Fine Woodworking

3 great shop designs, p. 45

Tools & Shops

ANNUAL ISSUE

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Brighter workshop means better work

Top 10 tool bargains

How to collect dust from every tool

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features

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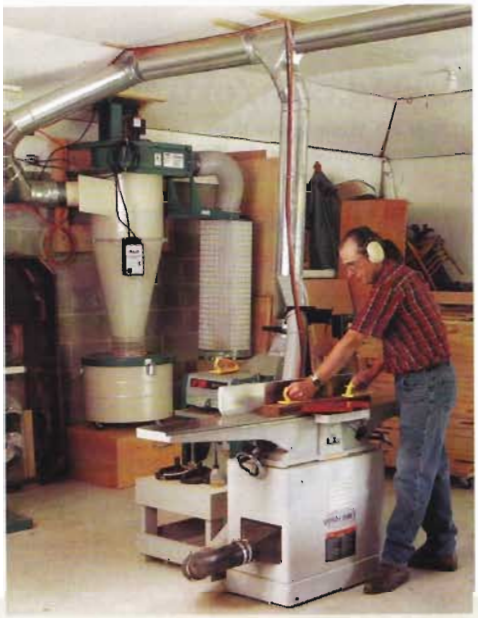

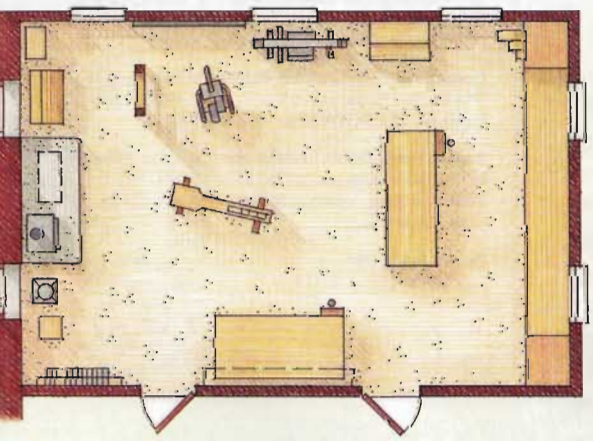

up front

in the back

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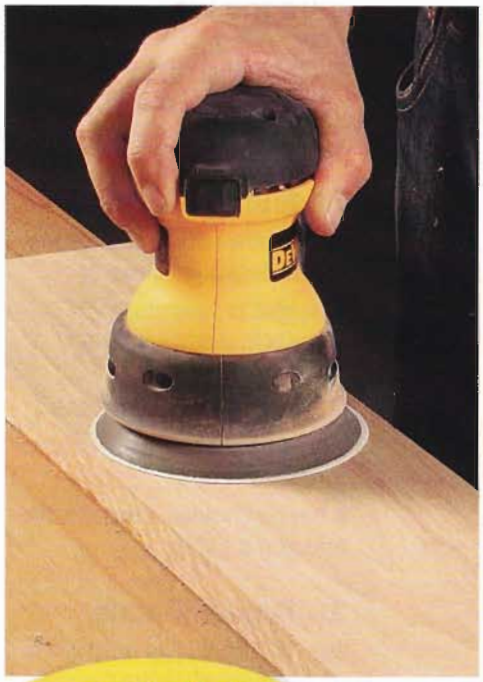

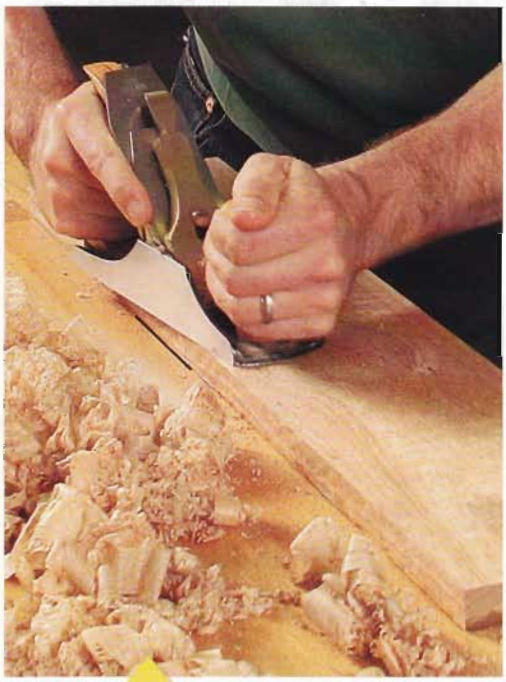

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LIVE VIDEO: Surface Prep Shootout: Hand vs. Power Tools

November 12: Tune in at 11 a.m. for a head-to-head battle. What's the best way to get a finish-ready surface?

VIDEO: The Ultimate Workbench

Is this Garrett Hack design right for your shop? Take a video tour to find out.

Great Holiday Gifts

Starting November 15: Post photos of shopmade presents for a chance to win prizes. Or, browse the gift gallery for ideas like this jewelry box by Steve Hitchen of Stocksfield, Northumberland, England.

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VIDEO WORKSHOP

Build a Small Tool Cabinet

Step-by-step how-to information from contributing editor Garrett Hack:

- Smart case construction with sturdy sliding dovetails
- Expert tips for making a door, drawer, and decorative molding

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contributors

Garrett Hack (*"A Workbench 30 Years in the Making"*) spends about half his time building custom furniture and writing about the craft. He's also a well-respected furniture-making teacher, a job that takes him all over the United States as well as Canada and England. Hack is known to push design boundaries, and much of his latest work plays with asymmetrical forms and rich materials, such as gold, ivory, and burls. When he's not in the shop or on the road, he's on his farm in Vermont, tending to his family's garden, orchard, Belgian workhorse (Jazz), three cows, and small flock of chickens.

Nancy McCoy (*"Let There Be Light"*) and her husband, **Peter Judge**, recognized the lighting geek in each other right away. McCoy, a nationally known lighting designer and lecturer, has written articles on lighting for *Fine Homebuilding*. A former carpenter, Judge is national sales manager for Boyd Lighting and a passionate woodworker. Most weekends, Nancy and Peter are hard at work on their home and gardens in Marin County, Calif.

Dan Faia (Master Class: *"Beautiful carving starts with a keen edge"*) has been an instructor at Boston's North Bennet Street School for 15 years, and a fan of the Boston Red Sox for much longer than that. A custom furniture maker who specializes in 18th-century reproductions, he gives occasional workshops at the Furniture Institute of Massachusetts and the Connecticut Valley School of Woodworking.

John White (*"Your Miter Saw Needs a Stand"*) was the shop manager for *FWW* from 1999 to 2007, when he moved back home to Rochester, Vt. He splits his time there between writing, teaching, designing, and consulting, although he recently managed a crew mapping Vermont for the upcoming U.S. Census. During the brief Vermont summer, he searches tag sales for old tools and vintage machinery, which he piles up in his barn and occasionally restores.

When he can take time away from his profession as an entomologist, **Randal "Toby" Schuh** (*"Step Up to Whole-Shop Dust Collection"*) builds furniture in his northeastern Pennsylvania shop. After producing several thousand board feet of lumber from local trees, he knew his shop needed more serious dust collection. He says he turned to Bill Pentz (www.billpentz.com) for ideas and inspiration when working out the bugs in his system.

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

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

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letters

Spotlight

ONE STUDENT'S MEMORIES OF KRENOV

I found James Krenov's book, *The Fine Art of Cabinet Making*, in the 1970s. A recommendation blurb said, "This book will teach you how to build your own handplane, which you can then use to build your own cabinet." The book stunned me.

Like a lot of other crafty people, I had done a few small refinishing and sanding projects, but on opening Krenov's book, I was plunged into another world. He described a special relationship with a cabinet, with the wood, with the process—offering something outside our society's norms. Here was an alternative to mass production, to meaningless jobs, to striving for money.

The book became dog-eared and eventually fell apart as I worked my way through years of learning. Finally I was good enough to be accepted into the Fine Woodworking Program at The College of the Redwoods, where Jim had made his home and set up a school (that's me and him, above, in 1991).

The program reflects his attitude. There is little time spent on teaching how to use a router or a tablesaw. The focus is on the fine points of cabinetmaking.

In class, it was hard to reconcile Jim, a sometimes hard and aloof person, with the sensitive, creative spirit I had met in the books. It took me a while to see that the person was inside a protective shell. He had become famous and was thrown in with 20 adoring students and a constant stream of visitors. But at times during his lectures, or one on one, the spirit would come out, and I'd have a burst of recognition and nostalgia.

I remember his beautiful hands, muscled and padded from years of working wood, delicately tracing the sweeping top of my cabinet. It delighted him. Then, moving into the air, his hands re-created the curve, dancing like a ballerina.

In his lectures, what started as technique often boiled down into philosophy, but never overt and always within the context of woodworking. A talk on handplanes turned to the idea that by slowing down we could produce results that big machines can't. Cabinetmaking or life lesson?

In the end, his was the life of a radical expressed in the simple process of building a cabinet. You must see his work in person to appreciate the plea it makes to be special, to be the best you can, to break the rules of society—all conveyed in subtle details and exquisite proportions. Rustic yet refined. Loved.

—GREG ZALL, Sonoma, Calif.

Editor's note: James Krenov, modern woodworking's most influential teacher, passed away Sept. 9. Go to FineWoodworking.com for a celebration of his life and legacy, and look for a special gallery of his students' work in the next issue of the magazine.

'A sharp chisel'

I've noticed in many years of reading *Fine Woodworking* that whenever a technique or procedure that involves the use of a chisel is being described, the reader is invariably told to clean up the waste or corners with "a sharp chisel." No one ever just writes "a chisel." Why? When would a dull chisel be the better choice? Isn't sharpness the essence of chiselness? As someone who values craftsmanship in writing as much as I do in woodworking, I object to the unnecessary word.

—CHARLES PREGALDIN, Tacoma, Wash.

Editor replies: Sharp observation. We include the extra word because we can't pass up the chance to remind readers about sharpness. You'd be surprised at how many people continue to struggle with chisels and planes because they just aren't sharp. Come to think of it, the extra word seems to be having little effect! So, we'll try sticking with just "chisel."

Faster way to square a miter gauge

Your recent e-newsletter included a method of cutting a board to see if the miter gauge is square. I find test cuts to be a waste of time. Instead I square my miter gauge to the blade using a Starrett framing square that is dead-on 90° and sells for $14 at www.woodworker.com.

—DAN McGARIGLE, El Segundo, Calif.

Accident waiting to happen?

I came close to a severe injury when following the advice in "Get Safer, Cleaner Cuts on Your Tablesaw" (Fundamentals, *FWW* #200). When making a zero-clearance throat insert, the author holds it down with a push stick while raising the blade through the insert. So I did the same. Everything was going great as I turned off the blade and began to lower it back into the table. But then I pulled the push-stick back toward me, and it caught the spinning blade, sending it directly into my neck. The EMTs said that nothing major was damaged, but that I was very lucky.

I'd like to see a revision to this article, one that uses a safer procedure for

Top photo: Kevin Shea

Fine WoodWorking

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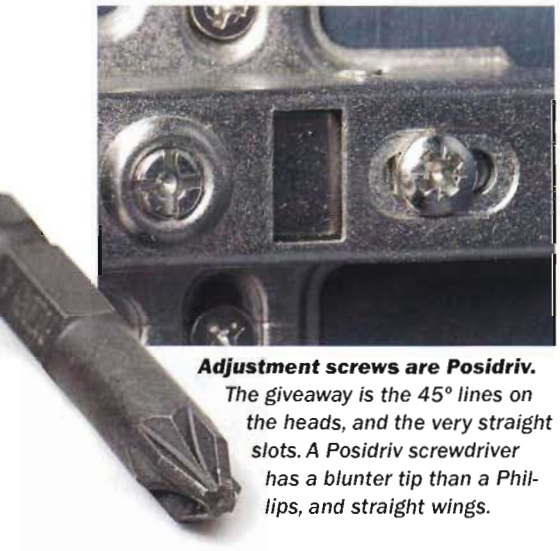
holding down a tablesaw insert, one that has nothing to do with the operator's skill.

—JASON PIPER, Seattle, Wash.

Editor's note: Hindsight is 20-20, but you didn't have to lower the blade at that point. Just hitting the off button would have sufficed, so you could focus on keeping the push stick still while the blade came to a stop. Other ways to hold down the insert while the blade comes up through it are to place a board across the insert, clamping it at the front and back of the saw table, or position the rip fence over the insert, away from the blade.

The secret to European hinges



Adjustment screws are Posidriv. *The giveaway is the 45° lines on the heads, and the very straight slots. A Posidriv screwdriver has a blunter tip than a Phillips, and straight wings.*

I just read your article on 35mm European cup hinges ("Best Hinge for Built-ins," *FWW* #207), and you forgot to mention an important point: The adjustment screws are not Phillips. They are Pozidriv, which is distinguished by the lines radiating out from the center. I've been a carpenter in America for 14 years, and nobody seems to know about this. If you use a Phillips bit on these screws they will strip after a few tries, which is bloody infuriating. When you discover the Pozidriv bit, your life will be a joyous carnival of bliss.

—JONAS READ, Brooklyn, N.Y.

Sweet escape. *Despite the recession, woodworking schools like The Center for Furniture Craftsmanship are still drawing plenty of students with the promise of a road less traveled.*

A school weathers the recession

These days, almost everyone I speak with asks how our school is faring in this recession. At a time when many nonprofits are on the ropes and many of the businesses we deal with—lumberyards, tool companies, publishers, and furniture manufacturers—have painfully reduced their workforces, we seem to be among the lucky ones. Apparently people recalibrate their priorities during a recession, and woodworking education remains high among them.

I'm sure this comes as no surprise to the authors and readers of *Fine Woodworking*. With the promise of Wall Street tarnished, the enduring satisfaction one can discover in the workshop seems to glow brighter. Woodworking exercises a person's full capacities—hands, heart, and head—in a holistic way that is both enjoyable and empowering. Instead of buying happiness, you learn to make it. Instead of accommodating a world built by others, you learn to construct your own. Craft has long been a road less traveled. Yet there is much to be said for meaningful, self-expressive work in today's world, whether one does it as a hobby or a profession.

—PETER KORN, executive director, Center for Furniture Craftsmanship, Rockport, Maine

Clarification

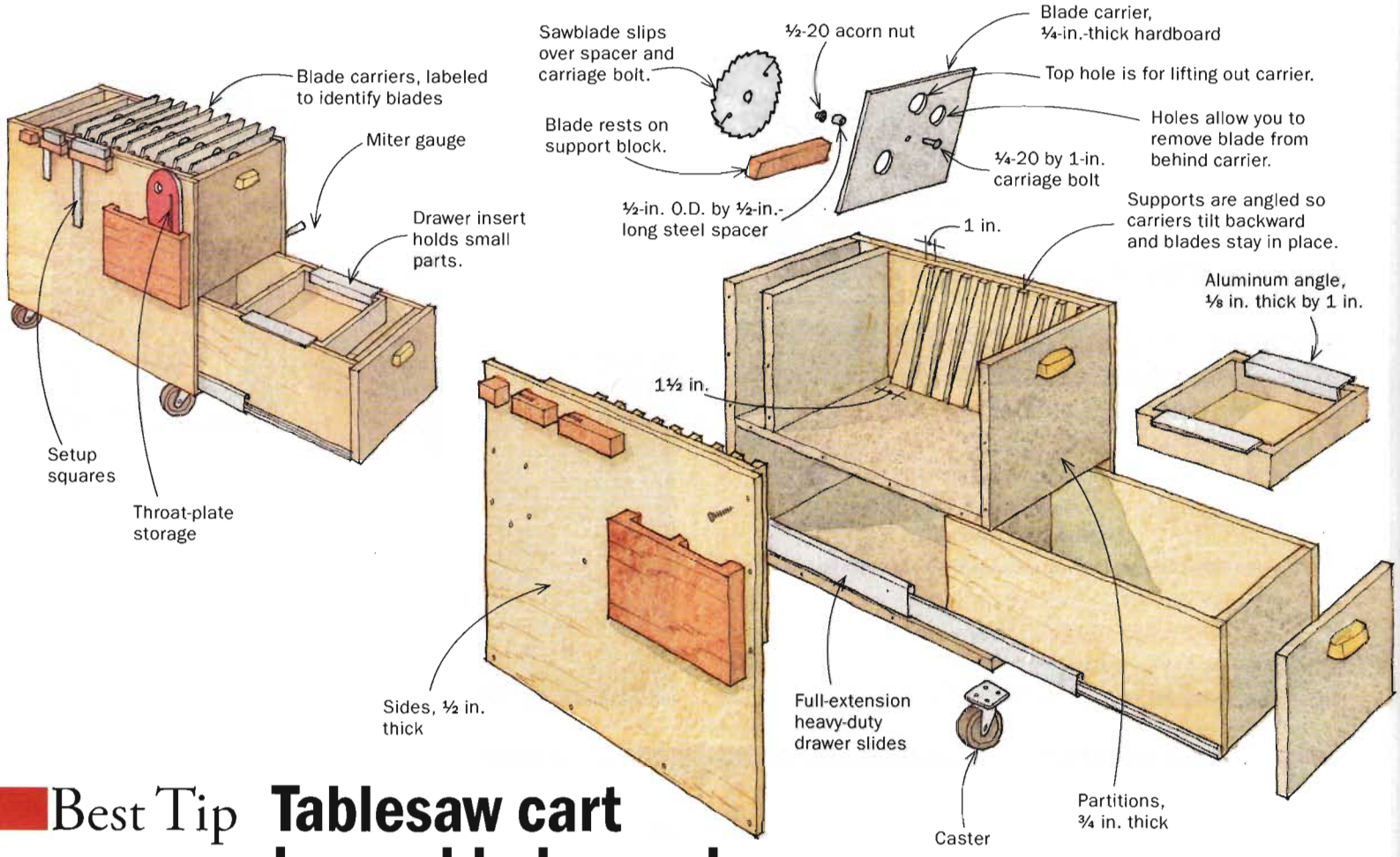
In Adrian Ferrazzutti's article, "A Box That Earns Its Stripes" (*FWW* #207), the individual veneer strips were described as being a little over 2 in. wide, but when glued together into a block they were shown and described as 3½ in. wide. If you only intend to make one box, 2 in. is wide enough, but 3½ in. will yield enough veneer for three or four boxes, the number the author normally makes at a time.

About your safety

Working wood is inherently dangerous. Using hand or power tools improperly or ignoring standard safety practices can lead to permanent injury or even death. Don't perform operations you learn about here (or elsewhere) until you're certain they are safe for you. If something about an operation doesn't feel right, find another way. We want you to enjoy the craft, so please keep safety foremost in your mind.

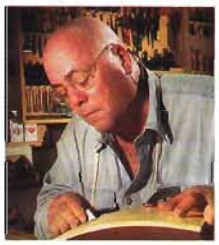
methods of work

EDITED AND DRAWN BY JIM RICHEY



Best Tip

Tablesaw cart keeps blades and accessories close by



David M. Grosz has a diverse woodworking background, having studied under Ian Kirby, James Krenov, and Jere Osgood. A professional woodworker, he says his philosophy is to do simple and honest work, do it correctly, and use the right materials.

When I first bought my tablesaw, I had one blade, an arbor wrench, and a rip fence. But after a few years, my collection of blades was hanging on the wall and my accessories were stored randomly all over the shop. I put an end to the tablesaw clutter by building a rolling storage cart that sits under the extension table of my saw.

The cart holds all the tablesaw's fixtures, including blades, miter gauge, setup squares, wrenches, and throat plates. Blades slip on and off the carriers easily. The carriers slide into an angled rack, which keeps the blades in place. All the materials and hardware can be purchased at your local home center.

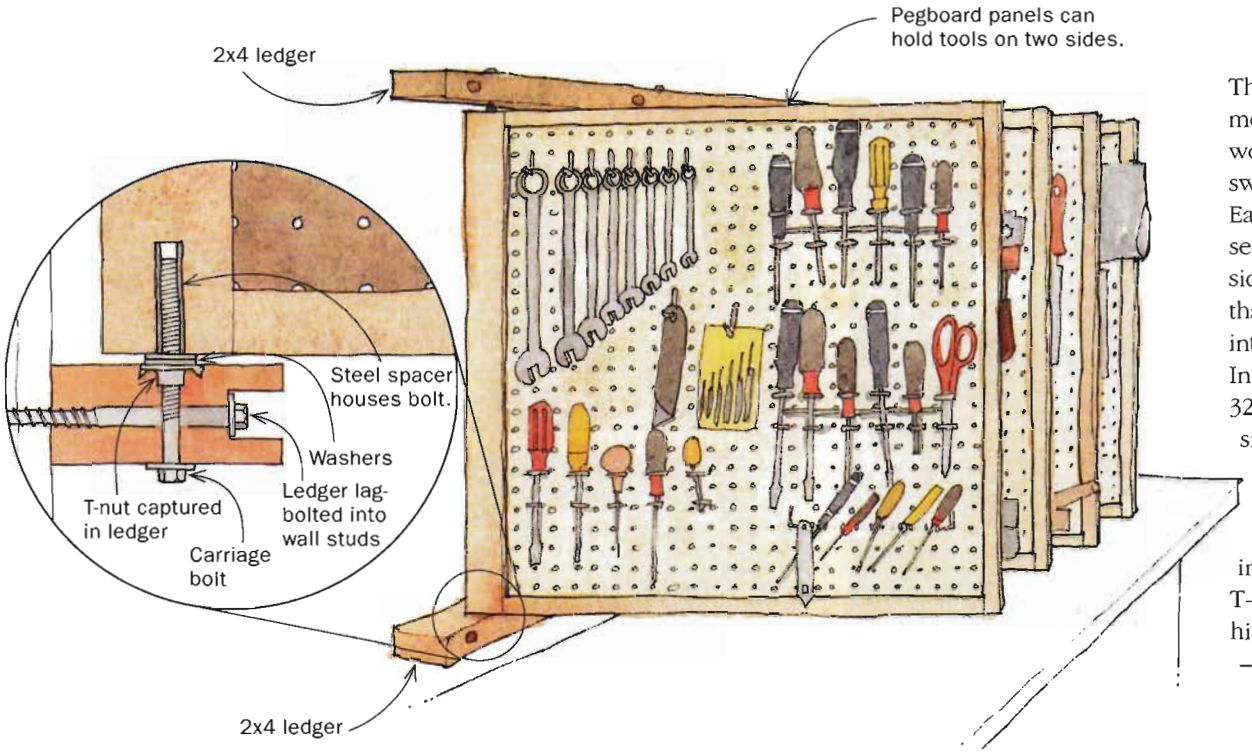
The sides and drawer boxes are made of ½-in. plywood; the rest is ¾-in. Joinery is simple (screws). The cart should fit under the extension table of your saw (don't forget to allow for the casters). Its length should not exceed the front-to-back dimension of your saw's extension table. I use 10-in. blades, so I made the interior width 13 in. I left 1½ in. of clearance between the cart and the extension table. The extra space allows me to leave the carrier for the blade I'm using right on top of the other carriers. That way, when I change blades, I don't have to go looking for it.

—DAVID GROSZ, Stamford, Conn.

A Reward for the Best Tip

Send your original tips to Methods of Work, *Fine Woodworking*, PO Box 5506, Newtown, CT 06470. If published, we pay $50 for an unillustrated tip; $100 for an illustrated one. If your tip is the best, you win Bosch's two-tool combo kit (model CLPK21-120), which includes a 12v impact driver and 12v screwdriver.

Hinged panels store lots of tools in a small space



This tool-storage system mounted above my workbench consists of four swinging pegboard panels. Each panel has a 2-ft. by 2-ft. section of pegboard on each side, separated by ½ in. so that the pegboard hooks won't interfere with each other. In all, the panels provide 32 sq. ft. of storage space in a small, easily accessible area.

The panels are mounted to 2x4 ledger boards that are lag-bolted to studs in the wall. Bolts through T-nuts provide the pivot hinge for the panel.

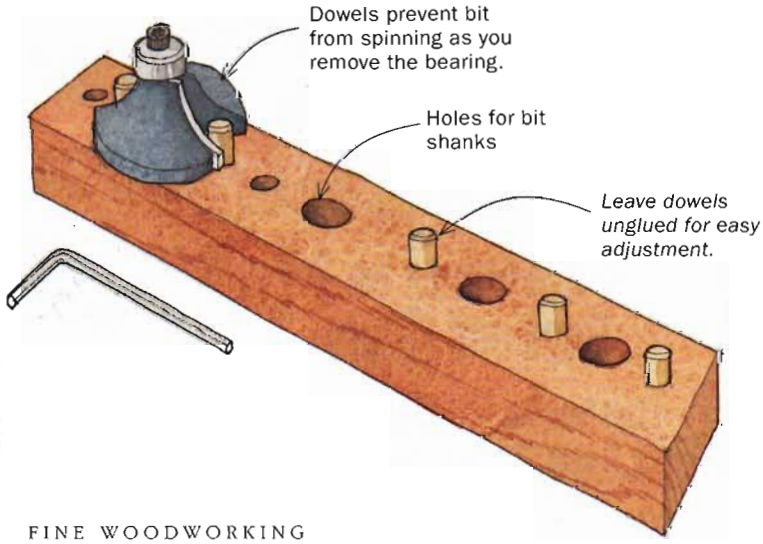
—VIRGENE K. ADAMS, Frisco, Texas

Change router-bit bearings without getting cut

Removing a bearing from a router bit can be awkward and hazardous to your fingers. But this little device makes the job safe and easy.

To make it, you need only a stick of hardwood and a few lengths of ¼-in.-dia. dowels. Drill holes for the bit shanks, then add holes for the dowels. In my jig, the dowels are spaced so they work for many sizes of router bits, from a 3½-in. panel-raising bit to a tiny ¼-in.-shank laminate flush-trimming bit. The dowels keep the bit in place, so I can remove the bearing without holding the bit in my hands. Don't glue the dowels; you'll need to remove some of them to accommodate the larger bits.

—SERGE DUCLOS, Delson, Que., Canada



Quick Tip

When I use steel wool between finishing coats, I clean up the dust and loose steel wool with a vacuum, a rag, and then (here's my secret) a flat 1-in.-dia. rare-earth magnet. I wrap the magnet in a square of plastic wrap and twist it. Then I run the magnet over the piece, paying attention to the inside corners and edges. The magnet grabs all the loose steel wool that is left. When I'm done, I untwist the plastic wrap and throw it away. The magnet stays clean, and there are no steel-wool particles to get into the next coat of finish.

—LEONARD YEE, Valencia, Calif.

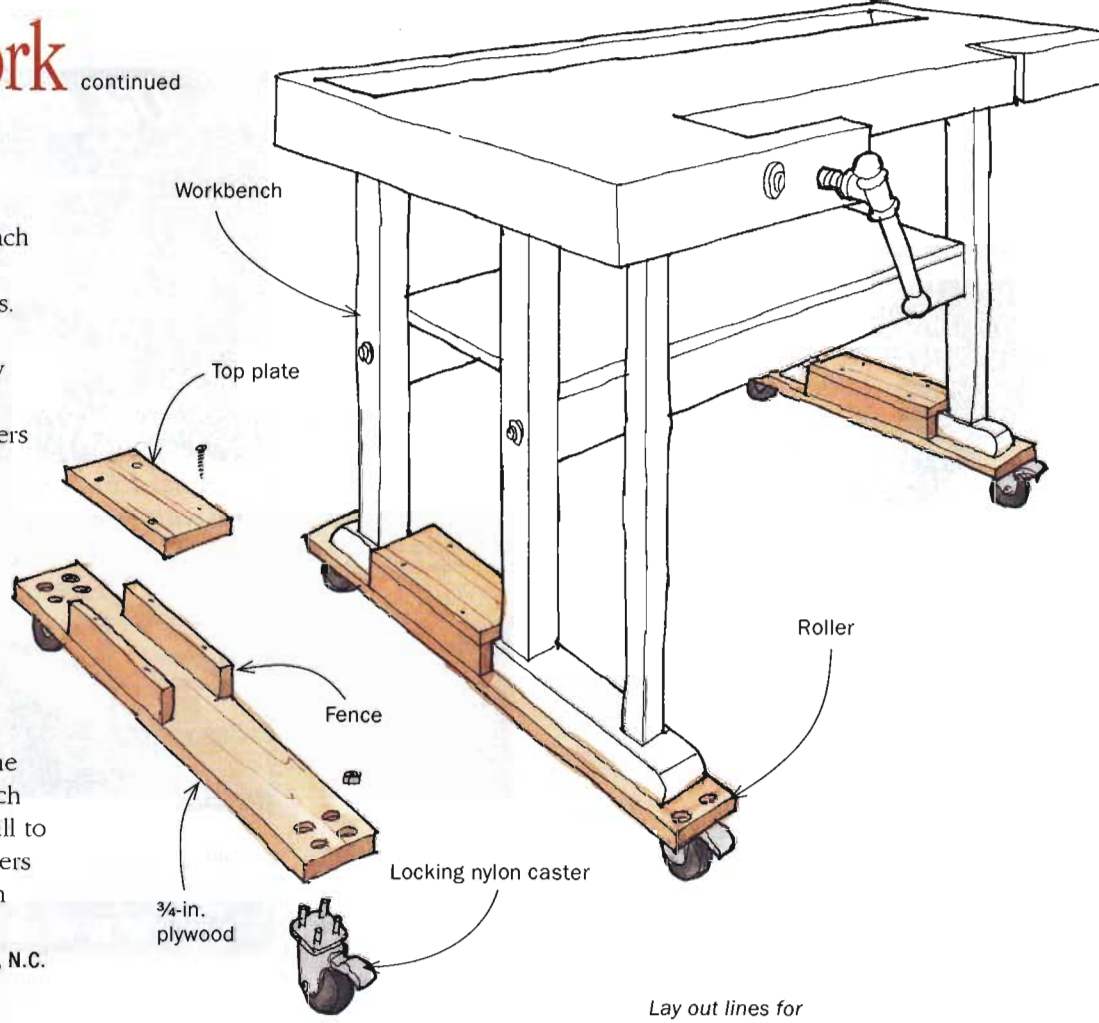
Workbench rollers

I wanted to move my 400-lb. workbench outside on nice days. So I made these rollers that fit onto the workbench legs.

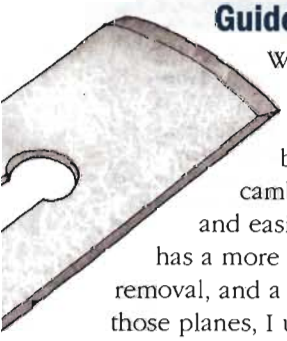
Each roller is simply a length of ¾-in.-thick plywood fitted with heavy duty, locking nylon wheels. The two fences and the top plate lock the rollers in position on the bench feet. The plywood and wheels add 3½ in. to the bench height, but I find the taller bench makes for easier handplaning.

To install the rollers, I first remove the top plate, jack up one end of the bench with a car jack, slip the roller under the foot, and reattach the top plate. I repeat the process to install the second roller. Now I can roll the bench outside or swivel it away from the wall to retrieve a dropped tool. With the casters locked, the bench stays in place, even while I'm handplaning.

—LEN HAMBLETON, Raleigh, N.C.



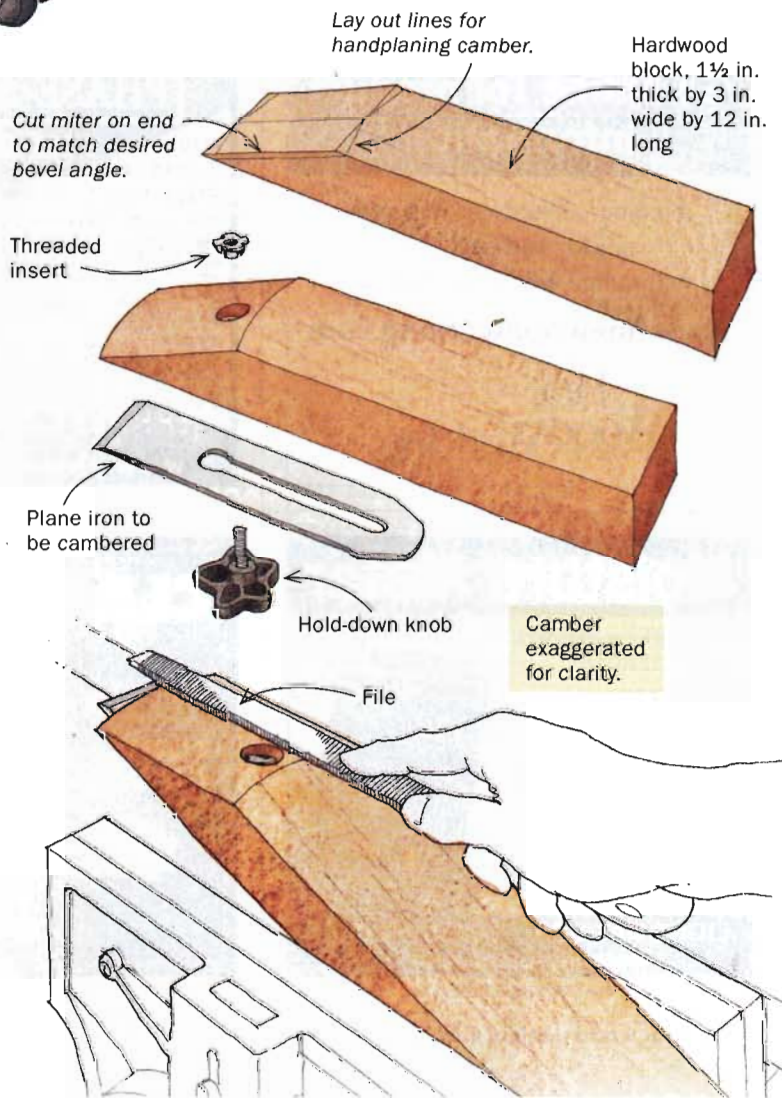
Guide for cambering a jack-plane blade



With handplanes, cambering refers to the formation of an arched surface on the cutting edge of the iron so the corner of the iron will be less likely to gouge the wood. The degree of camber for a smoothing plane is slight (0.002 in.) and easily achieved on your stones. But a jack plane has a more extreme camber (0.005 in.) for heavy stock removal, and a scrub plane's camber is even more severe. For those planes, I use this jig and a file to form the camber.

To make the jig, cut a 25° (or your preferred angle) bevel on one end of a hardwood block. Now, locate and bore a hole for a threaded insert for the hold-down knob. With a scribe or fine pencil, draw a centerline on the bevel and transfer the degree of camber onto the hardwood. Working from the outside with a plane, remove wood to the layout line of the primary camber. Plane away material from the center, then use a scraper, a fine rasp, and sandpaper to smooth the curve. Finally, install the threaded insert and hold-down knob. To use the guide, attach the plane iron parallel to the sides of the jig. File the primary bevel, starting from the outside and working toward the middle. Keep the file in light contact with, and parallel to, the guide. File until the plane iron's camber and bevel are the same as the guide's. I hone the iron by hand using the scary-sharp method based on a piece of plate glass and successively finer grits of wet/dry abrasive paper, rolling the iron to follow the curve.

—RON BAIRD, Wind Gap, Pa.

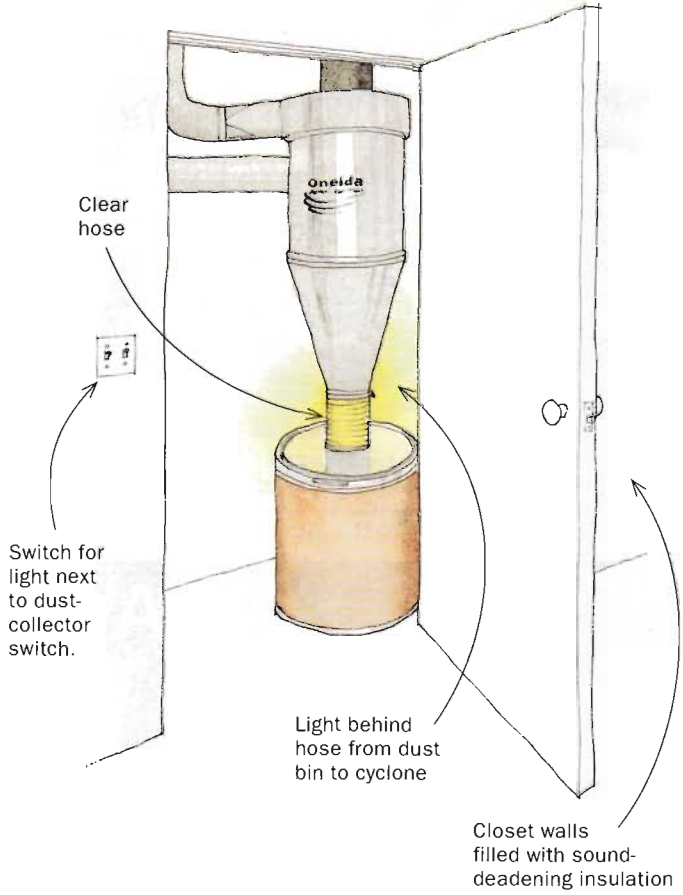


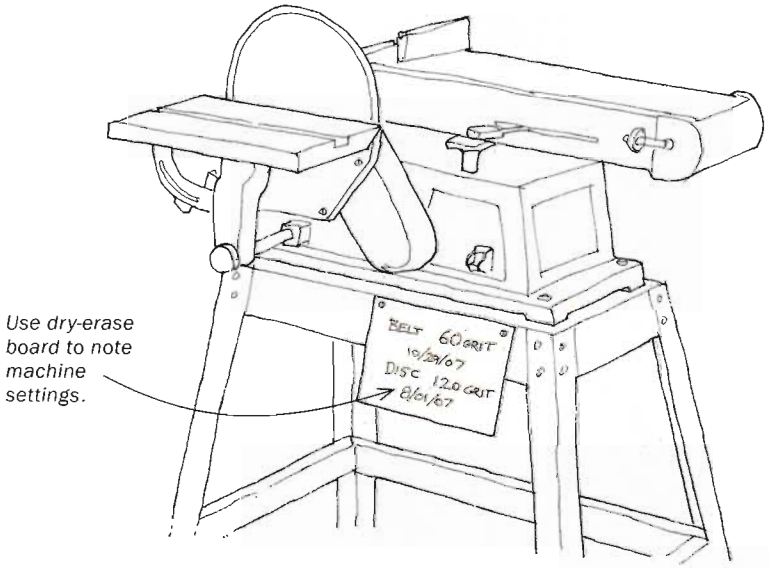
Closet muffles cyclone's roar, and backlight shows when bucket is full

A cyclone dust collector is great, but it can be noisy and it's hard to tell when the dust bin is filled without lifting the lid. But if you overfill the system and clog the ductwork, it takes an inordinate amount of time to disassemble, clean, and then reassemble the system. I solved both of those issues when I designed my new shop.

I built a special closet for the dust collector that deadens the sounds via noise-reducing insulation in the walls (www.soundprooffoam.com). I also added an incandescent light fixture behind the hose that connects the dust bucket to the cyclone unit. The light makes it easy to see when the dust bucket is getting filled. The light switch is right next to the dust-collector switch on the outside wall of the closet. This technique has worked very well, and I have not had an overfill problem in my new shop.

—BOB NASH, Newtown, Conn.





Handy notepad for tool setups

If you sometimes have trouble remembering the setup details on a tool from session to session, attach a small scrap of dry-erase board to the machine and write your setup notes there. You can jot down such things as the grit installed on a belt sander, the width/depth of the tablesaw dado head, or the rpm of the drill press.

—BARRY BURKE JR., Middletown, Conn.

■ MACHINES

New SawStop a better choice for home shops

SAWSTOP, THE COMPANY THAT DEVELOPED finger-saving tablesaws, recently added the Professional Cabinet Saw to its lineup. It's a somewhat smaller and less-expensive version of the original Industrial Cabinet Saw, but no less serious. While the first SawStop cabinet saw was built to withstand decades of all-day use in a commercial shop, this one is lightened a bit for the high-end amateur and small-shop pro. That said, dust collection is much improved on the new model, thanks in part to a unique branch line that connects the main dust hose to the blade guard.

I gave the saw a workout in the *FWW* shop. All the measurements that affect cut quality were within tolerance except blade-to-miter-slot parallelism, which was off by 0.016 in. Fortunately, SawStop makes it easy to correct this problem with a unique turnbuckle-style adjusting nut. A few turns with an open-ended wrench, and the saw was within 0.002 in.

The riving-knife system on this saw works very well. It includes two knives: a high-profile knife with attached blade cover and anti-kickback pawls, and a low-profile knife for non-through-cuts like grooves or slots. Switching out the knives is relatively easy. Just remove the throat plate and flip a lever to release the knife.

In fact, all the saw's components are well made and have excellent fit and finish, and the 3-hp motor matches the performance of the leading cabinet saws.

Bottom line: The new SawStop offers woodworkers a serious cabinet saw with blade-braking technology for nearly the same price as competitors without the technology. The model with a 52-in. rip fence sells for $3,000. With a 36-in.-fence, the price is $2,900. The optional mobile base adds another $200. Go to www.sawstop.com for more information.

—Former associate editor Tom Begnal lives in Connecticut.

Improved dust collection. *With a branch hose that connects the blade cover to the main port, the SawStop Professional Cabinet Saw captures nearly all the dust it produces.*

Photos: staff

■ HAND TOOLS

High-performance saws are a bargain

COMBINING TRADITIONAL DESIGN with modern materials, Veritas (www.leevalley.com) has created three outstanding, reasonably priced joinery saws. The 14-in.-long saws have 9-in. blades that can cut up to 1⅝ in. deep. They're nearly identical except for the tooth pattern. The 14-tpi ripsaw is ideal for stock ranging from ½ in. to ¾ in. thick; the 20-tpi ripsaw is for ½ in. and under. The 16-tpi saw is for crosscuts.

The saws' most unconventional feature is a molded spine made from a stainless-steel, glass-fiber composite. Its sculptural form makes a flawless connection between the blade and comfortable African rosewood handle. The blades are made from a thin, 0.020-in. high-carbon steel with a light set (0.003 in. per side), making the saws easy to start and control.

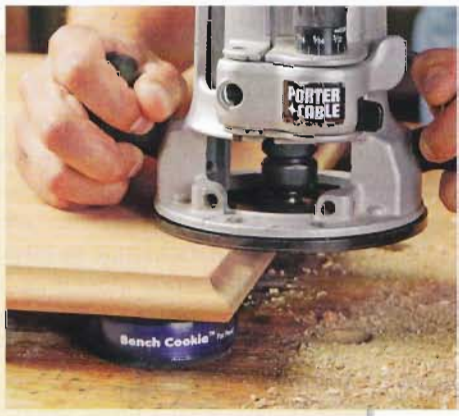
Although I'm impressed with all three, my favorite is the 14-tpi ripsaw. It excels at ripping and does just fine with crosscuts, too. I think it's a perfect dovetail saw.

Perhaps the greatest virtue of the Veritas joinery saws is their low price ($65), which is roughly half what other saws with similar performance cost.

—Chris Gochnour is a frequent contributor.

■ ACCESSORIES

Bench Cookies elevate work and grip it tightly



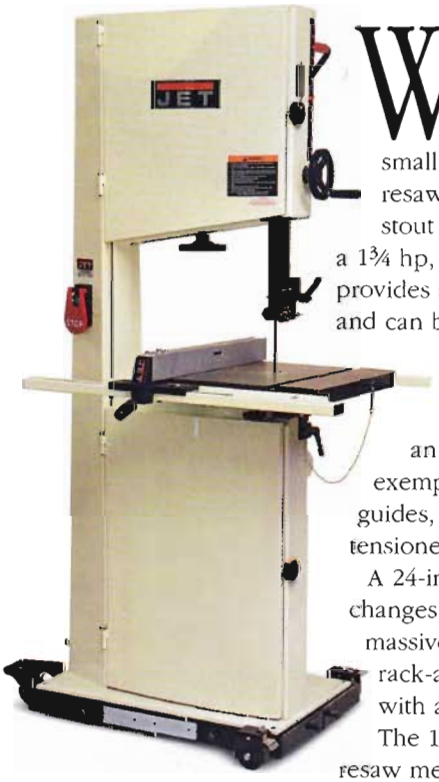
I RECENTLY PUT A SET OF THESE rubber-faced hockey pucks through a gauntlet of woodworking tasks and I found that they provide a quick and firm hold-down for routing, sanding, and finishing.

Rockler's Bench Cookies grip exceptionally well (even when belt sanding) and dampen much of the vibration you ordinarily feel with power tools. Unfortunately, they don't have quite the grip when covered with sawdust, but knocking off some of the dust solves the problem. I also found placing the cookies at the extreme corners of your workpiece prevents tipping. In general, I find these $12 cookies (available at www.rockler.com) a very welcome addition to my workshop.

—Kelly Dunton is an associate art director at *Fine Woodworking*.

■ MACHINES

WMH's big bandsaws: workhorse vs. racehorse



WMH TOOL GROUP HAS HIT the market with new Jet and Powermatic 18-in. bandsaws. The Jet JWBS-18QT ($1,600) is designed for hobbyist or small pro shops. It has 18-in. throat and 12-in. resaw capacities, and an innovative and very stout triangular-shaped steel frame. It's available with either a 1¾ hp, 120-volt motor or a 3 hp, 240-volt motor. A 21-in. table provides a good-sized work surface. The fence locks securely and can be used on either side of the blade. You can also angle it slightly to compensate for blade drift.

The Powermatic PM1800 ($3,900) is a zero-compromise machine. Clearly the designers put an emphasis on function rather than cost, a point exemplified by its hulking 805 lb. The stout frame and guides, massive upper wheel assembly, and threaded blade tensioner can easily support the widest resaw blades.

A 24-in. square table, split front to back for easy blade changes, offers great workpiece support and mounts on massive cast-iron trunnions. Table tilt is controlled by a rack-and-pinion assembly with an 8-in. handwheel. The 18-in. throat *and* resaw measurements and a standard 5 hp, 240-volt motor provide plenty of capacity and power to handle the widest boards and thickest planks. With nicely sized, chrome-plated thumbscrews, the roller blade guides are easily adjusted and maintain their settings. The thrust bearing is grooved to better support narrow blades, a feature that's unique to Powermatic.

The large, dual-position aluminum fence provides 6½ in. of support for resawing and a short ½-in. face for close guide support when ripping thin material.

Both saws have seen a pretty good workout in my shop over the past few months with nary a whimper of discontent from either. The Powermatic is the big brother here: quiet (almost scary quiet), powerful, easy to set up, and as stout as any big, vintage cast-iron bandsaw, but the Jet is an excellent value for woodworkers looking to step up to a big bandsaw. For more information, go to www.jettools.com and www.powermatic.com.

—Contributing editor Roland Johnson is a woodworker and power-tool expert in Sauk Rapids, Minn.

■ HAND TOOLS

Lynx scrapers are excellent for moldings

HAVE YOU EVER ROUTED FLUTES in a column or pilaster, and then had to fashion an old hacksaw blade or something else into a crude scraper to clean up the fuzz and chatter marks?

Maybe you've used a roundover bit to make a bullnose, and then you had to deal with a flat section in the center. Those are just two occasions when some clever little scrapers from Lynx have made my life easier. I've even used the smaller concave forms to put a bullnose shape directly onto square stock, bypassing my router, shaper, and spokeshave.

Curved scrapers are unmatched at cleaning up moldings without rounding the edges the way sandpaper does, and the Lynx sets offer the shapes you'll need most often. The scrapers are sold separately in pairs of convex and concave tools. They come nicely ground on the edges, ready to use. The sets sell for about $11 each (www.woodcraft.com; No. 150104 concave; No. 150105 convex).

—Alfred Sharp is a woodworker in Woodbury, Tenn.

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"[Forrest blades] cut true, with no vibration. I was a carpenter by trade for over 60 years and continue to be an active woodworker. So, I can say with confidence that Forrest blades are the best."
Carl Stude–Burbank, CA

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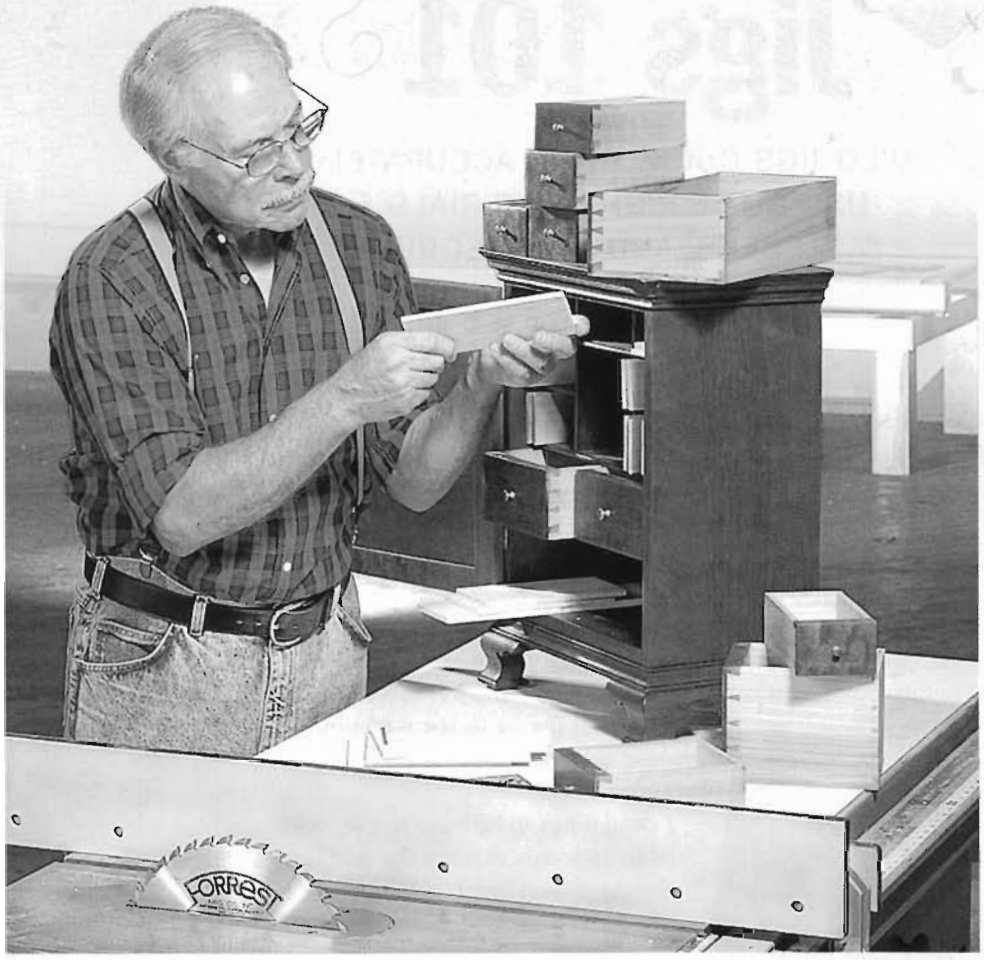

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Jigs 101

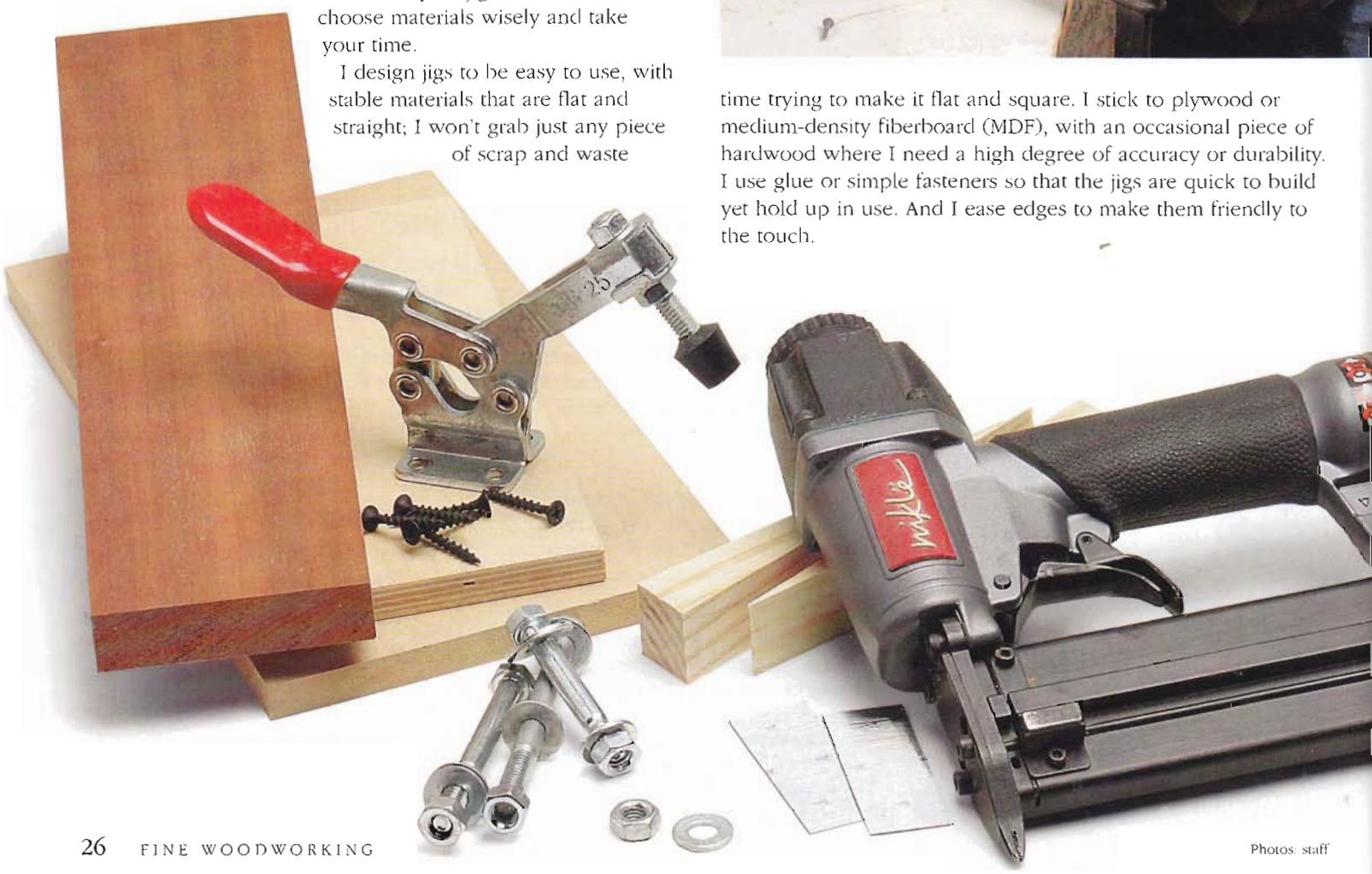
BUILD JIGS QUICKLY AND ACCURATELY USING THE RIGHT MATERIALS, FASTENERS, AND ACCESSORIES

BY GARY ROGOWSKI

A good workshop jig will hold your work accurately and safely so you can make consistent, repeatable cuts quickly. Take the template-routing jig I use at the router table (see photo, right). It protects my fingers and allows me to reproduce a shape over and over. It also speeds up the shaping process. So in one jig I get safety, accuracy, and speed.

The purpose of any jig is to make life in the shop easier. Whether building a simple one-use jig for the job at hand or a more complex jig to last a lifetime, choose materials wisely and take your time.

I design jigs to be easy to use, with stable materials that are flat and straight; I won't grab just any piece of scrap and waste time trying to make it flat and square. I stick to plywood or medium-density fiberboard (MDF), with an occasional piece of hardwood where I need a high degree of accuracy or durability. I use glue or simple fasteners so that the jigs are quick to build yet hold up in use. And I ease edges to make them friendly to the touch.



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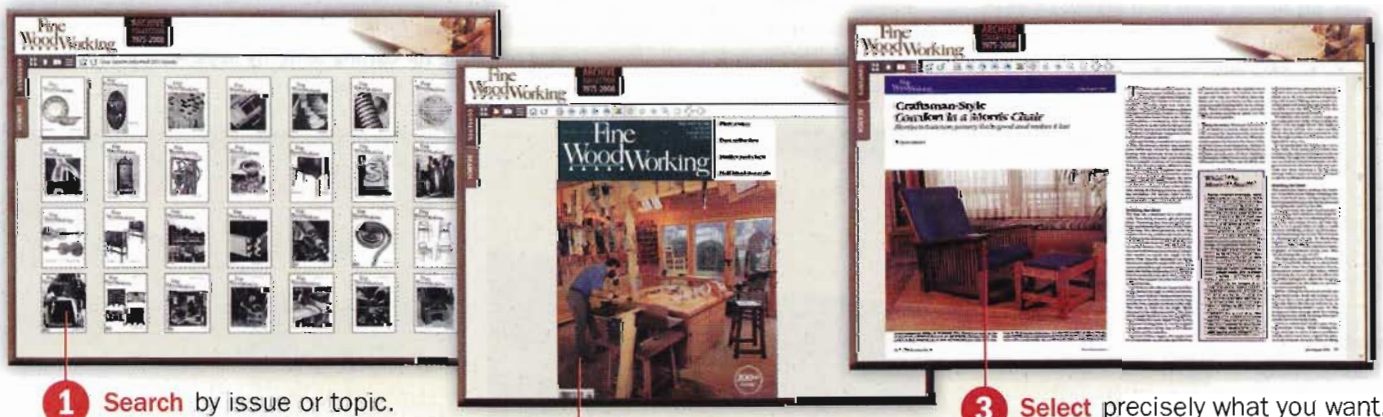

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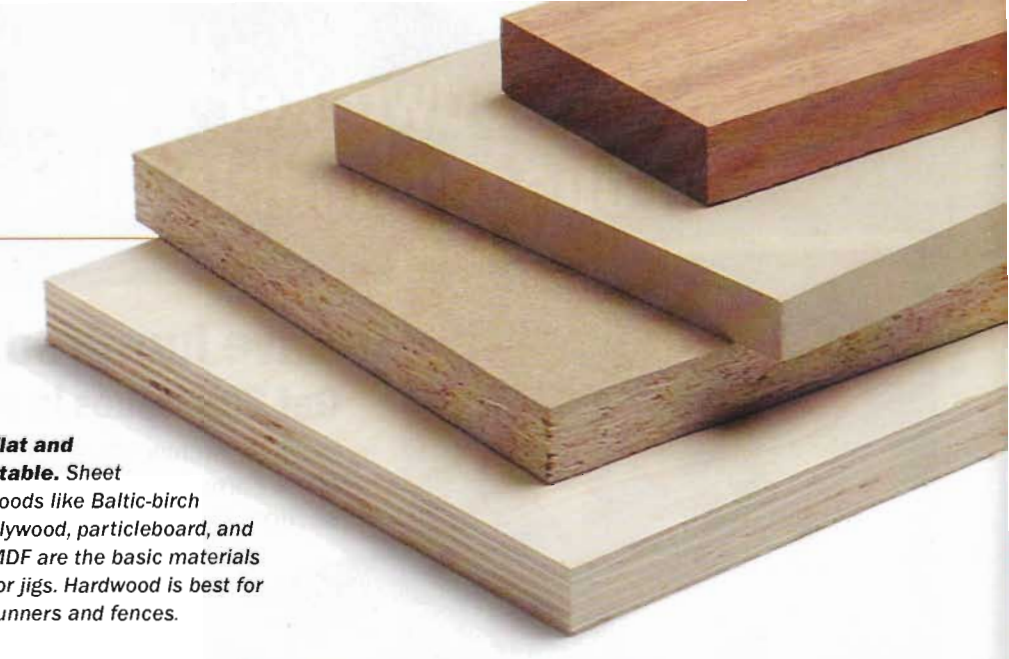
The Taunton Press
Inspiration for hands-on living

The right materials

The purpose of the jig will determine what materials you should use. Mostly I use ¾-in.-thick MDF or veneer-core plywood.

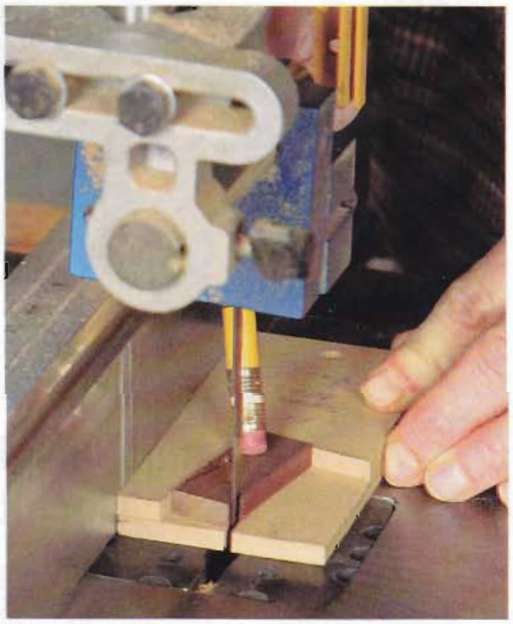
When I need an absolutely square fence on a jig, I'll use a piece of straight-grained hardwood milled flat and square. When I need to glue up layer after layer, such as when I make a thick bending jig, I'll use particleboard. It's inexpensive and works just fine. If you need material with no voids or gaps in its edges, then use a material like Baltic-birch plywood. (In the western United States, a product known as Apple-Ply is also widely used for jig making.) I've used Masonite for router templates, but I generally prefer MDF because it's easier to see pencil lines on the lighter surface. For jigs that get screwed or nailed together on edge, I use solid wood or plywood and drill pilot holes to avoid splitting the material.

Material that's ¾ in. thick allows enough room for countersinking large screw heads or bolt heads. It also reduces the chance of splitting if I have to screw into the edge of a piece. There are times when using thinner stock helps me hold a jig easier or maneuver it faster. When I cut butterfly keys on the bandsaw, for example, I hold the small workpieces steady in a simple jig made from two layers of ¼-in. MDF. It's nice to have a thinner profile on the jig to hold a thin wedge piece.

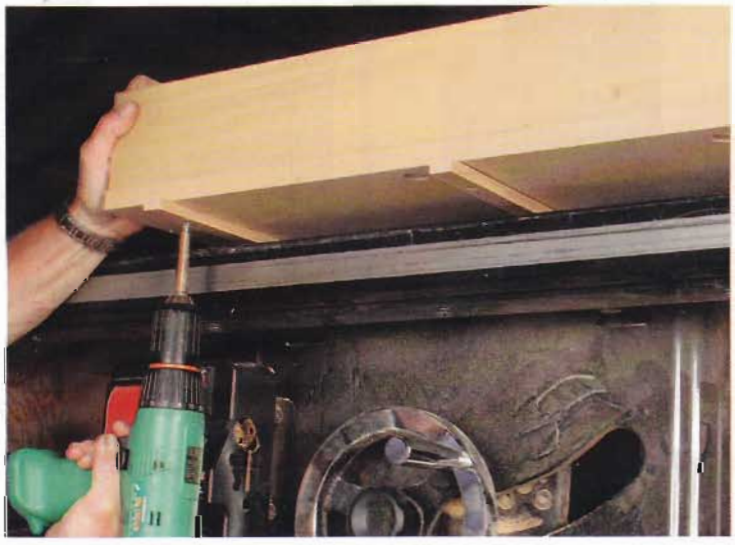


Flat and stable. *Sheet goods like Baltic-birch plywood, particleboard, and MDF are the basic materials for jigs. Hardwood is best for runners and fences.*

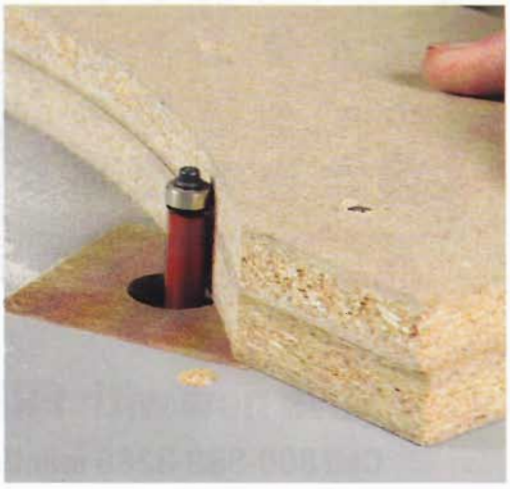
Sacrificial plywood. *This jig for cutting key slots in miter joints is made from scraps of ¾-in. plywood.*



Thin MDF. *Two layers of ¼-in. MDF create a handy jig for cutting butterfly keys. A pencil eraser holds down the work.*



Hardwood for durability. *Hardwood components, like these runners on a crosscut sled, can withstand repeated movement and rubbing. Note that the fence is also hardwood, milled perfectly straight and square.*



Low-cost option. *Particleboard is an inexpensive material for building up thick bending jigs.*

The right fasteners

Some jigs need to be assembled with glue to remain accurate through years of regular use. Just be sure that the surfaces you're gluing are clean and clamp them together for about half an hour. The trouble with glue is that it acts as a wonderful lubricant for 10 seconds or so, then locks your pieces into the wrong position. Or so I've heard.

To combat that creep, use brads or pin nails to lock pieces in place. Spread the glue, align the pieces, shoot several nails in place, then put on the clamps. If you don't have a nailer, clamp the pieces of the jig at the edges so they won't slip when you clamp the faces together. Or, dry-clamp the pieces, predrill screw holes, then glue and screw the jig together.

For jigs that don't require the permanence of glue, use drywall screws or round-head wood screws. Obviously, you shouldn't put any screw where it will get in the way of a blade or bit. For example, my tenoning jig fits over the tablesaw fence, but I made very sure that the screws holding it together are above any blade-height setting. And, obviously, don't use a round-head screw where it might prevent part of the jig from sitting flat, pivoting, or sliding smoothly.

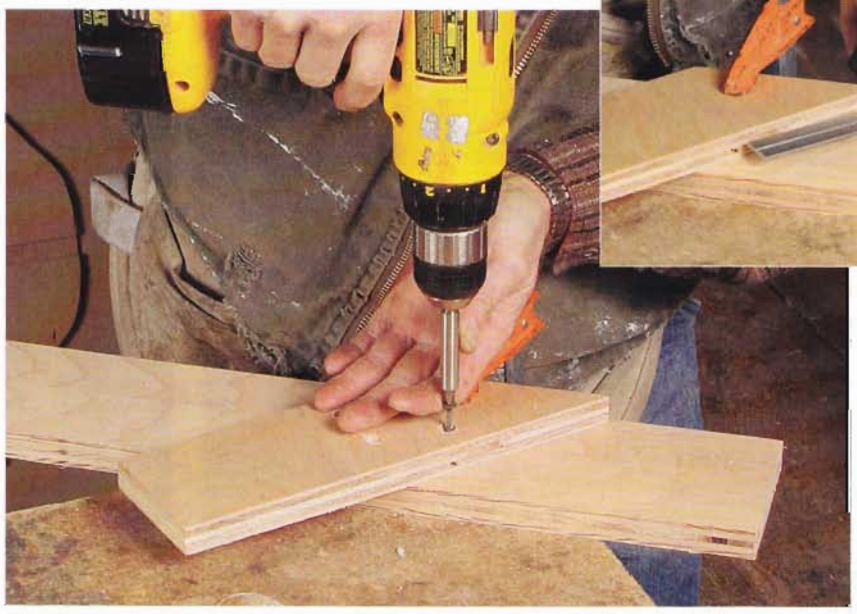
Some jigs slip out of adjustment over time, and you can't always tighten screws enough to bring the jig back into line. On my crosscut jig, for instance, I bolted the fence to the sled. That leaves a little wiggle room for adjustment, and makes it easy to crank down hard on the bolts, both when building the sled and when it needs to be realigned.

Quick and strong. *Drywall screws and yellow glue are fine for most jigs. Use bolts for extra strength and adjustability. A brad nailer can help keep parts aligned during glue-up.*

Glue for keeps. *For jigs that will see repeated use, glue the components together.*

Pinned down. *A few strategically placed brads keep the parts from shifting during glue-up.*

Wiggle room. *Use bolts and slightly oversize holes when you need room for adjustment, such as on this crosscut-sled fence.*



Clamp in place. *Clamp components together to ensure that they are properly aligned (above). Keep components clamped as you drill holes and drive screws (left) to be sure the pieces don't shift.*

The right hold-downs

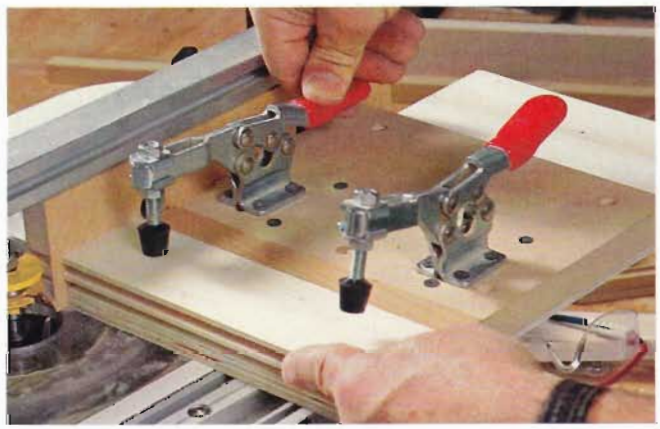
Many jigs are designed to work with some type of clamp to hold the jig down on the bench or on a workpiece, to hold a stop block on the jig itself, or to hold a workpiece in place. There are several types of clamp you can use. But always make sure there's no way in the world that the clamp can be nicked by a blade or cutter. And if the clamps will double as handles, be sure you position them where they keep your hands out of harm's way.

Standard C-clamps or F-style bar clamps work great, especially for holding a jig in place. They're easy to adjust and provide plenty of clamping pressure. When I need only a little holding power—to secure a stop block, for example—I'll use spring clamps. For the ultimate in low-tech clamping solutions, use opposing wedges to clamp your work in place.

For holding workpieces in place, as on a tenoning jig or template-routing jig, DeStaCo-style toggle clamps are the ticket. Screw these in place or mount them in T-tracks screwed into slots routed into the jig base for clamping pressure exactly where you need it. There are several types of toggle clamps available, so pick the one that best suits your needs.

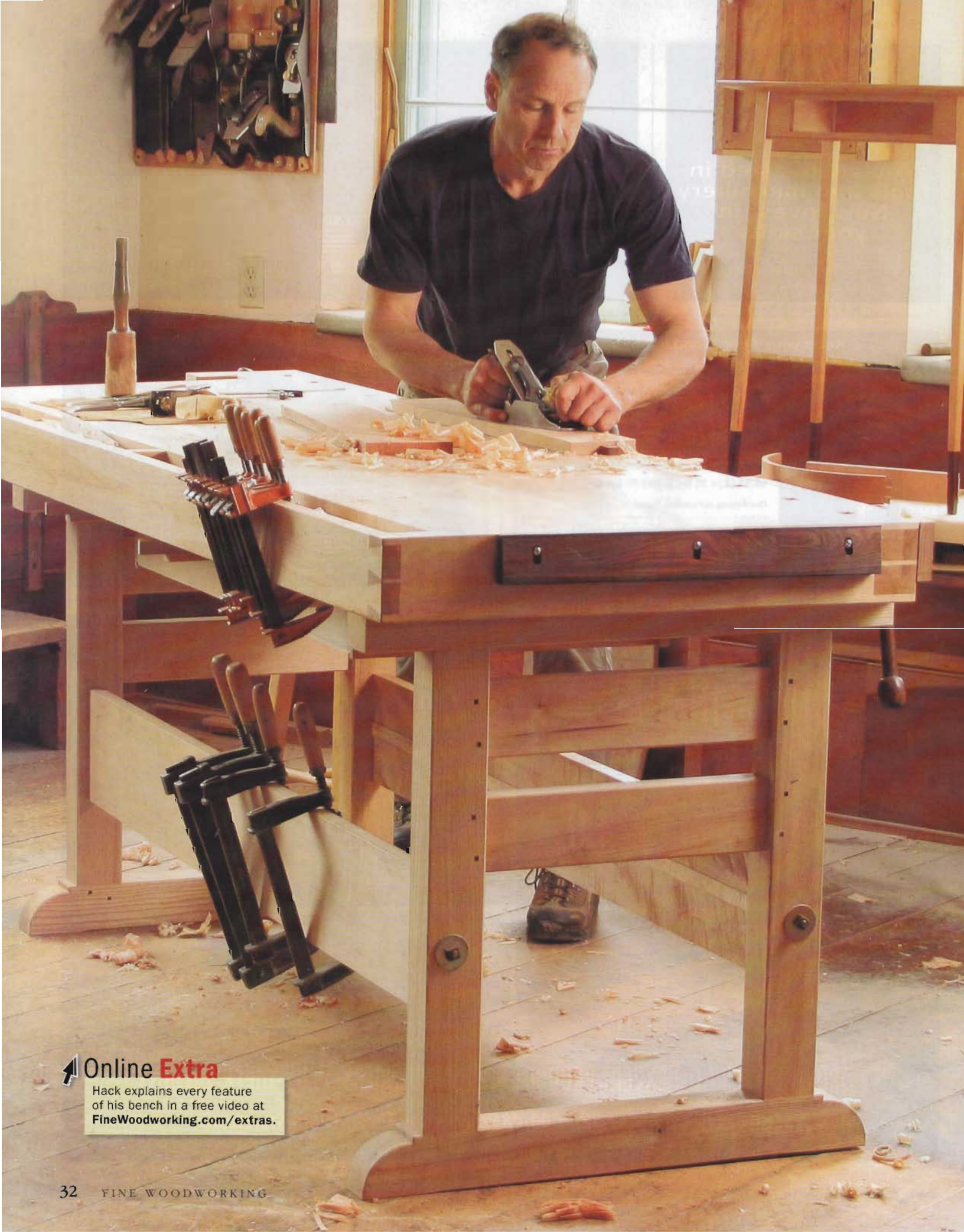
Extra hands. *Hold-downs go where your two hands can't, or shouldn't. These four will handle most of your needs.*

Spring action. *A spring clamp often provides enough holding power to keep something from shifting.*



Double duty. *Toggle clamps hold the workpiece in a jig and provide convenient hand-holds.*

Low-tech hold-down. *Opposing wedges can be an effective way to hold a workpiece in place in a jig like this router mortising box.*



Online Extra

Hack explains every feature of his bench in a free video at **FineWoodworking.com/extras.**

A Workbench 30 Years in the Making

Hand-tool expert designs his second bench, based on everything he's learned

BY GARRETT HACK

When I built my first bench well over 30 years ago, I had limited furniture-making experience, so I adapted the design from some benches I had used in various classes. That first bench has been a solid friend in the shop for many years. But as my experience level increased, I kept a mental list of improvements I'd make if I were to build a new one. I recently said as much in a lecture at Colonial Williamsburg, and *Fine Woodworking* decided to pay me to stop procrastinating.

Over the years, I've developed a love of hand tools. I use them in every aspect of furniture making, and details made with these elegant tools are a signature of my work. So my first priority was to make the new bench better suited to my hand-tool habits.

What makes a bench work

In building this bench, I wanted a tool that would withstand the daily stresses heaped upon it, and the materials and design reflect that approach. A bench can be fashioned with humble materials (any dense and stable hardwood will do) and basic joinery and work very well.

Add beef—The benchtop is big enough to clamp a large case piece in almost any arrangement, with room for many tools, and it's thick and sturdy. The base of the bench can hold a heavy load (the top weighs more than 200 lb.), but more importantly, it's rigid enough to withstand the racking forces created by handplaning.

At 35 in. tall, my bench will work for a wide range of tasks, from handwork to machine work to assembly jobs. But I'm over 6 ft. tall. You may have to experiment to find a comfortable height.

Lots of ways to hold work—Because I do a lot of handwork, I need surefire ways to hold workpieces. In my experience, the best tools for the job are a front vise and a tail vise, used in tandem with benchdogs and a holdfast. Finally, I added a sliding stop at the left end. It can be set high or low and is useful for planing panels, thin drawer bottoms, tabletops, or multiple parts.

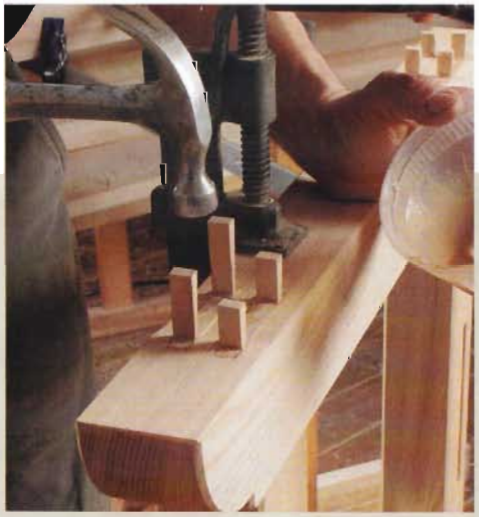
Build the top on a pair of strong horses

The top looks like a bunch of 12/4 planks glued together, but it's actually three layers of 1-in.-thick boards. This design is very stable so it will stay flat,

Base is rock-solid

To withstand the rigors of handplaning, the base is made from thick hardwood stock and held together with sturdy joinery.

Peg the short rails. *The trestles are assembled with beefy mortise-and-tenons. The rails are reinforced with hardwood pegs.*

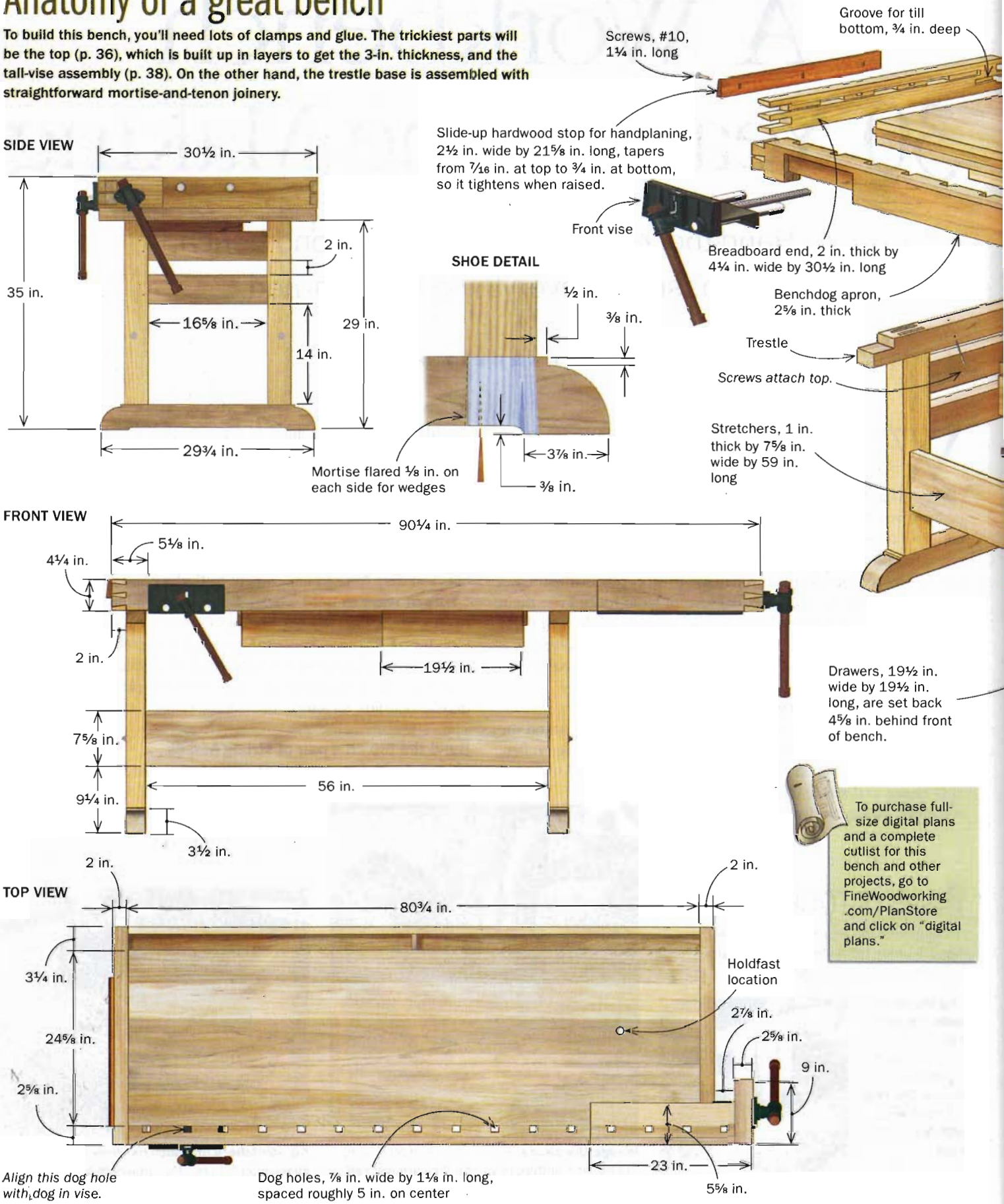


Wedge the shoes. *The mortise-and-tenons in the top and bottom of the trestles are wedged.*

Big stretchers. *Threaded rod gives a secure connection between the stretchers and trestles.*

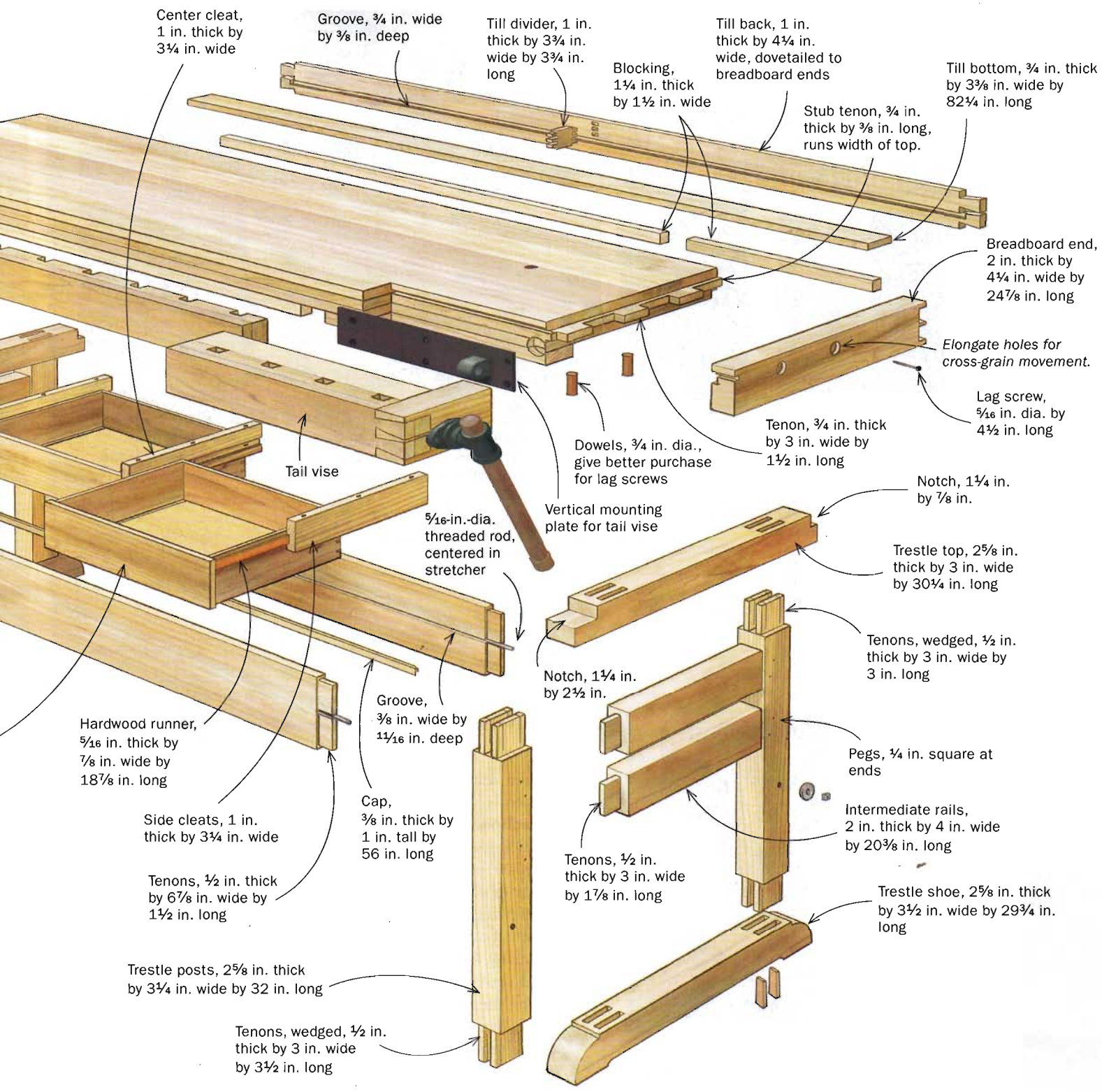
Anatomy of a great bench

To build this bench, you'll need lots of clamps and glue. The trickiest parts will be the top (p. 36), which is built up in layers to get the 3-in. thickness, and the tail-vise assembly (p. 38). On the other hand, the trestle base is assembled with straightforward mortise-and-tenon joinery.



To purchase full-size digital plans and a complete cutlist for this bench and other projects, go to FineWoodworking.com/PlanStore and click on "digital plans."

Photos: Thomas McKenna; drawings: David Richards



and it's an economical way to use materials. I used hard maple, yellow birch, and beech, dedicating the best of the maple to the top layer and the breadboard ends, and using narrower and somewhat lower-quality material for the middle and bottom layers.

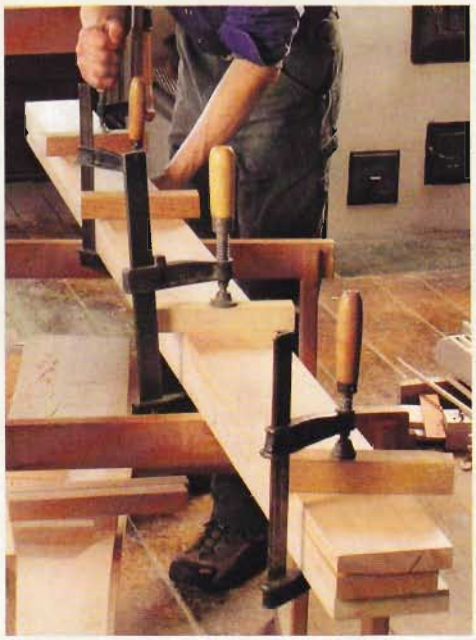
Glue up the top one section at a time. To make the job less stressful, I recommend Unibond 800, a slow-setting urea-formaldehyde glue (www.vacupress.com) typically used in vacuum veneering. Once you have the top glued together, use a circular saw to trim the benchtop to length. Clean up the edges with a scraper and a handplane, and flatten the top. When the top is flat, rout the rabbet for the till bottom on the back lower edge.

Make the benchdog apron—The benchdog apron is laminated from two pieces. After gluing the pieces together, lay out and cut the mortise for the front vise hardware in the apron; depending on the vise, you may need to cut a hollow under the top to accommodate the hardware. Once that's done, use a dado set to cut the dog holes. Attach the vise's rear jaw to the apron

Tackle top in sections

Assemble the benchtop in sections on a pair of sturdy sawhorses. Offset the pieces in each section to create a strong tongue-and-groove interlock and guarantee alignment.

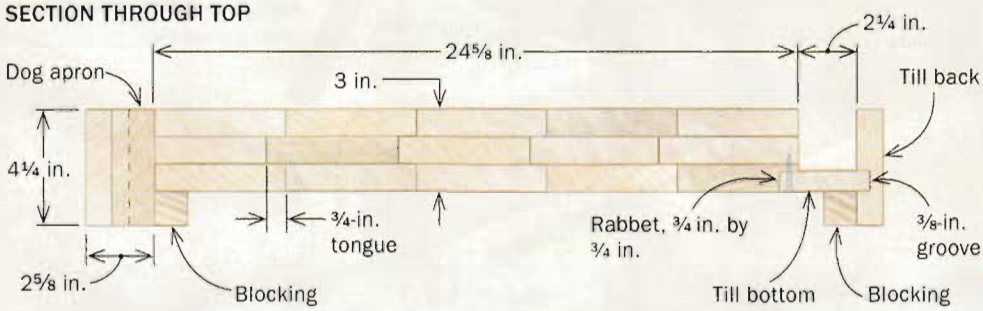
TONGUE-AND-GROOVE TRICK



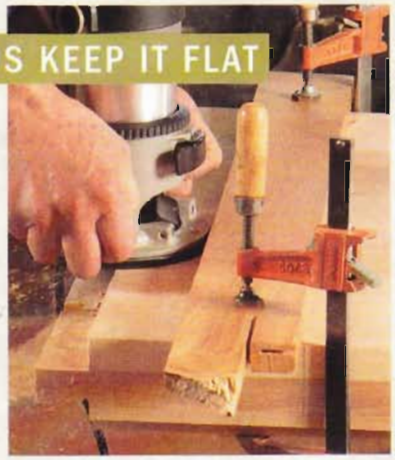
First section kicks it off. *Glue the first three boards together, then let the assembly dry. Clean up squeeze-out so it won't interfere with the following section.*

Three boards at a time. *After the glue dries from each previous section, add the next three boards, applying glue to all mating surfaces. Clamp across the faces and edges. Repeat until the whole slab of the top is assembled. You'll need lots of clamps. Use cauls to keep the assembly flat.*

SECTION THROUGH TOP



BREADBOARDS KEEP IT FLAT



How to handle big breadboards. *After mortising the breadboard pieces, cut the tongue and tenons on the top. Use a router and fence to make the cheek cuts and a handsaw to remove the waste between the long tenons. Clean out the corners with chisels.*

and then set the piece aside as you start working on the breadboard ends.

Breadboard ends are next—Cut the breadboard ends to width and thickness but leave them a bit long. Cut them to size after you lay out and cut the joinery to attach them to the benchtop. At the rear of each breadboard, rout the groove for the till bottom; it should align with the rabbet in the benchtop. Then drill holes for the lag screws that will help anchor the breadboards to the top. Finally, lay out and cut the dovetails.

Use a router and fence to cut the tenon cheeks on the ends of the top. Then lay out and cut the long tenons that will go deep into the breadboards. Clean up the inside corners with a chisel, and fine-tune the fit using handplanes.

Once the breadboards have been fitted, drill the pilot holes for the lag screws. To give the screws extra purchase (so they don't just go into weak end grain), I mortised hardwood dowels from under the benchtop, in line with the pilot holes.

Attach the breadboards, apron, and till—Start by gluing the apron to its breadboard end. Then apply glue to the apron and front edge of the benchtop. Screw on the breadboard end, and clamp the apron in place, working from the corner out. Don't worry about exactly where the apron ends; you'll be notching out that end of the benchtop for the tail vise. Finally, install the other breadboard end.

The apron frames the top

To allow for wood movement, the breadboard ends are tenoned to the top, with lag screws cinching the parts. Use slow-setting urea-formaldehyde glue everywhere else to buy time for fine-tuning.

Start at the front left corner. *Connect the breadboard to the apron (left). Then apply glue to the breadboard tenons and to the interior face of the apron. Go lightly to avoid squeeze-out into the dog holes. Clamp the breadboard in place to help support the long dog apron (upper right), then drive in the lags. The right-hand corner of the top (reversed in lower-right photo) will be notched for the tail vise, so there's no need to make the dog apron the full length of the bench.*

The till goes on last. *Screw the till bottom into its rabbet under the top. Glue the divider in the till back, then glue the assembly to the breadboard ends and the top.*

After the glue cures on the breadboard ends and the benchdog apron, install the till parts and 1x blocking underneath, which increases stiffness and gives better clamp purchase.

Assemble the base—Once the top has been glued together, build the trestles and make the stretchers of the base. Before gluing and wedging the top of the trestles, notch both ends to go around the benchdog apron in front and the till in back.

Add the tail vise

Building a smooth-working tail vise can take nearly as long as building the benchtop or base. The work is worthwhile because a tail vise is unmatched at holding work flat on the benchtop between dogs. Have the hardware in hand before you start and make a full-scale drawing of the whole assembly to make layout easier. Use a circular saw and hand tools to cut a notch in the benchtop for the vise, and tune the vertical surfaces square with the top. Rout the groove for the top plate (see top photo, p. 38) a bit oversize to provide a little clearance and leave room for adjustment, if needed. Now attach the vertical mounting plate to the bench (with only two screws so you can adjust it later if need be), aligned with the top-plate slot and perfectly parallel with the benchtop.

The core is key—The core of the vise accommodates the screw and nut, and is laminated from two pieces. Before gluing them together, hollow out the interior of one piece with a core-box bit

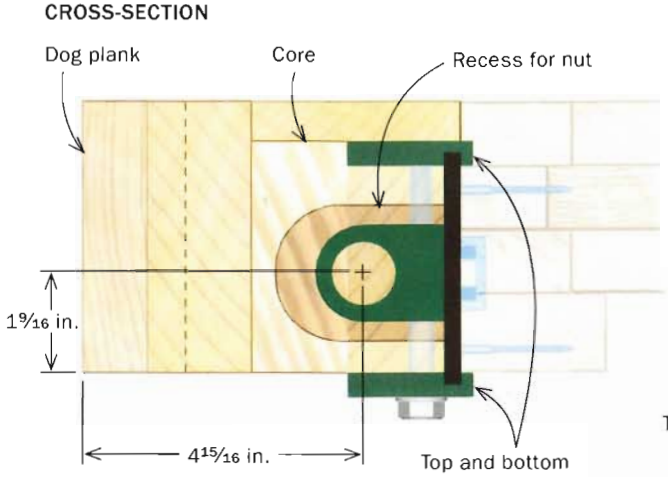
Tail vise is a worthwhile challenge

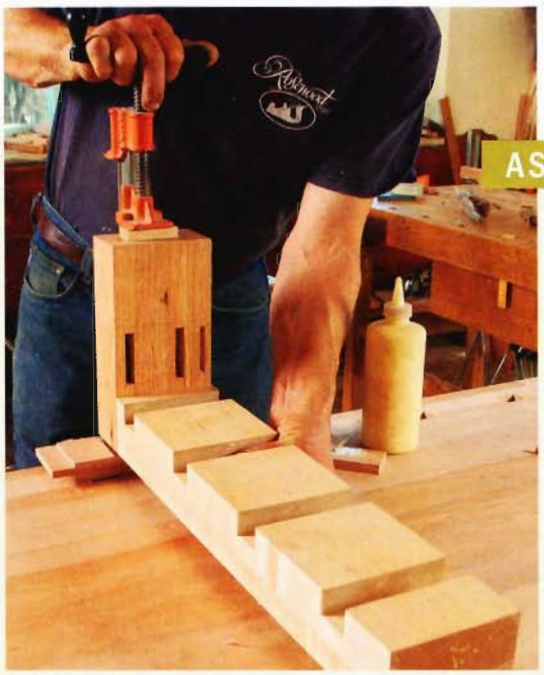
Hack begins by notching out the front right corner of the benchtop. The vise design uses readily available steel hardware for the mechanical parts ($80; Woodcraft #144807), housed in a shopmade wooden sliding jaw.

CHECK THE ACTION OF THE HARDWARE

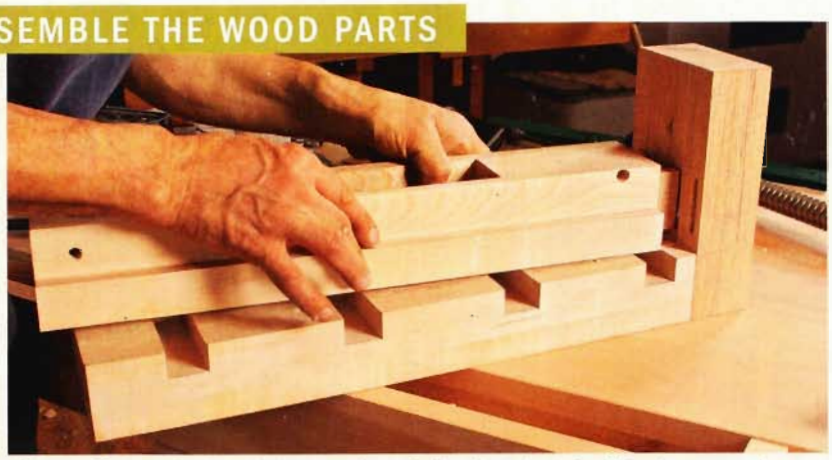
Make way for the top plate. *Use a three-wing slot cutter to rout a groove parallel to the benchtop to house the top plate. The vertical board tacked in the corner acts as a spacer to prevent the bit from cutting too far.*

Attach the vertical plate. *Clamp the bottom plate in place. Align the top of the vertical plate with the groove, drill pilot holes, and drive in the top screws. Now attach the top and bottom plates and try the sliding action.*





ASSEMBLE THE WOOD PARTS



Glue up the parts. *Dovetail the end cap to the dog plank first. Next, remove the top and bottom plates from the core and glue it to the end cap and to the dog plank. Try not to get a lot of squeeze-out inside the dog holes.*

and router. The other piece has a rectangular section removed with a saw. Glue these two pieces together and let them dry.

Now make the dog-hole plank and dovetail it to the end cap. Cut two mortises in the end cap and mating tenons on the end of the core, for alignment and added strength. Also, cut the shallow mortise into the end cap and a tenon on the end of the top cover. Cut a shallow rabbet in the top edge for the top guide plate.

Attach the top and bottom guide plates to the core and slide it onto the plate on the bench. Test the action—there should be little wiggle when you lift the front edge, and the core should move parallel to the bench. If the guide plates grip the steel plate on the bench too tightly, the core movement will be stiff. Shim the bottom guide plate with a piece of veneer or a business card. If you have lots of wiggle, the plates need to be tighter together, so deepen the rabbet for the top guide into the core slightly and retest.

Add the dog plank and top—When the core moves smoothly, remove it from the bench. Now glue the dog-hole plank and end cap together and to the core. Mount the assembly to the benchtop, adding the last screws to the mounting plate. Thread in the lead screw and fasten the flange to the end cap and test the vise action. Finally, install the top piece, which is tenoned into the end cap and glued to the top of the core.

Final details

Now finish the surface prep on the benchtop. Bring all surfaces flush and smooth using handplanes. I chamfered all edges with a block plane. Add the slide-up stop on the end of the bench, install the drawers, and make a couple of handles for your vises. Last, finish the top with two coats of boiled linseed oil. □

Longtime contributing editor Garret Hack loves his new bench.

FINAL ASSEMBLY

Mount the wood jaw to the hardware. *Be sure to clean up the wood parts to remove any glue squeeze-out that could interfere with the assembly (above). Thread the bolts through the core, and then screw each plate to the core. Glue the top cover to the core and to the end cap (below).*

Top 10 Tools for a Tough Economy

Editors, experts uncover today's best values

It never fails. Put a few woodworkers in the same room for an hour and, almost certainly, the talk gravitates toward favorite tools. And at *Fine Woodworking*, there are always a few woodworkers in the same room, so the discussion happens daily.

With that in mind, we thought readers might like to know which tools are our favorites. We asked staff editors, contributing editors, and regular contributors to tell us about the tool they'd hate to lose.

We had only two rules: The tool had to be a relatively new one, so readers could find it easily in a store or online. And, because our current economy is less than robust, we asked them to make sure the tool was also a good value.

Not a featherweight. *The Magswitch featherboard uses super-strong magnets to attach to the saw table. Because it doesn't rely on clamps or the miter slot, it can be mounted anywhere on the table.*

Go-anywhere featherboard

Ripcuts, especially narrow ones, can be dangerous because you have to hold the workpiece firmly against the fence while pushing it through the blade. One slip-up, and the blade can catch the piece and kick it back at you, potentially pulling your hand into the blade. A featherboard makes the task safer and easier. Positioned just in front of the blade, a featherboard keeps the workpiece firmly against the rip fence. With the featherboard on duty—and with a splitter behind the blade—there's no need to put your fingers anywhere near the blade.

A featherboard can be made in the shop without much fuss. But clamping it to the top of the tablesaw is always a challenge. You can buy versions that lock into the miter-gauge slot, but they can't be used when the workpiece is narrower than about 2½ in.

My favorite featherboard option, by far, is the relatively new Magswitch Magnetic Tablesaw Featherboard. It features a pair of powerful magnets that hold the featherboard anywhere on the tabletop (it doesn't work on aluminum or granite). Place the featherboard where you want it, then turn the two knobs clockwise to lock it in place in an instant. Removing the featherboard is just as quick.

The Magswitch Magnetic Tablesaw Featherboard sells for about $55. Go to www.magswitch.com.au for more information. It is available from numerous woodworking retailers, including Woodcraft (www.woodcraft.com).

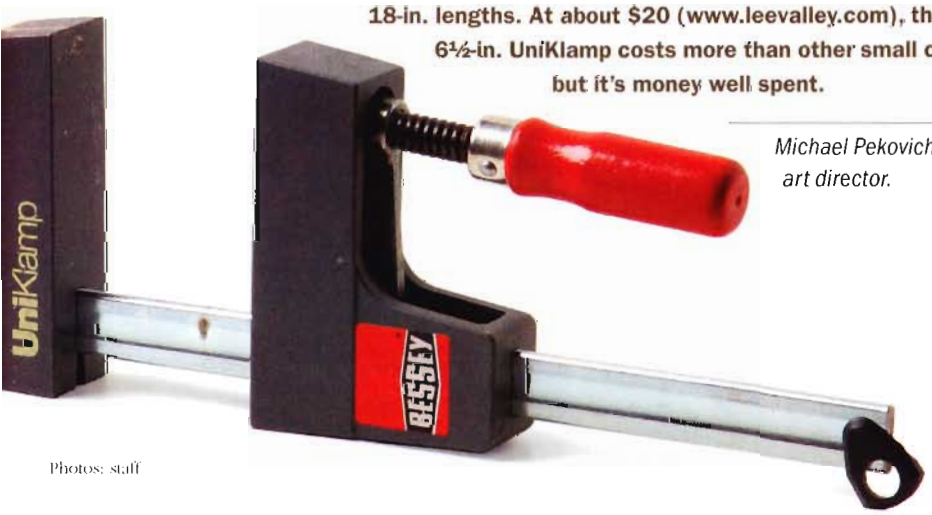
Tom Begnal recently retired from Fine Woodworking.

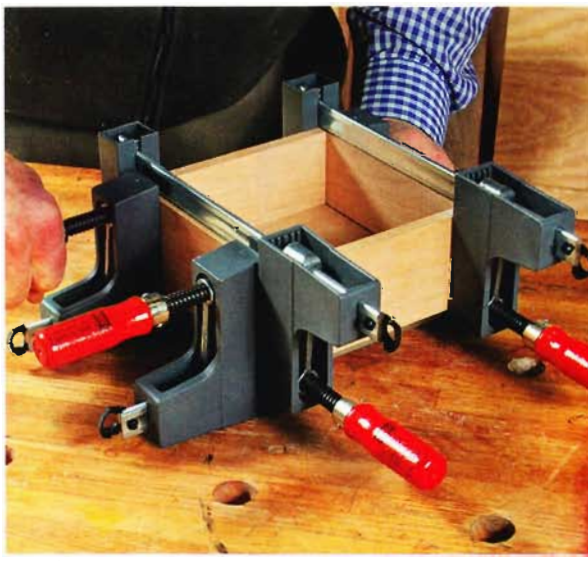
Small parallel clamp works great

Whenever I needed a short clamp, my first choice used to be a small bar clamp or a one-handed, Quick-Grip-style clamp. Either one got the job done, but the pads could be a problem. The small pivoting pad on my bar clamp would sometimes shift out of position as I tightened the clamp, or it would mar the workpiece. The squishy pads on my Quick-Grip-style clamp tended to shift parts out of alignment during a glue-up.

Recently, I replaced those clamps with the UniKlamp, a light-duty parallel-jaw clamp from Bessey. The UniKlamp has added precision to my glue-ups and removed a lot of the stress. It's easy to adjust, and the broad, flat jaws offer plenty of even pressure without shifting or denting the work. No longer do I fuss with clamp blocks while my workpiece slips and slides. I prefer the 6½-in. clamp, but it's also available in 12-in. and 18-in. lengths. At about $20 (www.leevalley.com), the 6½-in. UniKlamp costs more than other small clamps, but it's money well spent.

Michael Pekovich is the art director.





Precise glue-ups. *The Bessey UniKlamp puts all the benefits of a parallel-jaw clamp in a small, lightweight package.*

Photos: staff

The last bandsaw you'll need

A 14-in. bandsaw is the most common size we see in home shops. These machines typically have the perfect package of power, performance, and affordability for most woodworkers. Many of the latest models also have more resaw capacity.

Of the saws I reviewed in 2007 (*FWW* #193), I thought the Grizzly G0457 (www.grizzly.com) was the best value. The price has since gone up to $895, but it's still a great price for what you get.

The saw has a large table (19¾ in. by 14 in.) and a 2-hp motor. But what sets it apart from many other 14-in. saws is a resaw capacity of more than 10 in. Resawing saves money, letting you get a number of thin boards out of a thick one, and frees you from standard lumberyard thicknesses.

The G0457 not only makes resawing accurate and easy, but it also handles both tight and gradual curves with aplomb. For most woodworkers, the G0457 is the last bandsaw you'll ever need.

Tom McKenna is the senior editor.

Resaw beast. *The Grizzly 14-in. bandsaw comes with a tall fence and plenty of muscle to resaw wide stock.*

Perfect router for router tables

It seems as if the Triton 2¼-hp plunge router was made to be used upside down—in a router table, that is. This powerful router allows above-the-table bit changes and height adjustments, eliminating the need to buy an expensive router lift or a commercial router table.

Although coarse height adjustments can be made quickly under the table, the above-table crank works so well that I make all my adjustments with it. What's more, there is no slop in the height adjustment, which means I don't need to tighten the motor lock from under the table to maintain bit height.

However, there is one small annoyance: The spindle lock that allows single-wrench bit changes also locks the power switch in the off position. I have to reach under the table to turn it back on after every bit change. But I overlook this because I saved so much money by not having to buy a router and a lift. The router sells for about $210 at Woodworker's Supply (www.woodworker.com).

Matt Kenney is an associate editor.

Crank and lift. *The Triton comes with its own lift system for above-the-table height adjustment and bit changes.*

One finish that does it all

If I could have only one finish, it would be Zinsser's SealCoat Universal Sanding Sealer. This premixed 2-lb. cut of blond shellac is dewaxed and thus compatible with any finish applied before or after it.

SealCoat works as a sealer on bare wood before applying a clear finish, as a stain controller on blotch-prone woods such as cherry, and as a clear finish. It can be sprayed, brushed, or wiped on. Dry to the touch in 10 minutes, it's perfect for dusty shops, and can be recoated in an hour. Unlike shellac from flakes, SealCoat is ready once you open the can, and its shelf life is at least three years versus about six months for dissolved flakes. Priced at around $11 a quart or $33 a gallon, SealCoat is available at hardware stores and home centers.

Mark Schofield is the managing editor.

Dirt-cheap dovetail saw cuts like a champ

There are lots of great high-end dovetail saws, both Western-style and Japanese, that cost from $40 to well over $100. But I've found a cheap saw that cuts dovetails as well as any expensive saw I've used. The Zona Universal Fine Kerf Razor Saw (No. 35-500) sells for $6.50 (replacement blades are $1.50). It cuts on the pull stroke, has 32 teeth per inch, and produces a super-thin kerf (0.010 in.). Visit www.zonatool.net. for more information.

Anissa Kapsales is an associate editor.

Wixey Digital Angle Gauge does the math for you

Every angle's the right angle. *The Wixey Digital Angle Gauge measures angles precisely for all kinds of machine setups, including tablesawn miters.*

Useful for hand tools, too. *The gauge helps position chisels and plane irons at the correct angle in a honing guide.*

If the Wixey Digital Angle Gauge cost three times as much, I'd still buy it and consider it a great value. This handy gadget measures angles to within 0.1° and displays them in digital format.

The Wixey's strong magnet lets it mount to any ferrous metal surface. That makes it great for machine setups, such as setting the blade on a tablesaw or miter saw, the fence on a jointer, or the table on a bandsaw or drill press.

I also use the Wixey when sharpening chisels or plane irons. With it, I can determine pre-existing bevel angles, set up the grinder tool rest, and set tools at the correct angle in a honing guide. In furniture work, angles, tapers, and bevels are all made simpler with the Wixey, which sells for $40 (www.rockler.com).

Chris Gochnour is a regular contributor.

Buy a rip blade for joinery cuts

Combination sawblades create a kerf with shallow "ears" at the corners of the bottom. That's fine for most cuts. But sometimes, like when cutting an exposed groove or dado, I want a kerf with a square bottom. That's when I replace my combination blade with a rip blade.

On rip blades, the tops of the teeth are ground flat, so the bottom of the kerf ends up flat, too. So, when making a stub-tenon frame, there's no need to square the bottom of the groove with a chisel. Slots for key splines, which are cut across the corners of miter joints, also look great. Rip blades cost about $30 to $70. Look for them wherever tablesaw blades are sold.

Gary Rogowski is a contributing editor.

Ideal for tablesaw joinery. *The rip blade's teeth are ground with no rake across the top, leaving a cut with a flat bottom, ideal for dadoes and grooves.*

Sander offers unmatched versatility

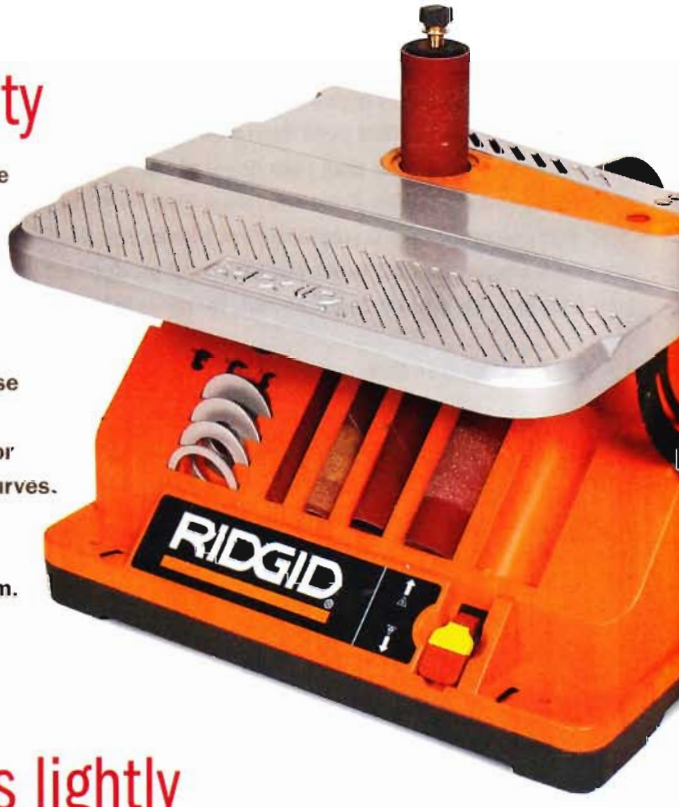
For sanding curved edges, especially inside curved edges, an oscillating spindle sander is my first choice. Because the drum both spins and goes up and down, you end up with fewer scratches and the sandpaper lasts longer.

I especially like the Ridgid Oscillating Spindle Sander because it also quickly converts to a 4-in. by 24-in. oscillating belt sander for working flat edges and outside curves.

The Ridgid is sold by The Home Depot ($200). For more information, go to www.ridgid.com.

T.B.

Spindle sander handles curves and flats. *The Ridgid oscillating spindle sander is great for curved work. It offers a belt-sanding attachment for flat edges and outside curves.*

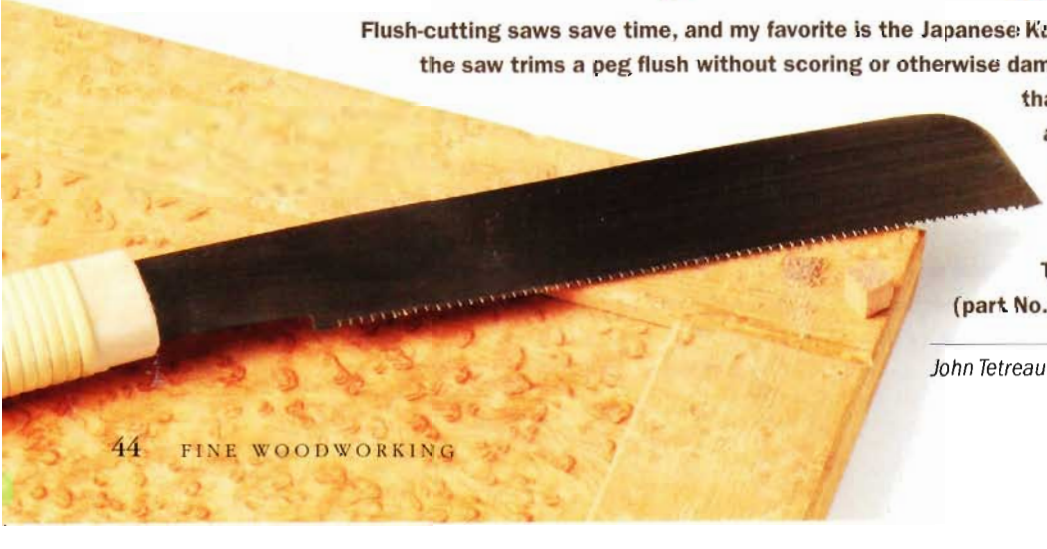


Flush-cutting saw treads lightly

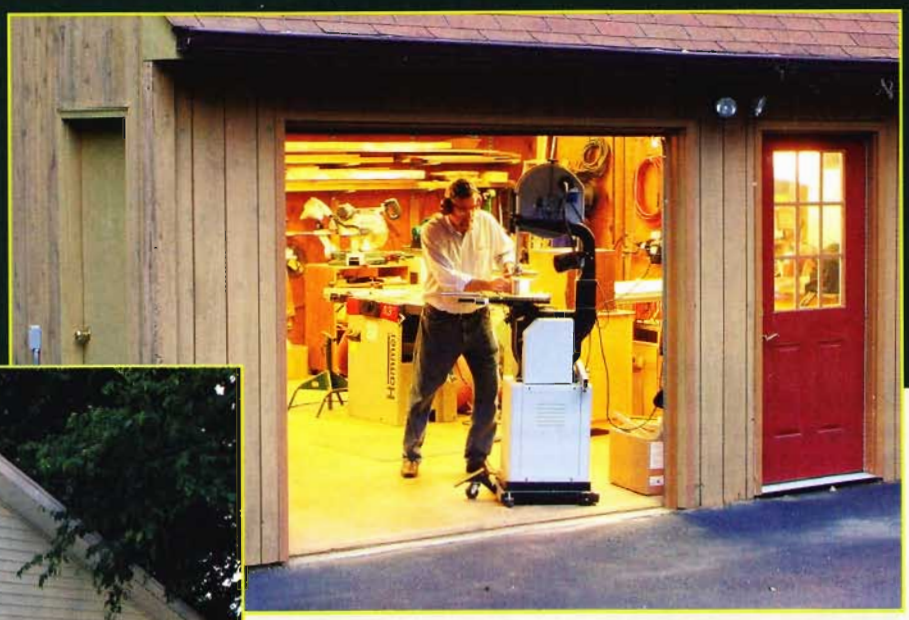
Flush-cutting saws save time, and my favorite is the Japanese Kugihiki. With its fine teeth (22 tpi), the saw trims a peg flush without scoring or otherwise damaging the adjacent surface. All that's needed to perfect the surface is a quick swipe with a block plane. A flush-cutting saw is only used to cut small pieces of wood, so it stays sharp for a very long time.

The Kugihiki is available at Woodcraft (part No. 12F24) for about $27.

John Tetreault is an associate art director.



3 Paths to a Stand-Alone Shop



Smart designs for a detached, dedicated shop that fits your work and your budget

BY MATT KENNEY

It's possible to build furniture just about anywhere—I've done it in an attic and on a narrow balcony—but it's more enjoyable and easier in a shop dedicated to woodworking. You don't have to pack up your tools and projects at the end of the day or work around a lawn mower, bicycles, or cars.

The good news is that it's not as difficult as you might think to have a dedicated shop. The three shops featured here are great examples of how it can be done on a variety of budgets. And all of them are detached from the house, which minimizes the amount of dust and noise that make it into the living space.

Matt Kenney is an associate editor.

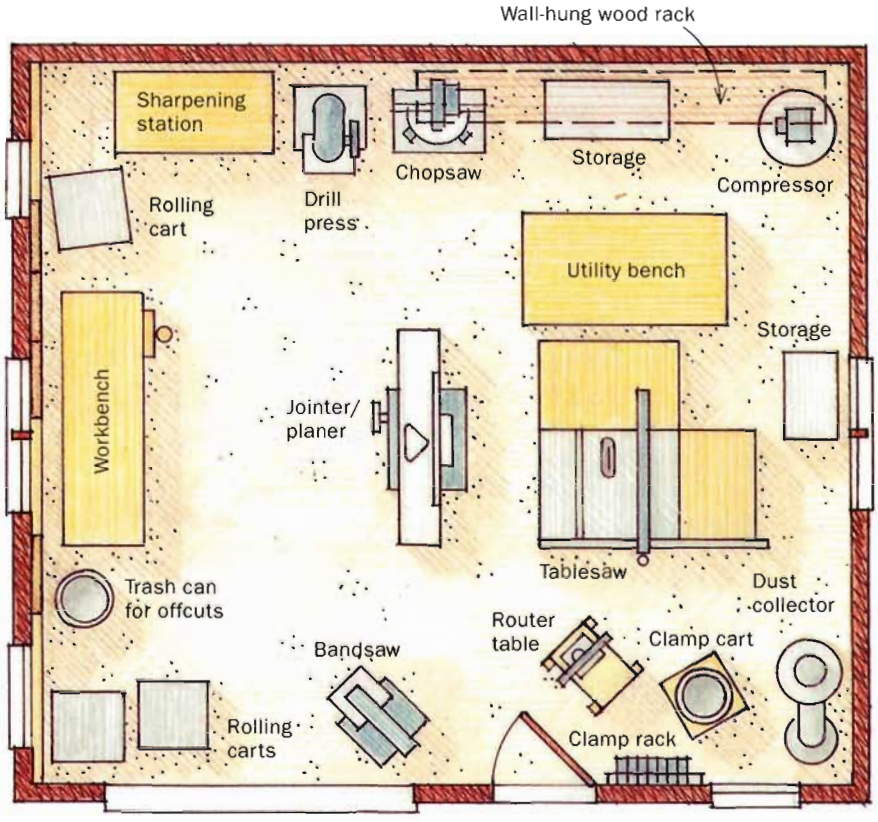
1 Convert a garage

No cars allowed. *A single overhead door is the only hint that Burkin's shop was once a two-car garage. He kept it because it's great for bringing materials into the shop and furniture out.*

When looking for a new house, Anatole Burkin found one for sale that had two garages: one attached to the house for the cars, and a detached garage, which he knew would make a great shop. He jokes that he was sold on the house before he even took a look inside.

By using an existing structure for his shop, Burkin avoided the cost of constructing a new building. The only structural changes he made were to remove one of the overhead doors and replace it with an entry door and window. He also insulated the roof, hung a ceiling, and laid prefabricated wood tiles on the floor. All these changes help keep the shop warmer in the winter. At 440 sq. ft., Burkin's shop is cozy, but by paying close attention to workflow he was able to arrange all of his tools and workstations to make it feel bigger.

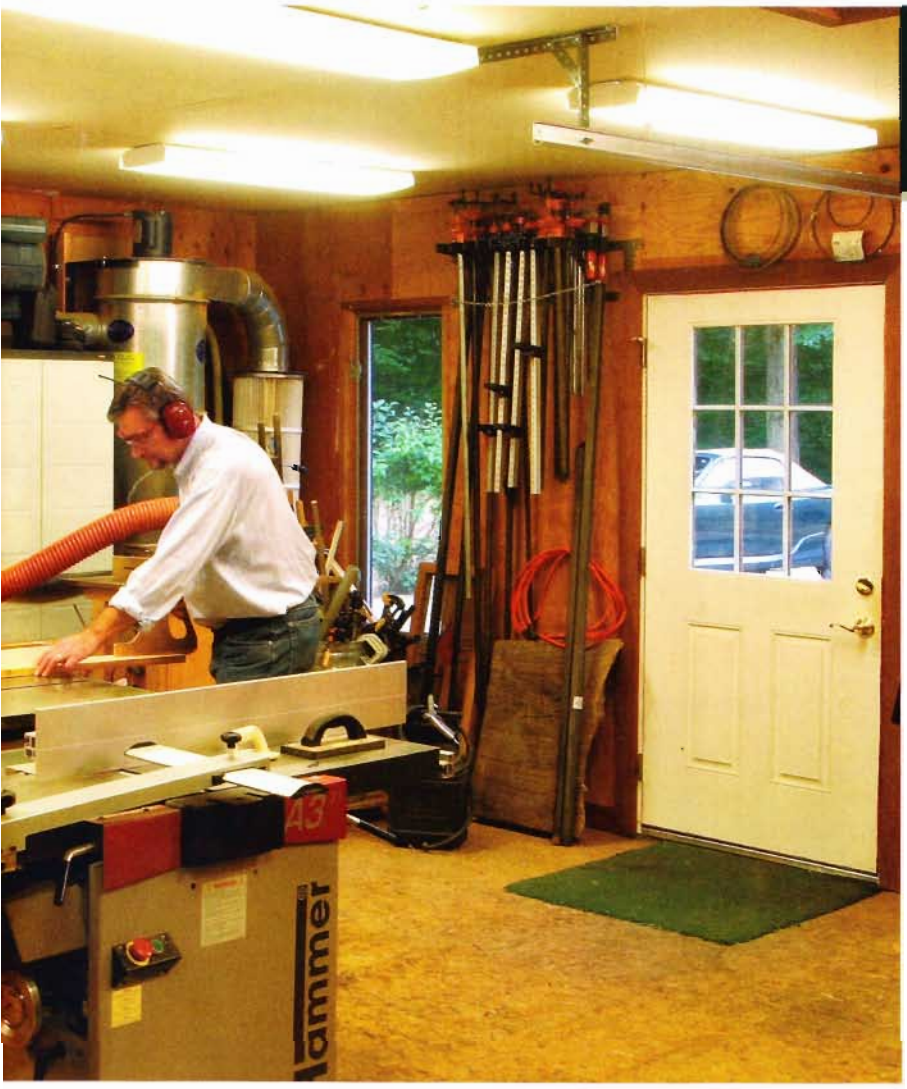
Efficient workflow maximizes space. *Grouped machines also save Burkin time and allow him to keep the dust hoses and duct-work together and out of the way.*



COMPLETE SHOP IN A SMALL SPACE

Although this shop is less than 500 sq. ft., Burkin laid out work areas in a smart way so it holds every tool a furniture maker needs.

Photos, except where noted: Matt Kenney; drawings: Vince Babak



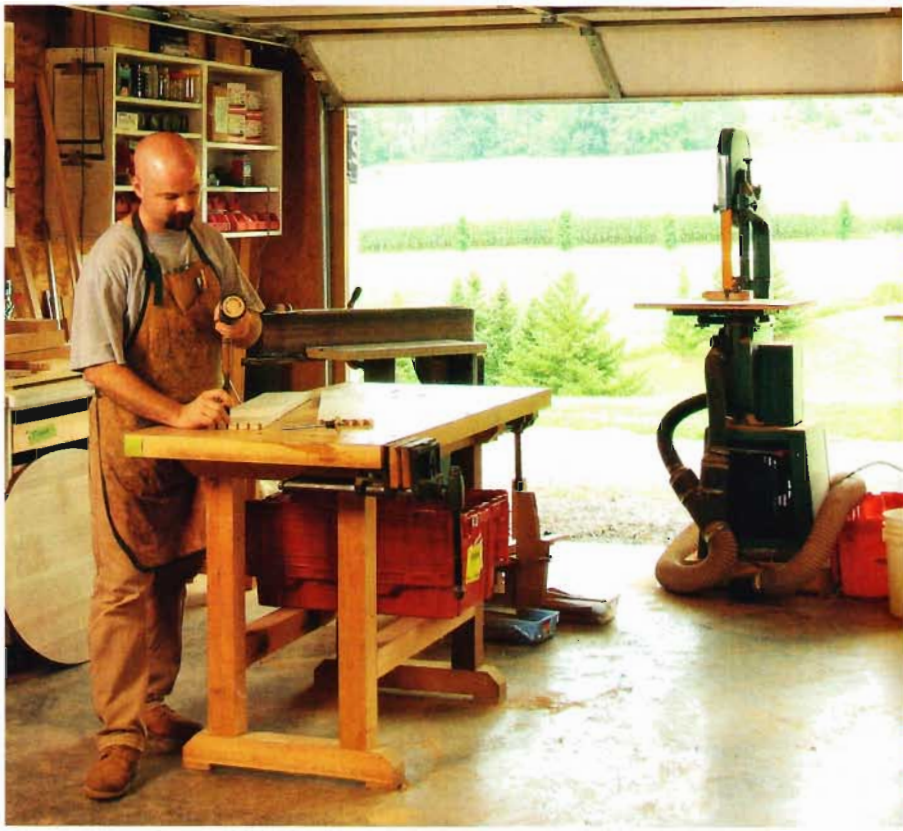
Rolling racks are versatile. *To make the most of the shop's wall space, Burkin used inline-skate wheels to create four rolling tool racks. They allow him to use the space in front of the windows without permanently blocking them.*

Mobile tools are there when he needs them. *When he doesn't, he pushes them against the wall to open up floor space.*

A place for bench work. *One side of Burkin's shop is reserved for his bench and hand tools.*

2 Build a garage shop with resale in mind

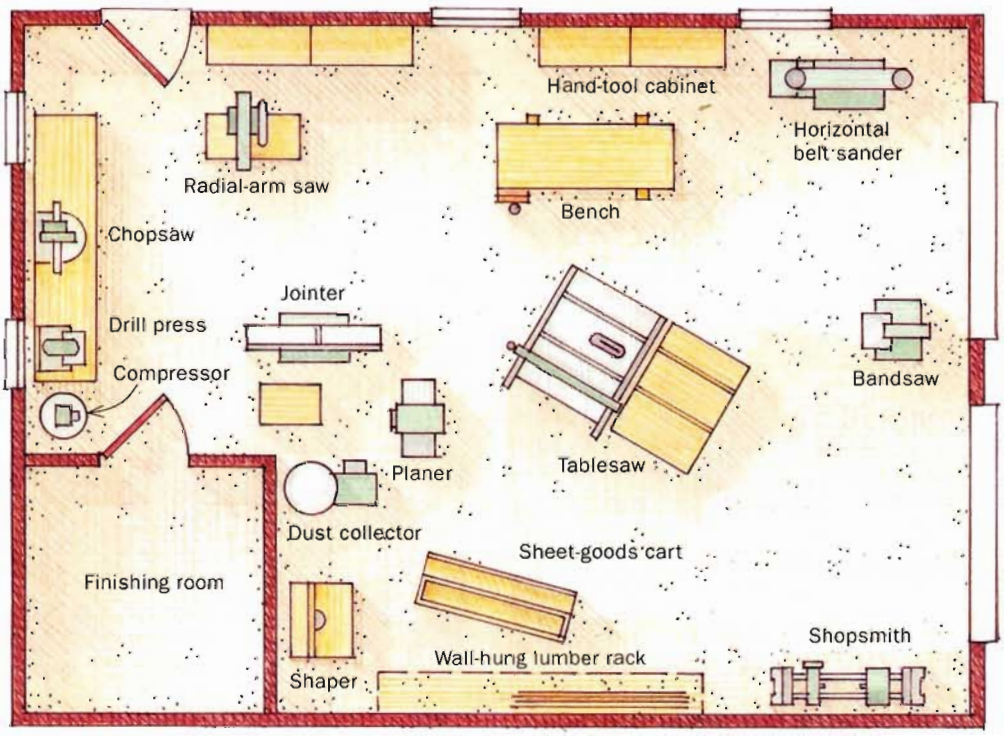
Easy conversion back to a garage. *Paolini knows that as his business grows, he might outgrow his home shop or sell the whole property. The oversize garage he built will easily house cars when it no longer houses his business.*



A place in the sun. *Paolini placed his bench alongside two south-facing windows, which let in light year round. Living in the South, he can open the overhead doors most of the year to let in an extra flood of light.*

Greg Paolini wasn't a full-time professional woodworker when he built his shop, but he knew that one day he would be. He needed a shop that would be big enough to run a business from, but didn't want to be burdened with a limited-use building if he ever outgrew it. That's why Paolini built an oversize two-car garage tailored to fit the needs of a professional furniture maker.

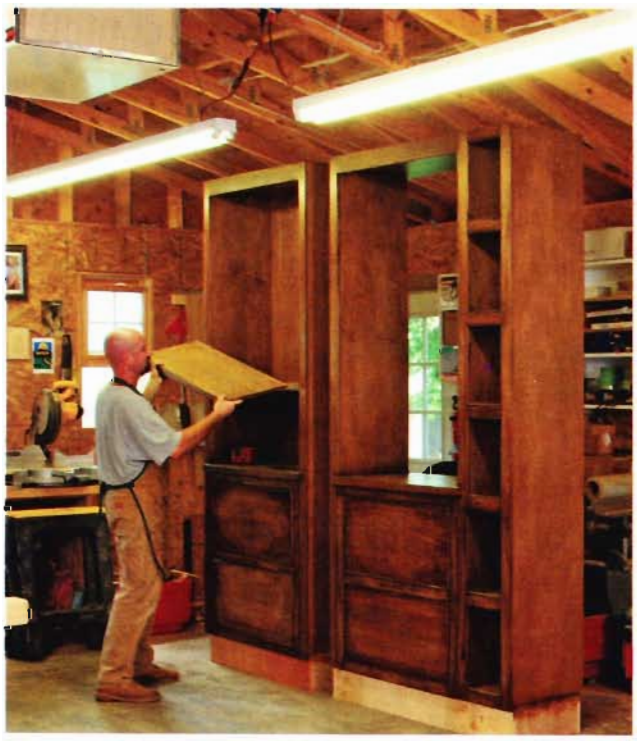
New construction is always expensive, but Paolini cut down on the expense by building a garage 24 ft. wide by 32 ft. deep, with studs 16 in. on center, which meant he didn't need to cut down any sheathing, insulation, or wall covering. He used attic trusses in the front for overhead storage and scissor trusses on the back half to get 11-ft. ceilings, space he needs to assemble large cabinets. But if Paolini ever moves his shop or sells the whole property, he would only need to remove his tools, and the garage would be ready for cars, bikes, and a lawn mower.



VERSATILE GARAGE SHOP

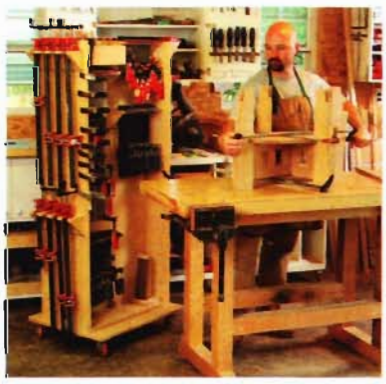
Spacious and filled with carts and tools on mobile bases, this shop can be reconfigured quickly to meet the changing needs of a professional cabinet maker.

Tablesaw takes center stage. *Paolini uses his tablesaw all the time, so it needs a central location and lots of space. He keeps just about everything on rolling carts so he can quickly clear out the area around it for cutting large pieces and assembling big cabinets.*



Tall work is no problem. *Paolini used scissor trusses on the back half of his shop. The extra height they provide lets him assemble very tall pieces.*

Sheet goods go on a rolling rack. *Offcuts are stored in bins to keep them organized and easy to find. Full sheets are stacked together, making it easier to sort through them and pull one out.*



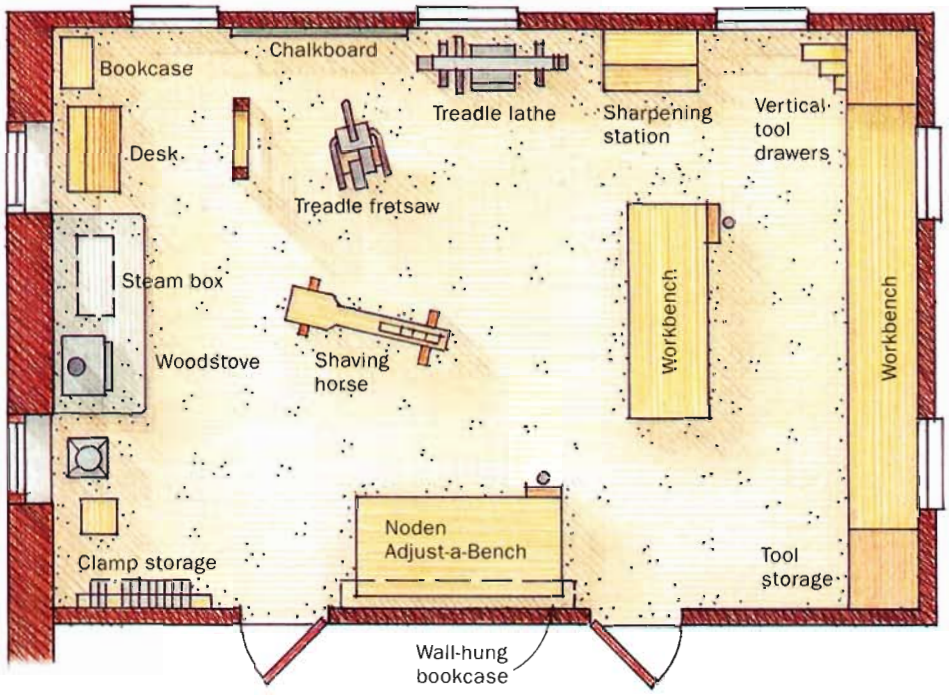
Clamp cart rolls, too. *Paolini saves time by always having clamps close at hand, rather than walking back and forth to a wall-hung rack.*

Timber frame creates dream shop. *To complement the pre-industrial charm of his home, Waters designed his timber-frame shop to look like a horse barn. The inside is beautiful, too.*

3 Or make no compromises

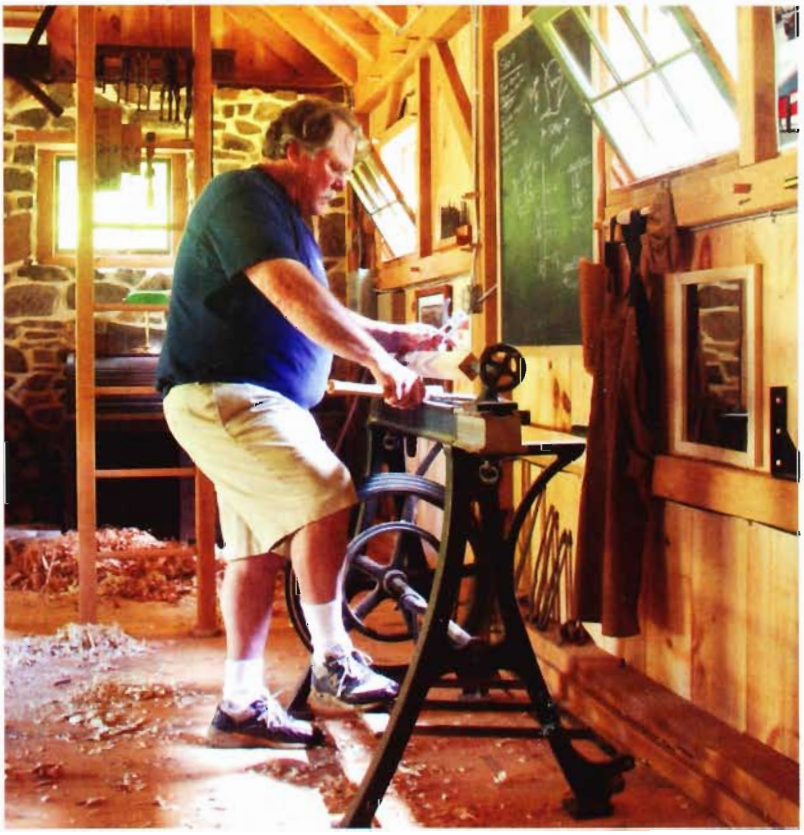
HAND-TOOL HAVEN

An emphasis on hand tools and man-powered machines led to this uncluttered but well-outfitted shop.



Sunny Waters lives in the Pennsylvania countryside. His home is an accurate reproduction of a classic three-level home, down to the interior plank doors with wooden latches and leather pulls. That's the perfect setting for his woodworking, as he makes period chairs using traditional techniques and doesn't use any power tools.

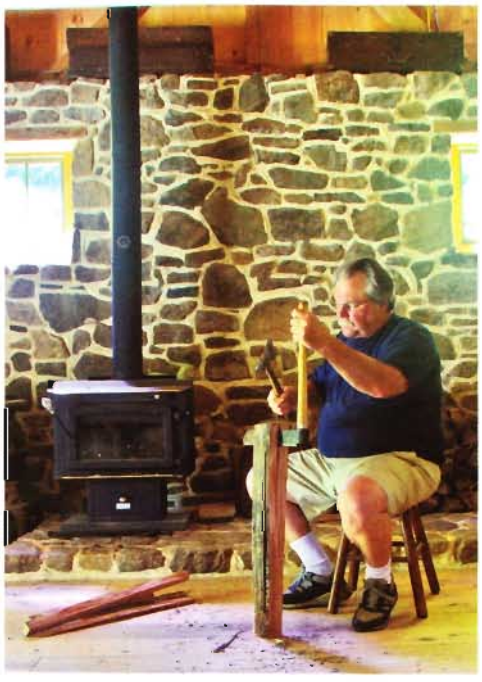
When Waters set out to design his shop, he was less concerned about the budget than he was that the shop not conflict with the historical accuracy of his home, the idyllic countryside, and the pre-industrial bent of his woodworking. That's why his shop appears to be a two-horse barn, why its bones are a timber frame raised by local Amish craftsmen, and why he built the interior of the shop over three years, using hand tools whenever possible. But that doesn't mean he completely shunned the modern world. The walls, floors, and ceiling are insulated, and although the primary means of heat is a woodstove, Waters installed a propane heater for really cold mornings. And he took advantage of full-extension drawer slides in a clever way to make his tools easy to store and easy to reach.



Take the lathe for a spin. *Waters likes to make chairs, which need turned parts. A treadle lathe allows him to stay true to his love for traditional, human-powered tools.*

Photos, this spread and p. 45 (bottom): Jonathan Binzen

A few modern conveniences fit in fine. *The Noden Adjust-a-Bench isn't out of place in Waters's hand-tool shop, and its versatility allows Waters to carve without bending over.*



Beauty and warmth. *A woodstove is the primary source of heat in winter. It looks perfect set against a wall made from local stones.*

Turn drawers on end. *Vertical panels, mounted on full-extension slides, pack Waters's large collection of hand tools into a small space, and the setup makes it easy to reach them.*

Your Miter Saw

Clever cabinet turns a job-site tool into a

SUPPORT FOR LONG PIECES

Each fence extends outward by 15 in. That's helpful when you want to set up the stop for extralong workpieces. A short shelf on each end supports those long boards (and cutoffs).

SMART STOP SYSTEM

The stand has a sliding stop system from Kreg Tool (www.kregtool.com). The tape measure makes it easy to set up an accurate cut. The stop also flips up to let you trim one end of a board and then cut it to final length without moving the stop.

SMALL FOOTPRINT

To make the stand compact, White designed folding side tables. When not in use, just pivot the support gussets out of the way to lower the hinged tables.

FULL MOBILITY

White added four casters to make the stand easy to roll around, a useful feature when the shop must give way to the family car. Available at Grizzly Industrial (www.grizzly.com; part No. H0693), the casters swivel and include a brake.

Photos: staff; drawings: Jim Richey

Needs a Stand

full-featured woodworking machine

BY JOHN WHITE

AUTOMATIC DUST COLLECTION

The saw is attached to a dedicated shop vacuum. White put it inside the stand to minimize noise. A hardware-store-variety power strip with a 15-ft. cord, mounted to the inside of the base, holds a remote switch (www.rockler.com; part No. 20890) that turns the vacuum on and off with the saw.

These days, a miter saw in the workshop is about as common as a router. Woodworkers use the saw for everything from cutting up rough lumber to making perfect-fitting compound-miter cuts for a cabinet crown molding. I designed this stand to take care of just about any demand your miter saw throws at you.

A good stand can make any miter saw sing a sweeter song. This one has five features that make it stand out from the rest, turning a portable carpentry tool into a safer and more accurate woodworking machine. One feature we don't point out at left is how easy this cabinet is to build, with just two sheets of ¾-in.-thick plywood and a box of drywall screws.

Start by making the base

The base supports the saw and holds the vacuum. It also serves as a platform for the tables and fences that are attached later.

I made the stand so the saw table would be at a height of 32½ in. That works for most people. But you can adjust the height to suit your needs.

Determine the base dimensions for your saw—The stand shown is designed to accept a Bosch 10-in. sliding compound-miter saw, model 4410L. Depending on the size of your saw, the length and width of your base might be bigger or smaller.

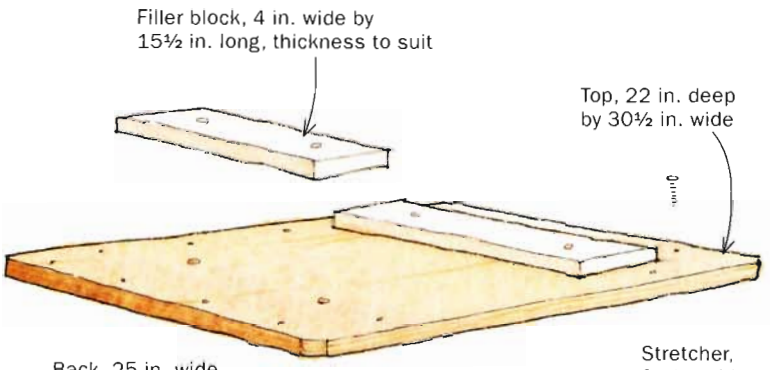
For other saws, there's an easy way to determine the side-to-side (length) and front-to-back (depth) dimensions of the top of the base. With the saw on your workbench, swing the blade all the way to the left and mark the extreme left-hand location of the saw handle. Then, swing the saw all the way to the right and mark the extreme right-hand location of the handle. Measure the distance between the marks and add 2 in. This is the length of the top of the base.

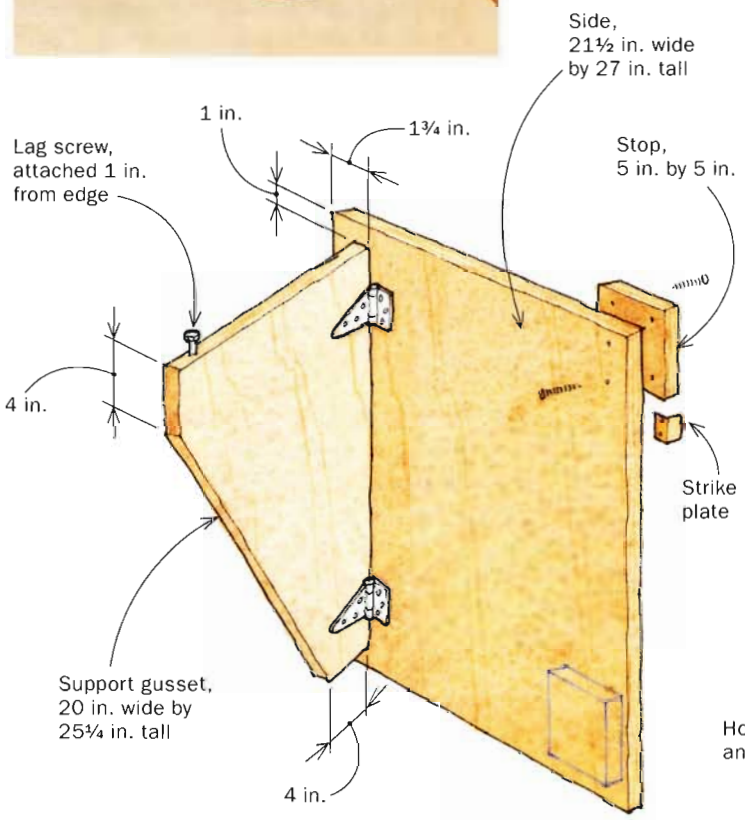
To determine the depth of the base top, allow 9½ in. from the front edge of the

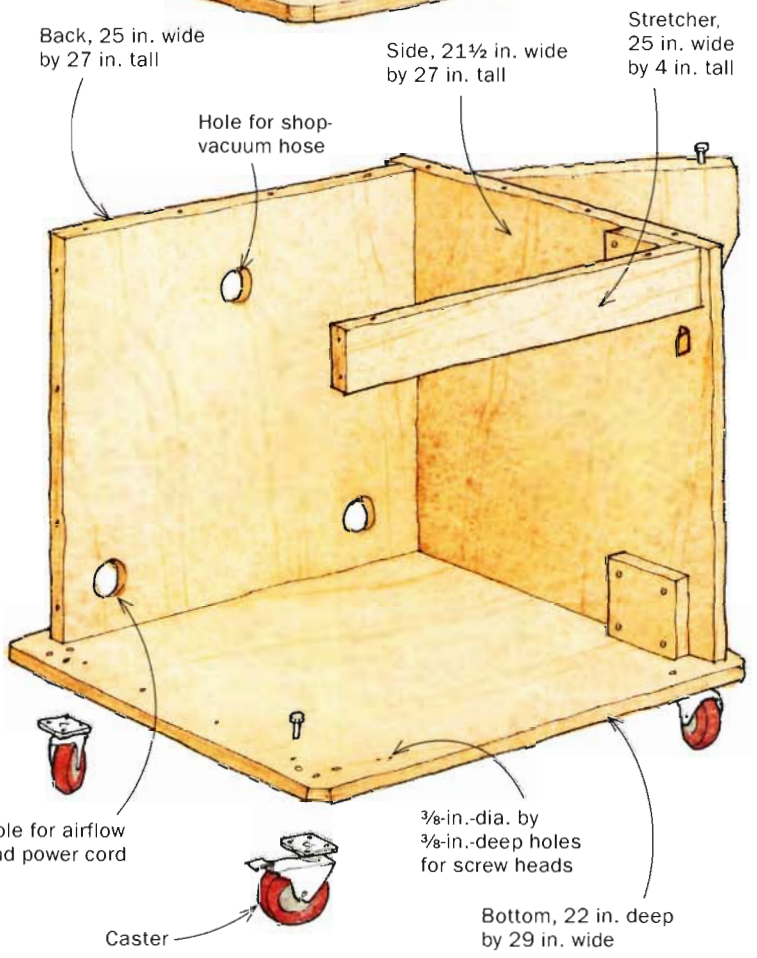
The base is the foundation

SOFT EDGES ARE FRIENDLY EDGES

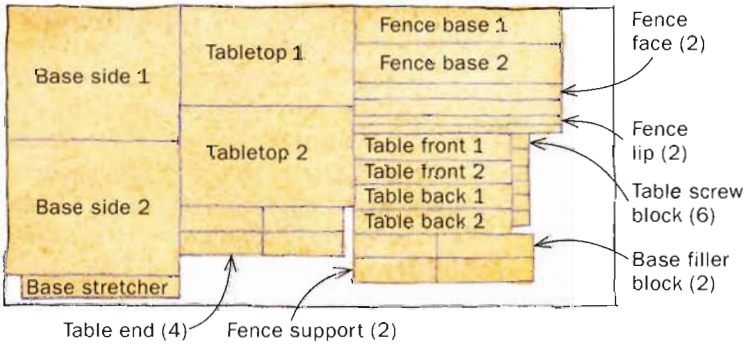
Quick work. *White uses a trim router with a ¼-in.-radius roundover bit to soften the edges on all the parts, including the holes drilled in the front and back of the base.*

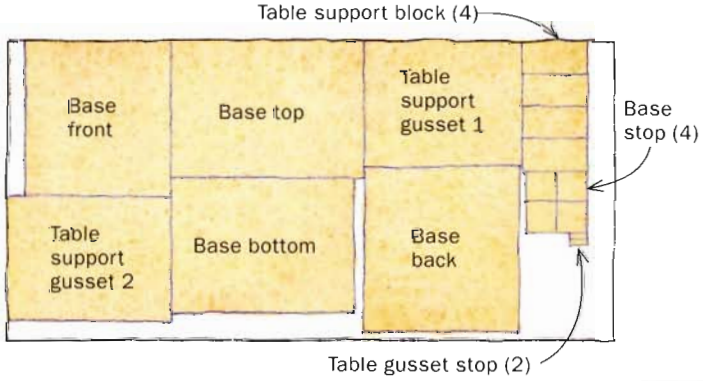




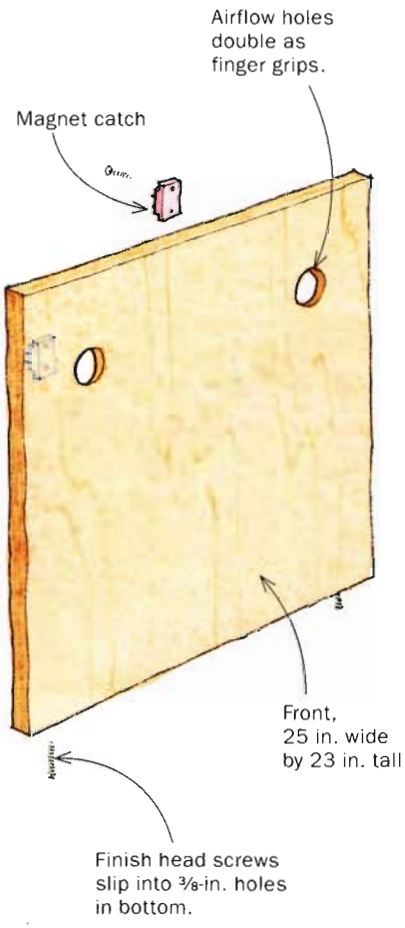


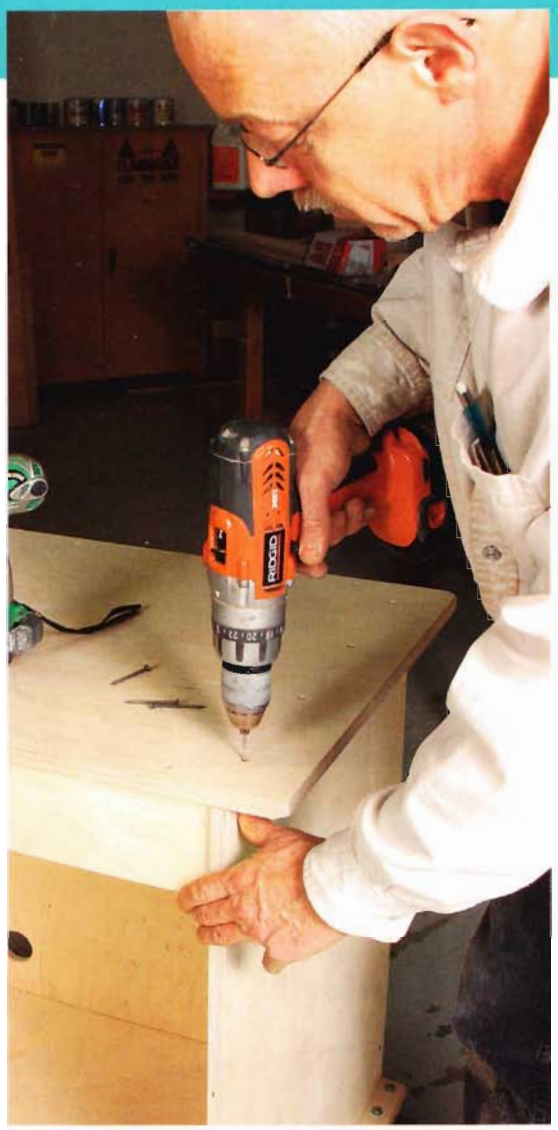
GET ALL THE PARTS FROM TWO SHEETS OF ¾-IN. PLYWOOD





Clearance hole first. *Each screw requires a shank hole and a shallow countersink for the screw head.*





Pilot hole next. *Align the parts and drill pilot holes into the plywood edges below. This makes them much less likely to split.*

No glue needed. *Drywall screws provide plenty of holding power, so there's no need to fuss with glue.*

top to the front face of the miter-saw fence. Then, at the back edge, add enough depth to ensure that all four of the miter saw's feet will end up on the surface.

Now you're ready to build. All of the base parts are joined with drywall screws. Drill an 11/64-in.-dia. shank hole and a 3/32-in.-dia. pilot hole for each screw.

The back and front have a series of 2-in.-dia. holes for the vacuum hose and for airflow and power cords. The holes in the front panel also work as finger grips. I used a drill press and a Forstner bit to drill the holes, although a hole saw also can do the job.

Once the stand is assembled, mount the four casters. To avoid having a bolt run into the bottom edge of the front and back panels, I used only three bolts to mount each caster, not the normal four.

Make the two side tables

As with the base, the side tables are assembled with drywall screws. The support block in the center of each table is actually two pieces of stock face-glued together to make a single 1½-in.-thick piece. Cut the block to fit snugly between the front and back pieces of the tables. Add the stop, which positions the support gusset when it's under the table. Then, mount a support block to each table by driving screws through the table sides and into the ends of the blocks. For additional reinforcement, drive a couple of screws down through the top.

Now mount the hinges, made by National Manufacturing Co. (www.natman.com, part No. N128-512). I bought them at a local hardware store and used the same kind to mount the tables and the support gussets. Next, cut the support gussets to size. A lag screw in each gusset allows you to adjust the tables parallel with each other. Check that the lag screw hits the stop at about the front-to-back midpoint of the table.

To level the saw table with the side tables, install filler blocks on top of the

Add the side tables and fences

TABLES ARE SIMPLE

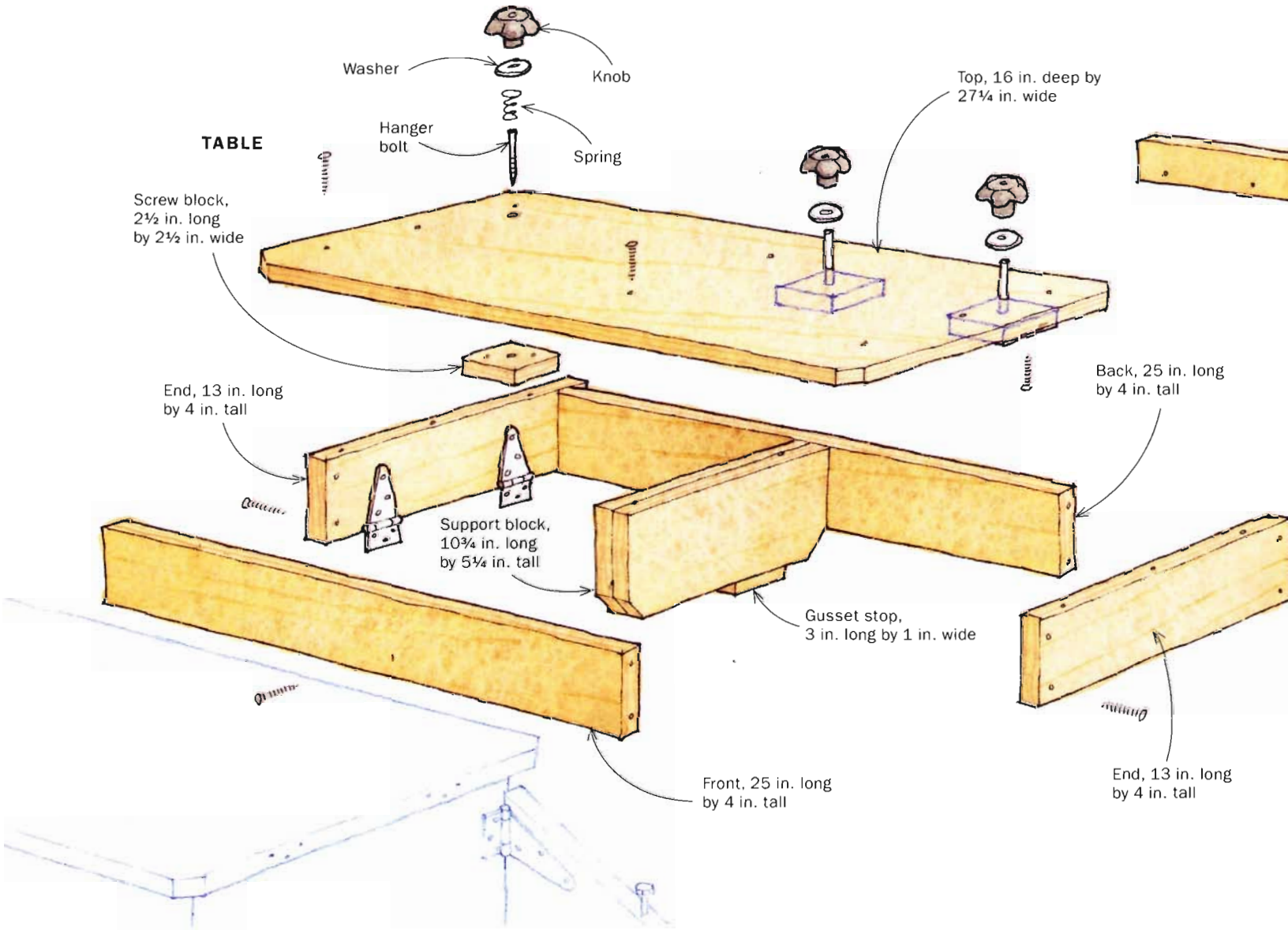
Assembly tip. *A stop block clamped to the ends of the table makes it easier for White to establish the ½-in. inset for the front and back pieces.*

base. Use solid stock so you can plane down the blocks until the miter-saw table is flush with the stand tables. Using filler blocks here gives you some room for height adjustment if you happen to replace your saw.

When bolting the saw in place, locate the holes so the miter-saw fence ends up 9½ in. from, and parallel to, the front edge of the cabinet. Cut the bolt holes oversize so you can make adjustments to the saw location before locking it down.

The fences hold the stop blocks

The base of each fence has two grooves—one long, one short—to accept the hanger bolts and knobs. These allow the fences to slide outward to support long boards. After assembling the fence parts, place a



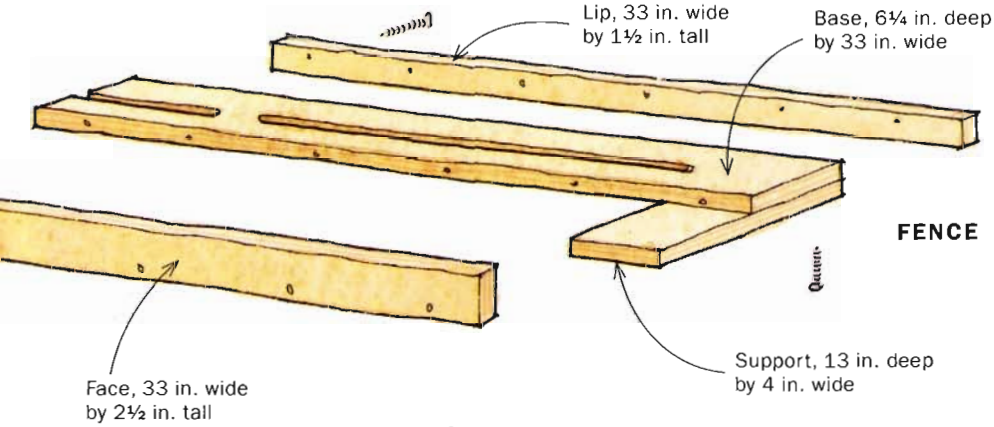
fence on each table and mark the location of the hanger bolts. Drill 11/64-in.-dia. holes for the ¼-in. bolts. To better support the bolts, screw blocks under each one. When driving in the hanger bolts, use two nuts on each of them so you can drive them with a wrench. Add the washers and nuts and check the fences for a smooth sliding fit.

The Kreg track is next. Measure the fence, then use a hacksaw to cut the track to that length. Drill a few holes through the back of the track and use the supplied screws to mount it to the fence. Do the same on the other fence. Mount the measuring tape and the lift-up stop. Now you have the best chopsaw stand on the block. □

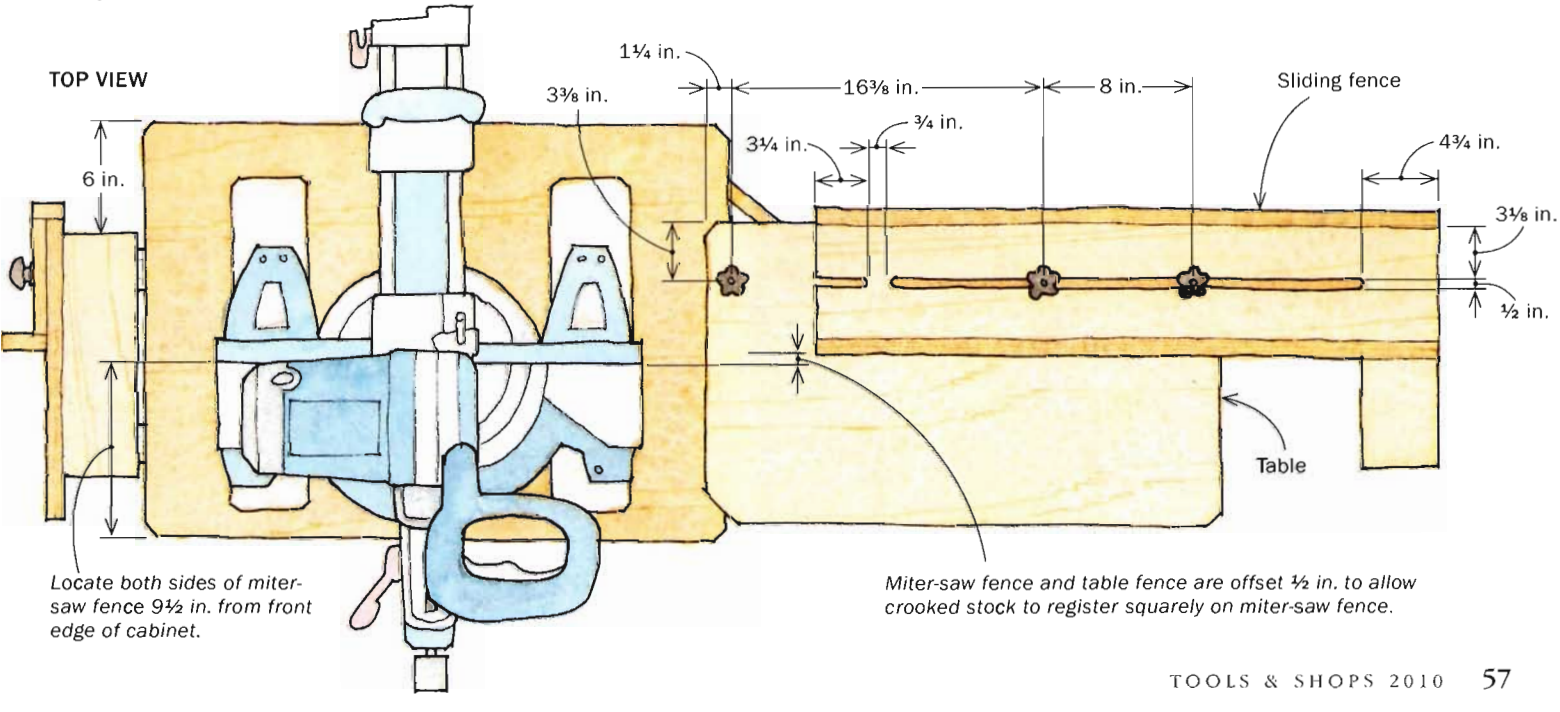
John White, the former FWW shop manager, writes about woodworking in Rochester, Vt.

THE FENCES SLIDE

Cut the grooves. *With a ½-in.-dia. straight bit in the router table and an outside fence acting like a featherboard, White makes the short end-groove cut first (left). To create the long stopped groove, the stock is slowly lowered into the bit from above, then fed forward or backward as needed to complete the groove.*



Assemble the lip and face. *After the base of the fence is grooved, the lip and face are screwed in place.*



Let There Be Light

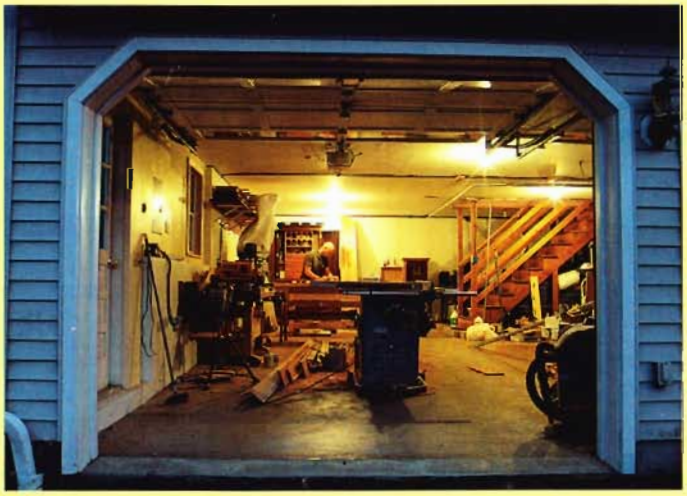
A blanket of bright light makes any workshop a nicer place to be

BY NANCY McCOY AND PETER JUDGE

Have you ever had to squint to see a scribe line or line up a pencil mark? Maybe a recent finish looked great in the shop, but once you brought it into the house you found sanding scratches. Your problem might be inadequate shop lighting. Light fixtures are seldom at the top of tool and equipment wish lists, so most home shops are illuminated with a collection of mismatched, outdated fixtures, with little thought given to their overall placement and how they're switched.

As a result, improving your shop lighting will likely mean starting over with new wiring and fixtures. Many woodworkers will think they can handle this job, but it's probably better to hire an electrician who'll let you do some of the work yourself.

LOTS OF AMBIENT LIGHT IS THE KEY



Before and after. *Home shops are commonly lit with 30 foot-candles or less (above), but 75 foot-candles is a better target (right). Installing a broad array of fluorescent fixtures will ensure that every corner of your shop has plenty of light.*

ADD A COUPLE OF TASK LIGHTS

A few specialists. *Sanding and finishing may require smaller, directed lights.* *For more on task lighting, see p. 63.*

An electrician looking at the job can confirm that your electrical panel isn't overtaxed and that there are no other pressing electrical problems. Then you can save some money by mounting the fixtures and running the conduit yourself. Later, the electrician can check your work, run the wires, and make the connections inside the panel. Some electricians are fine with this type of arrangement. Others will want to do everything themselves, so make sure you work out the division of labor in advance.

We used *Fine Woodworking* associate editor Matt Kenney's shop to demonstrate the techniques discussed in this article. Like most woodworkers, Matt thought his shop lighting was just fine. But when the upgrade was finished, he was amazed: "I don't have to get my eyes right up to the work to see what I'm doing anymore. More light just makes everything easier." The lighting upgrade also allowed Matt to start using the entire shop instead of the single well-lit area near his bench. Matt and local electrician Steve Foss worked together on the installation, with Matt installing the fixtures and Steve doing the wiring.

Two types of lighting

Any discussion of artificial light starts with the distinction between ambient and task lighting—you'll want both types for a well-lit shop. Ambient lighting describes general lighting for common cutting and shaping tasks. Task lighting

Photos, except where noted: Michael Pekovich

Fluorescents are the foundation

Light every corner of a workshop—you never know where you might need a clear view. Overhead fluorescents arranged on a grid are the most cost-effective way to create a blanket of bright light.

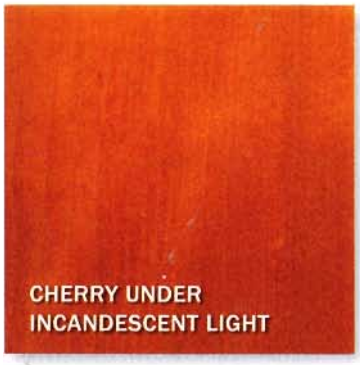
SHOP-READY FIXTURES

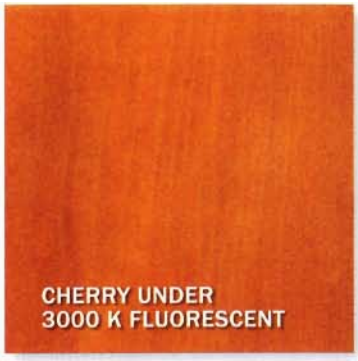
Buzz-free and efficient. *Modern fluorescents are the obvious choice for shop lighting. They have electronic ballasts that don't hum or flicker, and they're energy-efficient and affordable. The SB 432 from Lithonia (www.lithonia.com) has a wraparound lens that keeps out dust and spreads the light.*

Lower-cost option. *Strip (no lens) fluorescents are sold in 2-, 4-, and 8-ft. lengths. If you choose 8-footers, make sure to get them with pairs of 4-ft. bulbs instead of 8-ft. bulbs, which are harder to find and transport.*

THE RIGHT BULBS

Modern fluorescents save energy. *The fluorescent fixtures shown in this article take 4-ft. T8 bulbs, which sell for between $3 and $4 each.*





True colors. *A bulb's color temperature can make a big difference in the appearance of wood species and finishes. Ideally, you should select bulbs rated 3000 K, so the shop lighting matches your home lighting. Color temperature is found on packaging and sometimes right on the bulb.*

describes a higher level of illumination focused right on the work. However, it's important to remember that once you have an even blanket of bright light, task lighting is reserved for filling in the dark areas.

Don't skimp—It might be tempting to save money on lighting by arranging the ambient overhead lights so that they're strategically placed over benches and machines. But we recommend against this approach because the lights will be in the wrong locations if you ever decide to change your shop setup.

And you never know quite where you'll need light: Will it be on the floor when cutting up a sheet of plywood, or in the corner when picking through the scrap pile? With an even blanket of ambient light, you'll be able to work anywhere. You can save the task lighting for when you really need it, like finishing and joinery.

The Illuminating Engineering Society of North America (IES) recommends between 20 and 50 foot-candles for woodworking. One foot-candle is the amount of light produced by an ordinary candle measured from 1 ft. away. We suggest 75 foot-candles because you'll need more light as you age, and the cost difference is negligible. Even if your eyes are fine now, you'll need the additional light soon enough.

Light-colored surfaces boost light—Another consideration is how much of the light produced by your fixtures is reflected by the ceiling and walls. A clean, white surface may reflect as much as 85% of the light that initially hits it, while a dark, rough surface can

Drawings: Michael Pekovich

LAY OUT LIGHTS FOR COMPLETE COVERAGE

Help from an expert. *An electrician can help you determine the necessary fixtures and their placement. If you provide your own layout, be sure to ask if moving things a little or rotating the whole layout 90° will make the job easier and less expensive.*

reflect as little as 10% or 15%. If your shop is cluttered and dusty or has exposed insulation, you'll need to boost lighting levels by another 30% to 50%, compared to shops with clean white walls and ceilings.

A functional lighting layout is simple

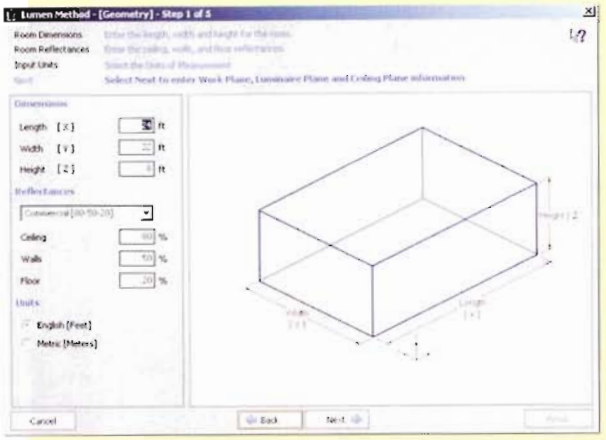
Once you've made a decision on the level of lighting you want in your workshop, laying it out is as easy as 1-2-3.

1. Choose your fixture—The most common shop fixture is an open "strip" fluorescent (see photo, facing page). These work pretty well, but without a cover they experience more "dirt depreciation," which is the drop in light output caused by dust on the bulbs and housing. It's easy enough to clean off the fixtures once in a while with compressed air, but it's even easier to select fixtures with an acrylic lens. Not only does the lens keep out much of the dust and spread the light, but it also provides a bit of safety when you're swinging around long boards.

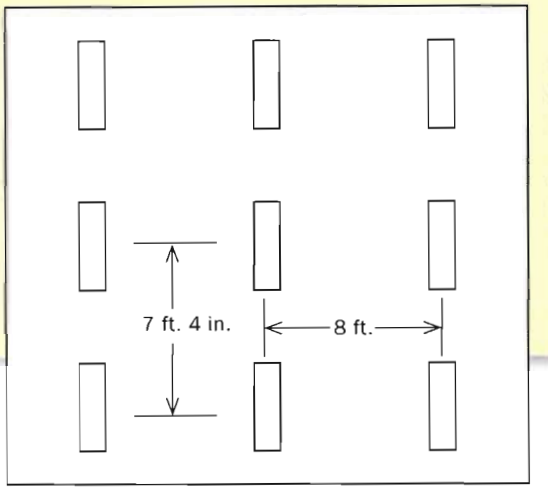
Our favorite fixture for a home workshop is Model SB 432 from Lithonia (see facing page). They have a lens, and their electronic ballast means they won't hum loudly and they'll work in cold temperatures. This fixture used to cost about 25% more than strip fluorescents, but we found them at Amazon.com for $55, which is the same as or less than some strip lights.

2. Select the bulbs—One of the complaints we often hear about fluorescent bulbs is that the light is bluish and unnatural. This used to be true, but fluorescent

Free layout software



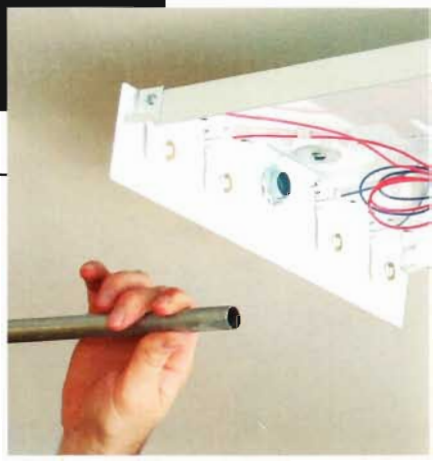
DIY layout. *Visual Basic (www.lithonia.com) is a free lighting design program. Once you've entered the shop dimensions and selected a fixture from a pull-down menu, the software generates a layout based on the foot-candle requirement.*



SAMPLE SOLUTION

This lighting layout is for a two-car garage shop (22 ft. by 24 ft.) using 4-ft.-long, 4-bulb fixtures.

INSTALLATION: SAVE MONEY BY PITCHING IN



Hang your own fixtures. *Fluorescent fixtures are surprisingly light, so toggle bolts let you put them wherever you want on a drywall ceiling (left). You also can fasten the lights directly to framing members with screws. Another task you can do yourself is to install the straight conduit between fixtures (above). Before tightening the toggles or screws completely, use the wiggle room to squeeze in the pipe. Always be sure to ream the conduit ends, as any sharp edges will damage the wires' insulation.*

Leave the wiring to a pro. *With the fixtures placed, you can bring back the electrician to install the rest of the conduit, run the wire, and make the necessary connections. This will likely take a day or less.*

TIP

Zoning saves energy. *A simple but effective setup is to have one zone for your bench or finishing table and another for the machine area.*

bulbs are now available in a wide variety of "color temperatures." Measured in kelvins (K), color temperatures of fluorescent lights commonly range from 2000 K (warm red) to 7500 K (cool blue).

Why is a bulb's color temperature important? Ideally, the lighting in the shop should be the same as the lighting inside your home, so your projects look the same in both environments. Most likely you have warm incandescent lighting in your home, so you should select warm fluorescent bulbs with a 3000 K color temperature. This will help your finished projects look the way you intended, and the cost difference compared to standard bulbs is negligible.

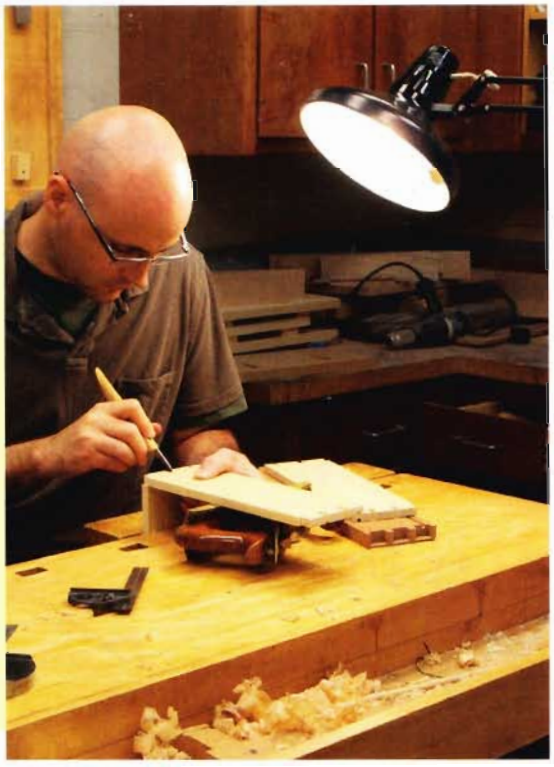
3. Plan your layout—Most electricians and lighting showrooms can provide a lighting layout for a garage shop easily, but if you want to do the layout yourself, we suggest using Visual Basic, a free program found on the Lithonia Web site (www.lithonia.com). Start the program by entering the shop dimensions and ceiling height, then specify a lighting level (75 foot-candles in our case). The program then gives you several options on the reflectivity of your walls. You can then select a light fixture from a pull-down menu, choose the type of ceiling and lens cover, and the software will tell you how many fixtures you need and how to arrange them.

Using the SB 432 fixture and assuming a 22-ft. by 24-ft. two-car-garage shop with 8-ft. ceilings as an example, the program says we need nine fixtures, arranged in three columns of three fixtures each (see drawing, p. 61).

Photos, this page: Kelly J. Dunton

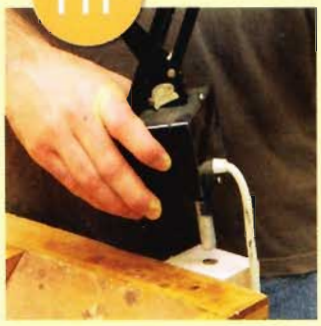
Task lighting

With most of the light provided by overhead fluorescents, task lighting is about filling the gaps.

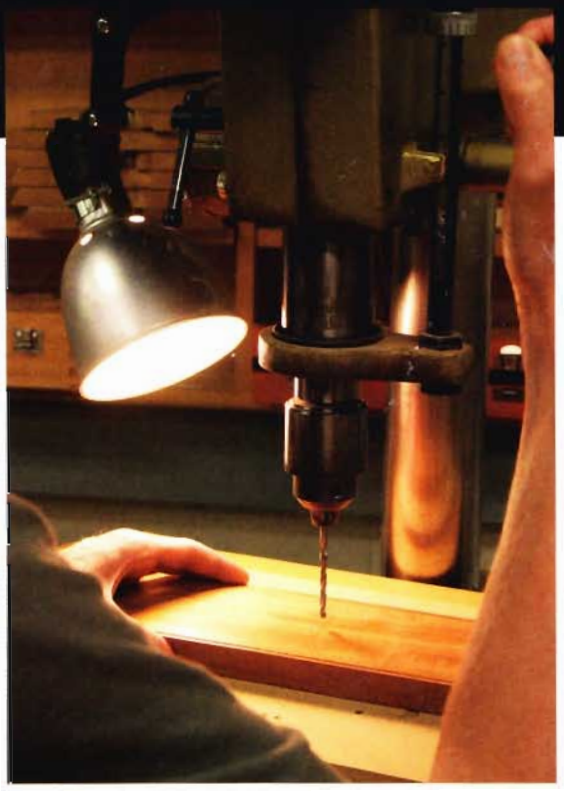


Desk lights shine bright. *When the shadow from your own body makes it tough to see, an inexpensive swing-arm desk lamp can fill in the dark areas.*

TIP



Attach a mounting block to your bench. *Many desk lights have a post that can fit into a block screwed to your bench for easy installation and removal.*



Tall machines cast a shadow. *Bandsaws and drill presses, with their large cabinets and motor housings, often block overhead lighting, but the fix is easy: a magnetic-base task light aimed right at the work.*

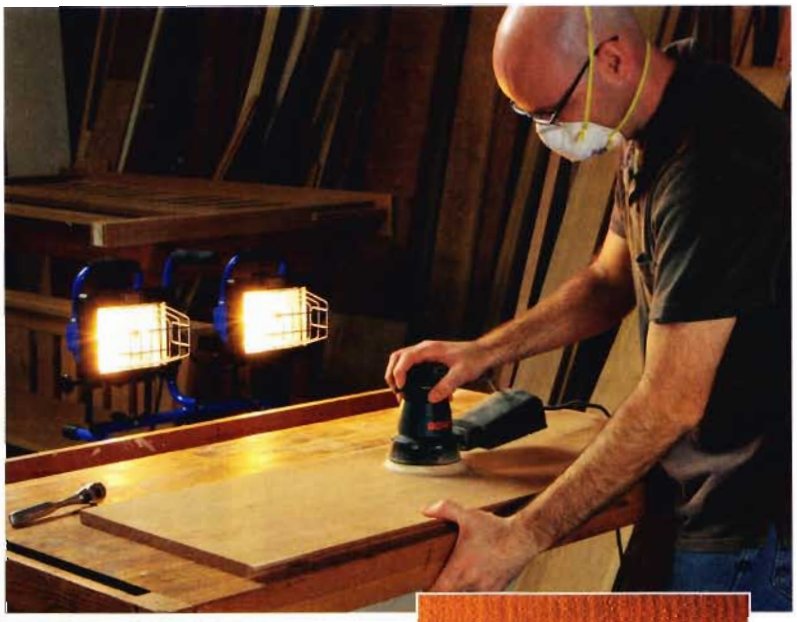
Zoning saves money and energy—Rather than having all your lights controlled by a single switch, it's a good idea to divide the space into work zones. For example, you could put the finishing table in one zone, the bench or assembly table in another, and the machine area in a third. For the cost of a little extra cable and a few switches, the energy savings is well worth it.

Another nice feature is an occupancy sensor that turns on a single light whenever you walk into the shop, especially when your hands are filled with tools or materials. Because an occupancy sensor will turn off the lights when it doesn't detect movement, it can occasionally leave you in the dark.

Task lighting

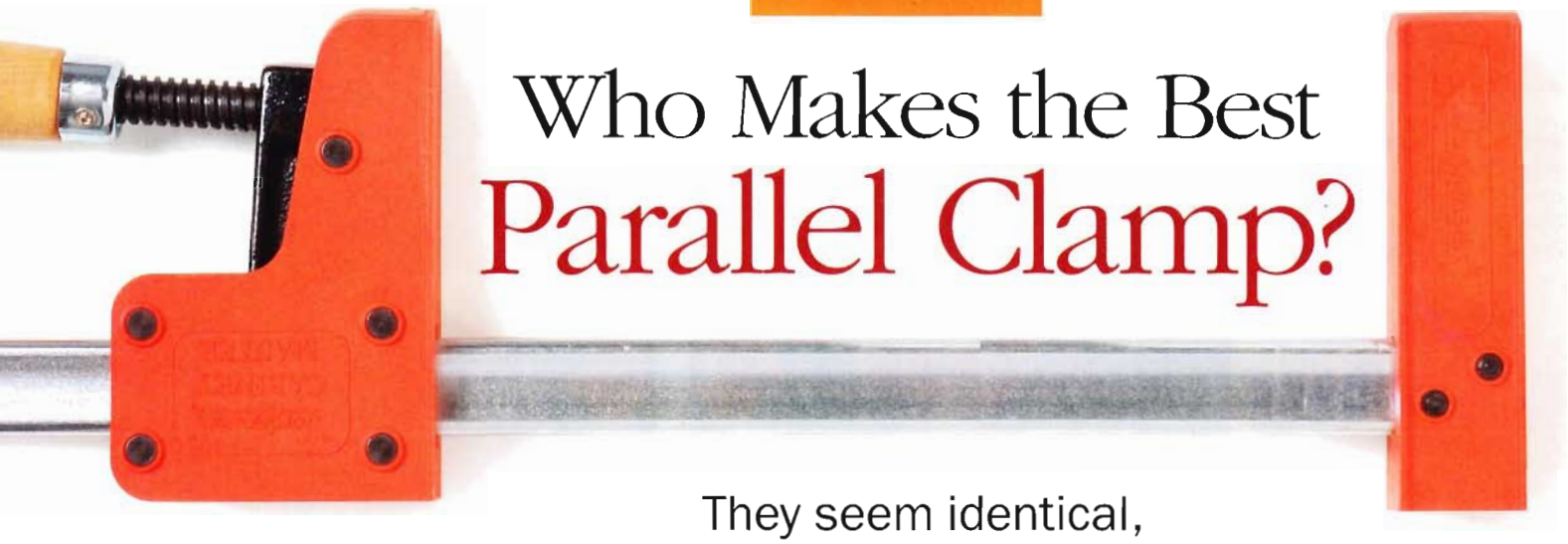
Overhead fluorescents are good for general ambient light, but for finishing and bench work you'll need additional task lighting. Swing-arm lamps like those found on drafting tables are great for aiming light directly where you need it. Twin-head halogen work lights are great for finishing because they can provide raking light that makes it easier to see runs and other problems.

Having a well-lit shop is a lot like having a well-heated one. The shop becomes a more welcoming place, a playground for your creativity. □



Raking light reveals surface flaws. *Inexpensive stand-mounted halogen worklights are a great way to provide low-angle light for surface prep and finishing (above). The raking light can highlight machine marks that are invisible under overhead light (right).*

Nancy McCoy is a certified lighting designer in Novato, Calif. Her husband, Peter Judge, is an avid woodworker.



Who Makes the Best Parallel Clamp?

They seem identical, but a head-to-head test tells a different story

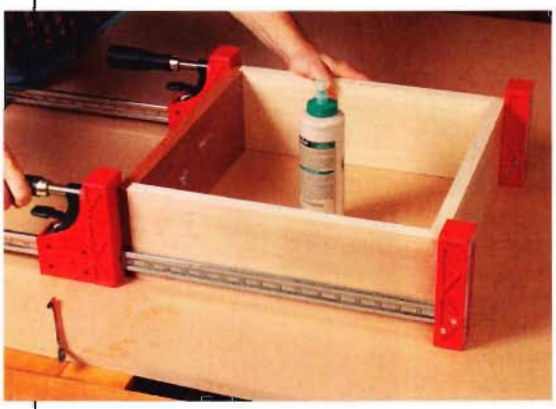
BY TIM ALBERS

Life in my workshop got a little easier about 15 years ago, on the day Bessey introduced the first parallel clamp, called the K Body. Ever since then, parallel clamps have become my main squeeze for a variety of clamping tasks.

Before the arrival of parallel clamps, I'd reach for a pipe clamp or a steel I-beam clamp when a long clamp was called for. Either one could muscle more than enough pressure. But clamp pads were a must if you wanted to avoid dents from the jaws; and because the jaws weren't parallel, workpieces often slid out of position. On the other hand, parallel clamps have big jaws, making workpiece denting much less of an issue. And because the jaws are square to the bar and parallel to each other, parts aren't as likely to slide out of alignment when the clamp is tightened. Plus, dried glue is easier to remove from the plastic jaws, so glue buildup isn't much of an issue.

The parallel-clamp manufacturers' club now has six members: Bessey (with a new version of its original), Irwin, Jet, Jorgensen, Woodcraft,

Why they're so useful



Parallel has its advantages. *Large, square jaws allow you to assemble a drawer box with only two clamps (left), keep a door frame perfectly aligned (center), and stand an assembly out of the way while the glue dries (right).*

and Woodline. To find out if any stood out from the group, I gathered four clamps from each manufacturer and set about testing them in my shop. I wanted to work with 36-in.-long clamps, but learned that some manufacturers don't make that size. In those cases, I worked with the length nearest to 36 in.

When all the testing was finished, I found the overall quality of the clamps to be a mixed bag. Several were disappointments; but a couple stood out as top performers.

Ease of use is important

Good clamps have a sliding jaw that moves and adjusts easily. The Irwin and Jorgensen clamps had the smoothest sliding jaws—sometimes too smooth. When the clamp is held vertically, the jaws can instantly slide down and whack your hand.

Two of the clamps—the Jet and the Woodline—won't slide unless you squeeze a trigger to release a locking clutch, a safety feature that helps prevent such hand-whacking incidents. The Jet trigger worked well and the jaw slid with ease. But the Woodline sliding jaw was difficult to move and often required two hands.

The original Bessey K Body was a big hit, but there was one common complaint: the skinny handle, which made it difficult to apply full pressure. So Bessey and all of its competitors came back with better handles. Any grip test is somewhat subjective, but I have average-size hands, and I liked the handles on the Irwin, Jet, and Jorgensen clamps. They were comfortable and easy to grab.

Another improvement is the retainer clip on one end. This useful little feature prevents the sliding jaw from sliding off the bar, and acts as a support to keep the clamp parallel to the workbench. In use, almost all of these worked well. The Woodline was the exception. Its retainer was too short, causing the clamp to rock on the bench.

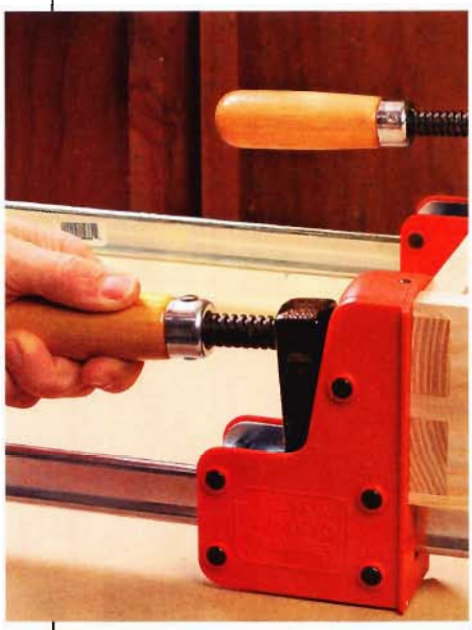
Performance under pressure

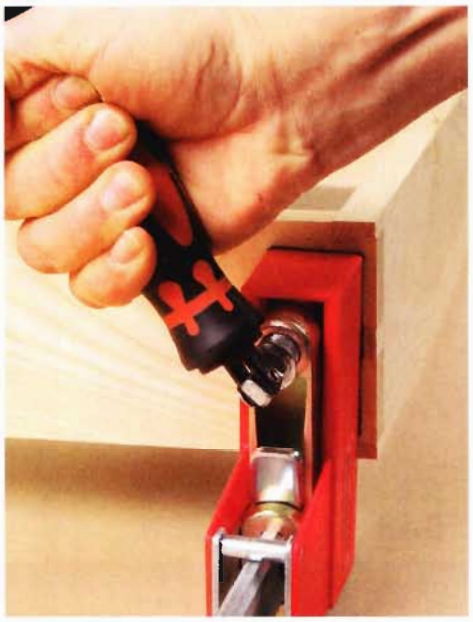
The bottom line with any clamp is how well it clamps. I performed several tests to see if the clamps could apply adequate pressure while living up to their promise to keep parts flat and straight.

Clamp-force test shows differences— To measure clamping force, I tested each of the clamps on a welded clamping fixture using an industrial-weight scale. The

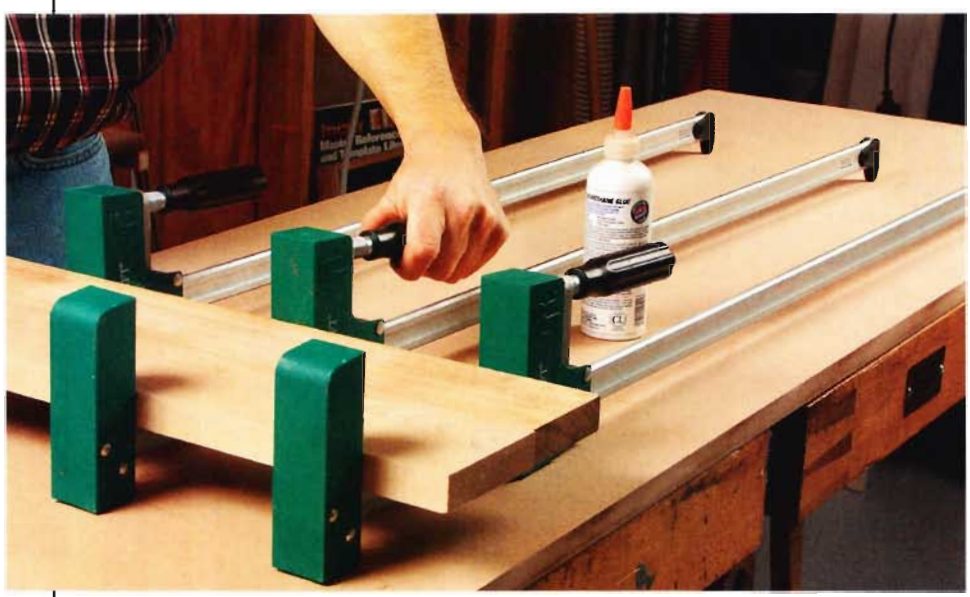
Key features

Trigger happy. *A small trigger makes it easy to move the sliding jaw on the Jet.*





Handle is important. *The Jorgensen's large wood handle makes it easy to apply maximum force (left). The Woodline's handle can be pivoted 90° for extra torque, but the coupling is weak and was quickly bent (right).*



Level-headed. *Small retaining clips at the far end keep most of the clamps level when the jaws are together at the other end.*

Photos: staff

Testing

CLAMPING FORCE

Tortured on the rack. *Albers used the same steel frame and industrial scale from past clamp tests to measure the force each clamp could apply. He tested them one-handed (shown), and also invited a few strong friends to try.*

movable bar—the one attached to the scale—runs on drawer slides to reduce friction. I turned each handle one-handed, as I usually do in the shop.

I'd say my clamping strength is about average, but to be sure I took the clamping fixture and clamps to a local millwork shop where the guys use clamps all day long (thanks to the team at Heartwood Milling). I also enlisted the help of a couple of retired gentlemen who work wood. The maximum pressure in the chart is the highest recorded for all the testers.

All the clamps, except for the Woodline, applied a force adequate for most glue-ups. That said, none of them reached the force you can apply with a pipe clamp, and all fell far short of the squeeze you can get from a steel I-beam clamp.

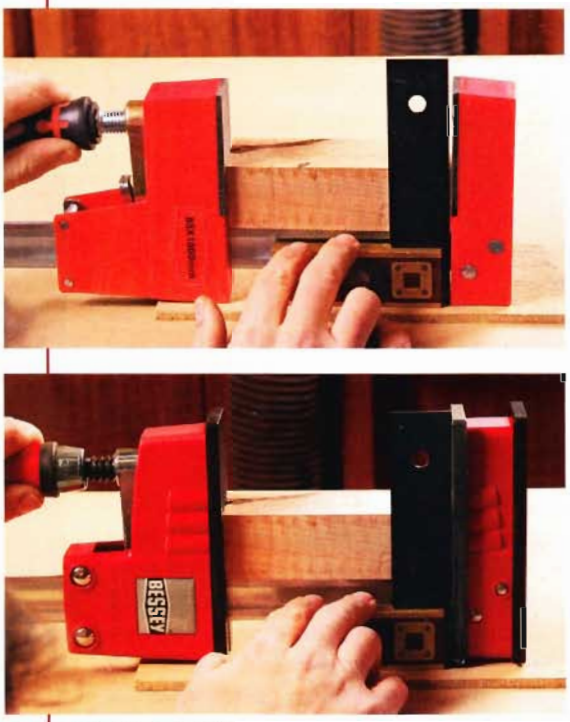
We applied the most force—an average of 700 lb.—with the Irwin clamps.

Bar deflection under load—The first thing I did, before any load was applied, was use a good straightedge to check the bars for straightness. All were straight. To determine the amount of bar deflec-

BAR DEFLECTION

Stiffness means accuracy. *When the bar deflects, the jaws do, too. The Irwin showed the most flex: 3/32 in. at full clamp pressure.*

JAW FLEX



Not all jaws stay square. *The Woodline's fixed jaw deflected severely under pressure (top), while the Bessey's stayed accurate.*

PANEL FLATNESS

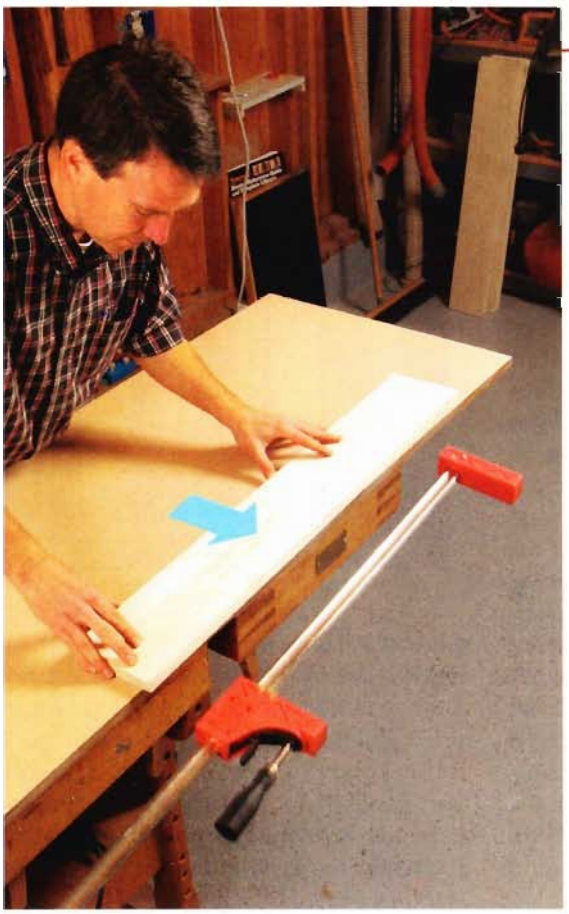
Toughest test of all. *Albers clamped a test panel at the tip of the jaws, applied full pressure, and measured any bowing with a straightedge and feeler gauges. He repeated the same test with the panel at the base of the jaws.*

tion with the clamps under pressure, I set them on a flat surface, marked the center of the bar, and measured the distance between the bar and the work surface. I then clamped a 30-in. length of hard maple, approximately 1¾ in. square, lengthwise between the jaws and tightened the clamps to my maximum clamping pressure. With the clamp tight, I again measured the distance between the bar and the work surface.

All the clamps exhibited deflection within a range of 1/32 in. to 1/16 in., a relatively minor amount, with the exception of the Irwin, which showed bar deflection of almost 1/8 in.

Jaw deflection under load—Next, I tried to isolate the jaws to find out how much they deflected. I placed a short block of wood between the jaws and tightened the clamp as much as I could. I used a square to determine how much the jaws deflected, if at all. I did the test with the block at the base of the jaws and at the tips.

To eliminate bar deflection from the test, the block was just long enough to allow room for the square. Interestingly, some of the sliding jaws deflected inward under pressure, but that is still a problem. The



DURABILITY

Brutal drop test. *Albers dropped each clamp five times from his benchtop, flat onto a concrete floor. A few were rendered unusable: The Jet's handle broke off, and the casing on the Woodline was shattered.*

Results

Bessey's jaws did especially well, staying dead square.

Panel provides real-world test—Finally, to see how the clamps would do in the real world, I clamped five boards, each ¾ in. thick by 6 in. wide by 36 in. long, edge to edge to create a single panel. To be sure the panel wasn't being restrained or affected by the bar, I clamped the test panel at the base of the jaws and also at their tips. I used a straightedge to measure deflection across the width of the panel. A measurement of 1/16 in. or less earned a deflection rating of "slight"; one between 1/16 in. and 3/16 in. was rated as "moderate." The Jorgensen clamps stood out here.

By the way, the Woodline clamps have hard plastic jaws with a rubber insert in the top portion of the jaw. I found that this design applies uneven pressure.

None of the jaws slipped—I had no issues with any of the sliding jaws slipping under pressure. But the sliding jaw on the Irwin clamp was difficult to disengage, particularly when the entire jaw was in contact with the work.

Drop test

Parallel-jaw clamps have plastic jaws, so I wanted to find out how they'd hold up when dropped. The test was brutally simple. I slid each clamp off my 36-in.-tall bench and let it fall to the concrete floor. For consistency, I placed each clamp in the same position on the bench and used a long board as a pusher. Then, in an effort to mimic a clumsy woodworker like myself, I dropped each clamp four more times, for a total of five visits to the floor.

All the clamps suffered to some degree. The Irwin and Jorgensen clamps showed the least amount of damage: Both were completely usable, although some of the plastic on the Jorgensen eventually broke.

The removable pads on the Bessey cracked or broke completely and parts of the clamp jaws broke but were still usable. The plastic jaw casings on the Woodcraft clamps cracked but were usable. The Jet experienced some cracking of the casing, but worse, the handle snapped off on the first drop. The Woodline was destroyed, with all the plastic casing breaking and pins and parts flying across the shop.

MANUFACTURER	STREET PRICE	LENGTH	JAW SIZE (ABOVE BAR)	MAX. FORCE	BAR DEFLECTION
Bessey www.besseytools.com	$45	40 in.	2 in. by 3¾ in.	650 lb.	0.042 in.
Irwin www.irwin.com	$50	48 in.	2 in. by 3¾ in.	700 lb.	0.095 in.
BEST OVERALL Jet www.jettools.com	$48	40 in.	1¾ in. by 4⅛ in.	690 lb.	0.032 in.
BEST OVERALL Jorgensen www.adjustableclamp.com	$40	36 in.	1⅞ in. by 4 in.	600 lb.	0.038 in.
Woodcraft www.woodcraft.com	$41	40 in.	1½ in. by 3⅜ in.	525 lb.	0.035 in.
Woodline www.woodline.com	$37	39 in.	1½ in. by 3⅜ in.	325 lb.	0.038 in.

Glue adhesion

Anyone who's been working wood for more than a few weeks has had to scrape dried glue from clamps. It's not fun. So I let Titebond III dry on the clamp bars and jaws for 24 hours and then tried to remove it. Hands down the best performer was the Jet, where the glue on the bar and plastic jaws just peeled off. Glue also peeled easily from the plastic jaws on the Jorgensen. The Irwin was the hardest to scrape off.

Which clamp would I buy?

After completing the testing and reviewing all the data, I felt the Jorgensen and Jet clamps were the best performers in this group. Either model would be welcome in my shop.

JAW DEFLECTION		PANEL FLATNESS	RESISTANCE TO GLUE ADHESION	SLIDING JAW OPERATION	COMMENTS
Force at base Fixed/sliding	Force at tips Fixed/sliding				
Slight/none	Severe/slight	Good	Good	Very good	Very good jaw-deflection scores, but pads fall off easily.
Moderate/ very slight	Moderate/ severe	Fair	Poor	Excellent	Best in drop test, but worst bar deflection.
Moderate/ very slight	Very slight/ slight	Good	Excellent	Good	Great clamp if you avoid severe drops.
Slight/slight	Moderate/none	Very good	Very good	Excellent	Second to Jet only in clamp force.
Slight/slight	Super severe/ slight	Fair	Good	Good	Severe deflection with force at tips of jaws.
Moderate/ moderate	Very severe/ slight	Fair	Good	Poor	Weak clamping force, poor accuracy, and shattered when dropped.

The Jorgensen has big jaws, and they slid especially easily. Clamp force was good. Plus, it was easy to remove dried glue from the bar. On the downside, the handle on the Jorgensen was a little too slick. And the sliding jaw can be a finger pincher.

I like the Jet because it has jaws that remained square under load. Also, the bar showed little deflection and the clamp force number was excellent. The trigger lock kept the sliding jaw in place, so finger pinching wasn't an issue. And, all components on the clamp worked smoothly. The main negative was the handle that broke during one of the drop tests.

The Bessey is also a good parallel clamp, but I was regularly annoyed by the protective pads, which slid off all the time and broke easily. Leave them off and the clamp works very well, though the jaws are smaller.

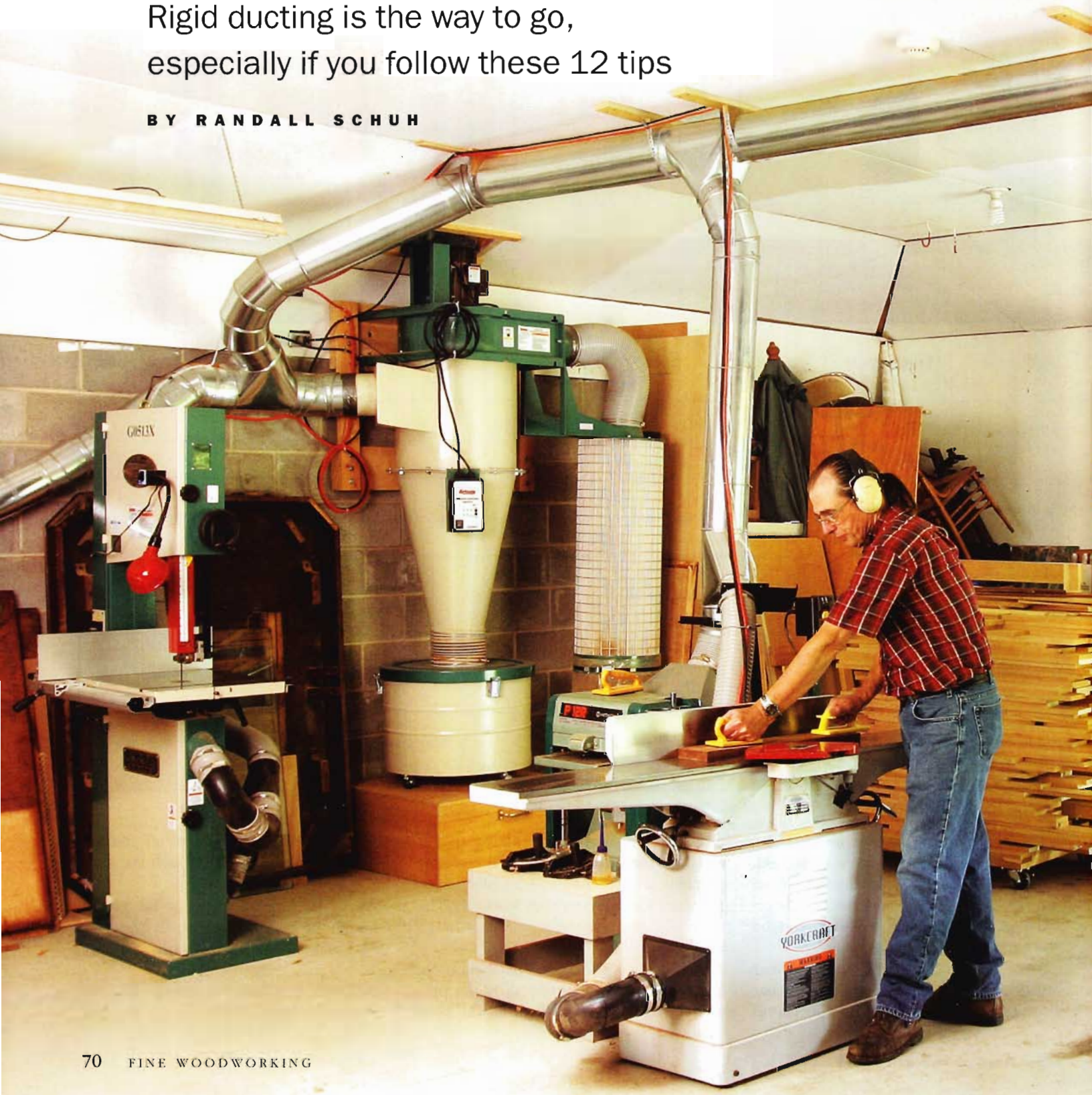
All of these clamps are a bit pricey (though the best are well worth it), so we didn't make a best value award. □

Tim Albers is a woodworker in Ventura, Calif., and a frequent contributor.

Step Up to Whole-Shop Dust Collection

Rigid ducting is the way to go, especially if you follow these 12 tips

BY RANDALL SCHUH



If you're like many woodworkers, your dust collector's duct system is mainly a tangle of 4-in.-dia. flexible hoses leading to the dust-collecting machine. And there's a good chance you're not satisfied with either the convenience or the efficiency of the system. You probably have to move and reattach hoses at times, or just live without dust collection on some tools. You might also be clustering tools close together in an awkward array to keep hose runs short, or living with hoses underfoot. Last, with corrugated hose, you are losing a significant amount of suction to friction. Sound familiar? Well, it might be time to upgrade to a rigid-duct system.

This article offers a number of tips on setting up a rigid-duct system for home woodshops. All the tips focus on saving you money while making your system work better. A lot of what I learned about dust collection came from Bill Pentz (www.billpentz.com), an expert on the topic.

Why rigid ductwork?

The effectiveness of your dust collector depends, to a large part, on the volume of air (measured in cubic feet per minute, or cfm) moving through the duct. If the cfm is too low, the dust won't be carried along effectively. Friction plays a key role. With less friction, you get more cfm and more dust moving toward the collector. That means a given dust collector can support much longer runs of ducting and still deliver high cfm at the end of the line.

Large-diameter, smooth-walled rigid ducting generates less friction than flexible corrugated hose and brings powerful suction to every power tool in the shop. All machines connected to my system with 6-in. duct have airflow volumes in excess of 620 cfm (and velocities greater than 3,200 feet per minute.

Upgrading to a solid-duct system isn't cheap—adding it to a 600-sq.-ft. shop could cost more than $1,000. Plus, it might take a few days to put it all together. But when it's done, you'll be putting more dust in the collector and less in your lungs.

Rigid ducting is not a cure-all, though. If you've been getting by with a small dust collector hooked up to a couple of machines, you'll probably need at least a 2-hp collector to handle the longer runs of rigid ducting.

Randall (Toby) Schuh works wood in his Saylorsburg, Pa., shop.

The basics

1 Minimize the use of flexible hose

Use rigid duct wherever possible. Corrugated flexible hose is cheap and convenient, but those bumpy ridges generate three times more friction than straight rigid duct, reducing cfm.

2 Use snap-lock duct

When it comes to straight runs, snap-lock rigid duct is an effective and economical alternative to solid rigid duct. Also, it's available in several convenient lengths (2 ft. to 5 ft.) in a variety of diameters (4 in., 5 in., 6 in., 7 in., and 8 in.). A good choice is 26 gauge; duct that's too thin has been known to collapse from the negative (vacuum) pressure. Unlike solid rigid duct, you must first connect snap-lock duct along its full seam.

3 Join ductwork with pop rivets

The sharp points of sheet-metal screws extend into the duct and can catch chips and other debris. Pop rivets are just as easy to install, but form a shallow mushroom shape inside the duct that's less likely to result in a plugged-up line. First drill a hole, then add the rivet.

4 Seal all connections with duct tape

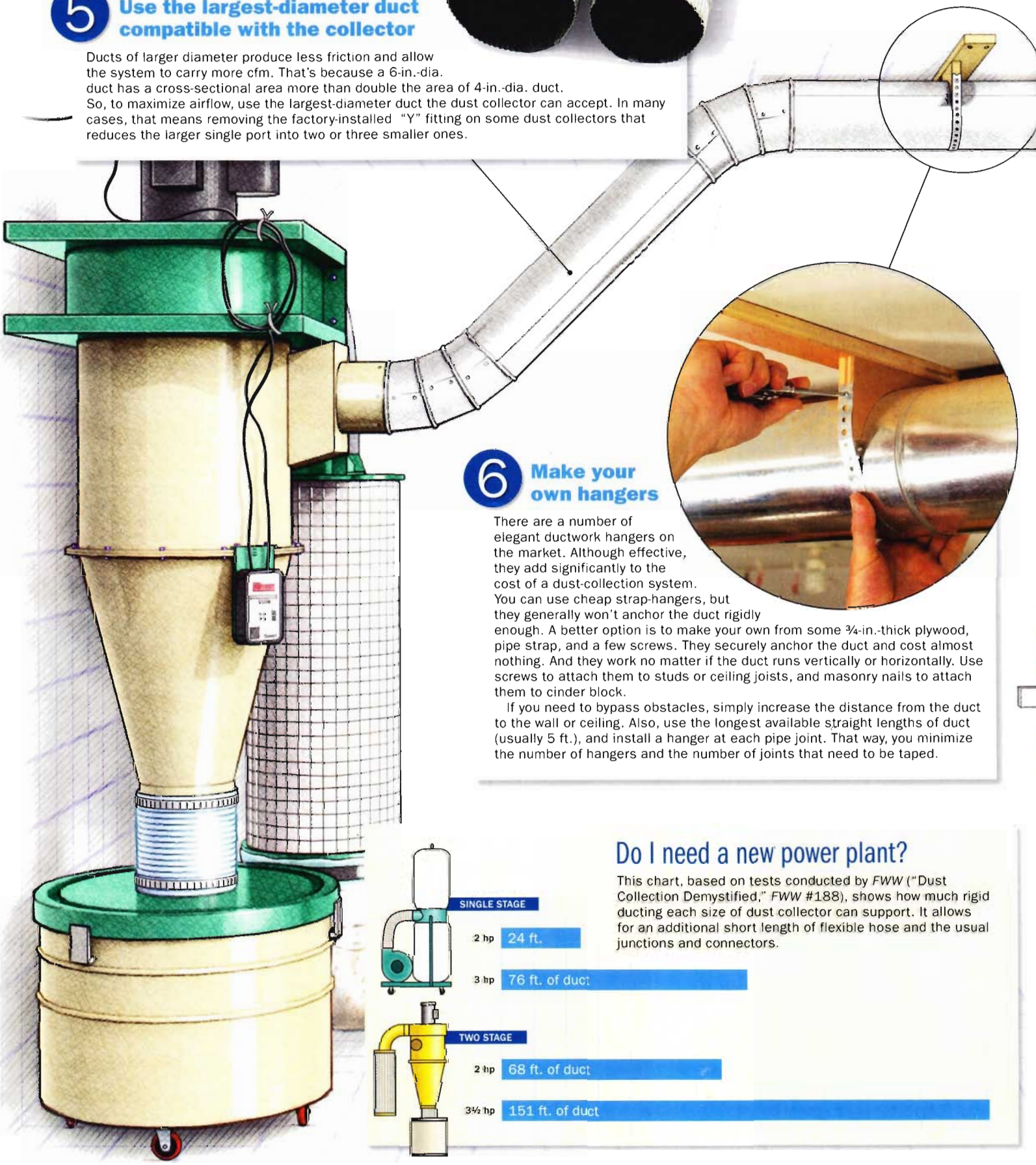
Your cfm will drop if air can be drawn through openings in the duct. Wrap the joints with duct tape to eliminate leaks.

Photos: Tom Begnal

Smarter installation

5 Use the largest-diameter duct compatible with the collector

Ducts of larger diameter produce less friction and allow the system to carry more cfm. That's because a 6-in.-dia. duct has a cross-sectional area more than double the area of 4-in.-dia. duct. So, to maximize airflow, use the largest-diameter duct the dust collector can accept. In many cases, that means removing the factory-installed "Y" fitting on some dust collectors that reduces the larger single port into two or three smaller ones.



6 Make your own hangers

There are a number of elegant ductwork hangers on the market. Although effective, they add significantly to the cost of a dust-collection system. You can use cheap strap-hangers, but they generally won't anchor the duct rigidly enough. A better option is to make your own from some ¾-in.-thick plywood, pipe strap, and a few screws. They securely anchor the duct and cost almost nothing. And they work no matter if the duct runs vertically or horizontally. Use screws to attach them to studs or ceiling joists, and masonry nails to attach them to cinder block.

If you need to bypass obstacles, simply increase the distance from the duct to the wall or ceiling. Also, use the longest available straight lengths of duct (usually 5 ft.), and install a hanger at each pipe joint. That way, you minimize the number of hangers and the number of joints that need to be taped.

Do I need a new power plant?

This chart, based on tests conducted by *FWW* ("Dust Collection Demystified," *FWW* #188), shows how much rigid ducting each size of dust collector can support. It allows for an additional short length of flexible hose and the usual junctions and connectors.

Drawings: John Hartman

7 Minimize the length of duct runs

Keep the duct runs as short as possible. That way, the frictional force on the air running through the duct is kept to a minimum. When friction is reduced, the drop in cfm is reduced, too.

8 Use "Y" connectors for lateral branches

Most systems have one or two main horizontal ducts. Branch ducts, often smaller in diameter, connect the dust-producing machines to the main duct. To join the branches into the main duct, you need a connector. Always use a Y-connector, which joins the ducts at 45°, to minimize friction and allow greater airflow.

10 Add a larger port to machines

Most woodworking machines have 4-in.-dia. dust ports, which will require a reducer to connect to a 5- or 6-in. duct or hose, and that reduces airflow. Whenever possible, replace that port with a larger one. If not, place the reducer as close to the dust-producing machine as possible, which allows the larger-diameter duct to run for a longer distance. For tablesaws of almost any type, consider modifying your machine as described in *FWW* #145 ("Dust-proof Your Contractor's Saw").

9 Minimize the bends and maximize the radius

You'll need curved sections to direct the duct system up, down, in, and around to get to the various machines. Keep in mind, though, that bends generate a lot of extra friction, causing a bigger drop in airflow than the same length of straight pipe. Indeed, in 4-in.-dia. pipe, two 90° elbows can add as much friction as 12 ft. of straight pipe. So, as you design your system, avoid bends whenever possible. In places where a bend must be added, use one with the largest possible radius. A large radius creates less friction than a smaller one.

At the machine

11 Blast gates are a must

A good dust-collection system connects to all of the dust-producing machines—your tablesaw, jointer, and thickness planer, for example. If all of those dust ports are left open, you are dividing up the suction among them, and none will work well. That's why a blast gate at each connection is a must, as it allows you to concentrate all the cfm on the tool you are using. Unless you have a 3-hp or larger collector (which can handle two open ports), you should keep only one blast gate open at a time. Be sure to use "self-cleaning" gates.

12 Connect to everything

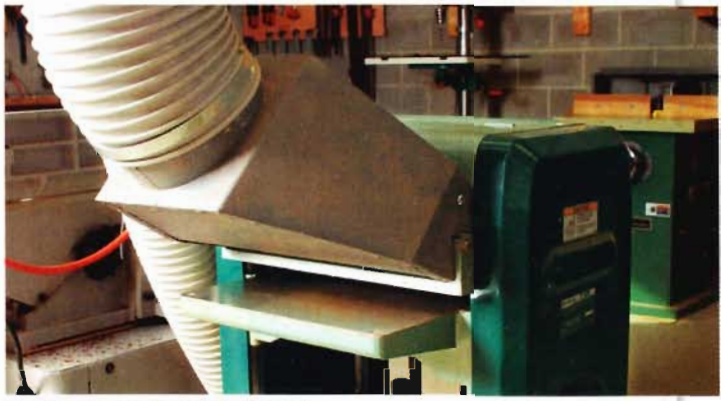
Since wood dust was declared a carcinogen, some newer woodworking machines have incorporated better dust-collection chutes and ports. If you've got 'em, use 'em. But if you have older machines, you may need to attach a ready-made port, or make one yourself.

MOST BANDSAWS HAVE TWO PORTS

Newer bandsaws include two ports, one to grab dust near the cut, and the other at the base of the cabinet to catch what the first one misses. Using elbows, a Y-fitting, and flexible hose, Schuh was able to connect both ports to a single Y on the lateral run from the collector.

JOINTER'S CHIPS JUST FALL DOWN A CHUTE

Many jointers have a big rectangular opening at the end of the dust chute, and it's easy to mount a 4-in. or 5-in. dust port to the base of the machine, using sheet-metal screws or pop rivets. It won't collect all of the finest dust, but it will grab most of it.



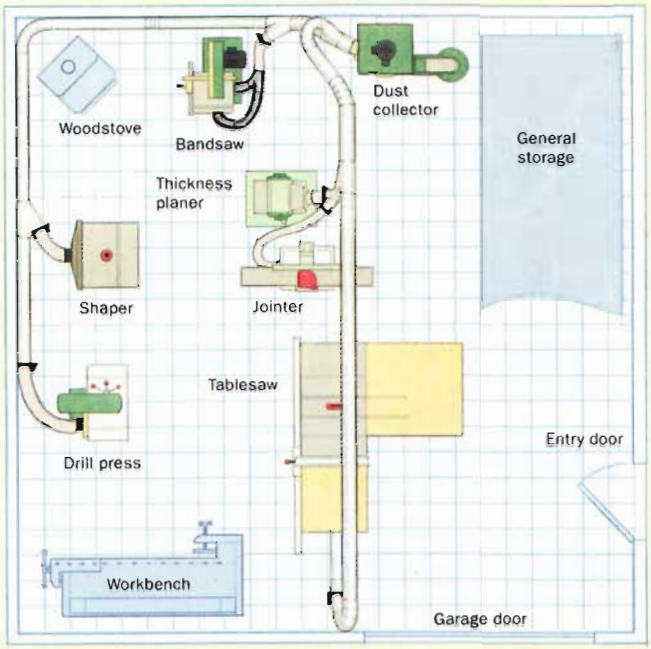
BIG PLANERS CAN BE TRICKY

Older thickness planers may lack a dust-collection port that will connect to a hose. So Schuh used a 6-in. universal mounting strip, some sheet metal, and pop rivets to fabricate a hood that fits over the existing port. Make a cardboard mock-up before you start cutting into your expensive sheet metal.

Typical system in a real-world shop

Schuh's shop measures 24 ft. square, a common size for two-car garages. His main dust-producing machines—tablesaw, jointer, thickness planer, shaper, bandsaw—are what you'd find in many small, one-man shops. His layout is typical, too.

There are two basic ways to run ducting: along the walls of the shop or over the top, attached to the ceiling. Schuh's system is a hybrid of both methods. If you have a similar shop, you might find his setup helpful. If not, there are a number of places to go for design help. Air Handling Systems (www.airhand.com) has excellent online resources for designing your own ductwork, and Oneida Air Systems (www.oneida-air.com) has great advice in a section they call "Shop Plan Design." These sources, and Penn State Industries (www. pennstateind.com) all offer a wide selection of ductwork as well.



AUTHOR'S SHOP, 24 FT. BY 24 FT.

OVER THE TOP

Running ductwork along the ceiling is often the best way to reach machines placed in the middle of the shop or on the side farthest from the collector. But the duct that drops from the ceiling still does create an obstruction of sorts. An alternative is to run ductwork under the floor.

ALONG THE SIDE

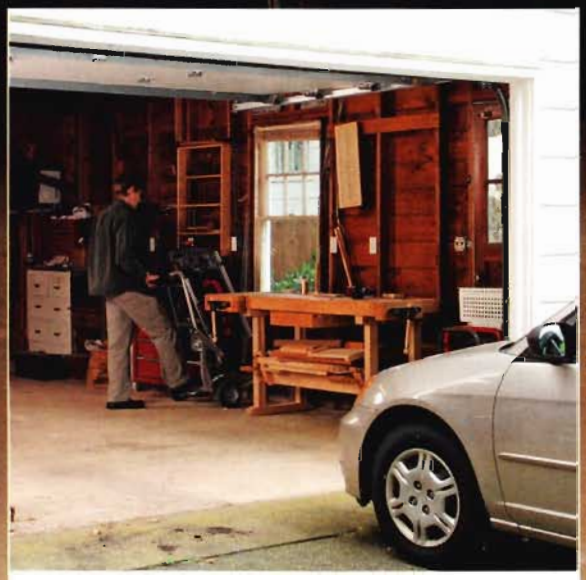
Ductwork that runs along the wall is a good way to reach machines along the perimeter of the shop. It stays completely out of the way but will usually increase the length of the duct run.

TOOL TEST

Portable Tablesaws

A new breed of small, powerful saws is a perfect fit for tight shops

BY PATRICK McCOMBE



Making room for the wheels. *With its stand folded up, a benchtop saw has a 2- by 3-ft. footprint, so you can tuck it against a garage wall and still have enough room for the car.*

The first benchtop tablesaws were little more than portable circular saws mounted upside down in plastic housings. They lacked the power and precision required to make furniture. But these saws have evolved into larger and more substantial machines, capable of surprising accuracy. And the latest models have European-style riving knives, a much better safety option than the old-school splitters.

Given their rolling stands, light weight, and small footprints, these little saws are the perfect choice for woodworkers who have downsized their homes and now live in condos and apartments. They're also good for those who simply want to keep their car(s) in the garage. Benchtop saws cost less than contractor's saws and much less than cabinet saws, making them a good first saw for beginner woodworkers.

But are benchtop tablesaws a realistic alternative to full-size tablesaws for serious woodworkers and furniture makers? The short answer is yes. I tested a half-dozen

MODERN BENCHTOP SAWS ARE UP TO THE JOB

Despite their small stature, these saws have the muscle and features to handle serious woodworking.

PLENTY OF POWER

With 15-amp motors, modern bench saws can cut through just about any material you're likely to use—even 8/4 hard maple. And they sail through thick cherry fast enough to eliminate burning.

VERSATILE RIVING KNIVES

Riving knives prevent stock from twisting and kicking back. All the saws tested have two-position riving knives that work for both through- and non-through-cuts.

YES, THEY CAN DO JOINERY

All but one of the saws have smooth-sided rip fences suitable for jigs. They all accept dado sets and hold their depth and bevel settings, allowing for accurate joints.

BUT THE TABLES ARE SMALL

Add some support. *About one-third smaller than a contractor's saw, the small work surface on a benchtop saw means you'll need additional tables or stands to support large workpieces.*

Miter gauge runs out of room. *The space between the front of the table and the blade (at maximum height) varies from 5 in. to 8¼ in., so plan on building a crosscut sled for panels and wide stock.*

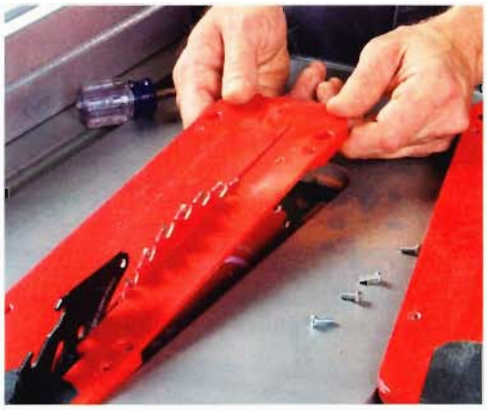
Photos: Kelly J. Dunton

LITTLE THINGS MEAN A LOT

Since all the saws have enough power to do the job, ease of use and accessories make a big difference.

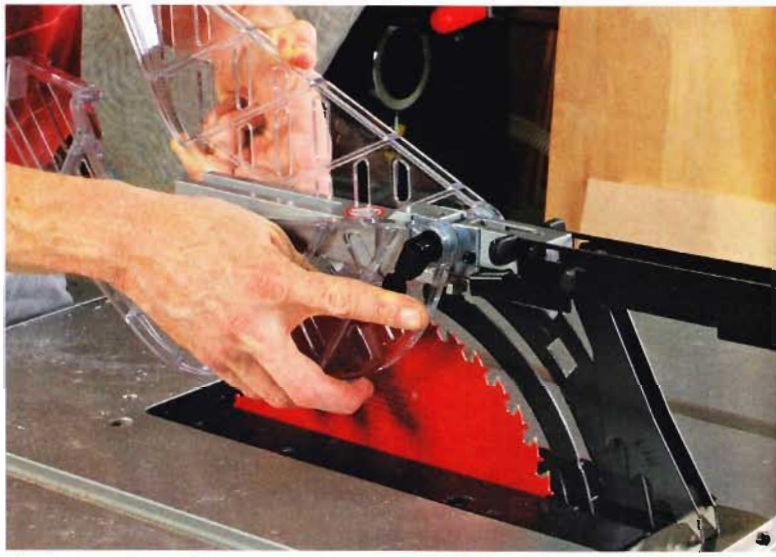
NOT ALL TAKE A ZERO-CLEARANCE THROAT PLATE

It's easy to install a shopmade throat plate on some of the saws; on others, it is difficult to impossible. Bosch offers blank inserts (top) as an accessory. The Craftsman's throat plate (bottom) has two problems: We couldn't figure out how to make a zero-clearance replacement, and the stock plate can't be adjusted level with the table.



SOME RIVING KNIVES ARE EASIER TO USE THAN OTHERS

Most of the riving knives are secured with convenient levers (left) or knobs. Unfortunately, the Jet's small knob (below) is hard to turn.



Blade guards are better than ever. *All the riving knives double as holders for blade covers and anti-kickback pawls. The guards and pawls install and remove easily, making it more likely you'll use them.*

new saws, including models from Bosch, Craftsman, DeWalt, Jet, Makita, and Ridgid. To be considered for the test, saws had to have riving knives to prevent kickback, the most common tablesaw accident. Without a splitter or riving knife in place, a board can pivot sideways as it passes the blade and catch the blade's back teeth, which launch it toward the user. But unlike old-style splitters, which are stationary, riving knives move with the blade, which means they're on the saw—preventing kickback—for almost all types of cuts.

The saws also had to have at least 24 in. of rip capacity, so they could conceivably break down full sheets of plywood—although doing so without an extra pair of hands or additional outfeed *and* infeed support is exceedingly dangerous. All but one of the saws have folding stands that put the saw at a comfortable working height and, when folded, act as two-wheel dollies for moving the rig around.

To measure their suitability for woodworking, I evaluated these little saws using the same criteria I would for a full-size tablesaw, including measuring for table flatness, blade runout, and miter-slot parallelism. I looked critically at the controls for blade height and bevel adjustments and compared the riving knives for function and ease of use. Finally, I did a series of real-world cutting tests, ripping and crosscutting everything from 8/4 hard maple to ¾-in. birch plywood. I also installed dado sets to see how they handled joinery. Since the factory blades that come with these saws are all over the place in terms of quality, I leveled the playing field by installing new, 40-tooth Freud Diablo thin-kerf blades on every saw before testing.

Bottom line: These are serious saws

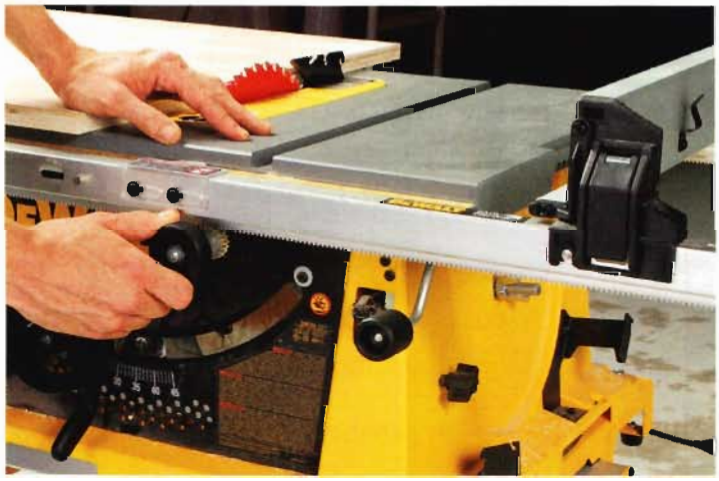
These saws all have motors rated at 15 amps, but they're designed to run on ordinary 110-volt circuits without tripping breakers, so you won't need any special wiring. They all have enough power to rip even 8/4 hard maple at a reasonable feed rate, and they all plowed through 6/4 cherry fast enough to avoid burning.

There is one downside to the small (universal-type) motors on these saws. They are *loud*, pumping out between 92 (Bosch and Makita) and 99 (Ridgid) decibels. I measured their volume from about 2 ft. away with the motors running, but not cutting. They get even more shrill under load, so ear protection is a must.

For accurate cuts, tablesaws must have their blades parallel to the miter slot. All these saws, with the exception of the Bosch, needed to have their blades trued to the miter slot before use. The numbers in the chart (see p. 80) relating to blade/miter slot

2-FT. RIPS ARE STANDARD

For maximum capacity without sacrificing portability, all the saws but the DeWalt have an expanding table to the right of the blade (top). DeWalt attaches the rip fence directly to a pair of rack-and-pinion extensions that make fine-tuning a rip setting faster and easier (bottom).



ONE MITER GAUGE STANDS OUT

Ridgid's very solid miter gauge has adjustable stops (left). Most others have metal tabs that work but have too much play (bottom).

SOME DIFFERENCES IN ADJUSTMENTS

All but two of the saws have positive, rack-and-pinion controls for bevel adjustment (left). On the Bosch and DeWalt (below), the trunnions swing free when you release the lock.

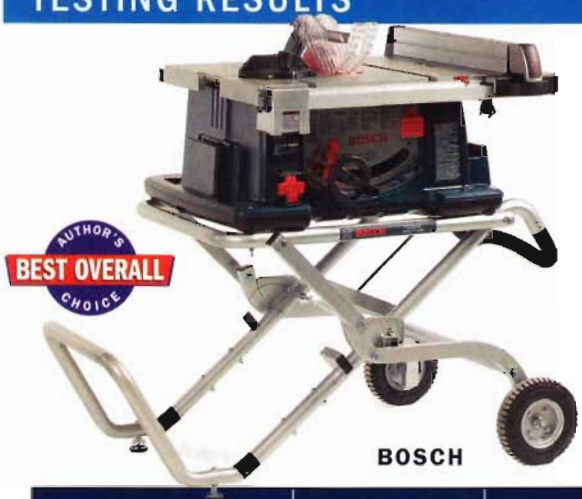
parallelism are after adjustments. Unfortunately, even after adjustment, the miter slot and blade on the Makita and Jet models were still out of parallel when they were set to cut at 45°, a problem significant enough that it probably would require shimming the trunnions to correct, a difficult and time-consuming job.

With those two exceptions, I found all the saws made high-quality cuts. To cut joinery, all the saws maintained a consistent blade height while cutting dadoes and tenons, and all the rip fences except the DeWalt's easily accept shopmade jigs. Miter-slot widths were consistent to 0.001 or 0.002 in., which will keep the miter gauge and various sleds and jigs on track. The Craftsman was the exception, with a slot that varied 0.007 in. over its length. The Craftsman also has the only non-adjustable throat plate, which was noticeably lower than the table.

Improved rip fences

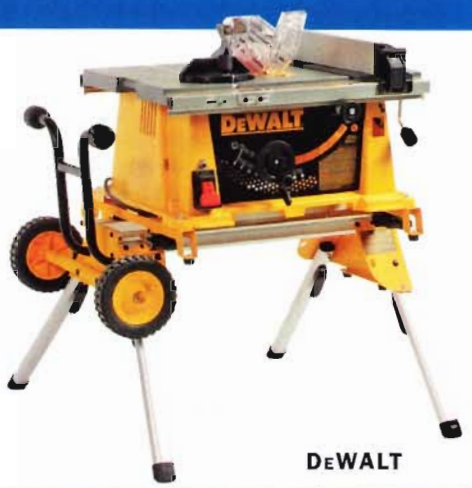
Rip fences have always been the weak link when it comes to portable tablesaws, but manufacturers have improved them dramatically

TESTING RESULTS



BOSCH

CRAFTSMAN



DEWALT

MANUFACTURER/ MODEL	STREET PRICE SAW ONLY/ WITH STAND	OPTIONAL OUTFEED/SIDE SUPPORT	ARBOR LOCK	TABLE FLATNESS	MITER SLOT/BLADE PARALLELISM		BLADE RUNOUT	DECIBEL LEVEL
					AT 90°	AT 45°		
AUTHOR'S BEST OVERALL CHOICE **Bosch 4100-09** www.boschtools.com	$500/$650	$40/$25	Yes	0.015 in.	0.001 in.	0.004 in.	0.003 in.	92
Craftsman 21828 www.craftsman.com	$314/NA	Included/None	No	0.006 in.	0.006 in.	0.006 in.	0.004 in.	98
DeWalt DW744X www.dewalt.com	$530*/$630	$110**	No	0.005 in.	0.003 in.	0.005 in.	0.004 in.	93
Jet JBTS-10MJS www.jettools.com	NA/$610	Included/None	Yes	0.011 in.	0.002 in.	0.015 in.	0.003 in.	95
Makita 2705X1 www.makita.com	$570/ $690	None/None	No	0.003 in.	0.002 in.	0.012 in.	0.006 in.	92
AUTHOR'S BEST VALUE CHOICE **Ridgid R4510** www.ridgid.com	NA/$450	None/None	No	0.014 in.	0.002 in.	0.004 in.	0.004 in.	99

*Base model includes simpler, non-rolling stand **Side and outfeed supports sold as set

in recent years. With one exception (DeWalt), all the rip fences grip aluminum rails front and back and true themselves as they're positioned and locked. DeWalt's rip fence works well too, but its unique design makes it tough to use jigs that ride on the fence.

Some controls are more positive than others

One of the most significant differences among models is the controls used for bevel and height adjustments. The Craftsman, Jet, Makita, and Ridgid models all have rack-and-pinion bevel adjustments while the Bosch and DeWalt trunnions swing free when you release the lock. The rack-and-pinion design makes it a little easier to fine-tune a bevel setting, but I wouldn't consider it a must-have.

All the saws' trunnions have adjustable stops at 45° and 90°. As a test, I repeatedly switched between the two settings and checked their accuracy with a drafting triangle. All the saws passed the test without even a sliver of light between the blade and the square.

The Ridgid is the only saw with a blade-elevation lock, but the others held their settings without it.

Riving knives are excellent

All the saws have two-position riving knives for through- and non-through-cuts. After removing the guard, anti-kickback pawls, and throat plate, you can loosen the lever or knob at the base of the knife and move it up or down. With a remote release at the back of the saw, Makita makes the process even easier. All the knives are sized for thin-kerf blades, and they barely attracted notice as I used the saws, which is exactly what you expect from a well-designed safety feature.

Some throat plates are deal-breakers

Any experienced woodworker will tell you that a zero-clearance throat plate improves safety and reduces tearout, but only Bosch offers a zero-clearance insert (TS1005). However, Leecraft (716-685-

JET

MAKITA

RIDGID

DADO CAPACITY	FRONT OF TABLE TO BLADE	ACCEPTS SHOPMADE THROAT PLATE	MITER GAUGE	RIVING KNIFE/ BLADE GUARD	STAND	COMMENTS
13/16 in.	6¾ in.	Yes	Very good	Very good	Excellent	Most power. Accurate right out of box. Best stand. Best accessories.
½ in.***	5 in.	No	Good	Very good	N/A	Non-adjustable throat plate can't be made flush with table. Onboard wheels and handle boost portability.
13/16 in.	5⅛ in.	Yes	Very good	Very good	Very good	Rack-and-pinion rip fence adjusts very well.
13/16 in.	6⅜ in.	Yes, but difficult	Poor	Good	Good	Riving knife most difficult to use. Non-adjustable stops on miter gauge. After truing, saw still off at 45°.
13/16 in.***	8¼ in.	No	Very good	Excellent	Very good	Smooth controls. Best riving knife and guard. Flattest table. After truing, saw still off at 45°.
13/16 in.	6⅞ in.	Yes	Excellent	Very good	Very good	Lowest price with stand included. Good controls.

***6-in. set only

4458, www.leecraftzeroclearance.com) makes one for the DeWalt. You could make your own (see "Get Safer, Cleaner Cuts on Your Tablesaw," *FWW* #200), but it looks nearly impossible with the Craftsman and Makita, and difficult with the Jet. I consider this a deal-breaker for serious woodworking. All the saws have available dado throat plates, and all but the Craftsman accept dado sets stacked to 13/16 in. The Craftsman and Makita will accept only a 6-in.-dia. dado set while all the others will take an 8-in. set.

Dust collection is decent

All the saws have 2-in. dust-collection ports connected to plastic shrouds that cover the section of blade below the table. For dust collection during testing, I used both a 16-gallon Ridgid shop vacuum and a portable 1½ hp Delta dust collector (Model 50-760). Both methods worked well, except when I was cutting 1½-in. or thicker stock, which puts more blade above the shroud and allows more dust to escape.

The verdict

Picking a best-overall saw here is tough. Most of the saws have enough power and accuracy to handle just about anything a serious woodworker would throw at them, but it's the little things that make all the difference.

I think the Bosch is the best overall choice for woodworkers, because it's accurate, smooth, and powerful. It doesn't really have a single stand-out feature, but all of its features rank near the top. It's one of two saws with an arbor lock (for easier blade changes), and it was the most powerful saw. Also, it easily has the best stand and most useful accessories. Taken together, it's an excellent package.

The Ridgid and DeWalt saws are also very solid performers. But since the Ridgid has the lowest price with a stand included, it gets the best-value award. □

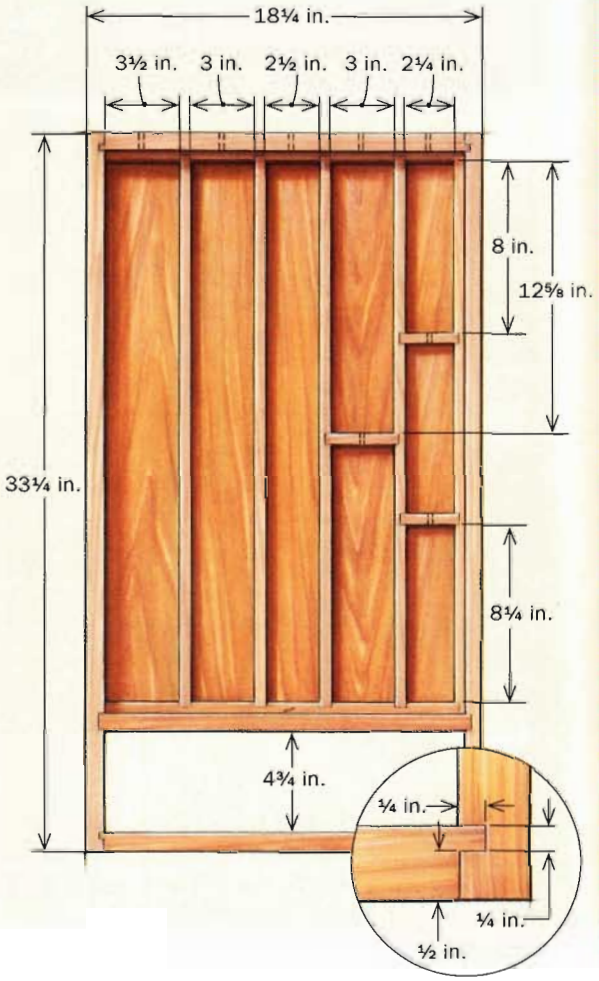
Patrick McCombe is an associate editor.

Keep Planes

Planes go in and out in seconds

BOOTLACES ARE THE SECRET

Planes rest on the angled back panel and are held in place with sturdy bootlace loops. The rack hangs on a hidden french cleat, screwed into studs.



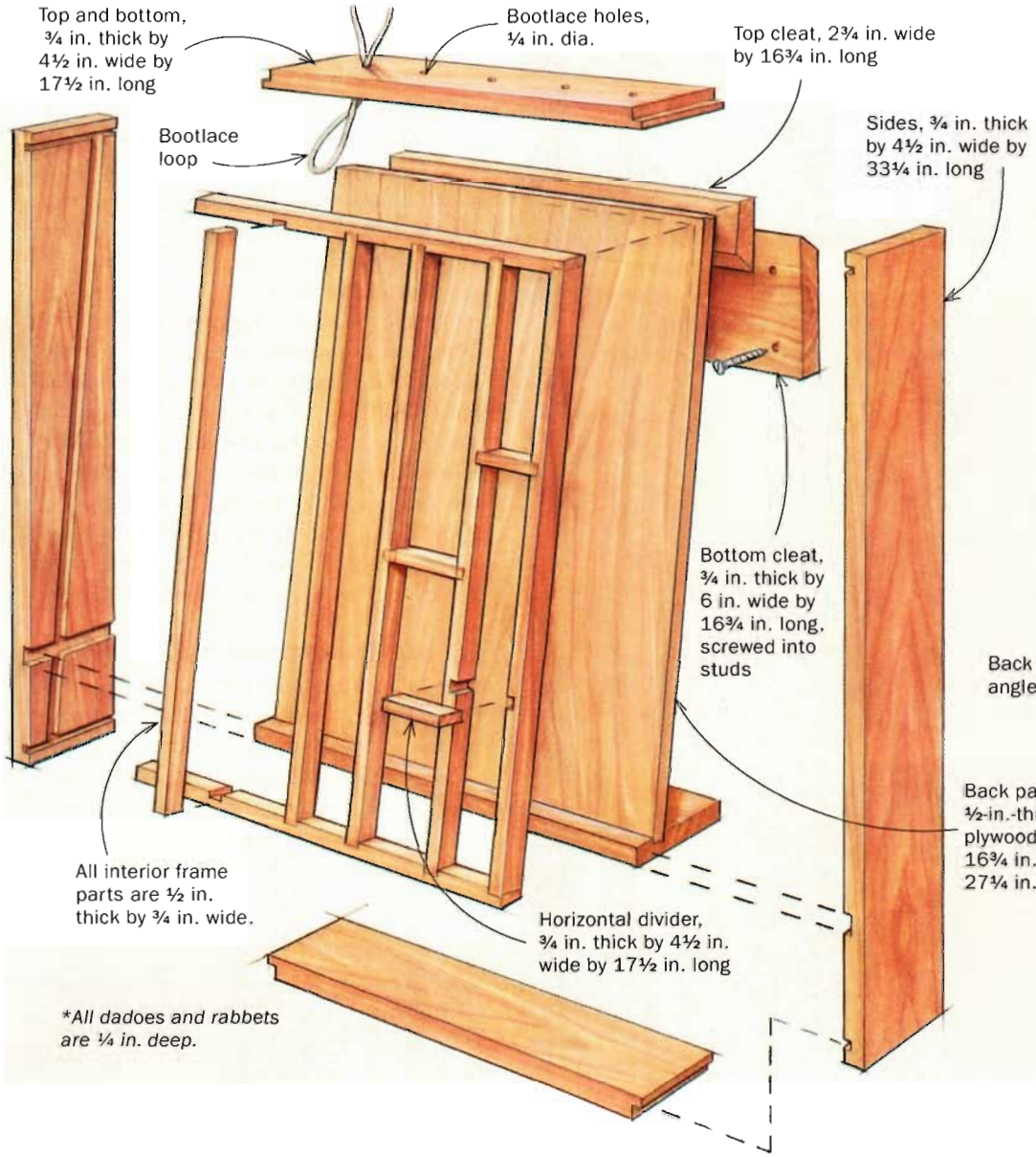
BY CHRIS GOCHNOUR

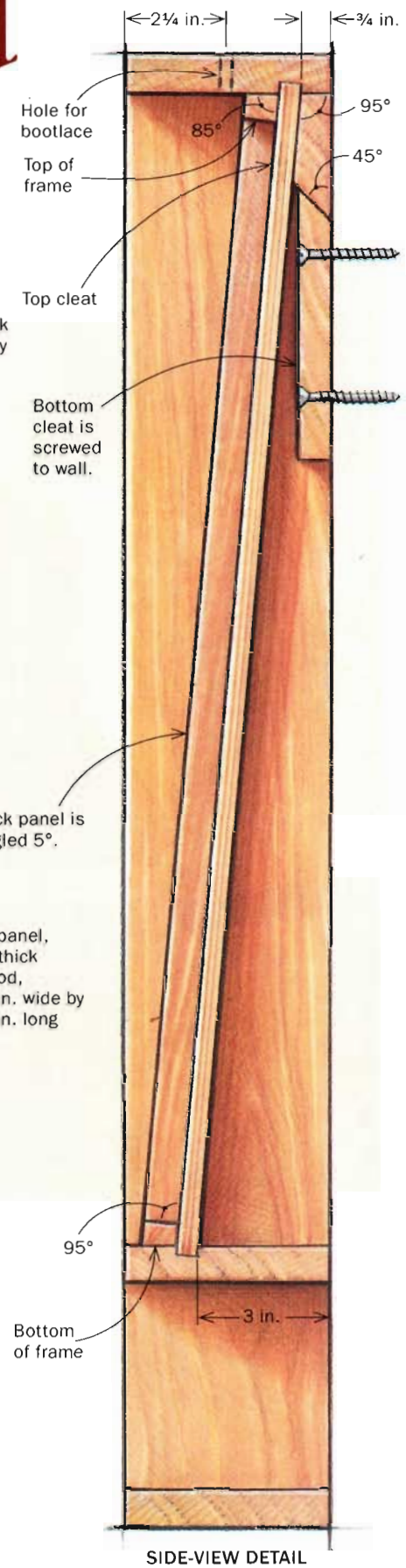
Let's face it. Handplanes are expensive, costing as much as or more than a benchtop power tool. To keep these investments safe, many woodworkers tuck their planes inside drawers or cabinets. Though the tools are safe and sound, it's a nuisance to keep opening a door or drawer to access the planes while they're

Photos: Thomas McKenna; drawings: Bob La Pointe

Close at Hand

with this easy-to-make rack





SIDE-VIEW DETAIL

working. For convenience, many folks end up keeping their most-used planes on top of the bench.

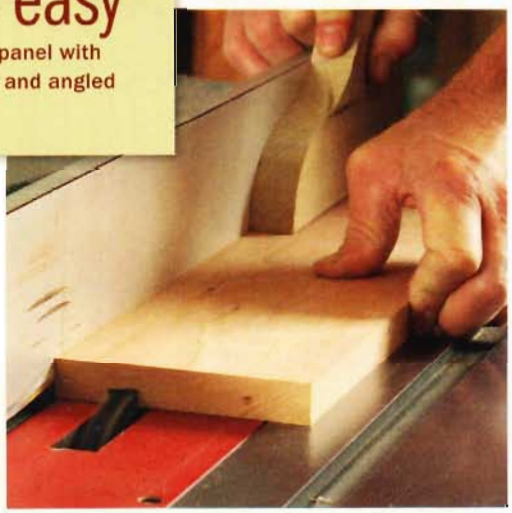
That method is not so convenient, however, because the planes can get in the way, and they're just inches from getting knocked to the floor accidentally. My plane rack solves all of those problems.

Though simple in design, the rack has a unique way of holding the planes. The knobs are suspended from loops made from bootlaces, and the soles rest on an angled panel. The system is strong and stable, and the bootlace hangers allow me to grab and store planes with ease.

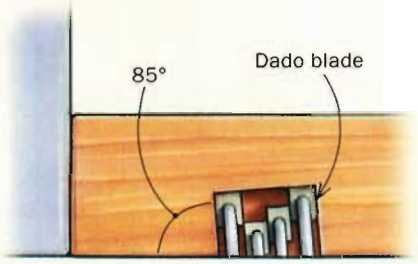
This rack holds what I consider to be a full set of handplanes—a jointer, fore, jack, two smoothers (Nos. 4 and 4½), three block planes—with room below for some specialty planes, such as a shoulder plane. But the rack can be modified to fit

Angled cuts made easy

Cut the top and bottom grooves for the back panel with a tilted dado blade. Then use a plunge router and angled fence to make the grooves in the sides.



Tilt a dado. *Cut the grooves in the top and the horizontal divider at 5°.*



Layout blocks ensure that all the grooves meet. *With the case dry-assembled, use offcuts from the back-panel stock to lay out the side grooves. Place these blocks in the top and bottom grooves and scribe around them with a knife.*

more or fewer planes, or planes of different sizes.

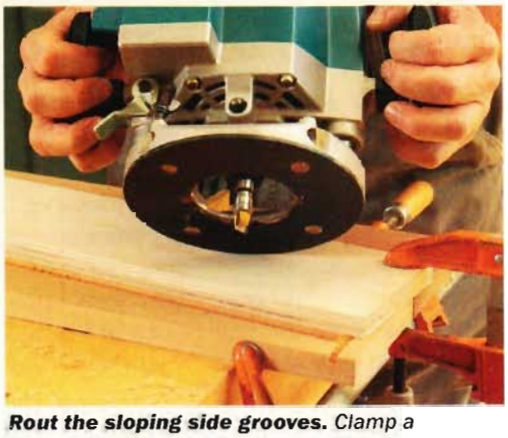
Joinery is straightforward

The case is assembled with simple dadoes and rabbeted dadoes. After cutting these joints, you can take on the trickiest part of the assembly: cutting the grooves for the angled back panel. Start by making the grooves in the underside of the top and in the top of the horizontal divider. These through-grooves are cut on the tablesaw using a dado set tilted to the panel angle (5°). Then, dry-assemble the case. Place a spacer, the same thickness as the back panel and about 1 in. wide by 3 in. long, into the grooves in the top and divider. Knife around the spacer to locate the grooves in the sides.

Clamp the sides together and to the benchtop and clamp a long plywood fence to one side, aligned with the groove marks. Rout the groove using a plunge router and a ½-in.-dia. pattern bit. Rout the groove in the other side piece in the same way. With all the grooves made, cut and fit the plywood back panel and glue up the case. Then make and fit the french cleat. Note how it is angled to sit flat against the back panel.

Cut and fit the interior frame

Start by making the top and bottom pieces of the frame. Cut them to length, then bevel one edge 5° so that the inward facing edge is at a right angle to the back panel (see drawing, p. 83). That means you bevel the top edge of the top piece and the bottom edge of the bottom piece.



Rout the sloping side grooves. *Clamp a fence aligned with the scribe marks, and use a plunge router and ½-in. pattern bit.*

Assembly's a cinch

Gluing up the case won't be hard. Assemble the carcase first. Once that's done, make the french cleat, then cut and assemble the interior frame.

Build the box first. *The plywood back panel is glued into its grooves, making the cabinet rigid.*

Glue in the interior frame. *Install the top and bottom frame pieces first, then attach the vertical pieces. You can glue them to the back panel without clamps, but the joinery must be tight. Drill the bootlace holes in the short horizontal pieces before gluing them in.*

Next, cut the dadoes for the vertical frame pieces in the top and bottom of the frame. Fit the vertical pieces, then cut the dadoes in them for the short horizontal frame pieces. After cutting and fitting the shorter pieces, drill ¼-in.-dia. holes in them for the lower bootlace hooks. Now glue the interior frame into the case. These tight-fitting parts require only spring clamps to hold them while the glue cures. After the interior frame has been installed, drill holes through the top of the case for the top bootlace hooks. Clamp a backer board to the opposite side to prevent tearout.

Finish the rack and tie up loose ends

I finished the rack with three coats of Watco Danish Oil, which brings out the beauty of the wood, protects it from grime, and touches up easily if needed. Once the finish is dry, make the bootlace hooks. It will take some tries to get the right-length loop for each compartment. Don't get frustrated. As long as you can hook the knob of the plane through the loop and the plane sits in its compartment, you're good to go. Singe the ends of the loops to prevent fraying.

It won't take long to get the hang of this rack. Soon you'll be removing and replacing the planes with just one hand. □

Chris Gochnour is a furniture maker near Salt Lake City.

HANG TIME

Holes for the hooks. *Once the case is glued up, drill holes through the top piece for the bootlace hooks. Clamp a backer board underneath to prevent tearout.*

Custom hooks. *Make a loop using a square knot (top) and thread it through its hole (above). Experiment to get the right-length loop for each plane.*

master class

Beautiful carving starts with a keen edge

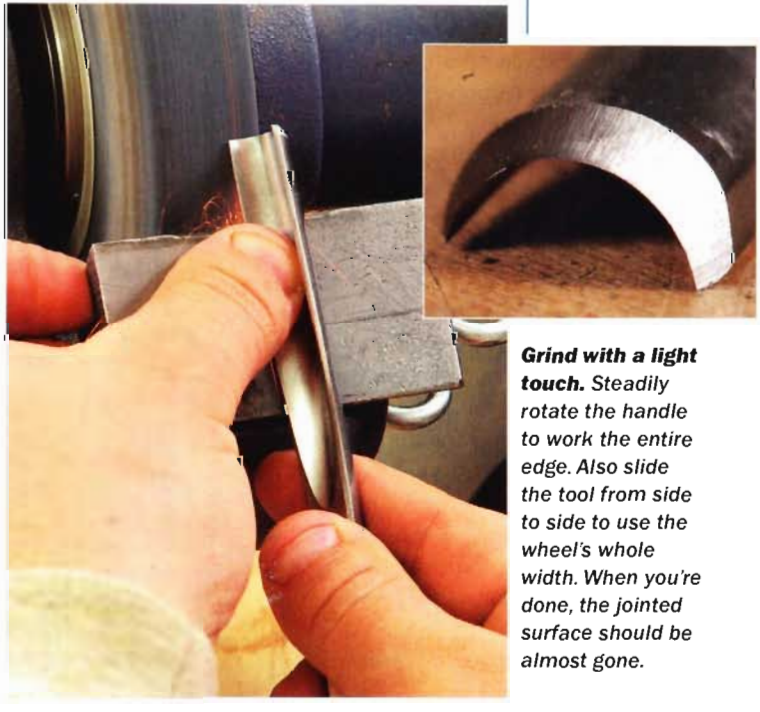
LEARN TO SHARPEN A CURVED GOUGE AND YOU'LL BE ABLE TO HANDLE MOST CARVING TOOLS

BY DAN FAIA

It is not the artistic side of carving that keeps some woodworkers from trying it, but the mechanics of how to sharpen the multitude of carving tools. This article will teach you how to sharpen a curved gouge, one of carving's most basic and useful tools. Gouges of various widths and curvature (sweep) are used throughout the carving process: the initial roughing out, the "setting in" of the carving's primary outlines, and the final details and finished

Grinding a smooth bevel

Joint the edge flat. *Faia rests his forearms on the benchtop to help keep the tool perpendicular to the stone. The goal is a flat that's no more than 1/64 in. or so wide.*

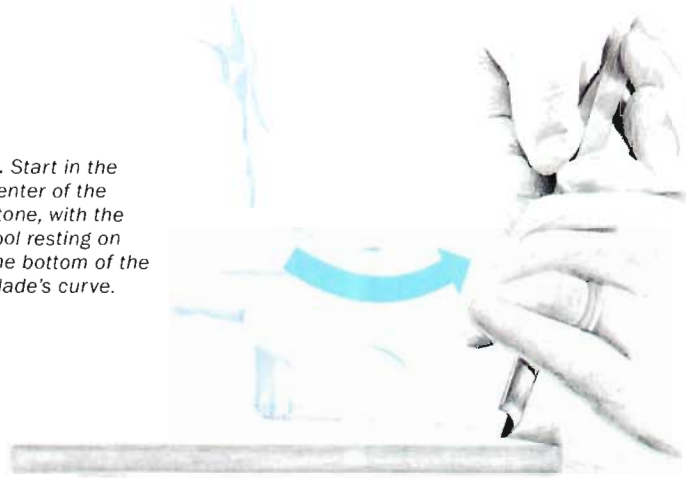


Grind with a light touch. *Steadily rotate the handle to work the entire edge. Also slide the tool from side to side to use the wheel's whole width. When you're done, the jointed surface should be almost gone.*

Photos: Steve Scott; drawings: John Tetreault

Get the hang of honing

Center to side. *Place the stone on the bench so its long axis crosses your body. Tilt the handle upward until the blade is seated on its bevel.*



1. Start in the center of the stone, with the tool resting on the bottom of the blade's curve.

2. Then work the gouge from side to side, rotating the tool as you go. End each stroke as the tool's corner touches the stone.

surfaces. Some of the techniques you'll learn also apply to other types of carving tools. On FineWoodworking .com, I'll show how I sharpen two others.

Gather your equipment

To sharpen a gouge or any other carving tool, you need sharpening stones (one coarse stone, like an India stone, and one fine Arkansas). I use oilstones because they wear more slowly than other types of stones. If you plan to carve a lot, get a separate set of stones for your carving tools. Otherwise, you'll spend too much time keeping the stones flat for your straight-edge tools.

You'll also need a fine, profiled slipstone, a leather strop, and a bench grinder with a tool rest. A slow-speed grinder is best, but a high-speed one with a white or pink wheel is fine, too.

Start by jointing the edge

The first thing to do with a new gouge is to joint the edge. Jointing flattens and trues the edge and creates a narrow, flat surface on the tip. This flat serves as a visual reference to aim for when grinding the bevel, helping you to keep the edge consistent. Jointing is also important in repairing a damaged edge or if you need to grind the edge again to re-establish the bevel angle. I joint the edge on a fine India stone. Using a two-handed grip, hold the edge perpendicular to the stone and take six to 10 strokes, drawing the tool toward you. Your goal is a flat that's no wider than 1/64 in. or so.

The next step is to grind the bevel. First, consider whether to bevel both sides of the edge or only one. Some carvers bevel both sides, but I find it easier to maintain the tool with a bevel only on the outside of the flute. Then consider the angle of the bevel itself. In general, a shallower bevel cuts more easily while a steeper bevel creates a longer-lasting edge. I like a 30° bevel because it gives you a durable edge that cuts effectively in all but the hardest woods. The steepness of the bevel also means that the tool's handle sits high enough when I'm cutting that my knuckles can ride underneath without bumping the work.

Setting the tool rest is easy. Most new tools come with the bevel set between 24° and 26°, and with a little experience you'll be able to use this angle as a reference to set the tool rest by eye. You also can set the angle using a protractor or

Move to the finer stone. *Continue honing in the same pattern, switching to the Arkansas stone to polish the bevel.*

Push back the burr. *Use a slipstone, working the edge with short strokes along the tool's long axis. Return to the Arkansas stone and repeat the process until the burr is gone and the bevel fully polished.*

Stropping is the secret

Pull and roll. *Faia starts with the edge on one corner and pulls the tool toward him, rotating it onto the opposite corner as he goes.*

angle gauge. The diameter of the wheel is not critical (because all of the hollow will be honed away). There's also no need to dress the wheel with a special shape—a flat grinding edge is what you want. To grind the bevel, hold the gouge flat to the tool rest and lightly touch the edge to the wheel. Steadily rotate the handle to ensure even grinding, and move the tool from side to side, using the whole width of the stone. Check your progress often. You'll know you're done when the jointed surface on the edge is almost gone.

Honing refines the edge

I start honing on the India stone. Orient the stone with its long side facing you. Start in the middle of the stone, with the middle of the flute facing down. As you move the tool toward the side, rotate the handle so that the stroke ends with the trailing wing in contact with the abrasive. The next step is to bring the tool all the way back across the stone, rotating as you go, so the opposite wing is touching when you reach the other end. But first, I back up just a little and work the same wing once more. This helps ensure even wear between the wings and the bottom of the flute.

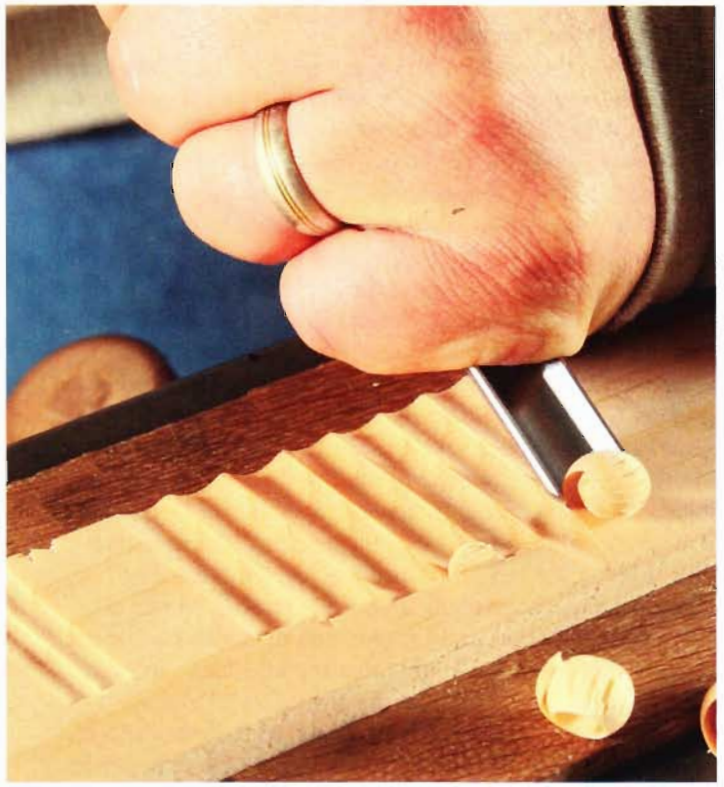
Work until you raise a burr on the inside of the flute. Then use the translucent white Arkansas slipstone to push the burr back, holding the slipstone dead flat against the inside of the flute. Move on to the finer stone, repeating the process to polish out the scratches from the India stone. Using the stones, chase the burr from bevel to flute until the hollow is flattened, the bevel is polished, and you can no longer feel the burr.

Finish by lightly stropping the bevel and flute to polish away any rough spots and create a highly sharpened edge. I charge the suede side of a piece of leather with honing compound (I like Herb's Yellowstone), and hold the strop flat on the bench with my hand as I work the tool across it. □

Online Extra

To see how Faia sharpens a skew chisel and a V-parting tool, go to **FineWoodworking.com/extras.**

Put a curl in it. *Faia simply folds the strop over to work the inside of the gouge.*



Do your carving tools cut like this? *A series of clean cross-grain cuts with clearly defined ridges and no tearout indicates a sharp gouge.*

Q&A

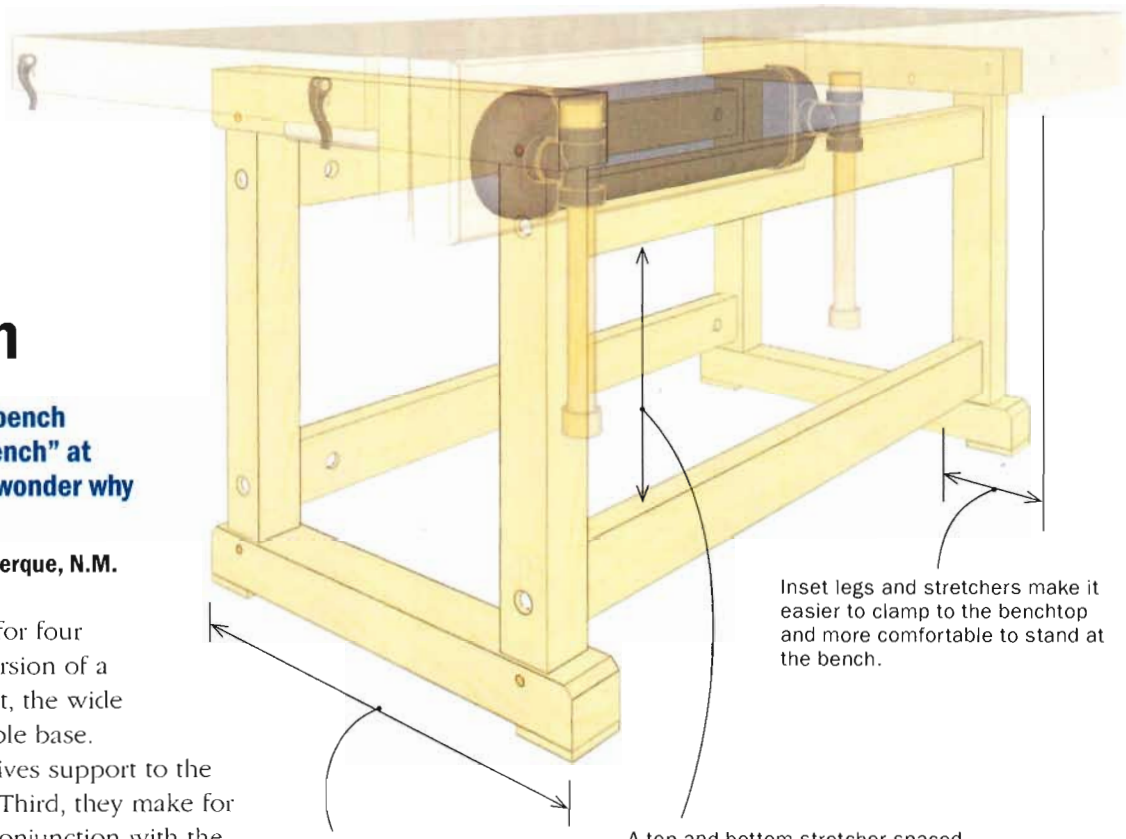
Trestle legs are best for workbench

Q: I like Matt Kenney's workbench (see "Matt's Monster Workbench" at FineWoodworking.com), but wonder why he used trestle-style legs.

—DWAYNE SALISBURY, Albuquerque, N.M.

A: I USED TRESTLE-STYLE LEGS for four reasons (see Garrett Hack's version of a trestle base on pp. 32-39). First, the wide sled foot makes for a very stable base. Second, the wide trestle top gives support to the entire width of the benchtop. Third, they make for solid end assemblies that, in conjunction with the long stretchers, resist racking very well. Finally, I was able to move the long stretchers in from the edge of the bench, freeing up foot room and making it easier to clamp to the benchtop.

—Matt Kenney is an associate editor.



Thin-kerf blade needs thin riving knife

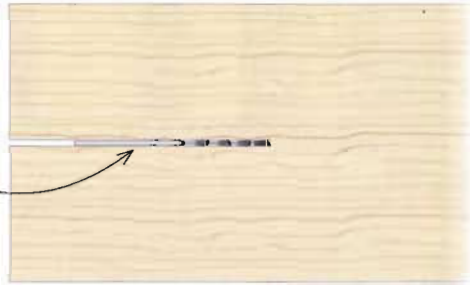
Q: After reading Roland Johnson's articles on riving knives ("Who's Got the Best Riving Knife?" *FWW* #202) and thin-kerf blades ("Thin-Kerf Blades Are for Everyone," *FWW* #204), I'm sold on both products. But will I need a special riving knife for the thin-kerf blades?

—LEN JANKIS, Norman, Okla.

A: YES. THE RIVING KNIFE should be as thin as or thinner than the kerf of the blade you plan to use. If it's thicker than the blade's kerf, then boards will get jammed on the knife, creating a dangerous situation.

The good news is that most tablesaws equipped with riving knives offer a thin-kerf knife as either standard equipment or as an accessory.

—Bob Nash is the shop manager at Fine Woodworking.



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.

Photos: staff; drawings: Dave Richards (top); Kelly J. Dunton (all others)

Reset and sharpen teeth to correct handsaw drift

Q: I recently bought a backsaw. I'm trying to cut a straight line, but the saw always drifts to the left. Is my technique at fault, or is there something wrong with the saw?

—GEORGE HARRIS, Media, Pa.

A: IT'S POSSIBLE THAT THE SAW has been set or sharpened incorrectly.

An easy fix in either case is to lightly run a medium-fine (1,000-grit) diamond stone along each side of the teeth. This will remove some of the excess set and slightly sharpen the teeth. Make a test cut. If it still drifts, give one more pass over the side the saw is favoring. Make another test cut and repeat the stone treatment if needed.

—Garrett Hack is a contributing editor.

Straighten up and saw right. *A quick fix for a handsaw that wanders is to lightly run a sharpening stone along the teeth on either side, taking an extra pass over the side the saw is favoring (above). That will sharpen the teeth and lessen the set (how far the teeth stick out). With a smaller set and sharp teeth, a saw should cut a straight line on its own (left).*

When to replace motor brushes?

Q: My router motor has begun to sound a bit fuzzy when it runs. What does that mean?

—JOHN TETREAULT, Durham, Conn.

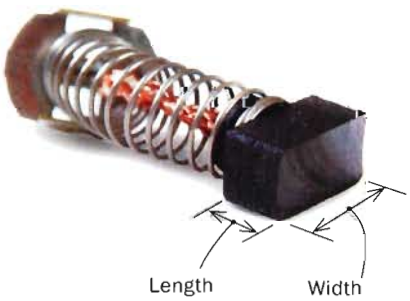
A: IT MEANS YOU NEED to replace the motor's brushes. When the brushes on a universal motor become worn, they no longer touch the commutator firmly, forcing electrical current to jump, or "arc," between them. Arcing is that fuzzy or scratchy noise you're hearing. You should be able to see that arcing through the motor housing vents. Look for flashes of light.

Unplug the router and remove the brushes. Check their condition against the owner's manual to determine if they need to be replaced. Always replace both brushes and make sure they can slide easily in the holder so that the springs can hold them against the commutator as they wear.

—Roland Johnson is a contributing editor.

CHANGE SHORT MOTOR BRUSHES

As a general rule, universal motor brushes should be changed if they are shorter than they are wide.



Remove brush and check for wear. *Worn brushes cause excessive arcing, which is responsible for the fuzzy sound of the motor.*

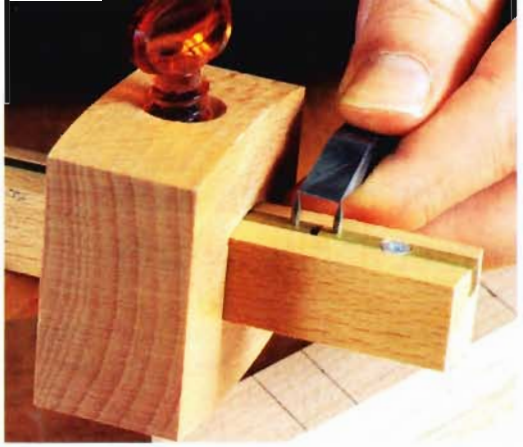
Mortise gauge is key to tight mortise-and-tenon joints

Q: I have trouble cutting mortises and tenons with hand tools. I cut the tenons too thick, and when I trim them they inevitably end up out of parallel with the faces of the board. What can I do to get past these problems?

—HENRY MAZZOCCHIO, Cleveland, Ohio

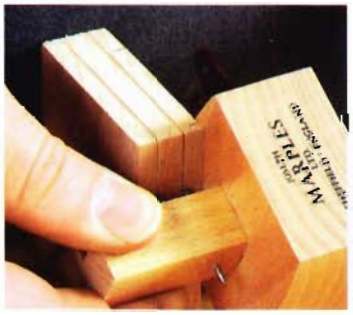
A: THE KEY TO SUCCESSFUL mortise-and-tenon joinery, no matter how you cut them, is laying out the joint precisely and then working up to, but not beyond, your layout lines. The best tool for laying out mortise-and-tenon joints is a mortising gauge. After you set it, use it to mark both the mortise and the tenon so that they are the same thickness. If you then work to your layout lines, you'll have a joint that fits perfectly.

—Chris Gochnour writes frequently about hand tools for FWW.



Set the gauge. *The distance between the pins should be set directly off the tool that will be used to cut the mortise, in this case a mortising chisel.*

Mark the mortise. *A mortise gauge marks both walls of the mortise at the same time.*



A tenon to match. *The tenon is marked with the same setup as the mortise, ensuring that the tenon is the same thickness as the mortise.*

Trim to the line. *After cutting proud of the layout lines to form the cheeks, trim down to the lines for a snug fit.*

Refinishing won't loosen veneer

Q: When stripping finish off veneer, is there any danger of the stripper soaking through and loosening the glue?

—RON DAVIES, Montpelier, Vt.

A: AS LONG AS THE VENEER is in good condition, then I wouldn't expect any problems no matter what type of glue was used to bond the veneer. I suggest using a methylene-chloride-based stripper, like Zip-Strip, because strippers of this type work fast and are easy to use. It's best to work outdoors on a warm day (60° or warmer), either in the shade or under cloud cover. After the finish is stripped, clean the surface with lacquer thinner and a Scotch-Brite pad to remove any residual stripper.

—Jeff Jewitt writes frequently about finishing for FWW.

Veneer refinishes like solid wood. *Standard stripping agents, like Zip-Strip, won't loosen the glue holding veneer to its substrate. Just be sure to clean up afterward with lacquer thinner.*

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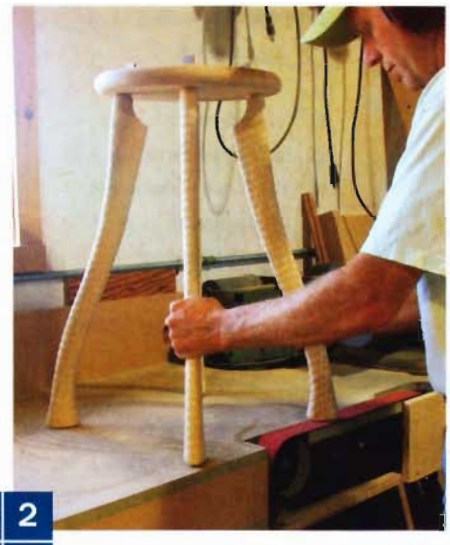
Masterful production

BY JONATHAN BINZEN

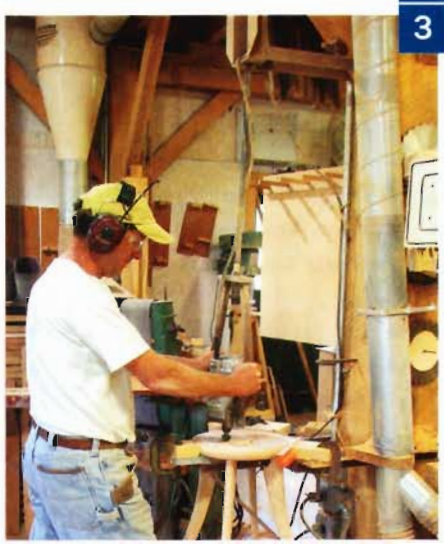
Every year, Brad Smith (see the back cover) makes hundreds of his ax-handle stools. The design of the stool has stayed essentially the same for 20 years, but Smith's methods of producing it have evolved. Along the way, he has developed an array of beautifully logical jigs, perfectly suited to his three-man shop. Here are a few of the innovations that enable him to produce his stools and chairs quickly and economically while maintaining his demanding standards of craftsmanship.

Antique ax-handle lathe. *Almost every process in Smith's shop relies on common tools, with one amazing exception. After buying hundreds of ax handles, Smith bought the machine that makes them, this automated lathe built in Cincinnati around 1900. With two motors—one to rotate the stock, the other to drive the cutters—it follows a template and cuts in one pass with a combination of ganged sawblades (roughing out) and an insert-knife cutterhead (finishing cut).*



Leg leveler. *To make quick work of leveling the stool's legs, Smith built a strip sander into the front edge of a dedicated stretch of countertop. A stool will rock on its high leg, so he simply sands the high leg until the stool no longer rocks. He built the counter using torsion-box construction to keep it flat over the long haul.*

1 2 3 4



Doing dishes. *To dish the seats of his stools, Smith made a 4-ft. pendulum for a heavy router. He bought the router for $50 and welded the parts of the pendulum from discarded farm implements. The pendulum has a steel sphere at the top end that rotates smoothly in a circular hole in a steel plate. Using a core-box bit in the router and cutting in concentric circles from the outside in, Smith can dish a seat in about a minute.*

Four notches, quick and clean. *Smith uses a steel ring as a footrest on his stools. To cut coved notches for the ring on the inside of each leg, he built this turntable jig for a router. While holding the leg against an adjustable metal positioning plate, Smith moves the jig's long handle, which swings the router through the cut. The jig is adjustable to accommodate stools in a range of heights.*

Photos: Michael O'Neill (top right); Jonathan Binzen (all others)

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Furniture Farm

Brad Smith is not a farmer, but his furniture and shop are as rooted in the soil of eastern Pennsylvania as the corn that grows in the surrounding fields. Smith grew up on a farm in Worcester, Pa., and learned to work wood as a boy. After studying furniture making at Rochester Institute of Technology's School for American Craftsmen in the late 1970s, he returned to Worcester with his wife, Sandy—an RIT classmate—and they set up a shop in his parents' barn and started making kitchen implements. Within a few years, Smith was building furniture that employed parts from farm tools. First came a stool with ax handles for legs; later a bench with pitchfork tines for spindles. When it was time for a new shop after 25 years in his parents' barn, Smith built a woodworker's dream on the property next door: a high-ceilinged, timber-frame structure with massive hemlock beams and an interior layout that accommodates all the clever jigs and fixtures he uses to build his furniture. As for the exterior, that was designed to appeal not to the furniture maker but to the passing dairy farmer.

—Jonathan Binzen

How They Did It Turn to p. 98 to see some of the clever jigs and fixtures Smith uses to build his ax-handle stools.

Pro Portfolio Go to FineWoodworking.com/extras for an audio slide show tour of Smith's shop and a close-up look at how he makes his furniture.