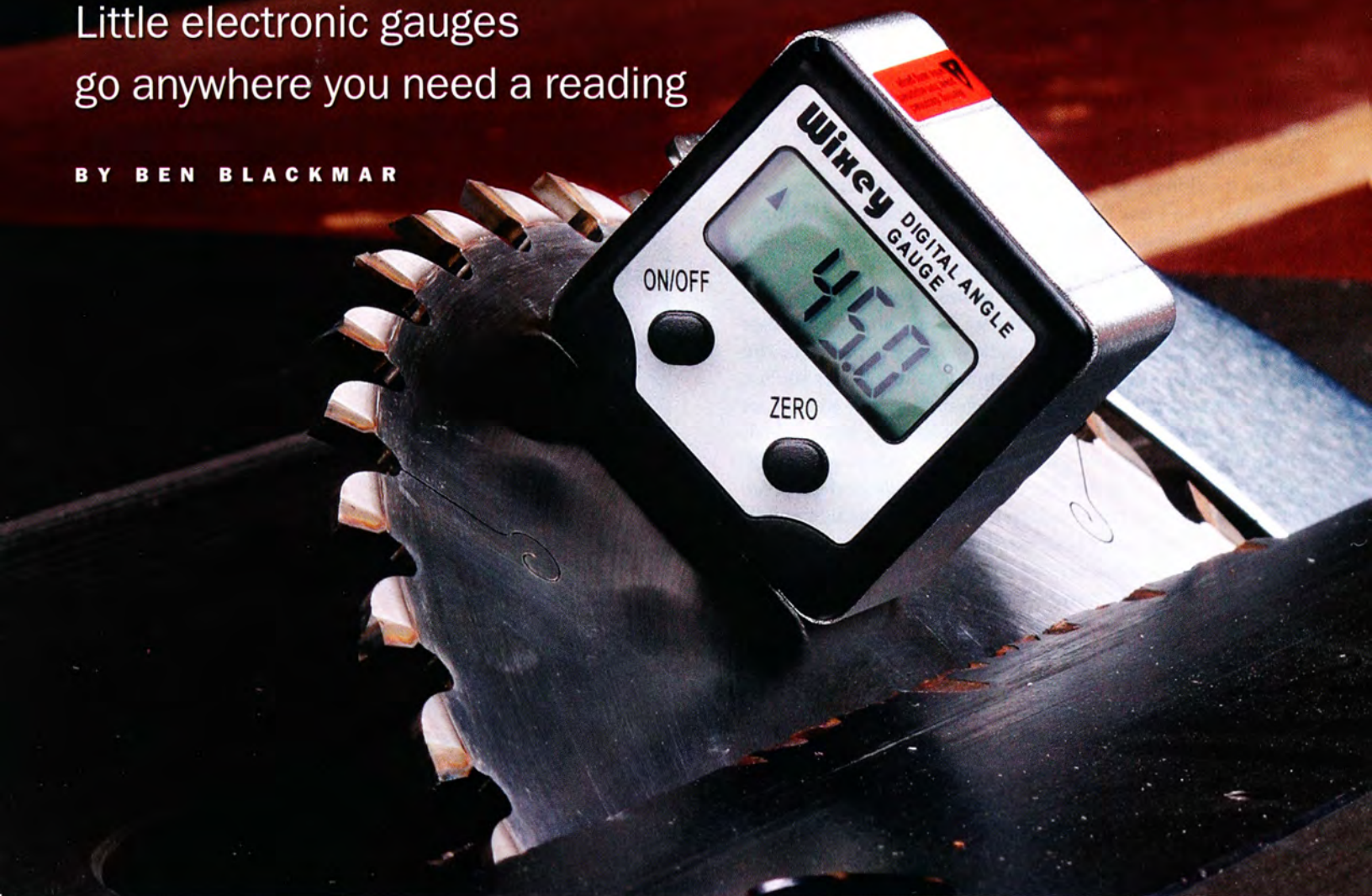


Dado in divider

Measure Angles the Digital Way

Little electronic gauges go anywhere you need a reading

BY BEN BLACKMAR



If you haven't seen them before, digital angle gauges, also called inclinometers, measure the angle of tilt after being zeroed to a reference surface. They have a magnetized base that attaches easily to most machine tables, fences, and blades in the shop.

Wixey was the first to market one of these magic little cubes to woodworkers, in 2006, and other brands and models followed. Soon they were appearing in the pages of *Fine Woodworking* as woodwork-

ers found a host of uses for them, from setting the bevel on a sawblade to setting up a honing guide.

The appeal is powerful: having one easy-to-read digital gauge that will guarantee any angle, from square to level to everything in between. But I found myself wondering exactly how accurate these little angle gauges are. Are they better than my usual tools for setting angles: a good square, drafting triangles, or a bevel gauge?

I started by interviewing *FWW* authors who use these gauges. I also reached out to our online readers in a recent blog. I heard opinions on all sides, and discovered uses aplenty, but no one had done any real testing.

Accurate to a point (0.1 actually)

My next move was to order all the digital angle gauges I could find. There are a dozen or more, but not all are relevant to woodworkers. I stuck to those with mag-

netic bases, small enough to fit on the part of an angled tablesaw blade that sticks up above the throat plate.

As soon as the gauges arrived, I gathered with my fellow editors and started designing tests (see “Testing reveals two favorites,” p. 77). It didn’t take long to figure out which ones were the most accurate, and just how good those are. The most sensitive models are accurate to plus or minus $\frac{1}{10}$ of a degree. But what does that mean in real woodworking terms?

Ultimately we determined that these digital gauges are best for any place where a good square won’t work. They will get you extremely close to the perfect setting, but not quite as close as bending over and looking for that sliver of light along the edge of a square. For angles other than 90° , however, a digital angle gauge is a wonderful tool. It will get you at least as close as a drafting triangle will, for example, and closer than the protractor head you can buy for most combo squares.

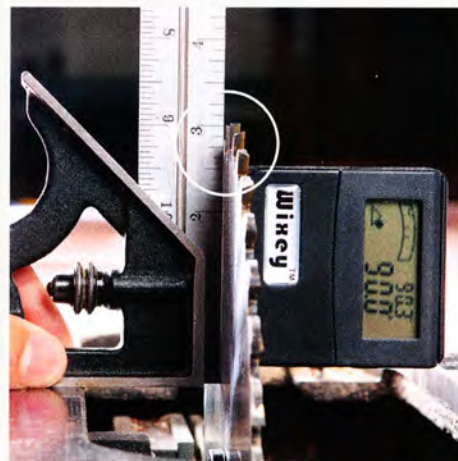
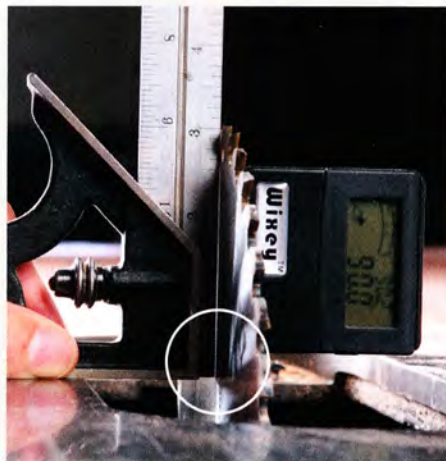
In any case, test cuts are the only real way to guarantee success. But it is a real benefit to be able to get a machine setup extremely close to start with, so just a little bump one way or the other delivers a gap-free joint.

Tips and techniques

These are simple tools, but there are tricks to using them accurately. Some units have magnets on the side as well as the base, but those magnets were not square to each other in our tests. So one tip is always to reference the gauge off the same side, both when zeroing it and placing it on whatever is being tilted.

Stick it on sawblades—The bevel scale on most machines, like tablesaws and miter saws, is just a rough series of graduations that only gets you in the neighborhood of the angle you want. By zeroing a digital angle gauge on the table and then sticking it to the blade, you can dial in any angle to a very close degree of accuracy. Be sure to zero the gauge by placing it on the cast-iron top, not the throat plate, which probably isn’t perfectly flat. This is how *FWW* author Craig Thibodeau sets up his tablesaw for cutting the long miters on his veneered casework, and how he dials in his chopsaw blade when tilting it to miter moldings and frame parts. Of course, he still

Best for angles off 90°



Not quite as good as a good square. You can tilt a tablesaw blade enough to see a tiny sliver of light in both directions without changing the numbers on the screen, demonstrating the margin of error inherent in these gauges.



Better than some other tools. For angles other than 90° , a digital gauge will get you at least as close to 45° as a drafting triangle (left), and closer than the protractor attachment for a combo square (right).



Often need test cuts anyway. No matter what setup tool you use, only test cuts will tell the whole truth. The trick is to get as close as you can beforehand, and a digital angle gauge does a very good job at that, with no bending over or squinting required.

A host of helpful uses



Dial in bevel angles on any blade. Zero the gauge on the saw's table (above), avoiding the throat plate. Then stick it on the blade in a plumb position (right) and adjust the tilt to any number you need.



Fine-tune fences.

A jointer can mill smooth bevels on the edge of any workpiece. Keep the gauge aligned in its two positions, in other words square to the fence when zeroing it on the table, and square to the table when placing it on the fence (as shown).



A trick for miter gauges. Zero the gauge on the saw's table, and then place the miter gauge's fence facedown. With the gauge stuck to the miter bar, you can now read any fence angle.



Sometimes it's the table that tilts. In this case, when angling a bandsaw table to cut dovetail pins, you zero the gauge on the blade (top), not the table. Stay clear of the teeth for a true reading. Then move it to the table (above) and dial in the angle.

Guide your honing. A digital angle gauge is the perfect tool for setting up a honing guide, ensuring that you return to the same angle every time.



cuts test pieces to be sure his joints will be square with no gaps.

A few more tips will help with accuracy. When you place the gauge on the blade of any tool, make sure it is as plumb as possible. It won't read as accurately if it is tilted backward or forward. Contributing Editor Roland Johnson also suggests dialing in your angle, and then taking the gauge off the blade and turning on the saw for a second. This lets any backlash in the adjustment mechanism settle, which might change the reading. Now check it again.

Works great for fences and tables, too—The same principles apply for setting fences on various machines. To set up tables that can be angled, like the ones on a drill press, bandsaw, or sanding machine, you first zero the digital gauge on the blade, bit, or platen, and then put it on the table. Be sure to keep the gauge exactly vertical. When angling a table, check the machine again once everything is locked down, because tightening can slightly change things.

Readers and authors weighed in with many other uses. What you see on this page is just the beginning. And no matter what you use your digital angle gauge for, you'll enjoy being able to read any angle at a glance. Try one for yourself, and I think you'll like it. □

Ben Blackmar is an associate editor.



Works on workpieces, too. Michael Fortune uses his angle gauge to cut square edges on curved panels. He zeroes the gauge on the sled, and then puts the curved panel in place. Then he places the gauge halfway across his cutting line and tilts the panel to bring the gauge level.

Testing reveals two favorites

There are all sorts of digital angle gauges on the market these days, for a variety of industries, so I focused on those most relevant to woodworkers. That meant they had to be small enough to fit on the side of a sawblade without hitting the arbor or teeth, and magnetized on at least one edge. I also ignored a few models that were identical to one in my test group but included features not useful to most woodworkers.

One simple test did the best job of determining accuracy. I placed each gauge on a 12-in. steel ruler, resting on a flat jointer bed, and zeroed it. Then I stacked slips of paper (each 0.004 in. thick) under one end of the ruler until the screen changed from zero. This quickly separated the group into two categories of sensitivity. The setup also created a triangle with three sides of known lengths. A little trigonometry then gave me the exact angle of tilt, in degrees. I repeated this test 10 times on each gauge, zeroing it again each time.

The results matched manufacturers' claims, so full marks to them for truth in marketing. Those that claimed 0.1° of accuracy in both directions delivered

Best of the bunch. We tested 10 digital angle gauges but these five were the easiest to use and delivered the highest degree of accuracy: +/- 0.1°.

just that. Same for those that promised +/- 0.2°.

The rest of the review came down to features. For example, some gauges offer an absolute-level button. However, my tests showed a traditional bubble (spirit) level to be at least as accurate or sensitive as the best gauges in our group. Other gauges offer magnets on two sides, but since their sides were a bit out of square, we didn't find that feature helpful.

However, the Wixey WR365 does have a couple of unique features that matter (see photos, right).



WIXEY WINS OUT

Among the most accurate gauges, the Wixey WR365 (\$40 at various websites) has two stand-out features: a tilting screen for easier reading, and a V-groove on the bottom. It is a toss-up among the rest of the group, with the Wixey WR300 edging out the rest simply on price.



Newest Wixey has standout features. The tilt-up screen helps to defeat glare and saves you from bending over. A V-groove on the bottom registers the gauge accurately on a drill bit, and is surrounded by narrow magnets that fit nicely on the side of a typical bandsaw blade.

Our best test. With the gauge on top of a steel ruler, we then zeroed the ruler on a jointer table and began slipping strips of paper under one end. The best gauges allowed on average just four layers of paper before the reading changed from zero to 0.1°.

readers gallery

DEREK COHEN

Perth, Australia

This unusual Spiers-style infill smoother is a restoration of an old, beat-up 7½-in. smoothing plane that Cohen bought from an online auction site. The original was a coffin-type smoother, but Cohen decided to add a tote (rear handle), which he tenoned into the rear infill portion and sandwiched to the sole. The infill portion was originally rosewood, but Cohen replaced it with jarrah, and made the tote from Tasmanian blackwood for contrast.



DAVID STREETER

Ladysmith, B.C., Canada

These small dueling block planes—one low-angle and one standard—are made of brass and infilled with ebony. At 1⅝ in. wide by 5⅜ in. long, they were made to fit the hand of their maker, who uses them for shaping canoe paddles, among other tasks. When he completed the planes, Streeter's wife suggested the presentation box, which he made from black walnut. To protect the planes from sliding around, he created a French-fitted look by cutting their shapes out of foam insulation with his bandsaw, then covering the foam with blue felt.



JAN NEZAR

Dana Bay, South Africa

This plane, which Nezar built for a customer, is a reproduction of the exceptionally rare "Falconer" coachmaker's plow plane, which was intended for plowing grooves into workpieces with curved sides, often to inlay bandings. The characteristic feature of this plane is its flexible steel fence, which can be adjusted to match a wide range of radii. The plane is primarily made from Indian rosewood, and features steel, bronze, and brass components. It's finished with Danish oil, and took Nezar 120 hours to complete.

Submissions

Readers Gallery provides design inspiration by showcasing the work of our readers. For submission instructions and an entry form, go to FineWoodworking.com/RG.



DEREK COHEN

Perth, Australia

This plow plane, made from the Australian hardwoods sheoak and jarrah, was built with hand tools to accommodate a set of "new old stock" (old but unused) irons. This particular kind of plow plane is known as a bridge plow, because of the way the fence is attached to the arms to ensure it stays parallel to the skate (the metal plates that ride in the cut). Cohen was inspired by a prize-winning plane made by then-18-year-old Kyle Barrett (of



D.L. Barrett & Sons, Canada) in 2007, who had been inspired, in turn, by a 19th-century plane made by Alexander Mathieson & Son of Scotland. Cohen says this plane was the most difficult tool he's ever built; he planned its execution for a couple of years before spending 12 weekends building it. It was finally completed in July 2012. The plane took so much time and effort that Cohen made a dovetailed storage box from the same woods to protect it.

JIM PLATTETER

Middletown Springs, Vt.

This tool chest is modeled after an 18th-century "gentleman's tool chest" that Platteter saw at Colonial Williamsburg in Virginia. These chests, believed to have been made for non-professional, well-to-do woodworkers, were available through tool catalogs in the late 1700s (they are considered the predecessor to the traditional machinist's oak tool chest). Platteter made the chest for a fellow woodworker, using curly cherry and sassafras as the primary and secondary woods, and embellishing it with bandings of maple and walnut. Like its 18th-century counterparts, it is relatively small, just 11 in. deep by 22 in. wide by 10 in. tall. The finish is polyurethane.

PHOTOS: JOHN DAVID GEERY



PATRICK SULLIVAN

Carmel Valley, Calif.

Sullivan uses his cordless Dremel for inlay, metal work, small repairs, marquetry, and other odd jobs. Before making this storage box, he kept the tool and its many attachments and bits jumbled together in the same case. This box gives every bit and accessory a home, and they're easy to remove and replace. The box is quartersawn walnut with simple rabbeted corners and floating panels in the top and bottom. The bits are held in place with 1/8-in. rare-earth magnets. Sullivan took care to ensure that the polarity on every magnet was oriented the same way. One at a time, he used a toothpick to add a drop of epoxy to each hole, then used a 4d finish nail to set the magnet. The finish is wipe-on polyurethane.



WILLARD "BILL" ANDERSON

Chapel Hill, N.C.

A furniture maker and instructor at Roy Underhill's Woodwright's school in North Carolina, Anderson designed this benchtop joiner's chest to use as the project for a five-day workshop focusing on basic joinery and bench skills. To make the chest, students must learn rabbets and dovetails, mortise-and-tenons, and tongue-and-groove joints, plus raising panels, among many other essential techniques. The box is made of poplar and painted with blue milk paint. The inside face of the lid is veneered with quilted cherry.



DARNELL HAGEN

Saskatoon, Sask., Canada

Hagen turned the octagonal beech handles for this set of screwdrivers from stock left over from his bench, which appeared in the 2011-12 *Tools & Shops* Readers Gallery. He says they took "a ridiculous amount" of time to complete, especially the carved, semi-circular detail on the ends. The handles are finished with lacquer. The steel shanks (with hardened tips) were purchased from Lee Valley, but Hagen turned the brass ferrules himself.



RUSSELL GARCIA-LECHELT

Pacifica, Calif.

Inspired by the handmade planes of renowned toolmakers Karl Holtey and Wayne Anderson, Garcia-Lechelt made himself a one-of-a-kind plane to tackle the toughest-to-plane woods. With Macassar ebony inlay and mother-of-pearl inlay, this 2-in.-wide by 8½-in.-long smoother weighs a hefty 3.7 lb. The sole is ⅜ in. thick and made of 360 brass, which is easily machined and takes a high shine. The sides are 1018 steel, chosen for its bending and cold-forming properties. Lechelt even forged and heat-treated the blade—a ⅝-in.-thick slab of O1 tool steel—himself. The plane's mass makes chatter all but impossible, and the steep 50° bed angle, he says, eliminates tearout on tricky woods. The matching blade-adjustment hammer is brass and walnut.





BEN BENTLEY

Greenport, N.Y.

A professional wooden boatbuilder who dabbles in plane making, Bentley made this 22-in., yacht-inspired smoothing plane for his boss. Specialized boatbuilding planes are typically long, narrow, and made with dense exotic hardwoods, which makes them less susceptible to rot. They aren't as widely available as carpenters' planes, so, like many shipwrights before him, Bentley made his own—first for himself, then for other local boatbuilders. This plane is made from a single piece of Pennsylvania cherry, an offcut Bentley saved from a boat project. He used a piece of lignum vitae, recovered from a log that was found sunk off the coast of Bermuda, to make the wedge and the strike button. The blade was manufactured by Baldwin Tool Company around the turn of the 20th century, but had never been used. Bentley sharpened it for the first time to use in this plane. The finish is Danish oil and paste wax.



JOHN EUGSTER

Las Vegas, Nev.

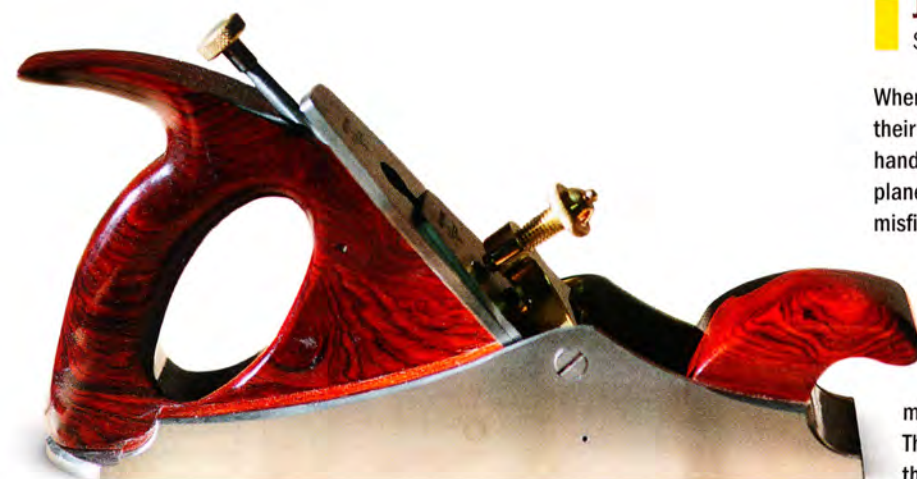
Eugster originally set out to build a Krenov-style smoothing plane, but setting the blade for fine shavings requires a hammer and a long learning curve. Besides, he already owned metal-bodied smoothers that can be dialed in easily with precision. So he made this scrub plane, which is designed for heavy work and for which fine blade adjustment is less critical. Because a scrub plane requires more force to get moving than a smoother, he added handles. The canarywood body is 2¼ in. wide by 13 in. long. The knob and handle are walnut, the sole is purpleheart, the wedge is zebrawood, and it's pinned together with ebony dowels. Eugster bought the radiused blade from Hock Tools. The finish is Danish oil.



JUAN HOVEY

Santa Maria, Calif.

When his wife asked him to please stop making new furniture for their furniture-stuffed house, Hovey turned his attention to making handplanes. He says he spent a year and a half building 20 or so planes before he figured out all the nuances involved; he keeps the misfires on a shelf in his shop to remind him of all the ways you can go wrong in design and execution. This 3-in.-wide by 12-in.-long smoother took him 120 hours. The sides and sole are made from O1 tool steel, joined with dovetails and inlaid with cocobolo. Hovey had the basic shapes of the sides and sole cut on a water jet, then refined the tails and pins on a machinist's vertical mill before finally peening the pieces together. The brass lever cap and knurled knob hold a Hock blade tight to the bed. The cocobolo is finished with Danish oil.



Remove stubborn pitch from bandsaw tires

Q: I cut pine on my bandsaw for my last project, leaving a lot of pitch coating the wheels. Cleaning them as suggested in “How to change a bandsaw blade” (Fundamentals, *FWW* #233) worked great for the upper wheel, but not for the bottom wheel. Any suggestions?

—MARK GREEN, Portsmouth, N.H.

A: IT'S COMMON FOR MORE SAWDUST and pitch to build up on the bottom wheel, since most of it goes straight down into the lower shroud and can become compressed between the blade and the wheel. To scrape the caked-on pitch from the lower tire, first unplug the bandsaw and remove the blade (see the article referenced above). Then plug the bandsaw back in and turn it on, letting it get up to speed. Turn off the saw, and use the edge of the steel ruler to scrape the sap off the moving tire. The wheel's speed and momentum make the technique more effective. Repeat the process if necessary.

Before you put the blade back on, apply paste wax to the rubber or urethane tire so pitch and sawdust are less likely to stick. Also, make sure to use a dust collector (*Q&A*: “Better dust collection for the bandsaw,” *FWW* #221), which will catch much of that pesky, sticky dust before it can cause problems.

—Michael Fortune is a contributing editor.



Power scraping. After the wheel gets up to speed, turn off the motor and set the edge of a rule on the tire. The edge acts like a card scraper, gets under the caked-on pitch, and pulls it off quickly.



Wax repels residue. With the motor off, coat the tire with wax and buff it. Less dust and pitch will stick to it now.

Charge a strop for honing

Q: I read the article by Dan Faia about sharpening carving tools (Master Class: “Beautiful carving starts with a keen edge,” *FWW* #209), but he wasn't clear on how to charge the strop with honing compound.

—DAVID WALKER, Constantia, N.Y.

A: THE HONING COMPOUND I USE ON MY STROP is Herb's Yellowstone stropping compound (\$9.50, craftsmanstudio.com). Apply it to the rough, suede side of your strop by flaking it off of the stick with the side edge of a chisel. Then work it into the strop with the chisel's flat back. After that, you're ready to hone your tools on the strop. One note: Unlike with other stropping compounds, oil should not be used with Herb's Yellowstone.

—Dan Faia is head of the cabinet and furniture making program at North Bennet Street School.

Ask a question

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



Scrape flakes onto the strop. The solid stick is too hard to rub into the strop, but the thin flakes (left) will work in just fine. Rub the compound into the strop by pulling straight back on an old chisel (right).



Pull and roll. To sharpen the gouge, start at one corner of the edge, pulling and rotating the tool to the opposite side of the edge in one motion.

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Clean and lube tablesaw gears for easy adjustments

Q: The adjustment cranks on my tablesaw are always hard to turn. Is there anything I can do to make them easier to adjust?

—CHETT HILLEN,
Sweetwater, Texas

A: TABLESAWS CREATE A LOT OF FINE DUST that settles on everything inside the saw cabinet, including the gears for blade tilt and elevation, which tend to jam when a lot of detritus is coating them. A good cleaning with a solvent such as naphtha will remove the caked-on gunk (a soft wire brush or an old toothbrush can be a real pal here). Then apply a dry moly spray lubricant to return smooth, easy movement to the gears.

—Roland Johnson is a contributing editor.

Use the right lubricant. Dry moly lube is long-lasting, and, because it's dry, much less dust sticks to it than to products that aren't dry.



Brush away the crud. A soft wire brush or toothbrush is well-suited to the job. Soak the bristles in naphtha, which will help break down and loosen the built-up and compacted sawdust in the gears.



Lube the gears. A spray lube makes it easy to cover all of the gears, getting down into every little nook.

Shorten hinge screws that are too long

Q: I'm making a wall cabinet with a single door. I know that I should have ordered the hinges before I began to make the cabinet, but I didn't. It turns out that the hinge screws are longer than the cabinet case is thick. What should I do?

—OLLIE TIMMONS,
Milwaukee, Wis.

A: I'VE MADE THE SAME MISTAKE—and more than once, I'm ashamed to say! But I've also intentionally designed cabinets with sides that were too thin for the hinge screws. Don't let hardware dictate design. I always shorten the supplied screws rather than replacing them. A screw's holding strength comes from the section of its shank where

the threads are not tapered. A long screw that's been shortened provides a longer section of full-width threads than one that's shorter to begin with.

To shorten long screws, mill a board about $\frac{1}{16}$ in. thinner than the case sides. Next, drill a pilot hole and countersink for the screw, and drive the screw into the board. Use a mill bastard file to remove

everything that sticks out. Back the screw out and it's ready for use.

Before you drive it in, you might need to use a screw with the pointed tip still on it to start the threads in the pilot hole—just be careful not to drive it through the cabinet side.

—Matt Kenney is a senior editor.



Thinner board becomes a filing jig. A board that's slightly thinner than the cabinet side holds the screw securely for shortening and allows you to precisely control how much of the screw is removed (left). File the tip flush to the board (right).



Drive with confidence. Drill pilot holes (carefully!) and then install the screws without worrying about poking through the other side.

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Prepare spalted wood for furniture use

Q: I really like the look of spalted wood. Are there any workability issues or risks I should know about before diving in?

—TURK SOBEK,
Sheridan, Wyo.

A: SPALTED LUMBER CAN ADD A DRAMATIC TOUCH to your furniture, but there are a couple of issues to keep in mind. The fungi that contribute to the wood's striking color can also lead to rot. So it's common to run across soft or punky patches in an otherwise usable board. When that happens, you can fortify the soft areas with cyanoacrylate glue. The softer areas also soak up more finish than other areas, creating dark, blotchy patches. As a remedy, I seal spalted boards with a washcoat of shellac before continuing my finishing routine.

Some people warn of the health risks associated with working spalted wood, but expert Sara Robinson (A Closer Look, *FWW* #199), says that the spores represent no more risk to healthy adults than normal sawdust (but it's a good idea to wear a dust mask anyway). However, she does advise people with immune-system disorders to avoid spalted wood. By the way, Robinson's article tells you how to save money by spalting your own lumber.

—Michael Pekovich is the art director.



Strengthen the weak spots. Soak any rotted spots with cyanoacrylate glue. This stiffens the wood fibers, allowing you to work the wood as usual.



Prevent splotchy finishes. The spalted areas can absorb more finish than the non-spalted areas. A thin coat of shellac seals the wood and evens out the amount of finish absorbed.

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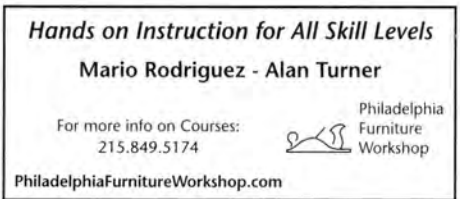
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how they did it

The story of a custom knob

BY JONATHAN BINZEN

Abiel Rios Wong's small garage shop in Elizabeth, N.J., is lined with machinist's equipment—Bridgeport mill, surface grinder, metal-cutting bandsaw, sandblaster. But for many of the parts he makes for his tools (see the back cover), the heart of the shop seems to be his metal lathe. To demonstrate a bit of how he works, Rios Wong used the lathe to make a knurled brass knob with ebony infill. He made the knob from a length of 1-in. brass rod and a small hunk of ebony cut from the corner of a plank.

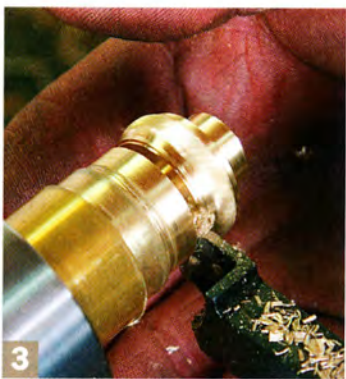
Milling the knob



1 Shaping and drilling. With the raw brass rod held in a collet on his metal lathe, Rios Wong turns it to a clean cylinder, squares off the end, then drills and taps it.



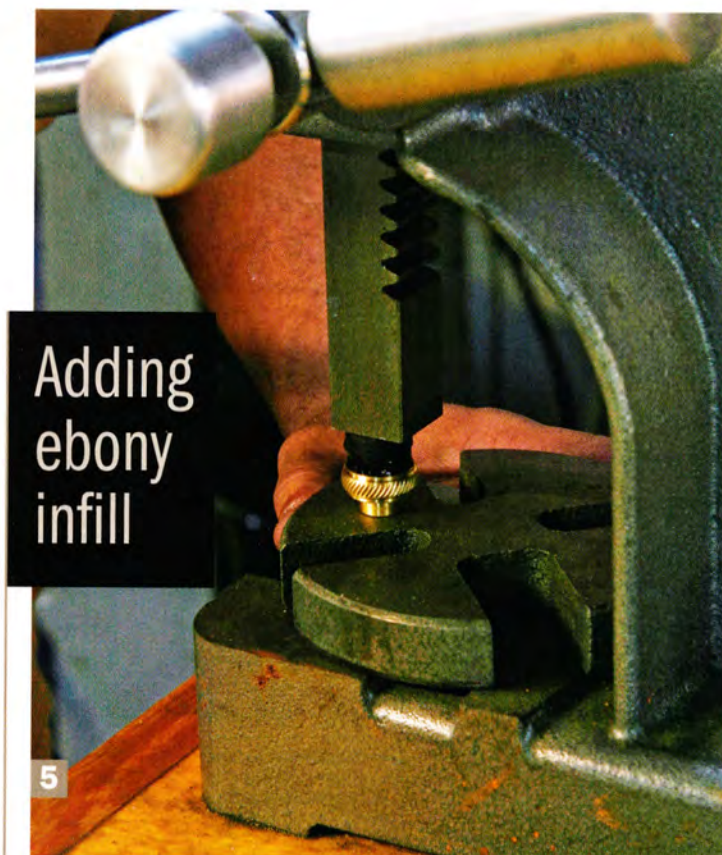
2 Knurling. After defining the neck of the knob, he creates a raised section and patterns it with a knurling tool, which doesn't cut, but operates solely by pressure.



3 Parting shot. After turning bevels on either side of the knurled section, he parts the piece off the metal lathe.



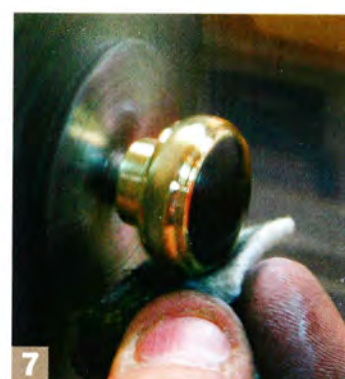
4 Recess time. With the knob reversed and held by its neck in a smaller collet, he turns a recess for the infill.



5 Squish. Having turned a small piece of ebony to a very tight fit in the knob's recess, Rios Wong applies epoxy and uses a bench-mounted arbor press to push the wood infill home.



6 Domm the infill. With the knob mounted in his wood lathe, he turns the ebony infill to a smooth, slightly domed surface.



7 This knob's finished. After using sandpaper and Scotch Brite on the brass and wood, he applies wax and polishes the finished knob.

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Hand Tools—Retooled

Growing up in Havana, Abiel Rios Wong was fascinated with his father's woodworking tools. But his dad, a veterinarian who had worked in a cabinetmaking shop as a young man, kept them locked in a tool chest and guarded the key. Whenever Rios Wong managed to get his hands on the key and the tools, punishment was swift. After immigrating to the United States in his mid-20s, Rios Wong began buying beautiful old tools and truly making them his own using skills he acquired in machinist school in Cuba. Today he works as a longshoreman in Elizabeth, N.J., and spends all his

spare time in a one-car garage shop crammed with machinist's equipment making and modifying woodworking

tools. In some cases, he restores the mechanisms of flea-market finds and gives them an ornamental flourish with new parts in brass and cocobolo, ebony, and ivory. More recently, he's been making tools entirely of his own design, like the scratch awls and marking knives at right. As he works, his machinist skills blend with his passion for the art and engineering of centuries past. Oddly enough, despite now having made many scores of woodworking tools, he still doesn't have a chest full of his own—they get snapped up as soon as he makes them.

—Jonathan Binzen



Photos: Fred Wes

How They Did It Turn to p. 90 to see how Rios Wong makes a custom brass knob with ebony infill.

Audio Slide Show To see an audio slide show featuring many more of Rios Wong's tools, go to FineWoodworking.com/extras.