Fine Woodworking

Winter 2001/2002
No. 153

Tools & Shops

FIRST ANNUAL ISSUE

The ultimate router table

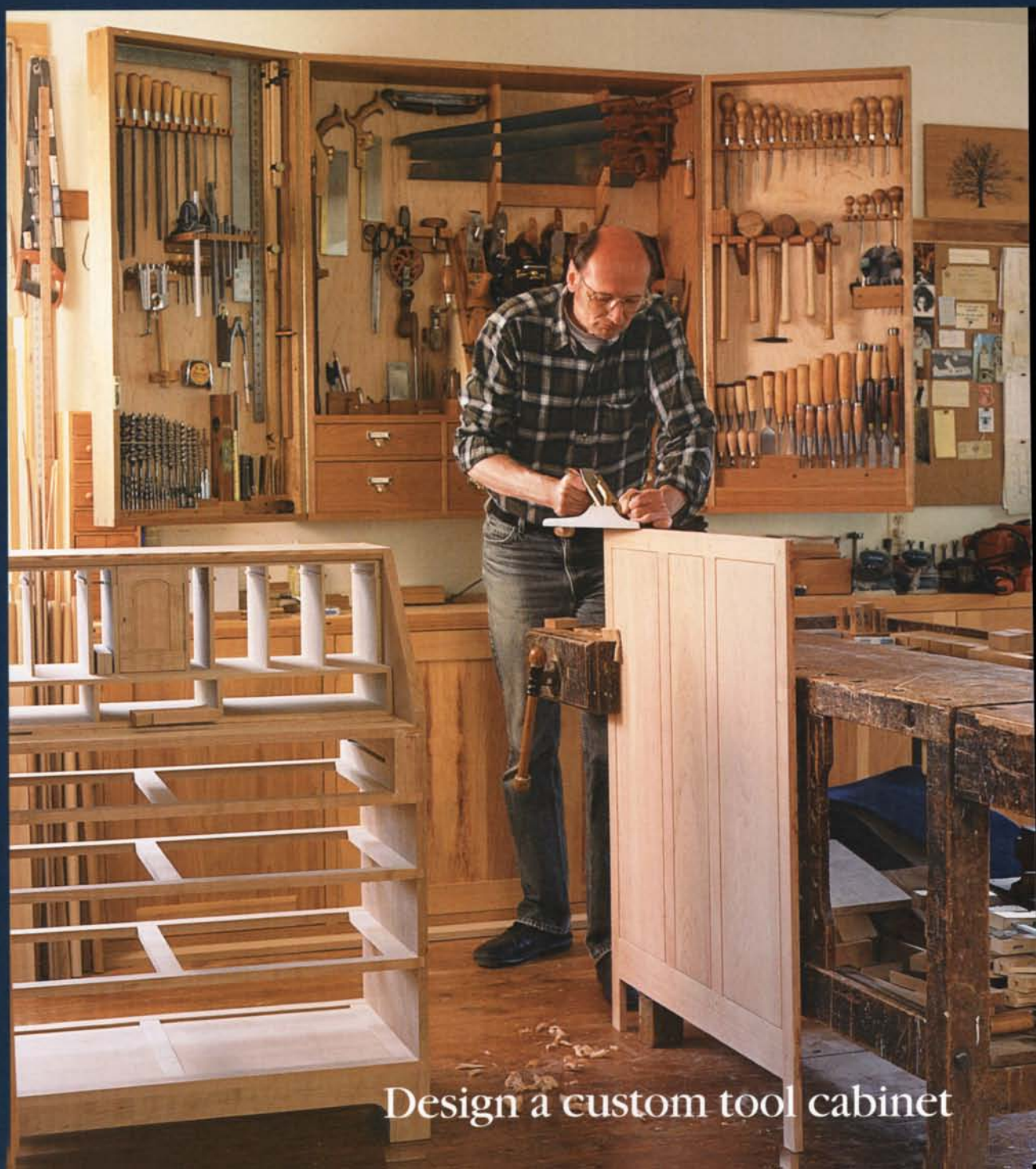
Block planes, 14-in. bandsaws reviewed

Small shop on wheels

5 essential power tools

Organized shop design

Mike Dunbar's workbench



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Fine WoodWorking

Tools & Shops®

Departments

One-man shop, p. 50

14-in. bandsaws, p. 92

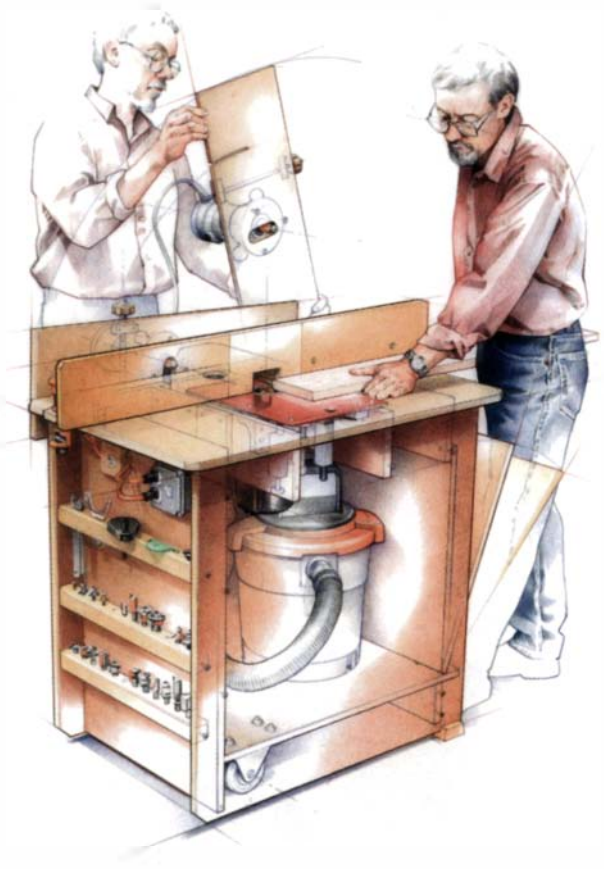
Shop on the go, p. 62

On the Cover:
Chris Becksvoort drew from his 30 years of woodworking experience to design a tool cabinet that keeps everything organized and within easy reach. *See p. 84*
Photo: Michael Pekovich

WINTER 2001/2002 NO.153

Articles

Low-angle block planes, p. 40



Ultimate router table, p. 55

The Taunton Press
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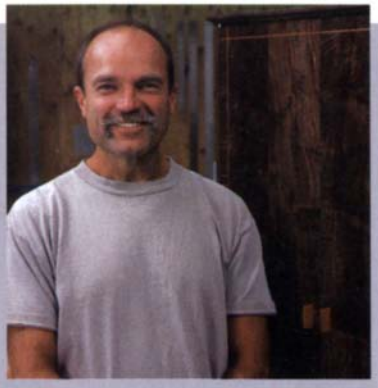

Ross Day ("A Well-Organized One-Man Shop") studied cabinetmaking with Don Khile at Seattle Community College, where he learned basic craftsmanship and how to work efficiently on large projects. Then he went off to the College of the Redwoods and studied with James Krenov, who helped him refine his skills and made him aware of the relationship between the furniture maker, his tools and the material. Day teaches woodworking and designs and builds custom furniture.

Rod Cole ("PVC Pipe Dangers Debunked") is a mathematician at the MIT Lincoln Laboratory in Cambridge, Mass. He became interested in the science behind PVC pipe and sparks when he planned to install his own dust-collection system. After poring through numerous studies on electrostatics (particularly within dust clouds), he became convinced that there was no danger of explosion in a home-shop-sized PVC system. As of late, his woodworking has slowed a bit with the addition of twins to his family. He lives with his wife and three children in Boston.

When **Anatole Burkin** ("Basement Shop on Wheels") isn't rolling around in the sawdust, he can be found pedaling the Connecticut countryside on a larger set of wheels. "With so little spare time, it's tough to choose between my two favorite pastimes: woodworking and bicycling. So I let the weather dictate. Rain, woodworking; sun, bicycling." Inspired by a weeklong class earlier this year with Kentucky chair maker Brian Boggs, Burkin plans on building a set of ladder-back chairs this winter. Burkin, executive editor, came to the magazine five years ago after working for newspapers on the West Coast.

Peter Brown ("A Downdraft Sanding Table") works a day job as an engineer in the aeronautics industry, making sure that jet engines are maintained safely. In his spare time, he collects wood—lots of wood. When he and his family moved into an existing farm just north of Cincinnati, Ohio, he acquired three barns with the property. One of them serves as his workshop, and he uses another larger structure to house his ever-growing collection of native lumber—mostly oak, cherry and walnut.

After serving a four-year stint in the U.S. Marine Corps, from which he was discharged as a sergeant, **Vincent Laurence** (Cutoffs) went on to study literature and philosophy at Vassar College, where he earned a Bachelor of Arts degree. He's worked as a carpenter, a prep-school English teacher, an editor for three Taunton Press publications, including *Fine Woodworking*, and as the product manager and catalog writer for a gourmet-vegetable seed company. Currently, he designs and installs gardens, builds custom garden structures, and writes, edits and photographs in the fields of crafts and horticulture. But a large amount of his time is spent in his 2,400-sq.-ft. kitchen garden avidly cultivating the good life in Newtown, Conn.

Chris Gochnour's ("Low-Angle Block Planes") career as a furniture maker was born from what was originally a hobby, while studying English literature in college. He started out by making an occasional piece of furniture and selling it, then decided to pursue woodworking as a career when he finished school. Gochnour prefers, whenever possible, to use a well-tuned hand tool for a given task. His love of hand tools made him a good candidate to be our reviewer of the low-angle block planes on the market.

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Letters

Welcome to Tools & Shops

You have in your hands a special issue we started working on about a year ago. As the name implies, it's all about tools and shops, two things dear to all woodworkers.

We had a lot of fun visiting woodworkers all across the country and putting together this issue. Inside you'll find a mix of articles divided between power tools and hand tools, shops large and small, and shop projects both easy and challenging. The aim is to help you improve your shops and make informed tool-buying decisions, which will enhance your woodworking. Good tools alone won't necessarily make you a better woodworker, but they help more than hinder your progress.

Tools & Shops is a special seventh issue of *Fine Woodworking*, published each winter, and next year's issue is already on our minds. We're on the lookout for ideas and would like your feedback. What tools would you like to see reviewed? Do you have a shop, tool or shopmade device that you'd like to share with others? Send me a letter or an e-mail (aburkin@taunton.com). I'd like to hear from you.

–Anatole Burkin, executive editor

18th-century revival—It is great to see 18th-century furniture back in the magazine! Gene Landon's Master Class on gadrooning is fantastic (*FWW* #151, p. 116), and you could not have chosen a more knowledgeable person. Please continue to do more articles on 18th-century furniture, especially with Gene.

–Frank McFee, Chester, Va.

Make your bench even better—I read with interest Dick McDonough's article "Bench Built to Last" (*FWW* #149, pp. 36-41). I thought it is a nice touch to put inlays in the top. Those inlays, however, could be more than just decorative.

Inlaying a grid pattern in a workbench would be an assembly aid. With only three or four lines in each direction I'll bet you would use your framing square half as much. Benches made for sewing or cutting glass sometimes incorporate grid patterns.

–Herman Spaeth, South Lyon, Mich.

Humor in the pages of *Fine Woodworking*—In all my years of reading your magazine, I have never seen one humorous article. Many of the woodworkers that I know have a keen sense of humor, and I feel that this is lacking in your magazine.

Therefore, I propose submitting an article for the April 2002 issue, an April Fools' article. I propose an article on how to make a "tater and onyon" bin. That's potato and onion bin for city folks. The article would be completely tongue-in-cheek, intended to tweak the noses of those snobs who complained so vehemently about the Norm Abram article many years ago.

The last paragraph would involve driving a bent nail into the side of the tater and onyon cabinet, sort of an artistic statement. Think about it. You guys should be ready for something with humor in it.

–Woody Herman, Middle Grove, N.Y.

ANATOLE BURKIN, EXECUTIVE EDITOR, REPLIES: You have no idea how ready we are.

A better way to make a scraper—I would like to offer a couple of refinements to the technique described in the Rules of Thumb "Making a custom scraper for a complex molding" (*FWW* #151, p. 100).

In order to exactly match the molding profile, two extra steps are needed. The trick is to mate the scraper perfectly, or nearly so, to the wood at the angle the

Writing an article

Fine Woodworking is a reader-written magazine. We welcome proposals, manuscripts, photographs and ideas from our readers, amateur or professional. We'll acknowledge all submissions and return those we can't publish. Send your contributions to *Fine Woodworking*, P.O. Box 5506, Newtown, CT 06470-5506.

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Fine WoodWorking .... around the country

Jan. 20-23 and 24-27: This year's annual Working Wood in the 18th Century conference at Colonial Williamsburg will focus on making tables. The conference, which is co-sponsored by Colonial Williamsburg and *Fine Woodworking*, features furniture makers Allan Breed and Philip C. Lowe. For information, call (757) 220-7182 or e-mail tkinkead@cwf.org.

Jan. 11-13: Bill Duckworth, associate editor, will be at The Woodworking Show, held at the Garden State Exhibit Center in Somerset, N.J. *Fine Woodworking* and the Marc Adams School of Woodworking sponsor the seminars and free Masters' Demonstration Stage at all 54 shows through May 2002.

scraper is actually used. This ensures the scraper contacts the surface evenly across the entire profile. It also, to the greatest extent possible, ensures the scraper's edge meets the angles and curves at a consistent cutting angle. Those angles and curves, to varying degrees, present an effectively skewed surface to the tool.

First, the spring angle must be determined. This is, more or less, the line, which is perpendicular to the approximate tangent of the molding profile's face. For a better explanation of spring, see pp. 188-189 of Garrett Hack's *The Handplane Book* (The Taunton Press, 1997). Although this application is not quite the same as with a molding plane, this is the first half of establishing the proper scraper profile.

Next, one must factor in the angle at which the scraper will be drawn across the surface of the wood. Take note of the cutting angle at which you actually hold the scraper relative to the surface of the wood on a piece of scrap. This might be anywhere from 45° to 75°, depending on the type and hardness of the wood, edge burr and personal technique.

This all might sound a little complicated, but in practice it's quite simple to apply. Just take a scrap piece of the molding. Hold the shaped face against the fence of your miter saw, estimating when it is roughly square/flat to the fence, to set the spring angle. Then set the miter angle the same as your measured scraping angle and cut. Use the resulting cross-section profile as the pattern for your scraper. This will fit and work far better than using a simple 90° pattern. *—Mitch Moschetti, Denver, Colo.*

A fix for DeWalt's biscuit joiner—I am writing in response to Roland Johnson's article "Biscuit Joiners" (*FWW* #151, pp. 58-63).

I was relieved, in a sense, to learn that my problem with nonparallel slots from my DeWalt DW682 was not unique to my own tool. I agree with Johnson: It is a serious problem with an otherwise very user-friendly tool. However, I

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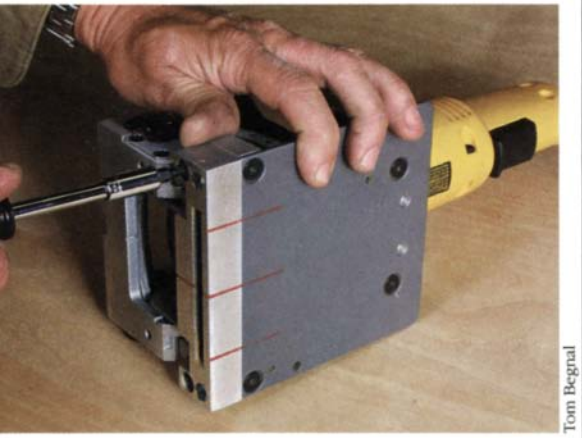
found a way to correct it. First, I loosened the two Torx screws that hold the fixed shoe. They are located just above the antislippage pins on the face of the fixed shoe.

There is a modest amount of play in the counterbored holes in the fixed shoe—not much, but enough to move the shoe to align it parallel with the blade. I think the play in the holes is the source of the problem.

I measured the amount of nonparallelism with a depth micrometer. I rested the base on the fixed shoe and measured the distance to one tooth on the blade. Then I rotated the blade and measured the depth, to the same tooth, at the other side of the shoe. What started as 0.017 in. of nonparallelism is now down to zero. A 6-in. caliper with a dial indicator can also be used to take this measurement.

–Leonard S. Dorsett, Orange, Calif.



Tom Begnal

A DeWalt biscuit joiner that cuts nonparallel slots can be adjusted. *Two Torx screws on the front of the machine are loosened, and the fixed shoe may be moved slightly to realign it.*

Clarification—A Chippendale breakfast table pictured with the Master Class article on gadrooning (*FWW* #151, p. 116) was made by William McGrath of Marblehead, Mass., who is a student at The Furniture Institute of Massachusetts, run by Philip C. Lowe.

Safety concern—After reading the Methods of Work best tip winner "A tablesaw splitter you will actually use" (*FWW* #151, p. 16), I started to think some. Do I really want to suspend a metal drill bit above/near a spinning sawblade? If that dab of cyanoacrylate glue fails, then look out, for you have just created a gun! I think a hardwood dowel would be a lot safer. *–Albert Pope, Knoxville, Tenn.*

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 try to 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, don't do it. Look for another way. We want you to enjoy the craft, so please keep safety foremost in your mind whenever you're in the shop.
–Timothy D. Schreiner, editor-in-chief

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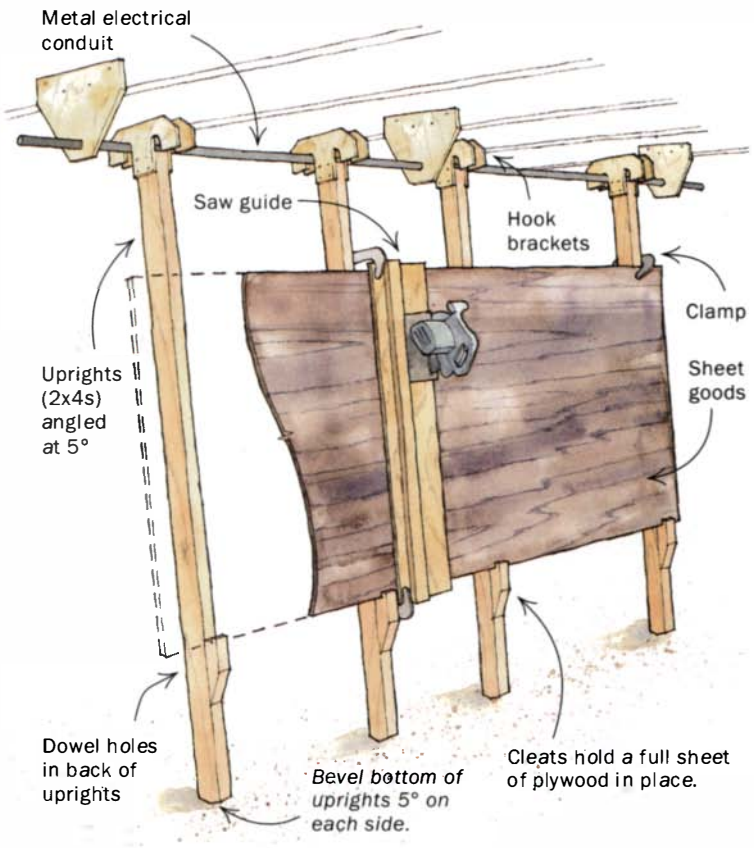
Methods of Work

EDITED AND DRAWN BY JIM RICHEY

Small-shop solution for cutting sheet goods



I work with sheet goods frequently and finally came to realize I needed a panel saw to make that work easier. There simply was not room for such a tool in my small basement shop, so I designed a fixture that makes cutting sheet goods quite simple and efficient. An added benefit is that I've since discovered other uses for the fixture as well.

I needed something that would be lightweight, easy to set up and easy to store. It couldn't be freestanding or mounted to the wall because I didn't have the room. So I came up with a design of four 2x4 uprights that hang from the ceiling.

To make it, I mounted a 10-ft. piece of ¾-in.-dia. metal electrical conduit spaced 4 in. from the ceiling, using plywood brackets. After some experimentation, I decided that the uprights should lean at an angle of 5°, so I cut the bottoms at this angle from both sides to make a foot beveled toward the center. By tilting slightly, the uprights can better support a full sheet of plywood without the sheet tipping over. Then I cut the uprights to length and mounted two plywood hook brackets to the top of each upright that slip over the conduit. Note that the hook brackets are two-sided and allow the uprights to be reversed. Finally I added a 2x2 cleat with a plywood lip about 24 in. up from the bottom of each upright. These cleats easily support the weight of a full sheet of plywood.

Reverse uprights and add dowels to make a drying rack.

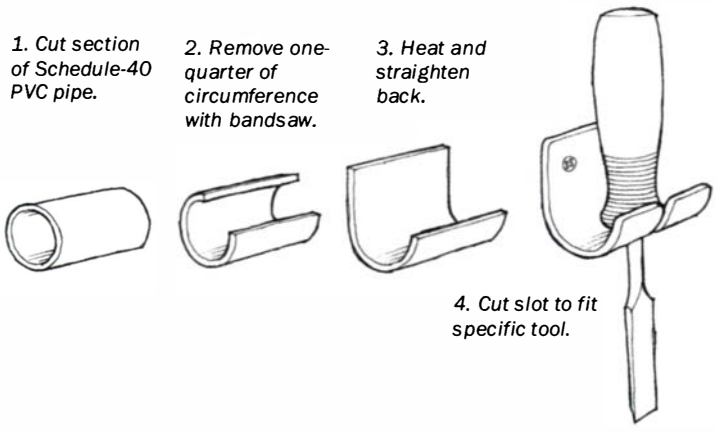
To use the fixture, I slip the hook bracket of each upright over the conduit and then rest the lower end on the floor. When crosscutting I space the uprights so that two are near the ends of the panel and two straddle the saw-cut location. I lift the plywood onto the cleats and clamp it to the uprights. Then I mark the sheet and clamp my saw guide on the cut line. I use a simple saw guide made from a strip of ¼-in.-thick plywood with a ¾-in. runner fastened to it. The first cut trims the guide to the right width, so that from then on it is easy to align it with a cut line marked on a workpiece.

I can also use the fixture to rip panels. To do so I clamp the top of the panel securely to the uprights and set the sawblade to barely cut through the sheet goods.

Now for some extra benefits. By reversing the uprights, drilling ¾-in.-dia. holes every 10 in. and filling the holes with 12-in.-long dowels, I get a great drying rack. And by adding a shower curtain suspended from the conduit with curtain rings and a piece of plastic to protect the floor, I can spray or stain right on the fixture.

—Richard W. Beebe II, Hamden, Conn.

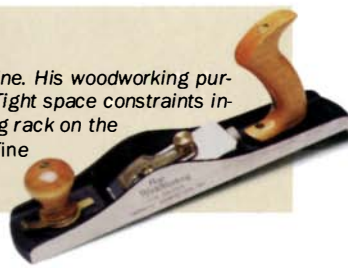
Custom tool hooks from PVC pipe



These tool hooks, made with PVC plumbing pipe and a few simple tools, are strong, nonmarring, inexpensive, quick to make and

A reward for the best tip

Richard Beebe makes a living in the digital world managing the data network for the Yale School of Medicine. His woodworking pursuits, accomplished in a small basement shop, consist mainly of furnishings and cabinetwork for his home. Tight space constraints inspired him to design a dual-purpose vertical rack for cutting sheet goods on one side and to serve as a drying rack on the other. Send us your best tip, along with any photos or sketches (we'll redraw them) to Methods of Work, Fine Woodworking, *P.O. Box 5506, Newtown, CT 06470-5506.*



custom-fitted to each specific tool. Start by cutting off a length of Schedule-40 PVC pipe to fit your application. A 3-in. length of 1½-in.-dia. pipe is a good size for a screwdriver or chisel, but you can vary the pipe size and length for each application. Using a bandsaw with a ¼-in. blade, cut out one-quarter of the circumference, as shown in the sketch on p. 16, to make a C profile when viewed from the end. The pipe tends to close around the blade as you cut, so a smaller blade works better.

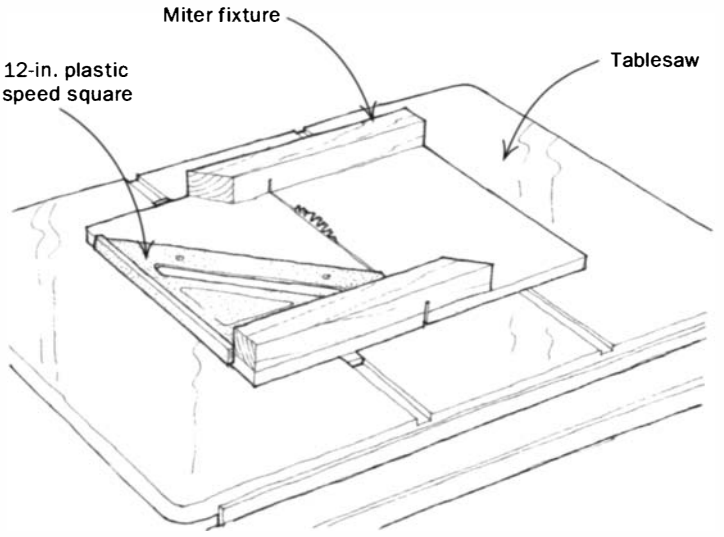
Next, use a heat gun to warm up about a quarter of the circumference of the pipe until it is soft and pliable. It takes only a minute, so don't overdo it. Lay the softened part of the plastic on a flat surface and place a heavy, flat object on the pipe—or clamp it lightly in your vise—until it cools, which takes a few minutes. The altered pipe will have a J profile.

To finish the hook, customize it in whatever way needed, cutting a slot in the bottom to hold the tool you want to hang. Drill a couple of holes for screws, and mount the hook on the wall.

—John J. Black, Clinton Township, Mich.

Speed square mitering sled

For cutting 45° miters on my tablesaw, I use a crosscut sled equipped with a common plastic speed square. To build the sled, attach a runner to the underside of a scrap piece of plywood. Turn the plywood sled 180° in the miter track and cut off the waste along that edge, making it perfectly parallel to the blade. Turn the sled back around, then attach the top and bottom fences 90° square to that trimmed edge. Stagger the fences on both sides of the sawblade to make more room on the sled to handle long workpieces that need to be mitered.



Now place the flange of a plastic 12-in. speed square against the trimmed edge of the sled and rest it against the bottom fence. Attach the square to the sled at this location with three or four small

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Woodworker II

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10"x80Tx5/8" *Delta, Bosch, Hitachi, Makita, Ryobi, AEG & all*	~~$139~~	$125	$118
12" x 80T x 1" *Delta, Hitachi, Makita, B&D, Sears & all*	~~$149~~	$134	$127
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Woodworker I

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screws. Push the sled through the saw to make a kerf in the sled and to saw off the nose of the speed square. Now you're ready to cut perfect miters.

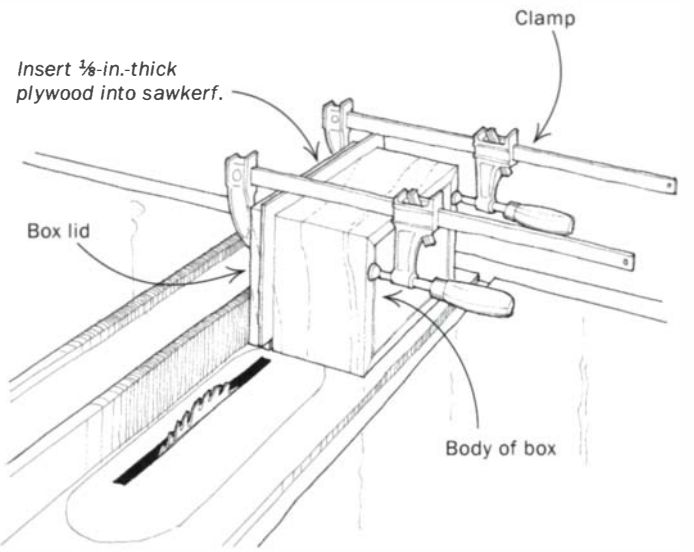
—Benjamin Retzinger, Mountain Home, Idaho

Quick tip: A plastic paint-roller tray makes a great screw-sorting device. Just pour that jar of randomly sized screws into the shallow end and, using a paint stir stick as a spatula, flick the screws you need into the deep end. When you're done, just pour the contents of the tray back into the jar. *—John Martin, Racine, Wis.*

Separating the lid from a box

Many boxmakers like to glue up the box body and lid in one piece and then separate the lid from the box on the tablesaw later. The usual recommended procedure for this (recently echoed by Lon Schleining in his article on box joints in *FWW* #148, pp. 60-63) is to set the tablesaw blade height to just less than the box-wall thickness and make four tablesaw cuts around the box. This leaves the lid attached by a thin wooden web, which you then cut away with a handsaw.

Here is another method that I believe is just as safe, faster and works flawlessly every time. First set the tablesaw blade height to cut through the box wall. Then cut one side and both ends free on the tablesaw. Before making the fourth cut, clamp a thin filler piece into the kerf made by the first three cuts—I use a scrap of ⅛-in.-thick plywood. Place the plywood in the kerf and tighten



two hand clamps across the box to squeeze the plywood in place. With that done, you can safely make the fourth and final cut.

—Eric Kudell, Irvine, Calif.

Quick tip: I save a little time in my shop by adding two or three sheets of sandpaper at a time to my palm sander. When the first piece wears out, I simply rip it off and continue sanding with the next sheet. *—Chris Forgacs, Green Bay, Wis.*

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READER SERVICE NO. 39

Shop Design

BY SCOTT GIBSON

A detached building provides freedom

I've worked in woodshops large and small but none as pleasant as the space I use now. The shop takes up most of a 28-ft. by 24-ft. cedar-shingled building not far from my back door. It has an 11-ft. ceiling, plenty of windows and real heat. The high ceiling seems to amplify light, and it is often possible to work there until dusk without turning on the lights. It's the first woodshop I designed and built from the ground up, so I'm sorry to say the building has a few shortcomings. Most of them could have been avoided with better planning.

That's the first lesson I learned about designing a freestanding woodworking shop: It's not a piece of furniture. You get one crack at it. Deciding that you hate a piece of furniture you've just finished is bad enough. But you can improve a design with a second or a third try, and the first drafts can be cut up and put in the scrap bin or burned in the woodstove. Tearing down a woodshop because the lines are wrong is insanity. Once it's up, there's no tucking it in a corner. You just live with it.

When I was planning my shop, a friend suggested making scale models from mat board to get a sense of how various designs might work. This was excellent advice, but winter wasn't far off, and I was in a hurry. I made one model and a few sketches. Now I know it would have been wiser to spend more time on the planning stage. Eight years after the fact, I see clearly that the best design would have been a small, barnlike structure painted red. With a little cupola or maybe a weather vane on the roof, such a building would have looked as if it belonged next to a 19th-century farmhouse, which is what I live in. Next time I'll work harder on coming up with a design that coexists harmoniously with my house and property. Listening to advice from friends with good design genes wouldn't hurt, either.

Separate building for noisy work

I've had two basement shops, and they both had the same problem. You can't turn on the planer or tablesaw whenever the urge strikes you—at, say, four in the morning. Noise, sawdust and that sinus-reaming aroma of fresh lacquer all find their way up the stairs and into the house. Your spouse and children may swear none of it bothers them, but they are only being polite.

Building a detached shop is more expensive than converting a basement or a garage. My shop cost about $14,000 ($20 per square foot). A separate building also creates long-term costs—maintenance, heat and increased property taxes. Despite all that, a detached shop provides much more freedom, and I think it's worth it if you have the room and the money.

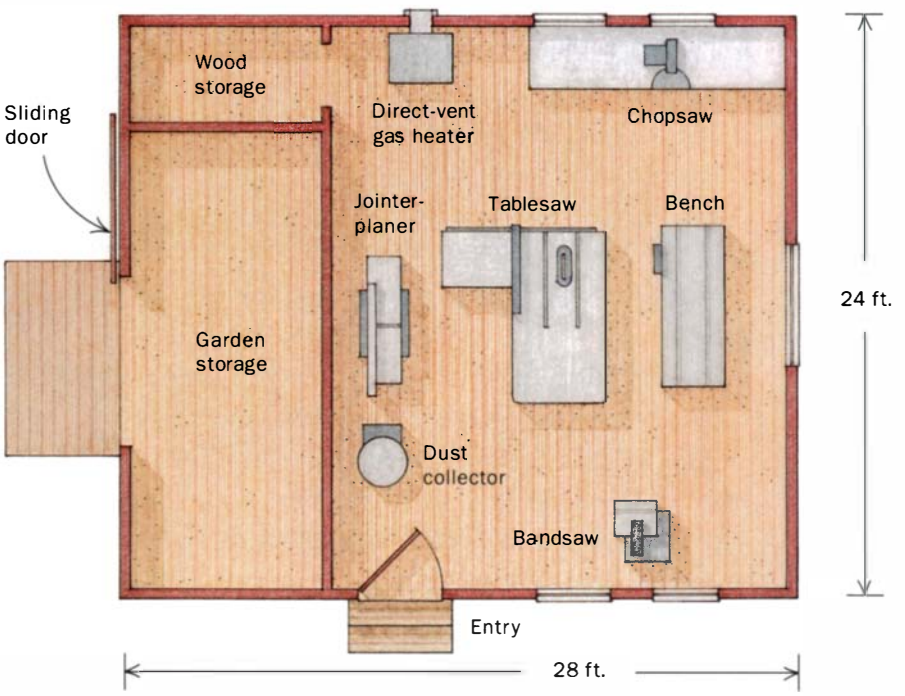
A new shop doesn't have to be luxurious, nor does it have to be huge. My father built chairs in a tiny building that would have made me claustrophobic. It suited him perfectly because he had only a few power tools. I needed more space, although I don't have anything exotic or oversized: a cabinet saw, a combination jointer-planer, a dust collector, a small bandsaw, a lathe and more hand tools than I probably need. In the end, the 480 sq. ft. of floor space I have has been enough to make kitchen cabinets, dining-room tables, cupboards, wall cabinets, a couch. A subpanel handles the three 220-volt circuits I need to run the stationary tools and the half-dozen 120-volt circuits for lights and outlets. It's not high-tech.

Feet prefer wood floors

I did not want to work on a concrete slab. Every shop I'd ever had came with a slab floor, and they were tough on my feet and back. By the end of the day I'd felt as though I had been worked over with an iron pipe. Slab foundations also make wiring and dust collection more difficult if you want to run utilities under the floor, as I did. I also wanted to change either the wiring or ducting around as I needed.

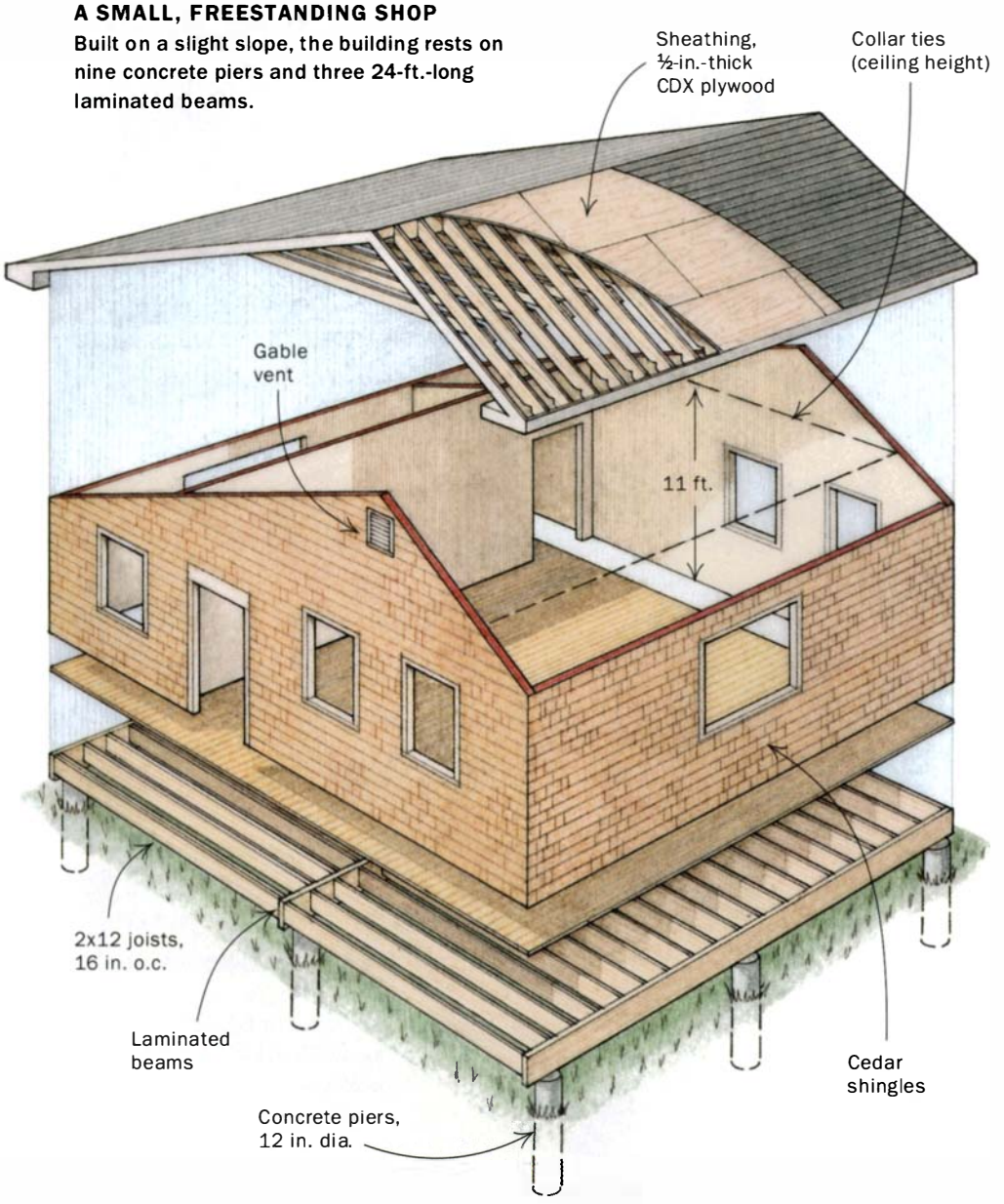
I settled on a wood-framed floor right from the start. The only question was how

FLOOR PLAN



Drawings: Vince Babak; photos: Timothy Sams

A SMALL, FREESTANDING SHOP
Built on a slight slope, the building rests on nine concrete piers and three 24-ft.-long laminated beams.



to support it. A conventional concrete foundation with footings below the frost line would have been $4,000 or $5,000, a big chunk of my budget. I decided to build the shop on 12-in.-dia. concrete piers and laminated beams instead. Much cheaper. For a couple of hundred dollars, I hired a local guard-rail company to dig 5-ft.-deep holes. Concrete forms and rebar are inexpensive, and all nine piers took only a few yards of concrete.

The theory was great, but I found out I didn't know as much about pouring concrete piers as I thought I did. We salvaged the job, but I was grateful that none of my carpenter friends were there to watch. Although the foundation has performed well enough, I've come to believe that pier foundations lend an air of impermanence to the buildings they support, especially on a sloped site. It's all that air beneath the building where block, stone or concrete should be. Next time I would be willing to spend a little more money for a proper foundation. A poured slab with sleepers and a wood-plank floor might not have been a bad idea after all.

Thrift, within reason

I looked for ways to save money. While the shop was going up, I also was renovating my dining room, and I salvaged a big picture window. It's set in the shop's west-facing wall, and it lets in a lot of afternoon light. The walls are ⅜-in.-thick plywood paneling with a coat of white paint. I never got around to finishing the ceiling; it is still covered by sheets of blue foam insulation. It's a shop, I keep reminding myself.

But saving money shouldn't mean freezing. Two winters with a kerosene heater convinced me I needed something with more gusto. If I lit the kerosene at, say, seven in the morning, the shop was just getting comfortable at six that evening, just about the time I was ready for a beer. And the stove produced so much moisture that a globe of hoarfrost the size of an ottoman formed at the gable vent over the door. I hunted for a direct-vent gas heater and eventually found a used one for $350. It's wired to a programmable thermostat and cranks out something like 50,000 Btu—plenty of heat. And it doesn't burn shop air. A double-walled pipe brings in combustion air and vents the heater. As a result, sawdust, solvent fumes and other potentially lethal combinations are not sucked into the heater where they can explode.

And I did get my wooden floor. It's 2x6 tongue-and-groove yellow pine laid directly over 2x12 joists. The floor is very stiff but resilient, and the paint spills, gouges and puddles of dried stain make it no less comfortable for my feet. I do, however, wish from time to time that I'd put the flooring in right-side up. At the time, I thought it would be more attractive with the V-grooves facing up. I've since learned they just gather debris.

Upside-down flooring aside, I don't have many regrets about what I built. The building is far from perfect, as my builder friends must have foreseen the day they helped me frame it. But whatever construction and design problems I've encountered seem much less important than the space itself. Isn't the whole point just being there? □

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READER SERVICE NO. 173

Tools & Materials

There's a lot to like about Milwaukee's new router

Milwaukee recently introduced a 1¾-hp fixed-base router, model 5615-20 (model 5615-21 is the same router with a storage case). And, as I soon discovered during a hands-on test, this is not your father's Milwaukee router.

For starters, my average-sized mitts found the soft-grip handles more comfortable than handles on most other routers. Ideally, though, I'd like them even a bit bigger. In addition to feeling pretty good, the handles can be moved to any one of three different positions on the housing.

Aware that some woodworkers occasionally guide a router one-handed, Milwaukee has made it easier by wrapping the aluminum base with a unique molded-plastic grip. And to provide further support, there's also an adjustable hook-and-loop strap that wraps over the back of the hand.

As fixed-base routers go, I found it better than most when it came to changing bits. The motor removed quickly from the base, providing easy access to the collet.

I was also impressed with the beefy collets Milwaukee uses on this router. It comes with two collets to accommodate bits with ¼-in.- and ½-in.-dia. shanks. Another plus—a large (2½ in. dia.) opening in the plastic subbase allows room for big router bits.

Once the bit has been installed in the collet, it takes just a couple of steps to set the depth of cut. Pushing a motor-release button allows the motor to slide up and down for coarse adjustments. Then, to fine-tune the depth, it's just a matter of turning a micro-adjustment dial. A hefty steel lever locks the motor in place.

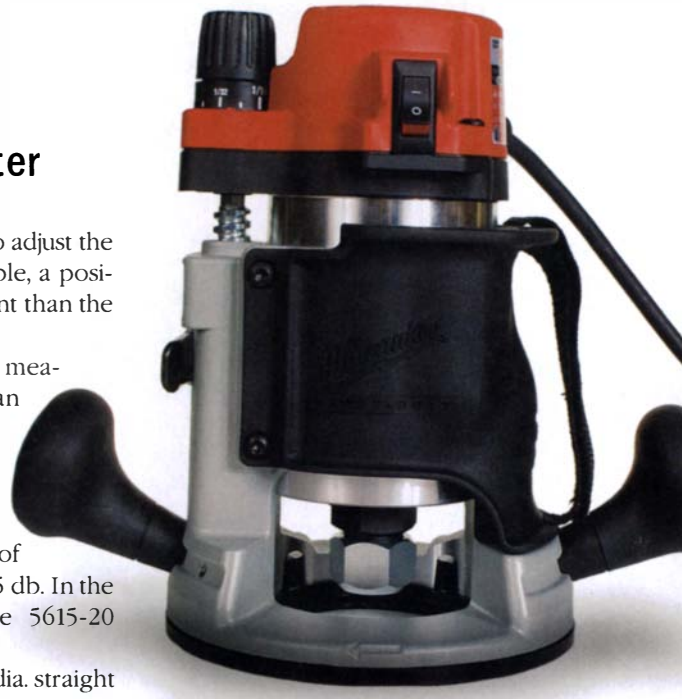
The depth-adjustment system has another feature that's pretty clever. Using any standard ⅜-in. drive hex-socket with a ¼-in. extension, or a T-handle wrench from Milwaukee (an optional accessory), the micro-adjustment dial can be accessed through the subbase. That's handy when setting the bit depth while the router is sitting upside-down on its flat top.

And the subbase access becomes even more useful with the router in a table. That's because once an access hole is drilled in the tabletop, you can use the socket (or T-handled wrench) to adjust the depth of cut from above the table, a position that is a lot more convenient than the usual under-the-table option.

On the unit I tested, runout measured 0.002 in., compared with an average of 0.00415 in. in a recent test of eight fixed-base routers (see *FWW* #150, pp. 52-57). Those same routers had an average noise level of 95.375 db; this one measured 95 db. In the vibration test, the Milwaukee 5615-20 scored an "excellent" rating.

In use, equipped with a ½-in.-dia. straight bit set to make a ¼-in.-deep cut and guided by a straightedge, I plowed three, 36-in.-long grooves in ¾-in.-thick fir plywood. The 11-amp, 24,000-rpm motor made the cuts without any sign of bogging down.

The only features missing are variable speed and a soft start. If you expect to use bits much bigger than, say, 1 in. dia., it's nice to be able to slow down the speed. Milwaukee also makes a D-handled version of this router, model 5619-20. For more information on either router, contact Milwaukee (262-781-3600). Model 5615-20 sells for about $170; the D-handled version, model 5619-20, costs about $180. *—Tom Begnal*



Side grip. *A molded-plastic grip allows you to hold the router from the side with the aid of a support strap.*

A likable boss. *The Bevel Boss makes it easy to transfer an angle to a sliding bevel gauge.*

Quick angle settings with the Bevel Boss

The Bevel Boss is a template designed to set a bevel gauge to a precise angle, up to 50° off 90°. It's well made and does its job exceedingly well, far better than with a speed square. The increments (to quarter degrees) are etched into a plate of stainless steel, 0.040 in. thick. If I were a chair maker or a boatbuilder, I'd probably use the Boss quite a bit, but it will come in handy on those special, angular occasions.

Inch scales (to sixteenths) are on the back and on one end. Out of curiosity, I aligned them with my trusty Starrett scale. To my surprise, the increments did not line up exactly: A few were off by just under 1/128 in. The discrepancy is finer than I'll ever need, but I'd prefer to be the only one adding error to my work.

The angle gradations could be off by as much, but I didn't notice. For the first time ever, I set my bevel gauge to exactly 45°, giving me as accurate a layout line for a miter cut as my Starrett adjustable square. For octagonal work, the Bevel Boss is the ticket, though a little pricey at $29.95. For more information, contact Sutherland Tool (877-472-7717). *—Strother Purdy*

Photos, except where noted: Tom Begnal

Head to head: screw lubes

Tale of the tape. *A strip of masking tape positioned ⅜ in. from the end of each thread helped ensure that the same amount of lube was added to each screw.*

Woodworkers use an assortment of lubricants to make screws easier to drive. Beeswax, paste wax and paraffin (candle) wax are among the most popular. And there are a couple of products marketed specifically for lubing screws: Akempucky and Lube Wax Stick.

To find out whether any one of this bunch might stand out from the others, I ran a little head-to-head test. By the way, soap wasn't included because it tends to attract moisture, and a damp screw soon becomes a rusty one.

The test was simple enough. First, a pilot hole was drilled in a block of maple. Then I added lubricant to a screw and drove it with a power drill until the drill bogged down and the screw wouldn't go in any farther. Then I measured the distance from the top of the head to the surface of the maple. After driving six screws for each lubricant and measuring all of them, I came up with an average number. The one with the lowest average number rated the best score.

To ensure a level playing field, the test had a few ground rules. All of the screws were #10 by 3-in. bright-steel, flathead wood screws from the same box, with Phillips heads. All of the screws were drilled into the same 3-in.-thick block of maple. And to ensure the corded power drill wouldn't have enough oomph to drive all of the screws completely into the maple, I used a lightweight drill with only a 2-amp motor.

To make sure the same amount of lubricant was added to each screw, the end of the thread was masked off with tape so that only ⅜ in. was exposed. Then the tape was removed and the screw was driven with the drill until the motor groaned to a stop.

When the driving (and arithmetic) was over, the two commercial lubes proved to be the most slippery of the bunch. Numerically, the Akempucky had a slightly better score, 1.4479 in., compared with 1.5156 in. for the Lube Wax. That's about a 1/16-in. difference, but as a practical matter, I'd call it a tie.

Beeswax came in third, with 1.8229 in. as an average, followed by 1.9323 in. for paste wax. Paraffin wax had the lowest score, with 2.0833 in. for an average.

By the way, when no lubrication was added, the average measurement was 2.25 in. That's proof that any of these lubricants are better than none at all.

For more information on Akempucky, contact McFeeley's (800-443-7937). A 3½-oz. tube costs $14.95. For information on Lube Wax, contact Grizzly Industrial (800-523-4777). A 2½-oz. stick costs $2.95.

—T.B.

Friction fighter face-off. *Begnal drove screws into a block of wood to find out which lubricants work best.*

Three-in-one spokeshave

Whether it's handplanes, routers or spokeshaves, the well-equipped woodworker can't get by with just one of each. Tools come in varieties for a purpose. You need different planes to handle end grain vs. flat grain, a choice of routers for plunge cuts vs. light-duty edge trimming and a multitude of shaves for flat vs. curved shaping. Well, maybe not. Veritas has a new low-angle spokeshave designed to work flat, convex and concave surfaces. You might be able to get by with just this one spokeshave, at least for a while, anyway.

The low-angle spokeshave has a cast-aluminum body with brass adjusting screws and an A2-steel blade. What sets this tool apart from others is the toe piece, which may be positioned in two different ways. One position is suitable for flat or convex work; the other setting allows it to reach into concave areas.

Whether you're shaping cabriole legs or simple ladder-back posts, the Veritas shave allows you to take rough cuts, then reset the mouth opening and depth of cut for fine shavings. The A2 blade, which is bedded with the bevel up, is really tough and does a lot of work between honings.

The Veritas low-angle spokeshave is reasonably priced at $39.95 and is available from Lee Valley & Veritas Tools (800-871-8158; leevalley.com). *—Anatole Burkin*

Removable toe piece. *Removing a pair of machine screws separates the toe piece from the body of the spokeshave.*

Photos, this page (top right, bottom left) and p. 36: Erika Marks

Eliminator RC quick-change router collet

Quick bit switch. *Bit changes are easy with the Eliminator RC collet, which requires only one Allen wrench to release the cutter.*

It's a rare woodworker who hasn't wished for a simpler way to change router bits. And although quick-change collets have been available in the past, none of them have worked particularly well.

But this collet, called the Eliminator RC, does indeed make it easier to switch bits. Currently, it fits only Porter-Cable routers with ½-in. collets. But a version for the DeWalt 625 is expected soon.

Installation is easy. With the original collet removed, simply thread the Eliminator onto the router spindle.

To add a router bit, slip the shank of the bit into the bore. Then use an Allen wrench (not supplied) to tighten the screw. When tightened, the screw draws a small block with a curved face through a slot in the side of the bore. That's what locks the bit in the collet.

On most bits, the block produced a small, half-moon-shaped impression on the shank. But the metal wasn't roughened or raised nearly enough to cause a problem.

Suspicious that such a simple locking mechanism wouldn't hold the bit solidly, I made several test cuts. And during the cuts, I intentionally pushed the collet extra-hard by using large bits and higher-than-normal feed rates. In all of the tests, I found no sign of a bit slipping in the collet.

I also tested the Eliminator RC for runout, noise and vibration. But first I ran the same tests on the original factory-installed collet. The tests showed no difference between the two collets.

The Eliminator RC is especially useful in a router-table setup. When the router motor is raised to its highest position, this collet projects above the table. So the bit can be changed without having to remove the router from under the table.

The Eliminator RC sells for about $50. If you use ¼-in.- or ⅜-in.-dia. shank bits, you'll also need an adapter: $8.50 for the ¼ in., $10.50 for the ⅜ in. For more information, contact J.P Walsh & J.L Marmo Enterprises at (703) 644-5647. —*John White*

New saws with an old pedigree

High-end handsaws. *The Pax dovetail saw (front) and tenon saw (rear) cut as beautifully as they look.*

I recently tried a pair of handsaws from Thomas Flinn and Co. of Sheffield, England. The 8-in. dovetail saw and 12-in. tenon saw carry the venerable Pax label, a highly regarded name in saw making that dates back to the 18th century.

The handles are both roomy and comfortable. And they're set at an angle that allows for good control of the blade.

Out of the box, both blades were straight and flat, in large part because Flinn didn't skimp on the back—the brass strip that runs along the top edge of the blade. Also, I was pleased to find that the brass back was aligned parallel to the cutting edge of the blade. That's important, because you're able to get the best sense of the cutting plane by observing the back rather than the teeth.

Compared with the tenon saw, the dovetail saw has more teeth per inch (20 vs. 13) and a thinner blade (0.020 in. vs. 0.028 in.). As a result, the dovetail saw makes a thinner kerf and a smoother cut. But don't expect the dovetail saw to cut better tenons. That's because most tenons require too much cutting for a thin blade. So a thinner blade generally tends to wander from the line.

When put to wood, both saws worked well, and both cut in a straight line. However, the kerf of the dovetail saw was wider than I prefer, the result of a little too much set to the teeth. And there was slight tearout along the face of the wood, a sign of unevenness in the set. Not that I was surprised; such quirks are common on new handsaws.

It took just a few minutes with a fine sharpening stone to get the saw cutting perfectly. With the blade on a flat board, I placed the stone flat on the side of the blade and worked the stone from end to end along the teeth. Three gentle strokes on each side are normally sufficient. Don't overdo this procedure or the kerf could end up too small to be effective.

Expect to spend $70 for the dovetail saw and $75 for the tenon saw. For more information, contact The Woodworkers Club (203-847-9663) or Promax (800-933-1562).

—Ian Kirby

Tom Begnal is an associate editor; Strother Purdy builds furniture in Connecticut; Anatole Burkin is executive editor; John White is a contributing editor; Ian Kirby teaches and writes about woodworking.

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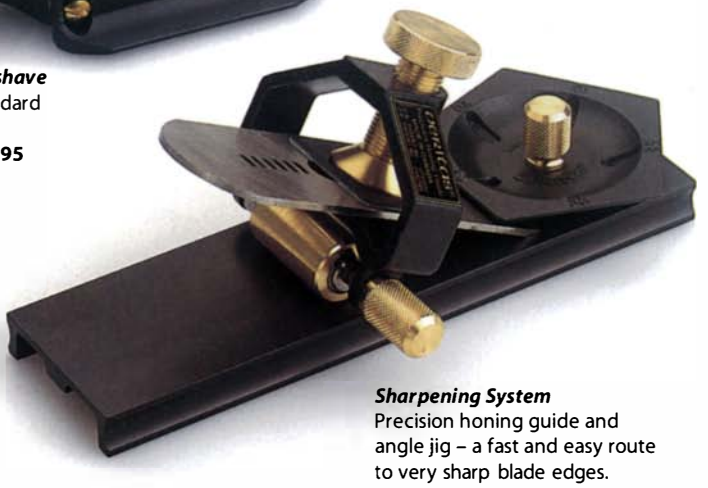

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READER SERVICE NO. 144

Low-Angle Block Planes

Eight models on the market are more different than they are similar

BY CHRIS GOCHNOUR

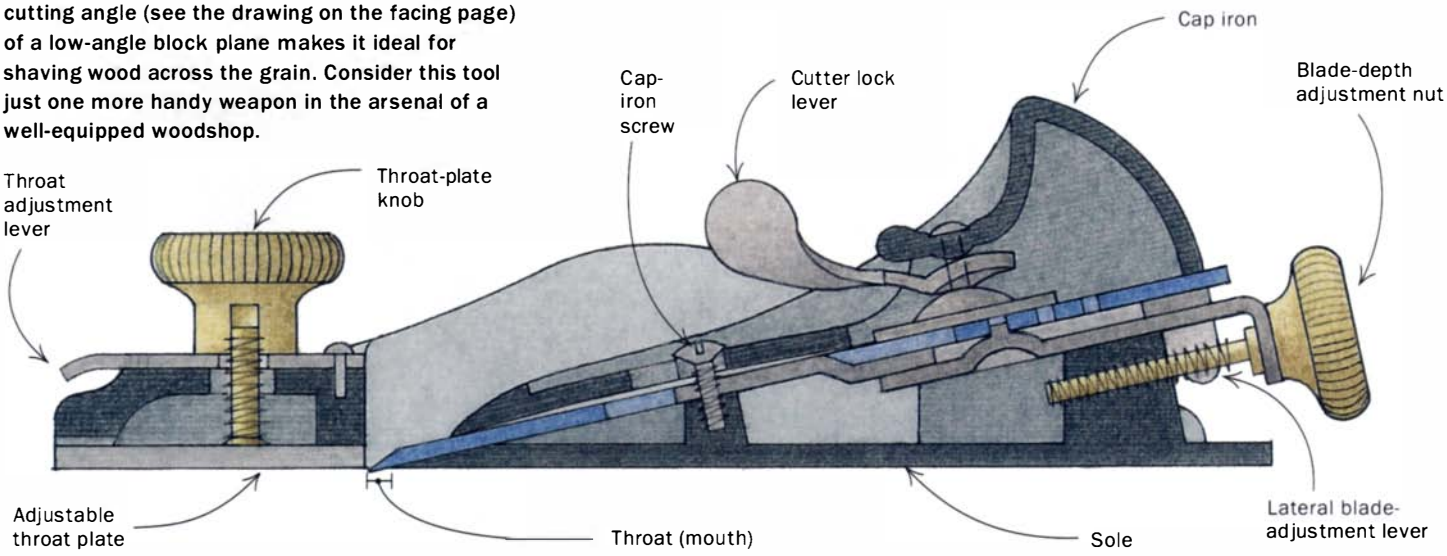
Fifteen years ago, when I was first tooling up my shop, there were only two low-angle block planes on the market: a Stanley and a Record. In the years since then, woodworkers have been treated to a resurgence of high-quality hand tools, including a remarkable variety of low-angle block planes. But because of that diversity, making a choice can be more difficult.

A low-angle block plane is a small, one-handed tool used for trimming and fitting, though more often than not I'm more comfortable using two hands. I often find myself reaching for this handy tool several times a day when I need to plane end grain, cross grain and miters. A block plane excels at trimming excess material from the pins and tails of through-dovetail joints; fine-tuning miters; perfecting the reveal on cabinet doors; cleaning up saw marks on the ends of tabletops, shelves and panels; and softening the edges of a board. But even though a block plane performs all of those tasks extremely well, its small size limits its use in smoothing larger panels or accurately truing edges. You may also find that the low angle is problematic when planing some long-grain surfaces because the blade has a tendency to lift and pry the wood fibers, leaving a rougher surface.

A block plane is distinguished by the blade's upward-facing bevel. This contrasts with a bench plane, on which the bevel faces down. To appreciate the difference you must study the geometry of each type of plane. The standard bench plane has the blade bedded at 45°. Because the bevel faces down, changes to the bevel angle of a bench-plane blade have no impact on the cutting an-

PARTS OF A LOW-ANGLE BLOCK PLANE

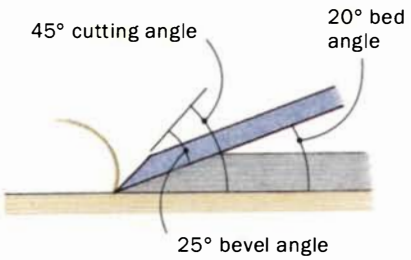
Most low-angle block planes are based on the original Stanley design shown below. The reduced cutting angle (see the drawing on the facing page) of a low-angle block plane makes it ideal for shaving wood across the grain. Consider this tool just one more handy weapon in the arsenal of a well-equipped woodshop.



Drawings: Vince Babak; photo, facing page: William Duckworth

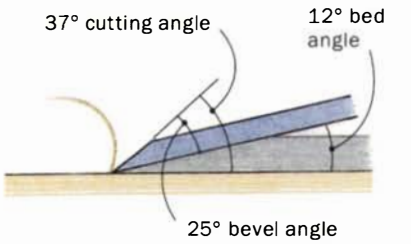
STANDARD VS. LOW-ANGLE: WHICH PLANE DO YOU NEED?

Unlike a bench plane, a block plane has the bevel of the blade facing up. Therefore, when you change the bevel angle on the blade, you change its effective cutting angle in relation to the workpiece. The low-angle block plane is a better choice for trimming end grain and cross grain, as when you true a miter joint or pare down a too-fat tenon. For other tasks that require trimming with the grain, such as chamfers on a tabletop, the low-angle design generally works better on softwoods, and the standard version is suitable for hardwoods.



STANDARD BLOCK PLANE

A 20° bed angle and a 25° bevel angle make the effective cutting angle 45°, which is essentially the same as that of a bench plane.



LOW-ANGLE BLOCK PLANE

A 12° bed angle and a 25° bevel angle make the effective cutting angle 37°, which works better on end grain and cross grain. Gochnour recommends adding no more than a 1° microbevel to a low-angle blade.

gle of the tool. Low-angle block planes, on the other hand, have the blade bedded at 12° to 12½° and the bevel angle of the blade at 25° after sharpening (see the drawing on p. 41). The effective angle of the plane is the sum of the bed and bevel angles—37° for the block plane as opposed to 45° for a bench plane.

In addition to the low angle, a block plane has a couple of other features that enable it to work well on challenging tasks such as cutting cross grain and end grain. Because the bevel faces upward, the bed of the plane supports the blade all the way to where it pierces the throat, adding stability to the cut. Also, the angle of the blade is more closely aligned with the force of the cut. These two characteristics make a block plane less prone to chatter.

The evaluation criteria

I look for several details when selecting a low-angle block plane. Among the most important are the ergonomics, or fit and feel of the tool in the hands; the heft, or what some would call the weight or mass; and finally, the ease of setup and adjustment—including the blade depth of cut, throat (also called a mouth) and lateral blade adjustment. I judge a plane's performance and overall value based on how well it rates in all of these areas.

Because it is used frequently under challenging circumstances, such as when you must hold the tool in one hand and reach up high to trim the edge of a cabinet door, a block plane must be comfortable to hold and use. Hand sizes vary, so don't listen only to what others say or write about the tool; try one, if at all possible, before you make a purchase. Heft is also critical. Evaluate a plane to make sure it has a solid bed, a stout flat blade and a secure lever cap. The planes I use most frequently have a solid, weighty feel. The mass of a plane is important because it adds stability and balance when performing a task.

A plane's adjustment features should be convenient to access and to use. When I look at a plane, I want to see a depth adjustment that is handy, and I check for a smooth and precise movement with minimal backlash (play in the mechanism). A throat adjustment and a lateral blade adjustment can also be helpful in achieving peak performance. I open the throat for coarse shavings and close the throat to limit the size of the shavings and to minimize

STANLEY NO. 60½ LOW-ANGLE BLOCK PLANE

Weight: 1 lb. 8 oz.

Blade width: 1⅝ in.

Price: $42

Source: Various catalogs

This is the latest version of the Stanley No. 60½ design. Features that once were patented, breakthrough advances in plane technology are nowadays often taken for granted. Genuine Stanley innovations include the adjustable throat, which functions smoothly and precisely; the endwise blade-depth adjuster, which functions effectively (even though it has a bit of backlash); and the milled depression in the sides of the body. The lever cap is easy to remove using the pivoting lock-lever.

Stanley's relatively thin blade does not receive much support from its small bed. Lateral adjustment is easily accomplished using the patented lever. However, the plane I received from the factory was defective and relied on the lateral adjuster to the extreme. This defect must have occurred at the factory when the body casting was misaligned during the machining of the bed. The result was a slightly angled bed. By moving the adjuster all the way to the right, the blade could be made parallel with the sole and did work properly. I am confident that most dealers and Stanley would replace a plane with this defect, if asked.

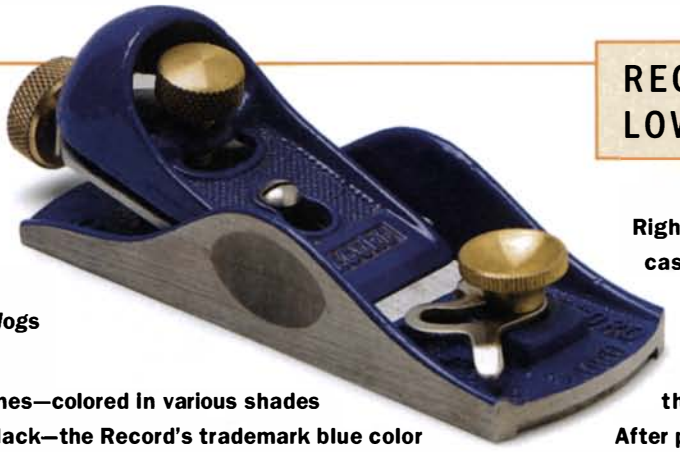
The granddaddy of them all. *The Stanley No. 60½, with the adjustable throat and the cutter-adjustment functions, is the benchmark design that others copied or improved upon.*

The Stanley required the most attention right out of the box, but in 30 minutes it was ready to go. The sole was out about 0.004 in., toe to heel, and it took 15 minutes to lap it flat. Even if it had been flat, at the factory they coat the cast iron with a rust-preventing varnish finish that I prefer to remove. After tuning the blade, the plane was in service.

With a sharp blade, the plane performed the basics nicely, but it showed some weaknesses on end grain, miter cuts and dense hardwoods, where it was susceptible to chatter due to its small bed and thin blade. As the least expensive tool reviewed, it is only reasonable to expect some shortcomings. Still, this tool has a lot of great features and appeal for a $40 price tag. For a trim carpenter working primarily in softwoods or the occasional user who has a limited budget, this may be just the tool.

Photos, except where noted: Erika Marks; this page (bottom): William Duckworth

RECORD NO. 60½ LOW-ANGLE BLOCK PLANE



Weight: 1 lb. 8 oz.

Blade width: 1⅝ in.

Price: $50

Source: Various catalogs

In a sea of handplanes—colored in various shades of gray, gold and black—the Record's trademark blue color is always easy to spot. The plane has a wide blade and body that can do a lot of work but may tire out the user's hand. The adjustable throat and depth-of-cut adjuster are similar to those on the Stanley. However, the Record had the most backlash of all of the planes reviewed—more than one-and-a-half full turns. The lever cap is tensioned by a knurled knob that is awkward and difficult to grasp because of its location. Like its cousin the Stanley, the Record has a thin blade and a small bed.

Right out of the box (plastic sleeve, in this case), I first noticed how sharp the edges were on the castings and had to file them down. The adjustable throat plate was bowed with a 0.002-in.-high spot in the middle. Lapping corrected the problem. After preparing the blade, I put the tool to work.

The Record performed similarly to the Stanley, under moderate conditions, but balked under the more demanding tests. Adjustments during use were a bit trying due to the excessive backlash and hard-to-get-to lever-cap screw.

I agree with the comments of other woodworkers who reviewed this plane in our trial tests. They called the Record "a good value for an entry-level plane," and said, "its performance and value are consistent with its price." All in all, it's a reasonable tool for the money.

VERITAS LOW-ANGLE BLOCK PLANE

Weight: 1 lb. 12 oz.

Blade width: 1⅝ in.

Price: $85

Source: (800) 871-8158

The designers of this tool broke all of the old molds and started from scratch to make a unique, no-nonsense, purely functional tool. The unorthodox grip—three circular depressions milled into each side of the body—fits comfortably in the hand, and the wide body enables the tool to cover a lot of ground.

One of the features unique to this tool is that two setscrews near the plane's throat can be used to center the blade precisely. All lateral adjustment occurs at the rear of the blade. Lateral adjustment and depth of cut are both produced using one knob, much like vintage Norris planes, and the Veritas had the least amount of backlash of the planes we reviewed. I found the lateral and depth adjustments to be extremely precise, tight and responsive. The adjustable throat functions smoothly. Simply loosen the knurled knob to open and close the throat.

The body is made of ductile cast iron, which makes the tool durable and stable. The ⅛-in.-thick blade is seated securely on a large, accurately machined bed. The blade is made of A2 steel, an alloy that is reputed to take a keen edge and hold it longer. In our tests the blade held up well, but it was not noticeably superior.

The Veritas was nearly ready to use right out of the box. The sole required minimal lapping, and the blade needed to be slightly rehoned for my use. Among my review group, the Veritas was lauded hands-down as the best value, dollar-for-dollar, on the market.

Lateral and depth-of-cut adjustments are made with one knob. *All adjustments are made at the back of the blade. Setscrews on both sides of the body center the blade at the throat. The large machined bed supports the blade fully, reducing chatter.*

Photo, this page (bottom): William Duckworth

tearout. A plane with a lateral blade adjustment can make up for a blade that has been sharpened out of square, and I'll readily admit to that fallibility.

An organized review process

I have always been skeptical of tool reviews that are entirely dependent on one person's opinion. To broaden the scope of this review, I invited a diverse group of hobbyists, professional cabinetmakers, tool collectors and a violin maker to my shop and asked them to evaluate each plane. Out of the box, I first used feeler gauges and a straightedge to check the flatness of each plane's sole and the squareness of each blade. I also sharpened each blade before we put the planes to work.

I wanted a consistent and thorough review, so I set up four workstations, where we could evaluate each plane's effectiveness under different applications. One workstation was set up for planing white oak and mahogany end grain. Another workstation was used for fine-tuning the mitered border of a tabletop. On the third workstation, we trimmed the top of a cabinet door, where the end grain of the stile meets the long grain of the rail. At the fourth workstation, we planed the long-grained edge of a board.

Each reviewer was given an evaluation sheet and was asked to rate and comment on each plane's fit and feel, heft, ease of setup and adjustment and the relative val-

LIE-NIELSEN LOW-ANGLE BRONZE BLOCK PLANE

Weight: 1 lb.

Blade width: 1¼ in.

Price: $95

Source: (800) 327-2520

This small gem of a plane is another quality product from Lie-Nielsen. It was the smallest plane reviewed, but it had plenty of punch. The plane is made from cast bronze, which apart from looking nice and feeling good in the hand, adds weight to the tool, enhancing its performance.

This plane has a sizable, precisely machined bed that supports a thick blade. The bed mass and blade thickness help eliminate chatter. The blade is further stabilized by a notched lever cap that is secured to the body with a steel cross pin and a tensioning wheel. Setup and adjustment are easy, but the plane has no throat adjustment. Except for honing the blade, the tool was ready to go right out of the box.

Its diminutive size does not diminish performance. *This Lie-Nielsen bronze plane is the smallest of the bunch, but it worked well in a series of tests.*

This plane's solid construction resulted in a solid performance with each application. Depending on the type of work you do, the plane's size can be an advantage or a disadvantage. It fits comfortably into the palm of a hand, making one-handed use a breeze. Two-handed planing is trickier because of the small size and the absence of a front knob. This plane will excel in situations where small, detailed work is required. But for more demanding tasks, some people may prefer a larger tool.

LIE-NIELSEN LOW-ANGLE ADJUSTABLE MOUTH BLOCK PLANE

Weight: 1 lb. 12 oz.

Blade width: 1⅜ in.

Price: $150

Source: (800) 327-2520

The Stanley Rule & Level Co. introduced the No. 60½ low-angle block plane 100 years ago. Through the last century the tool underwent several changes, but five years ago Lie-Nielsen nearly perfected the original design. The first thing you notice about this plane is its beautiful blend of materials—iron, bronze and steel in perfect harmony. A closer examination reveals a body made of ductile cast iron. An extralarge bed is precisely machined, providing rock-solid support for the ⅛-in.-thick, high-carbon tool steel blade.

Setting up and adjusting this plane is easy. Loosening the knurled front knob frees the eccentric lever that precisely moves the throat in and out. The depth of cut is regulated by a steel knob that registers in a single slot at the rear of the blade, providing smooth operation with minimal backlash. Even though the tool has no lateral adjuster per se, users can grasp the blade and move it back and forth within the body, as needed.

Photo, this page (middle): William Duckworth

LIE-NIELSEN LOW-ANGLE SKEW BLADE RABBETING BLOCK PLANE

This skew block plane is the "multi-tool" of the low-angle block-plane family: It functions as a rabbet plane, a fillister (fenced rabbet plane) or a standard low-angle block plane—an impressive portfolio for the money. A beautiful tool made from manganese bronze, steel and cherry, this plane has great heft and is well balanced. Like the other Lie-Nielsen planes, the skew block has a large solid bed for the blade and similar lateral adjustment and depth-of-cut mechanisms.

The skewed blade sets apart this tool from the others. *Removing one side of the body converts it into a rabbet plane (above), and adding an adjustable fence (inset) further transforms it into a fillister plane.*

The skew blade sets this tool apart. It does not have an adjustable throat. The blade produces a shearing cut, helpful in planing end and cross grain. I found the setup, sharpening and adjustment a bit tricky due to the skewed nature of the tool.

One distinctive feature is the steel plate on the side of the tool that can be removed to expose the edge of the blade, turning it into a rabbet plane. In this mode, the plane can be used to size tenon cheeks and smooth the bevel on raised-panel doors (after roughing them to shape on a tablesaw). By attaching the fence, you can transform this plane into a fillister plane, cutting rabbets both with and across the grain, but you need to define the rabbet first with a marking gauge.

Using this tool as a shoulder plane is problematic. Trying to size tenon cheeks proved a bit challenging because the blade projects on the right side only. I either had to use the plane left-handed or pull it toward me with my right hand.

Weight: 2 lbs. 4 oz.

Blade width: 1½ in.

Price: $185

Source: (800) 327-2520

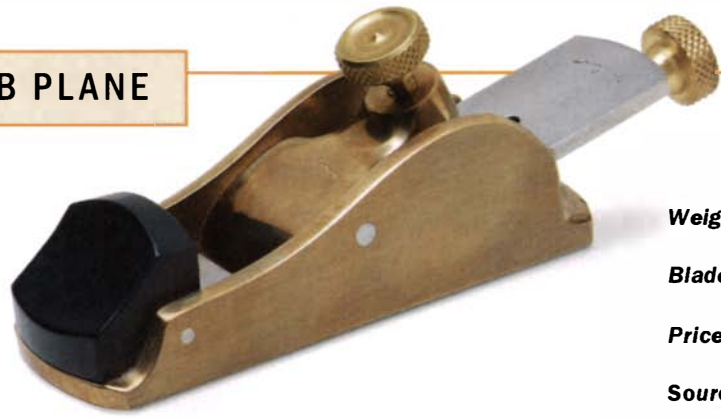
This plane, as well as the other two Lie-Nielsen planes we reviewed, was nearly ready to go right out of the box. A check with a straightedge confirmed a flat sole. After a few minutes spent tuning up the blade, the tool was in service.

As you might expect, the tool excelled in all of the workstation tests. The polished bronze lever cap felt great in my hand. The solid construction and high-quality materials helped it to handle even the most difficult tasks. The plane was not susceptible to chatter or vibration. Overall, this plane is a great value given the middle-of-the-range price tag of $150.

One finely made plane. *The Lie-Nielsen version is a step up in the evolution of the original Stanley design. All blade and throat adjustments function precisely. The well-machined bed was the largest of all the tools reviewed, providing good support for the blade and eliminating chatter.*

Photo, this page (bottom): William Duckworth

ST. JAMES BAY THUMB PLANE



Weight: 1 lb. 9 oz.

Blade width: 1¼ in.

Price: $225

Source: (800) 574-2589

St. James Bay is a small firm in Mesa, Ariz., that makes handmade, labor-intensive tools at reasonable prices. The company's thumb plane is a beautiful reproduction of a classic British design originally made by Thomas Norris. It is made of silicon bronze with ebony infill. It has a high-carbon tool steel blade. With the exception of some minor honing of the blade, the thumb plane was ready to use right out of the box.

Both the solid lever cap and the extralarge bed filled with ebony are impressive. The solid bed, coupled with the vibration-dampening qualities of ebony, supported the blade well through a series of demanding tests. When other planes had taken their last shavings, the St. James Bay blade held up and kept cutting.

Even though there is no adjustable throat on this tool, the throat is tight enough to produce fine results on end grain, miters and long grain. Users will need to make lateral adjustments to the blade by hand-tweaking it within the casting.

There is a loose shoe that fits under the lever-tensioning screw. This shoe is somewhat difficult and tedious to position, and because it is a small separate part, it would be easy to misplace.

The feel of the tool was foreign to some of the people in my review group, but it in no way impeded the quality of the results the tool delivered. All in all, the St. James Bay thumb plane was a solid performer with a strong aesthetic appeal.

These shavings were cut from end grain. *This St. James Bay thumb plane was one of only three planes reviewed that could make continuous ribbons of end grain. (The other two were the Bridge City and the Lie-Nielsen adjustable-mouth plane.)*

A loose shoe is easy to lose. *The separate brass shoe serves as a pad to tighten the blade in place. Gochnour says that it would be easy to misplace.*

ue. I used their ratings and comments to season my own reviews that appear in the boxed text.

Tips for peak performance

Once you have purchased a low-angle block plane, you will get the most utility and pleasure from your tool if it is well-tuned. Understanding a few fundamental practices will improve your ability to use the tool for tasks that it can do well.

Tune it up first—Even the best of the tools reviewed for this article required a little effort to get them into peak form. I am a firm believer in the old adage, "If it isn't broke, don't fix it." Consequently, I am not going to suggest that you lap every plane you buy. I do advise that you check the flatness of the sole by testing it with a straightedge. If you need to lap it, make sure the blade is in place and secured by the lever cap but drawn up into the body so it will not be damaged by the abrasive.

Why lap it with the blade in place? I'm convinced that the tension of a fully tightened blade can slightly distort the shape of the plane's body. I start lapping with 80-grit sandpaper glued to a flat stone, followed by 120 grit, and I finish the job with 220 grit. You may choose to polish it with finer grits, but I've found that simply using a plane puts the best polish on the sole that you'll ever need.

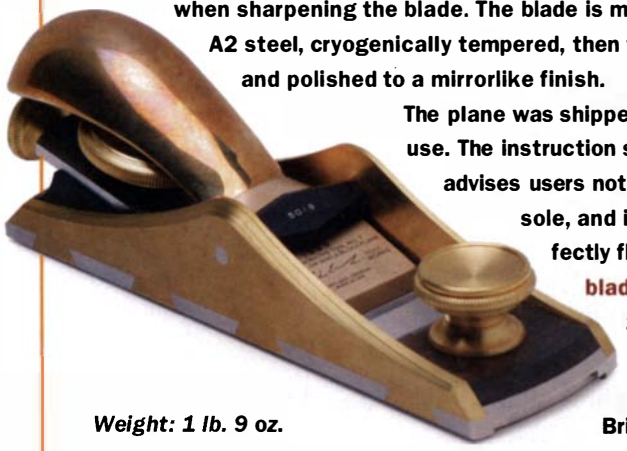
After lapping, blow out the casting with compressed air, and wax the sole to reduce friction. I prepare the blade by lapping it through the same abrasive sequence that I took the sole through, followed by further honing on waterstones.

Make sure you keep your low-angle plane at a low angle. Most of the planes

Photos, this page (bottom left and right): William Duckworth

BRIDGE CITY PRECISION LOW-ANGLE BLOCK PLANE

With this tool Bridge City has taken the art of plane making to a new level—a beautiful blend of materials, design and state-of-the-art technology. The body of the plane was not made from a casting. Instead, Bridge City mills a thick piece of stainless steel into a complex form, including the sole, solid bed, provisions for the blade-depth adjustment, an adjustable throat and a series of dovetails. The brass sides are connected to the sole with a unique, interlocking double-dovetail joint. An ebony infill accents the body and the inside of the blade-adjustment knob. The cast bronze lever cap is polished and secured to the body with a knurled locking wheel and cross pin. All of the knobs are beautifully turned forms that are comfortable to grasp. The depth of cut is controlled with micrometer precision, but the lateral adjustment is minimal, which means great care must be taken when sharpening the blade. The blade is made from A2 steel, cryogenically tempered, then flattened and polished to a mirrorlike finish.



The plane was shipped ready to use. The instruction sheet advises users not to lap the sole, and it was perfectly flat. The blade was razor-sharp and ready to go. Bridge City suggests stropping on canvas or leather to remove the final burr. In a shop, however, preserving the blade's mirrorlike finish could prove tricky, and deburring only on a soft strap would take some practice.

Perhaps this plane was an anomaly, but I had to make a slight modification to get the blade parallel with the sole. The manufacturer assured me that any problems would be corrected by returning the tool. I achieved a temporary fix by rehoning the blade to achieve a parallel alignment.

Put through the paces, the plane performed admirably, and its solid construction translated into solid performance. For those with the means, it would be a source of continual inspiration because of its utility, quality and beauty.

For that price it had better be good. *In this plane beauty married brawn, and it was an expensive wedding. Meticulous detailing and fine craftsmanship result in a tool that will appeal to collectors as well as to woodworkers who actually intend to use the tool.*

Weight: 1 lb. 9 oz.

Blade width: 1⅞₂ in.

Price: $659

Source: (800) 253-3332

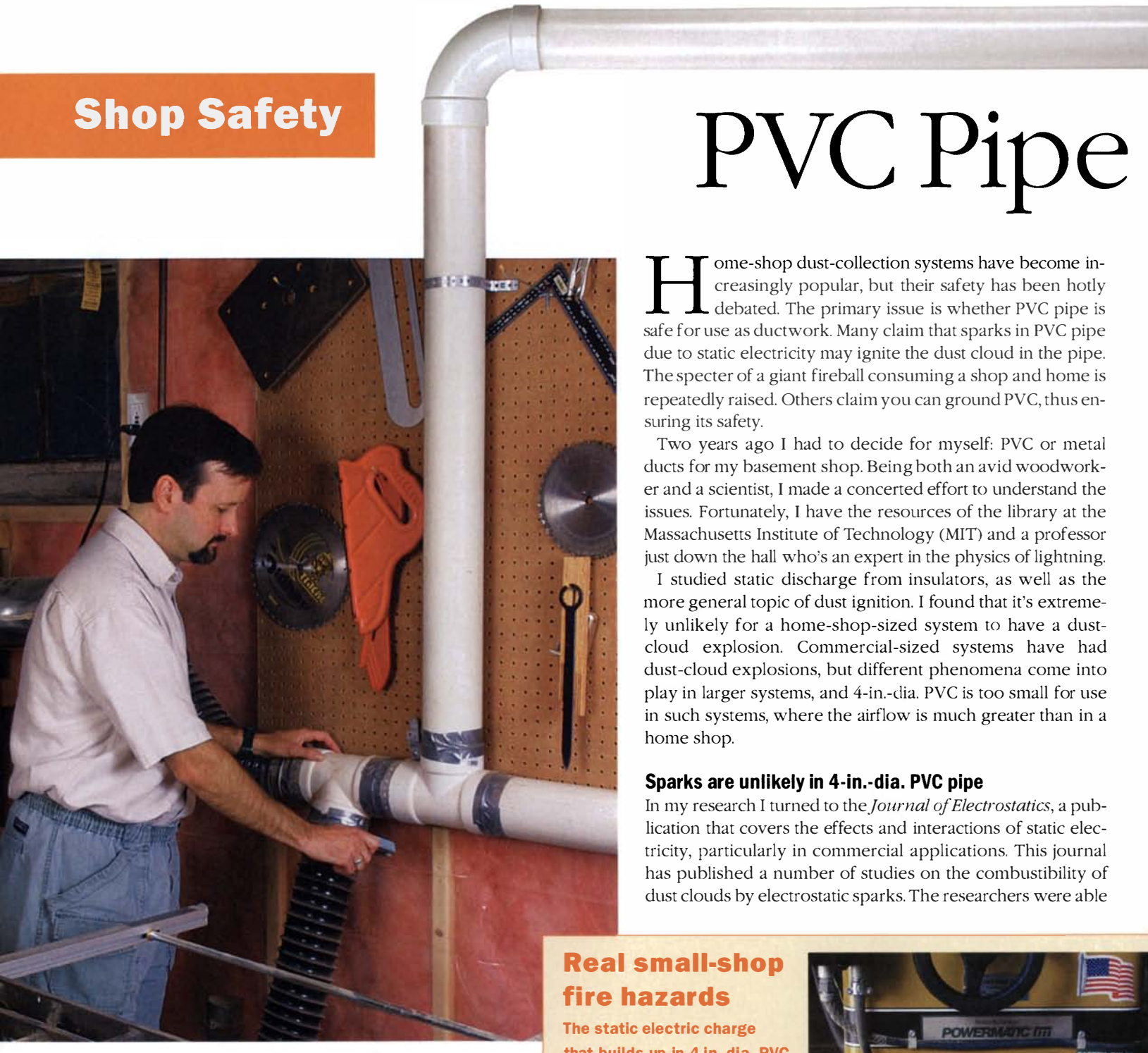
come from the factory with a 25° bevel. A microbevel of 1° or so is helpful because it minimizes the amount of steel to be polished. But a rash decision to hone a 5° microbevel would quickly turn a low-angle block plane into a standard-angle block plane, losing all of the advantages of a low-angle tool.

Cut at a skewed angle—When faced with a difficult planing task, such as planing the sawblade marks off the end of a board, there are a few things you can do to make the job easier. See to it that the blade is razor sharp; adjust the plane for a light depth of cut and make the cut by turning the plane at a slightly skewed angle to the path of travel across the workpiece. Skewing lowers the effective pitch of the blade by reducing the friction on the blade and the force required to produce a shaving. Skewing can also reduce chatter and prolong blade life between sharpenings.

Moisten end grain—Because sharpening takes time and interrupts the flow of my work, and because many of the tasks of a low-angle block plane are demanding, I often lightly moisten the end grain of a board before planing it. I generally use water, but water left unchecked in a tool can cause rust. Water and tannic acids in some woods could also react with iron in the tool and stain your wood. I have not had either of these problems, but you can avoid them altogether by using a solvent such as mineral spirits or denatured alcohol to dampen the end grain and make the wood fibers more supple. □

Chris Gochnour designs and builds custom furniture near Salt Lake City, Utah.

PVC Pipe



4-in.-dia. plastic duct is unlikely to cause a static-induced blast in a home shop

BY ROD COLE

Home-shop dust-collection systems have become increasingly popular, but their safety has been hotly debated. The primary issue is whether PVC pipe is safe for use as ductwork. Many claim that sparks in PVC pipe due to static electricity may ignite the dust cloud in the pipe. The specter of a giant fireball consuming a shop and home is repeatedly raised. Others claim you can ground PVC, thus ensuring its safety.

Two years ago I had to decide for myself: PVC or metal ducts for my basement shop. Being both an avid woodworker and a scientist, I made a concerted effort to understand the issues. Fortunately, I have the resources of the library at the Massachusetts Institute of Technology (MIT) and a professor just down the hall who's an expert in the physics of lightning.

I studied static discharge from insulators, as well as the more general topic of dust ignition. I found that it's extremely unlikely for a home-shop-sized system to have a dust-cloud explosion. Commercial-sized systems have had dust-cloud explosions, but different phenomena come into play in larger systems, and 4-in.-dia. PVC is too small for use in such systems, where the airflow is much greater than in a home shop.

Sparks are unlikely in 4-in.-dia. PVC pipe

In my research I turned to the *Journal of Electrostatics*, a publication that covers the effects and interactions of static electricity, particularly in commercial applications. This journal has published a number of studies on the combustibility of dust clouds by electrostatic sparks. The researchers were able

Real small-shop fire hazards

The static electric charge that builds up in 4-in.-dia. PVC pipe is not a hazard. But there are other dangers associated with sawdust.

Buildup of dust in machines. *Hot metal that finds its way to the dust that collects at the base of a saw could start a fire there or be sucked up into the dust-collection system.*

Photos: Timothy Sams

Dangers Debunked

to determine some of the conditions necessary to create sparks and ignite a dust cloud.

Sparks can be caused by a variety of conditions—one of which is static electricity. However, sparks are unlikely inside a standard 4-in.-dia. PVC pipe that would be used in a home shop, and more importantly, any such sparks are extremely unlikely to be strong enough to cause an ignition. I can't say it is truly impossible, but it is very close to impossible, and I do not know of a single instance.

The difference between metal and PVC is that one is a conductor (metal) and the other is an insulator (PVC). A conductor allows electrical charges to flow freely. If any excess charge is not given a path to ground, it can arc, creating a spark that in certain conditions can ignite a flammable substance such as dust. Grounding provides a path for this excess charge to flow harmlessly to the earth, which is why dust-collection systems in all commercial shops are required by code to be grounded. However, an insulator is a very poor conductor of electricity. While it's possible to get a static shock from the outside of a PVC pipe, it is highly unlikely for sparks to occur inside.

Dust collectors with 3 hp or less pose little danger

I published my findings on my web site. Rob Witter, a representative at Oneida Air Systems Inc., which makes dust-collection systems, said he largely agreed with my research. "We as a company have been trying to trim away at these misunderstandings for years," he said. He added that plastic pipe will "probably never cause a problem" in a home shop. Finally, he pointed out that the National Fire Protection Association (NFPA) puts no regulations on dust-collection systems of 1,500 cu. ft. per minute (cfm) or less.

All of this discussion applies to home-shop-scale systems. Larger systems, complete with ducts and filters that move more than 1,500 cfm, require at least 3 hp and are not found in most home shops. Larger systems need larger ducts, and with that you have to begin to worry about more complicated forms of static sparks.

The real hazards

In a home shop, the dust-collection fire hazards you need to worry about are not in the ductwork but in the collection bag or bin itself. A fire may be caused by a spark, which can occur when a piece of metal is sucked into the ductwork and strikes another piece of metal, or by embers from a pinched blade. The spark or ember settles into the dust pile to smolder, erupting into a full-blown fire hours later, often after the shop has been shut down and no one is there to respond. For this reason, my most important recommendation is to empty the collected dust every day or at least keep it in a closed metal container.

As you can see from the photo of my shop, I ended up plumbing it using 4-in.-dia. PVC pipes and did not ground them. I feel perfectly safe using them this way. □

Rod Cole is a woodworker and mathematician who lives in Lexington, Mass. An expanded version of his research can be found at: gis.net/~dheaton/woodworking/woodworking.shtml.

Cutting a nail. *Not only does this damage a blade, but it can also send a very hot piece of metal into your saw cabinet.*

Metal in the dust pile. *When cleaning shop, it's easy to sweep up screws, washers and nails. Dust from the floor should be sifted by hand, before it's introduced into a dust-collection system.*

Sparks in the bag. *Metal sucked into the dust collector's fan blade may cause a spark and ignite sawdust in the filter bag.*

A Well-Organized One-Man Shop

Plan machine and bench layout around logical workflow and convenient storage

BY ROSS DAY

Last year, my wife and I decided to leave the city for the country. Our goal was to buy a house, a shop building and land so that we would no longer be at the mercy of downtown Seattle landlords and a real-estate market that had gone totally nuts. We found what we needed about an hour outside Seattle.

The shop building was a bare shell: concrete pad, open stud walls, no windows and a lightbulb or two. It was large enough at 1,300 sq. ft. with a 12-ft. height from floor to trusses.

Having worked in a number of shops, I had a good idea of what I wanted: a design that maximized available space and efficiency in every way possible. To do that, I needed to think about workflow and storage and remember that floor space is precious. I aimed to keep the shop as uncluttered as possible, and that affected my choice of machinery. I also designed the shop with plenty of light, both natural and electric.

Draw it first, then pick up the hammer

I made a scale layout of the shop using ¼-in. graph-paper sheets taped together to represent my shop's 36-ft. by 36-ft. footprint (¼ in. = 1 ft.). Then I made scale footprints of all machines and benches—and whatever else would take up floor space—on separate pieces of paper. Moving around these paper footprints let me try different combinations, locations and workflow patterns, allowing me to visualize several workflow and storage combinations.

Lay out the shop on graph paper. *Draw machine and workbench footprints on separate pieces of paper and move them around to try different configurations.*

I prefer a shop that is divided into separate areas for machine work and for bench-work (see the drawing on p. 52). However, I didn't want to lose the sense of spaciousness that this new building offered. My solution was twofold. The bench room received a raised wooden floor

The machine room of the shop has double sliding barn doors near the wood-storage areas. Weather stripping helps keep out drafts.

A light gray epoxy floor paint reflects light. Crushed walnut shells were mixed with the paint and make for a slip-free surface.

A SHOP ORGANIZED FOR EFFICIENT WORKFLOW

Store materials near the machines that will be used to cut them. And consider combination machines, such as a jointer-planer-mortiser, to maximize floor space.

Photos, this page: Anatole Burkin

Drawings: Toby Welles @ Design Core

GET THE MOST OUT OF THE AVAILABLE SPACE

Through his years of experience working in a number of different shops, Day grew accustomed to having separate rooms for machine and benchwork. The partial wall in his shop separates the machine room from the bench room without closing it off entirely and making the modestly sized building feel cramped. That wall also adds significantly to the efficiency of the shop, providing plenty of storage space. Because floor space is always precious, Day went so far as to mount the compressor up high, out of the way, so that the area below could be freed up for a sharpening station.

Day's furniture requires a fair amount of handwork. *That's why he reserved a generous portion of the shop for benches.*

A simple pipe rack for lumber. *Holes drilled into the studs behind the plywood walls anchor the 2-in.-dia. galvanized pipe.*

The bandsaw may be placed close to a wall. *Leave plenty of room fore and aft to handle long stock.*

A sliding tablesaw negates the need for a chopsaw station. *Sheet goods and solid stock may be crosscut or ripped accurately on a sliding tablesaw.*

and was partially separated from the machine area by a floor-to-ceiling partition wall.

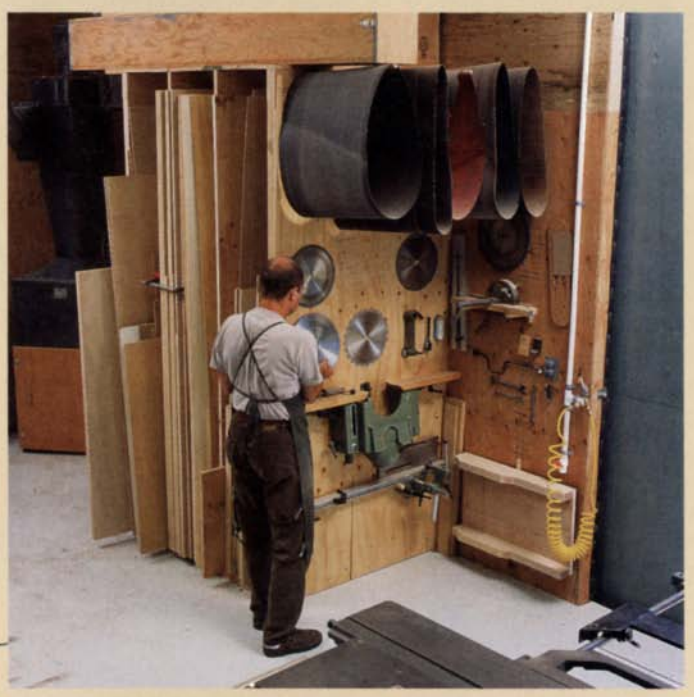
Machine and bench rooms use space efficiently

The shop is divided approximately in half between the bench and machine rooms. I chose my machines for their efficiency and space-saving attributes. For example, I have a 12-in. short-stroke sliding tablesaw, which allows me to rip and crosscut on one machine. My 16-in. combination jointer-planer-mortiser uses only the floor space of one large machine. Switching between functions takes less than a minute.

I also have a 32-in. bandsaw, a 24-in. thickness sander, a shaper-router table combo, a drill press and an air compressor. I mounted the air compressor high on a wall so that I could use the floor space below for a sharpening station.

Photos, except where noted: Terry Reed

The air compressor rests on an industrial-strength shelf along one wall. *Below, the floor space is utilized for a more practical application, in this case a sharpening station.*



Keep stock and accessories near appropriate machinery. *A wall two steps away from the tablesaw holds blades and other accessories. Plywood is also stored near the saw.*

Every machine is hooked up to a central cyclone dust-collection unit, which I prefer over portable units that tend to get in the way and take up more floor space. The dust and electrical systems are interconnected through a sensor in the main electric panel. When a machine is turned on, the dust collector starts automatically. All dust-collection hoses and pipes are off the floor, which is safer and also makes it much easier to sweep up debris.

To keep cables off the floor, I cut a groove through the floor slab (a very messy task) and buried electrical conduit to reach tools in the center of the room. Then I sealed and painted the floor with a light gray epoxy floor paint to reflect light to make the room brighter. Crushed walnut shells (available at paint stores) were mixed with the paint to make the floor surface nonskid.

The furniture I build requires a lot of handwork. That's why the bench room takes up half the shop. This room includes two workbenches, hand tools and machines, a 4-ft. by 8-ft. vacuum press, a desk, a sharpening station and plenty of room for assembly.

A wood floor is a lot easier on the legs and back. It's also a lot kinder on dropped tools. I used pressure-treated 2x4s for the sleepers, then overlaid them with 1⅛-in.-thick tongue-and-groove plywood. The floor was painted with epoxy floor paint.

Electrical systems require careful thought

While all of the different areas and systems in a shop must be designed to work together to be effective, the electrical system requires as much, if not more, planning. There are many critical things that must be considered. I really underestimated the cost and time involved in wiring my shop.

Plan for all of your current needs and add enough extra capacity for future needs. Do as much work as possible while the walls are still unsheathed. It is much more expensive and time-consuming to add things outside the walls later.

A list of all current and future needs combined with a scale electrical layout of the shop is the best way to do this. Obviously, you should check your local code when diving into this area, and don't do anything with which you are uncomfortable or unfamiliar.

I realized my electrical work was more than I could handle alone. Luckily, my friend Roland has a master electrician's license in three states and really sunk his teeth into this project. He took my scale electrical-layout sketch and converted it into a workable plan. Among the things he tackled included figuring out the exact panel scheme, phase conversion and wire and breaker sizes.

Once we were ready to go to work, I ran a lot of the wire and hooked up receptacles while he worked inside the panel, doing the more skilled work. I was amazed at the amount of wire and parts required for the job. The attic space of the shop looked like a spaghetti factory.

Make sure there's plenty of light

When I was a student at the College of the Redwoods, I loved the quality of light in the shop. It was so open and airy with the combination of natural and artificial light. I vowed that if I ever built my own shop I would try to reproduce those lighting conditions.

For my shop, I had six skylights installed (three in the bench room and three in the machine room). And three wide windows were installed across the wall in the bench room. Then I added 8-ft. fluorescent fixtures, flush-mounted to the ceiling, as well as task lighting at the workbenches.

Paint is also an important factor in creating a well-lit area. The ceiling and skylight wells were painted white for maximum light reflection. On a sunny day, I can work by natural light alone, saving on electricity.

Radiant panels are an efficient way to heat the space

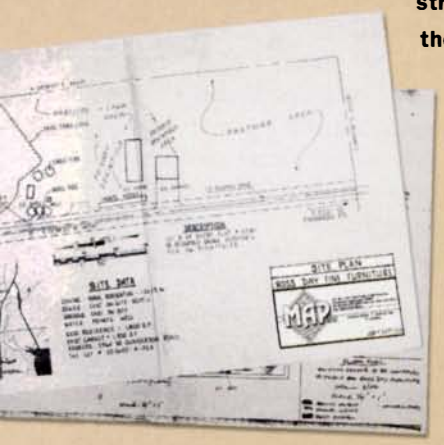
To work year-round in my shop, I needed to heat it. I settled on radiant electric panels from Solid State Heating Corp. in Old Saybrook, Conn. (800-544-5182; sshcinc.com). They are compact and lightweight (a 1-in. by 2-ft. by 8-ft. panel weighs only about 20 lbs.) and mount directly to the ceiling. They are more efficient than forced-air heat and don't take up floor space.

Buttoning up the shop with proper insulation, weather stripping and sheathing is very important for maximum energy efficiency. I used insulation batts in all exterior walls and wrapped the skylight

Building to code requires some patience but brings peace of mind

Many small shops aren't built or operated with commercial building and electrical codes in mind. I've worked in some. But for my latest shop, I decided to go by the book. At times the whole thing had me ready to pull out what little hair I have left, but I figured it would be worth the headaches in the long run. I didn't want some inspector who happened to drive by one day shutting me down. Trying to satisfy code after the fact could be a nightmare. I wanted to sleep well.

Building to commercial code was expensive and time-consuming. Surveys and site plans had to be created, submitted and approved, myriad permits procured, and meetings, inspections and checkoffs had to be scheduled. My processes with the building and electric departments were reasonably straightforward, though I thought they were overly strict in some areas. All of my hang-ups were through the health department of all places. Go figure.



After experiencing this entire process, I would strongly recommend scheduling a meeting with the supervisor of any department that will affect your project (especially electric). This way you can meet the person face-to-face, discuss the nature of your project and compile a list of what needs to be inspected.

The city said my shop had to have a separate electric service from the house, which meant having to dig a ditch 100 ft. long and 3 ft. deep. All of the machines had to be on separate breakers, with any wire coming out of the wall encased in dust- and waterproof conduit. All switches and receptacles needed to be dust-proofed. Lights, heat panels and dust-collection pipes had to be mounted against the ceiling. (The explanation was that nothing should be suspended because dust would collect there and pose a fire hazard.) Home shops and many small, noncode professional shops don't meet many of these requirements.

The city also told me that an exhaust fan had to be hard-wired into the wall (no portables), and it had to have enough power to change the air in the shop a minimum of six times a minute. My fan creates a veritable hurricane when I fire it up, but boy does it ventilate! It all seemed like too much of a hassle at times, but now that it's all said and done, I have a much nicer, safer shop as a result.

wells with insulation. The attic has blown-in insulation. All windows and skylights are double-pane, gas-filled, low-E glass. The wood floor in the bench room has rigid-foam insulation between the joists. The side entry door is weather-stripped to help keep out drafts.

The sliding barn doors proved to be a challenge. Because they were both slightly warped, there were gaps of up to 1 in. wide that required sealing. After a lot of scrounging at hardware stores, I figured out the answer: 2½-in.-wide weather stripping designed for the bottom of roll-up garage doors. I tacked the stripping onto the edges of the walls and the header over the doors, overlapping the doors. I also tacked on a strip between the doors.

Stock is stored near appropriate machines

Plan as much storage space into your shop design as possible. It is amazing how fast it fills up. In addition to the cabinets and shelves we all have, here are some other storage solutions I used.

I store sheet goods in a shopmade open-faced plywood cabinet with three compartments. It is only a few steps away from the tablesaw. The sides of the cabinet hold thickness-sander belts, tablesaw blades and tools, and shaper accessories. The top of the cabinet provides more storage space.

Lumber is stored on a pipe rack installed on the machine-room side of the interior wall between the machine and bench rooms. Lumber is heavy, and the storage system must be engineered accordingly. The wall studs are tripled up on 16-in. centers. The wall frame is lag-bolted into an exterior wall stud and tied into the roof trusses with truss clips. The entire framework was then glued, sheathed with ¾-in.-thick CDX plywood and nailed off. Holes were then drilled on 32-in. centers to accept the 2-ft. lengths of 2-in. outside diameter (O.D.) iron pipe. For efficient workflow, the jointer-planer-mortiser is close to the lumber rack.

Various jigs and general storage are in a loft just above one end of the bench room. Because all of the walls were sheathed with plywood instead of drywall, I can drive a screw or nail anywhere I wish to hang a tool or shelf.

My three-phase converter and air compressor are also hung on walls to maximize floor space. My electrician introduced me to a very innovative system to support such equipment. B-Line Systems Inc. in Highland, Ill. (618-654-2184), manufactures and markets a modular system to support equipment or storage by utilizing metal strut channel with various universal attachments. The system can satisfy just about any support need you may have.

A good plan ensures success

Involving the expertise and help of others will speed up things and give you a better result. My friends Gary and Robert did the windows and skylights, Richard and Carissa helped with carpentry, and Roland was the electrical mastermind. They helped light the end of the tunnel when it seemed like there was just too much to do. With their generous assistance, I now have a shop that is a pleasure to work in.

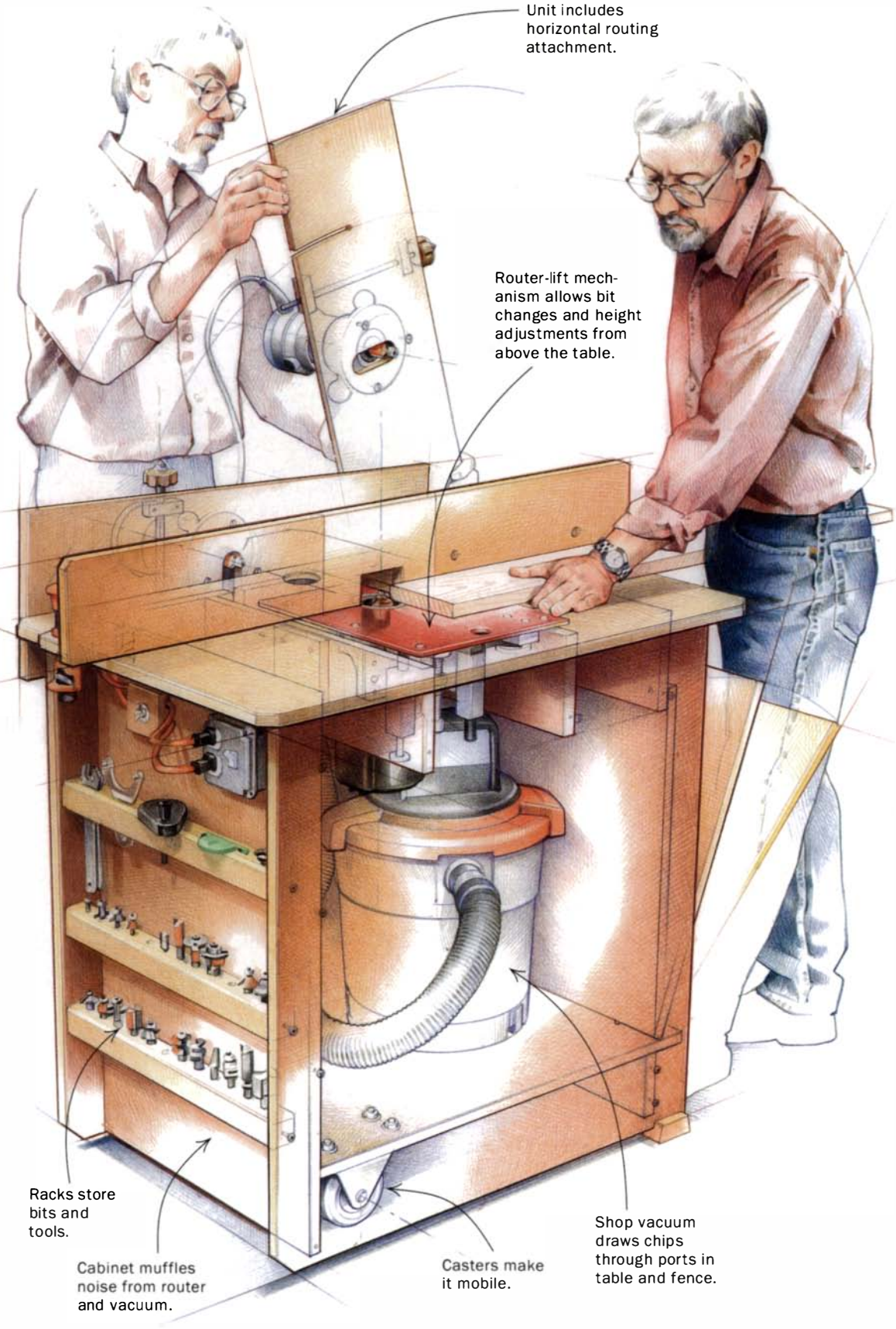
Paying attention to details while keeping the big picture in mind helps you stay out of hot water. Plan your project as carefully as possible to avoid making major mistakes or oversights, and you'll end up with a shop you are proud of. □

Ross Day builds custom furniture in Poulsbo, Wash.

The Ultimate Router Table

Cabinet-based unit devours dust and decibels and puts controls on the outside

BY JOHN WHITE



I have always been dissatisfied with the popular designs for router tables and the versions available on the market. In some way or another, they are all less convenient than standard woodworking machines. For one thing, you have to reach under the table a lot to adjust bit height, change bits or hit the power switch. The ultimate router table would be as convenient as a shaper or tablesaw—all of the common tasks and adjustments are done from above or outside the unit. It would also have the dust-collecting ability and vibration-dampening mass of a cabinet-mounted tool.

I came up with a router cabinet that meets all of the above criteria and is super-quiet to boot. The design relies on the JessEm Rout-R-Lift, a screw-driven mechanism that allows you to raise and lower the router and bit by cranking a handle inserted from above. The JessEm unit is also sold by Jet as the Xacta Lift, for the same price—around $200 in many catalogs. By adding a shopmade mounting block to the lift, I was able to raise the router high enough to allow bit changes from above the table as well.

Eliminating the need to reach un-

Drawings: Bruce Morser

SIMPLE PARTS, SMART FUNCTION

The cabinet is made entirely from ¾-in.-thick MDF joined with knockdown fasteners. The front-to-back braces below the tabletop support the router plate and double as the sides of the dust manifold. Two filler blocks close the gap around the lift mechanism, which makes for efficient dust collection.

Top, 24 in. deep by 38 in. wide

Dust port for horizontal routing, 2 in. dia., is plugged when not in use.

Insert plate

Lift mechanism and plate

MDF filler blocks, 4 in. by 6½ in., close the gap around lift mechanism.

Dust-collection port, 1 in. by 3 in.

Removable end panel, 20½ in. wide by 23¼ in. high

Port for router and vacuum exhaust; cords also pass through here.

Support blocks, 4 in. by 4 in., prevent top from sagging.

20-amp switch and duplex receptacle

Front-to-back supports, 6 in. wide by 20½ in. long

Vacuum port matches the diameter of the vacuum hose.

Bottom of manifold, 6½ in. wide by 12¾ in. long

Backing blocks support caster load

Ledger

Alignment pins, ¼ in. dia., fit 5⁄16-in.-dia. holes.

Small blocks aid panel alignment.

Fixed-base casters, 4-in.-dia. wheels

Bottom, 20½ in. deep by 30 in. wide

Racks for bit and tool storage, 1¾ in. square

End panel, 20½ in. wide by 33 in. high

Front-to-back supports flush with inside edge of router plate opening

Tabletop is flush with back of cabinet.

2 in.

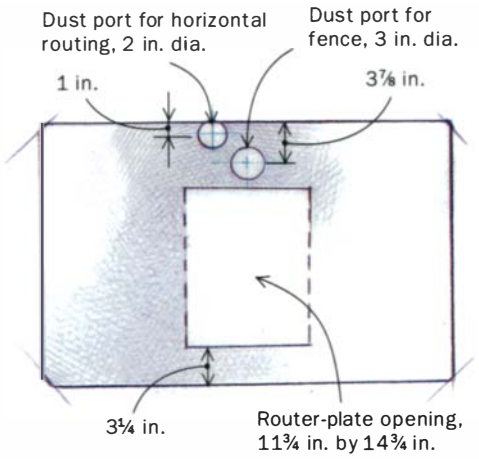
3 in.

10¼ in.

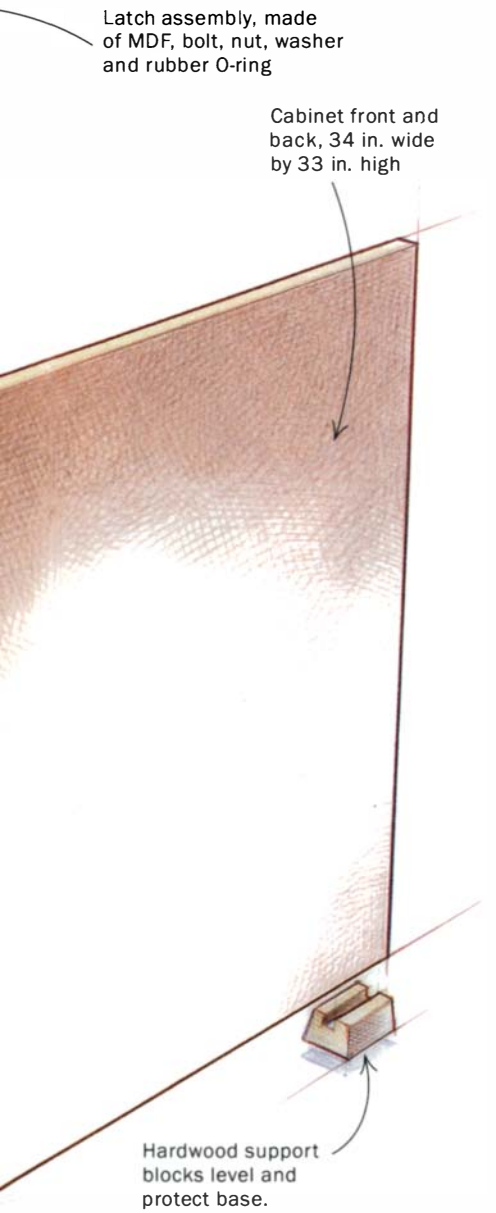
5¼ in.

FRONT VIEW

SIDE VIEW

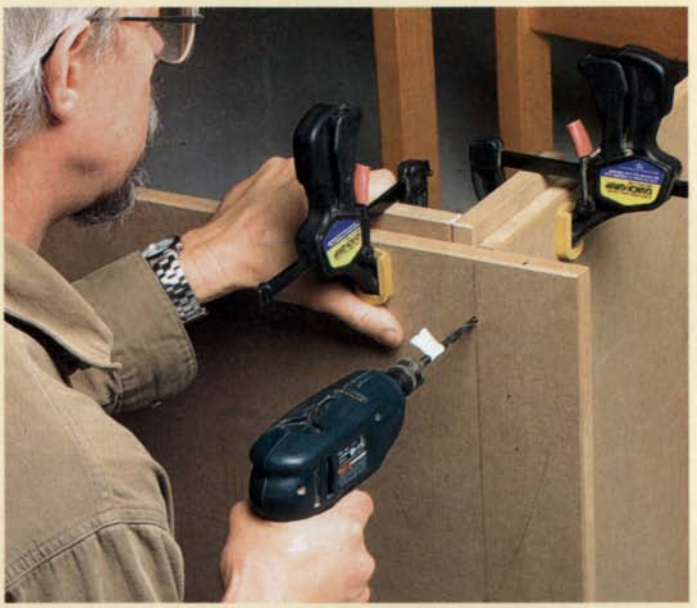


TABLETOP



Knockdown fasteners make strong joints

Cross-dowel fasteners require accurate holes. *To hold the pieces at right angles for drilling the long holes, make a right-angle jig and clamp it to the workpieces at the top and bottom of the joint.*



Aluminum flashing makes a layout jig for the cross-dowel holes. *With a drill bit in the bolt hole, use the jig to locate the centerpoint of the cross-dowel hole.*

The cross dowels will be invisible if you don't break through the outside. *Use a stop collar to control the depth.*

derneath the top let me mount the table on a cabinet, which could enclose a shop vacuum and muffle its sound and the roar of the router itself. A dust-collection manifold fits under the tabletop and behind the lift unit. A fence system with a dust port ties into the system below.

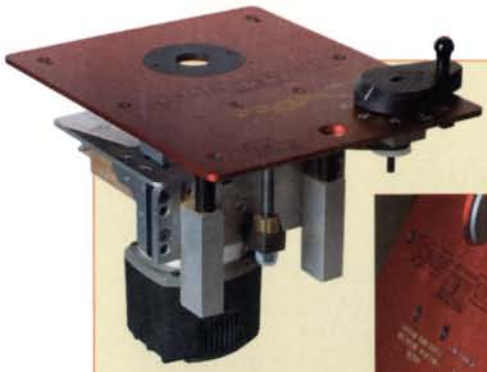
I mounted a switched outlet for the router and vacuum unit outside the cabinet. Just for fun, I threw in racks for bit and tool storage. Casters under one end of the cabinet make it mobile—like a wheelbarrow—but still stable on the floor.

Materials cost just over $300, including the shop vacuum and the router lift but not a fixed-base router (the more powerful, the better for use in a table). The investment in time and money was significant but reasonable, considering the performance and convenience I gained.

MDF and knockdown fasteners make a strong cabinet

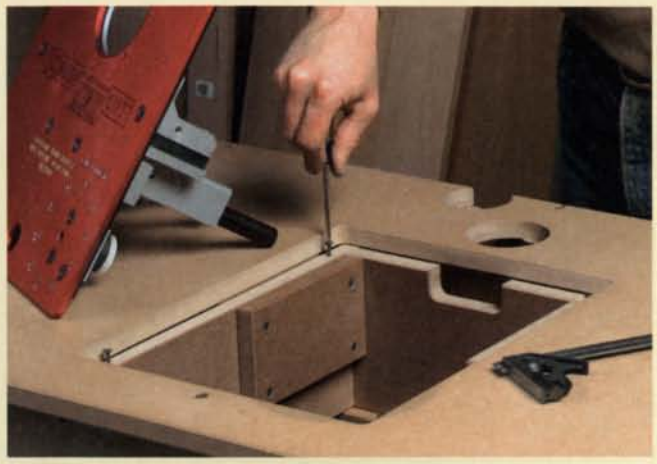
The entire unit—cabinet, table and fence—is made of ¾-in.-thick medium-density fiberboard (MDF), with two coats of Watco

Photos: Asa Christiana



Router lift is the heart of the table

It all started with the JessEm Rout-R-Lift, which allowed White to design a cabinet-based unit that encloses dust-collection and muffles noise yet puts all controls and adjustments on the outside.



Leveling screws offer precise adjustment. *The weight of the router lift is carried by the two front-to-back braces, instead of the tabletop as is the case with most router tables.*

No reaching below to adjust height. *The adjustment crank is inserted from above.*

A CUSTOM ROUTER MOUNT FOR EASY BIT CHANGES

Replacing the router's base with a shopmade mounting bracket allows the nose of the router to be raised high enough for wrenches to reach it.

oil for added durability. I used MDF because it offers flatness, mass and stability at a very low cost. To make sure the cabinet would remain sturdy, I opted for cross-dowel knockdown fasteners over glue and screws. Casters and wood blocks keep the MDF edges off the floor, where they might soak up moisture and then fracture.

Cutting out the MDF parts should be straightforward, but be sure to wear a dust mask, and don't count on the factory edges of the panels being square. Squareness and accuracy are very important with such a large cabinet, especially with interior parts that must fit tightly. Chamfer the edges of the tabletop to prevent chipping. This isn't a bad idea for the other MDF parts, as well. I used a laminate trimmer with a 45° router bit to zip quickly along the many edges.

I have a few tricks for drilling accurate holes for knockdown fasteners (see p. 57). On the back side and tabletop, counterbore the heads of the fasteners to maintain a flat surface.

To support the casters, install backing blocks inside the cabinet. Assembled, this unit weighs more than 100 lbs.

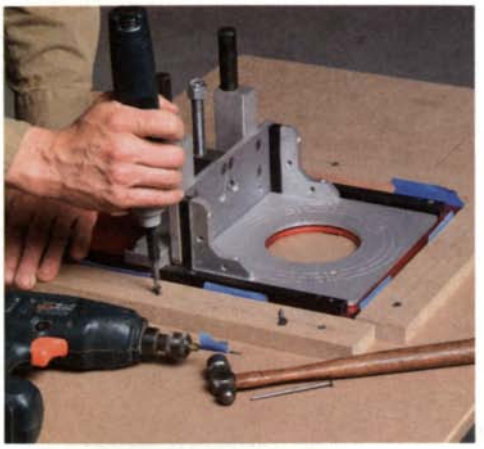
Installing the access panel—One end panel is removable so that you can open the cabinet and empty the shop vacuum. Size this panel to fit the cabinet walls snugly, but overlap the support strip at the top of the opening. Drill two ¼-in.-dia. holes in the bottom edge of the panel for the pins or cutoff bolts that will keep the panel in position. Press the pins into the panel, then drill 5⁄16-in.-dia. holes in the base of the cabinet to receive the pins. Glue the two stop blocks to the walls of the cabinet, which will make it easier to put the panel quickly back in position.

Add the latch assembly. I recommend placing a rubber O-ring under the rear washer to regulate the action of the latch.

Router lift requires an exact cutout

The only tricky procedure on the tabletop is making a precise cutout to fit the router-lift insert plate. Start by flipping over the top. Lay out the front edge of the cutout 3 in. from the front edge of the tabletop. Then lay the lift-plate assembly on the tabletop, locating its front edge along the layout line. Next, screw MDF strips around the edges of the insert plate, being careful not to punch through on the top side. Additionally, to avoid too snug a fit (MDF

MAKE AN ACCURATE CUTOUT FOR THE INSERT PLATE



MDF guide strips ensure accuracy. *Lay the insert plate on the underside of the tabletop and screw on the strips. A layer of tape leaves room for seasonal movement of the MDF.*

The strips guide the jigsaw. *Make the rough cutout about ¼ in. from the MDF strips.*

Then they guide the router bit. *Remove the tape, and use a bearing-guided bit to cut the opening flush with the strips. A ¾-in.-dia. bit will leave a ⅜-in. radius at the corners.*

swells in high humidity), add a layer of masking tape along the edges of the guide strips before attaching them to the underside. These strips will guide your jigsaw and router cuts.

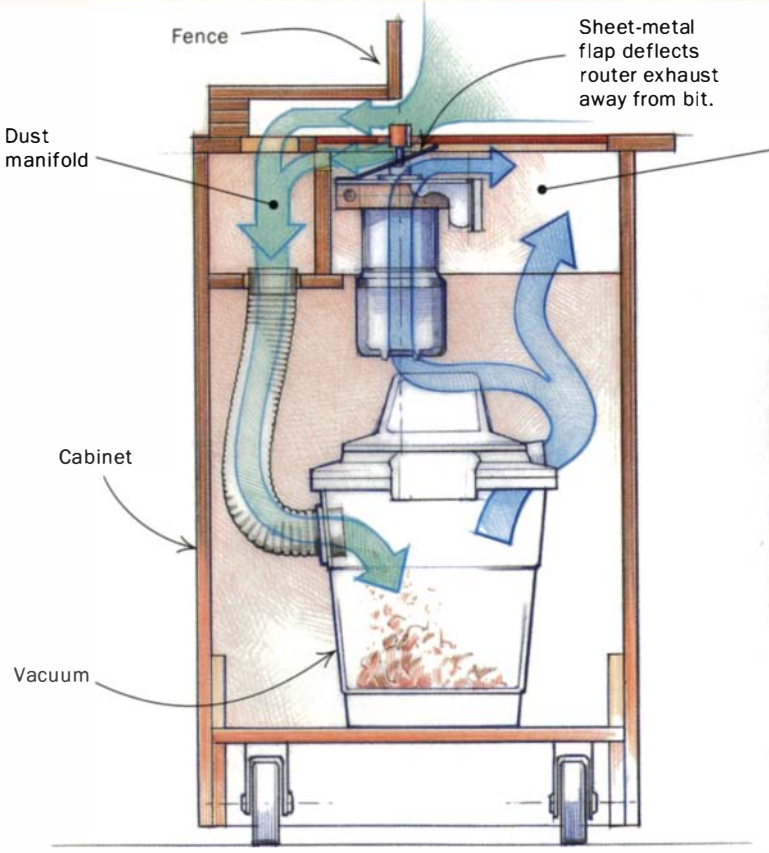
Keep the jigsaw cut about ¼ in. away from the strips; the router will handle the rest. Then remove the masking tape, and rout the finished opening. A ¾-in.-dia. pattern-cutting bit will leave the correct ⅜-in. radius at the corners to match the lift plate.

Drilling vacuum-port holes—There are a number of large holes in this unit. I use an adjustable-wing circle cutter (or fly cutter) for all of these. (For a video clip on using this tool, go to finewoodworking.com.) A wing cutter must be used in a drill press. Proceed slowly and with caution, keeping your hands and clothing well clear of this whirling dervish of a bit.

The large hole in the tabletop connects the fence's dust port with the dust-collection system below. Another one is necessary if you opt for the horizontal router attachment. In that case, one of these holes should always be plugged when the other

FOLLOW THE AIRFLOW

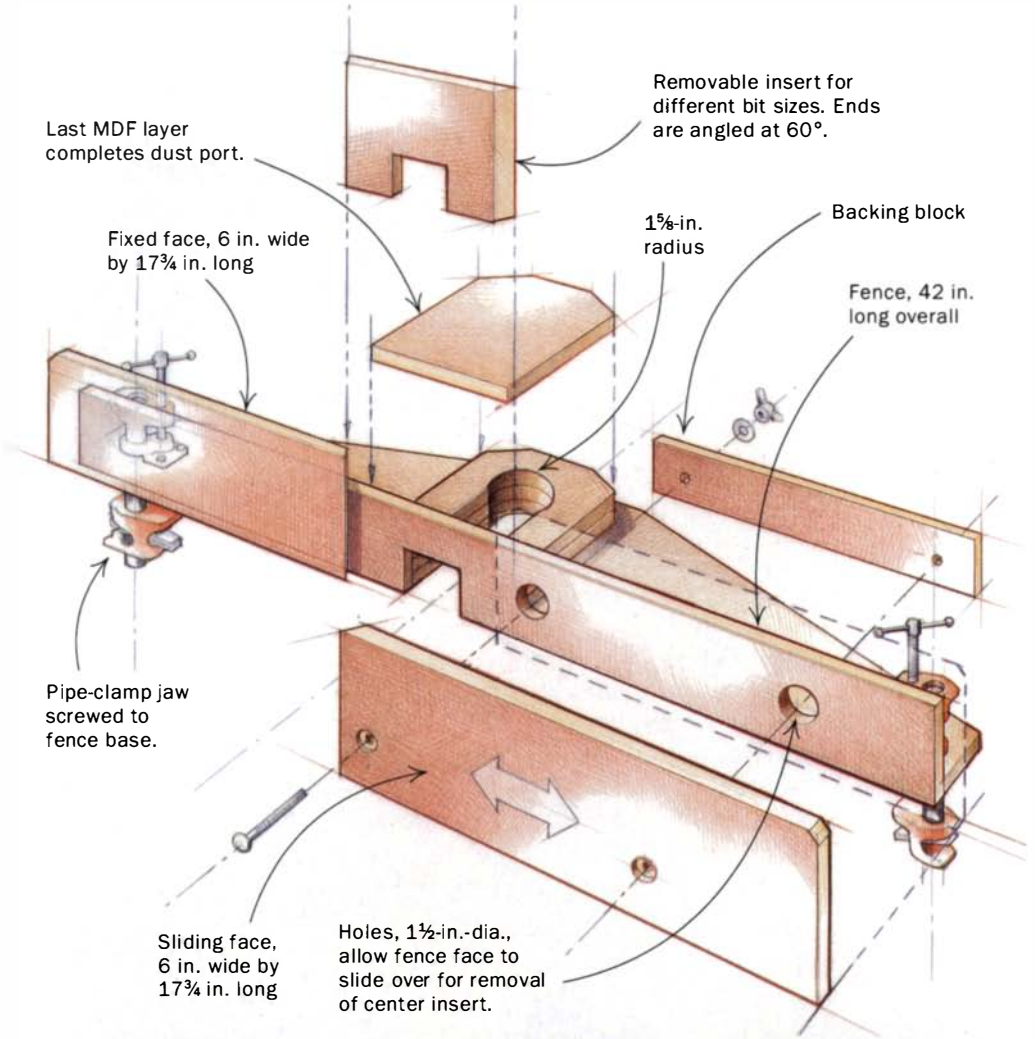
The vacuum draws air and chips through the bit openings in the table and fence, into the dust manifold and down the hose into the vacuum, where the dust and chips are filtered out. An angled flap of sheet metal deflects the router's exhaust blast away from the bit opening and into the cabinet.

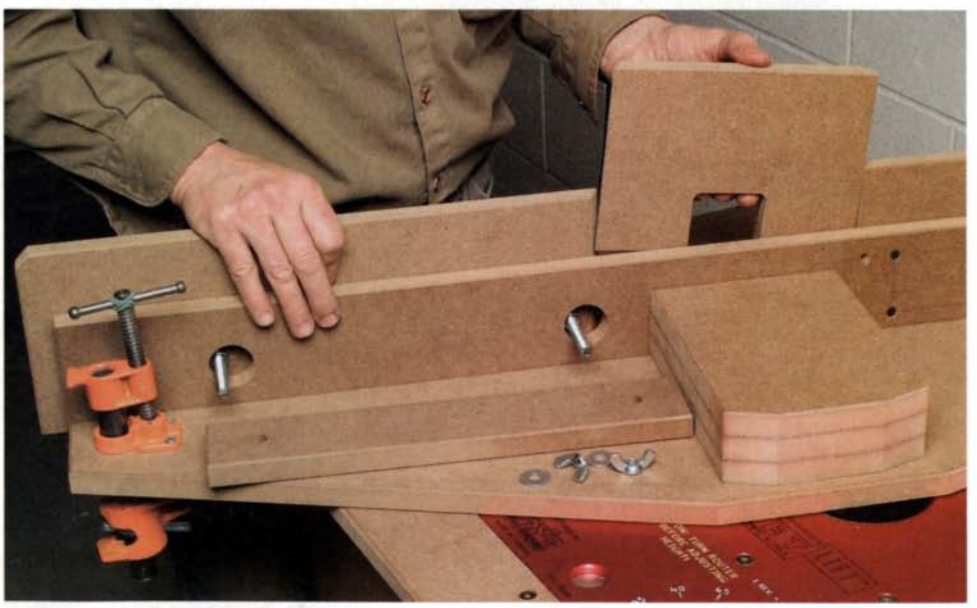


Another important modification to the router lift. *A square of aluminum flashing—bent slightly and attached with double-stick tape or screws—deflects the router's exhaust into the cabinet, allowing chips to be sucked past the bit.*

SIMPLE BUT EFFECTIVE FENCE

The fence features a removable insert, a dust manifold that ties into the one below the table and modified pipe clamps that grab the table edges.





A removable fence insert. *One half of the fence slides sideways, allowing for interchangeable inserts that fit various bit sizes. The edges of the fence faces and insert are angled to hold the insert in place, but a few brads with the heads clipped off also help.*

is in use. Attach fender washers on the underside of the table around each hole to support the plugs.

Support structure aids dust collection

With the top completed, you are ready to assemble the support structure below. The two main braces for the router-lift insert plate also serve as the sides of the dust-collection manifold at the back of the cabinet. Locate and attach these pieces first.

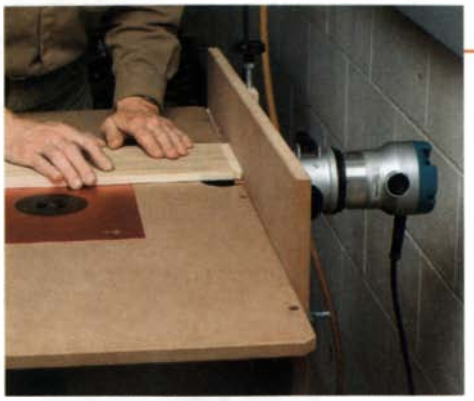
Secure these front-to-back braces so that their outside faces are just even with the edges of the insert-plate cutout. Then attach the notched crosspiece, positioning it to miss the lift mechanism by 1/16 in. or less. The smaller the gap here, the less suction lost around the lift plate. The notch in the crosspiece is a dust port that draws air through the bit opening into what will be the dust manifold. Now cut out the piece for the bottom of the manifold and use the wing cutter to drill a hole for the vacuum hose. Only a cutoff section of the vacuum hose will fit into the cabinet, so size the hole in the box for the hose diameter, not an end coupling. Lock the hose in place with two fender washers positioned to catch the spiral grooves in the hose. Screw the bottom piece to the manifold.

A few steps remain to create good air suction through the bit opening. Attach another layer of ¾-in.-thick MDF to each support brace, along its inner face, to create a close fit around the sides of the insert plate. Then, using double-sided tape and/or screws, attach a thin metal flap (I made mine from aluminum flashing, about 0.020 in. thick) to the insert plate as shown in the drawing on p. 59, to deflect the exhaust blast from the router motor and to allow air and chips to be drawn into the dust manifold.

Last, screw two blocks to the outside of the large front-to-back braces to prevent the tabletop from sagging near the opening in the middle of the plate.

Mount the router in a shopmade base

Fine-threaded drywall screws in the support braces act as levelers for the four corners of the insert plate. MDF loves to split at its edges, so drill pilot holes for any screws, making them slightly larger than usual. I typically go with drywall screws that are at least 2 in. long. Normally, coarse-threaded screws are better for MDF, but these levelers are for fine adjustment.



You'll have to mount the router body in a shopmade base to position it high enough in the table to allow bit changes to be made from above. (The router's original base can be mounted and left on the horizontal routing attachment on the back of the table.) But you can skip this step if you don't mind removing the router-lift mechanism from the table to change bits.

Use a wing cutter to drill a large hole, exactly the size of your router body, through a block made of two thicknesses of MDF. Then cut a thin kerf through the edge of the block to allow for tightening, and drill the long hole for the tightening bolt. Attach the mounting block to the lift plate with coarse-threaded drywall screws.

Install the switch box and fence

I mounted a 20-amp switch and outlet box on the end of the cabinet to connect the vacuum and router to one easily accessible on/off switch. I also mounted a small block next to the box to act as a cord manager.

The fence is joined with long drywall screws but incorporates a dust box that ties into the dust-collection manifold through a hole in the tabletop. Also, a sliding face allows the fence to have an interchangeable center insert. Carriage bolts and wing nuts lock the sliding face in position.

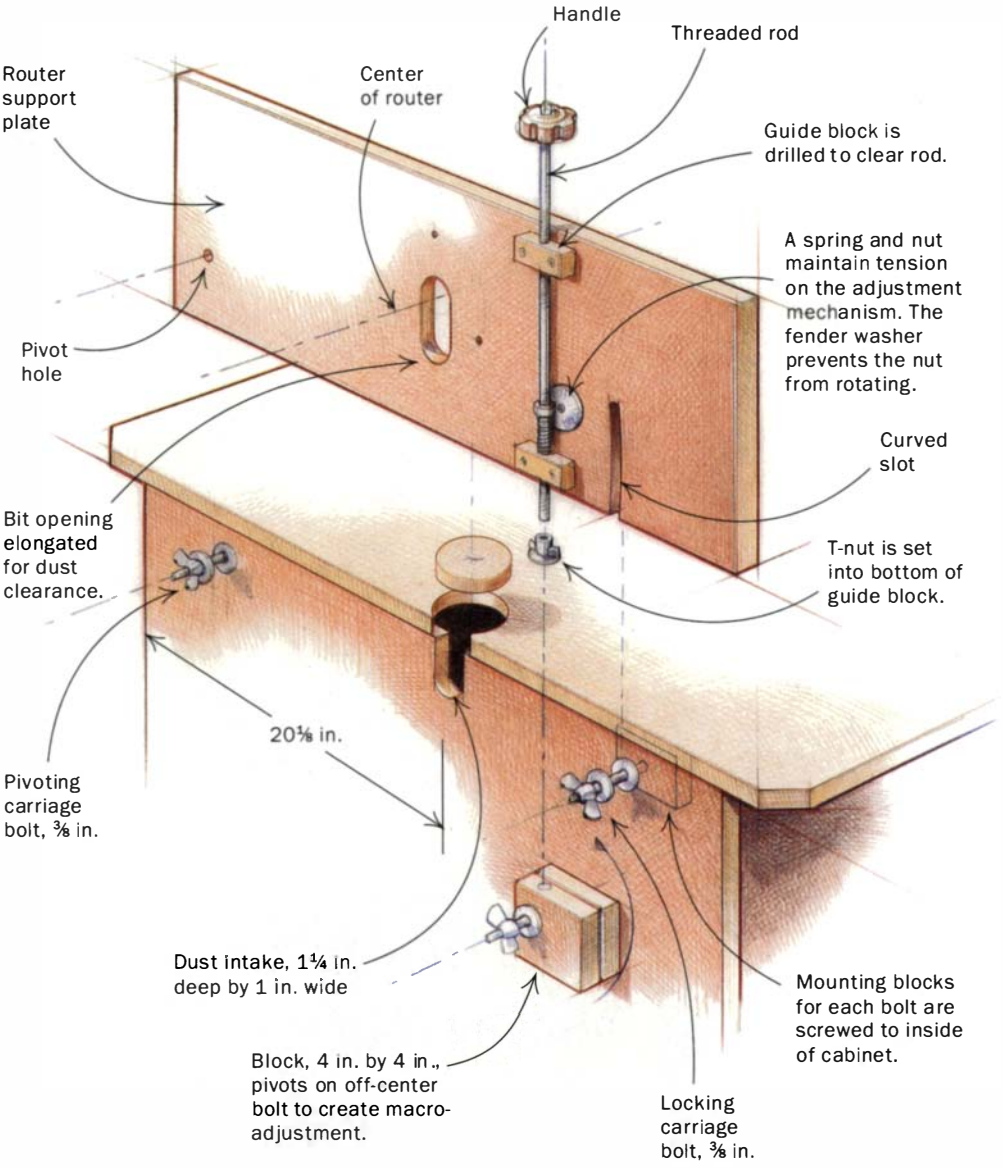
Pipe clamps make a simple clamping system, gripping the edges of the table but also sliding freely. Drill small holes through the adjustable jaws of the pipe clamps, and screw them permanently into place.

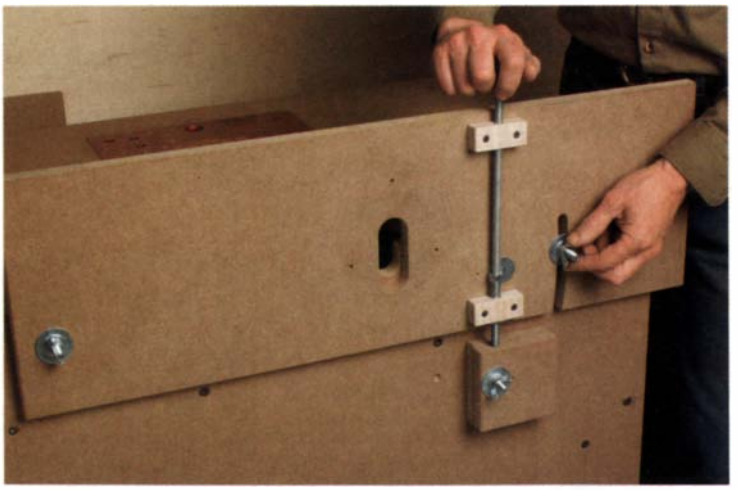
Creating this "ultimate router table" takes some time and money, but the added precision and ease of use will reward you many times over. □

John White is a contributing editor and the shop manager for Fine Woodworking.

HORIZONTAL ROUTING ATTACHMENT

The back of the table is flush with the cabinet so that White could include a horizontal routing attachment—useful for making tenons, raised panels and sliding dovetails, among other operations.





Adjust the bit height. *The fine-adjustment screw moves the router up and down, and the clamping bolt locks everything in place. A coil spring keeps tension on the screw, preventing it from drifting as a result of vibration.*

Shop on

PLANES

Rodriguez's traveling collection of tools includes four planes (from left): a block plane, a low-angle jack plane, a No. 4 smoothing plane and a ¾-in. shoulder plane that he made.

I often find myself far from a well-equipped shop, and when I reach my destination I typically need a good collection of woodworking tools that can help me tackle anything from basic joinery to furniture repair.

I've been a cabinetmaker for a long time, and I own lots of tools. When I travel, I can't lug everything, so I pare down my collection to the tools that give me the best results with the least weight and bulk. Although I routinely use a variety of stationary power tools when they are available, my travel kit allows me to make almost any small project from scratch when they are not. In my travels I've discovered that this set is really all I need and would serve as a good set of essentials for any shop.

In addition to being compact and portable, tools must have three qualities: each must be effective, versatile and of good quality. Ef-

the Go

A travel kit of carefully chosen tools keeps a veteran cabinetmaker at work away from home

BY MARIO RODRIGUEZ

fectiveness means a tool must be well designed and well balanced, easy to adjust, comfortable to use and easy to sharpen and maintain. Versatile means that it should perform more than one task. Quality is important, too. This is about more than appearance: Top-quality tools work better. Everything in my travel kit meets these criteria, with one exception: a set of completely useless screwdrivers my daughter proudly gave to me on Father's Day when she was 7 years old. I never go anywhere without them.

Key personal tools include planes and chisels

Personal tools are ones that I always carry. I never leave them lying around, and (sorry, buddy) I rarely lend them to anyone.

I used to laugh at people who bundled their pets in little jackets. Now I pack my planes in special socks. I carry four planes: a low-angle jack, a block plane, a No. 4 smoothing plane and a shoulder plane. Three of my planes are made by Lie-Nielsen, where I work part-time as a consultant. The planes are well made, but they are expensive. In most cases, you could substitute another brand, such as Record or Stanley.

The low-angle jack plane is a copy of the Stanley No. 62. It is long enough to serve as a jointer yet short enough to double as a smoothing plane. It can cut with the grain, perpendicular to the grain, and it even handles end grain. It also works on very dense woods such as bird's-eye maple. Like most woodworkers, I can't do without a block plane. Mine is a Lie-Nielsen No. 103, but good block planes also are made by Stanley and Record. A No. 4 smoothing plane is rightfully regarded as an all-purpose bench plane. I use mine to smooth and flatten short and narrow pieces, to clean up edges and to remove saw marks and other surface blemishes. The last plane in my kit is a ¾-in. shoulder plane. I made this one myself, modeling it after one from the tool chest of famed 19th-century cabinetmaker Duncan Phyfe. Unlike other planes, a shoulder plane's blade extends the full width of the plane body, making it useful for trimming rabbets, tenons and shoulders. A good substitute is the Stanley No. 92.

CHISELS

Paring chisels, from ⅛ in. to 2 in. wide, are protected by a heavy canvas roll during the rigors of travel. The kit also includes a turned carver's-style mallet.

I carry six paring chisels—⅛ in., ¼ in., ½ in., ¾ in., 1 in and 2 in.—although it would be possible to get by without the ⅛-in. and 2-in. chisels. I also bring a ¼-in. mortise chisel that doubles as a heavy-duty bench chisel (and I use my ½-in. chisel as a burnisher for my scrapers). I think Marples' Blue Chip is a good brand at a good price. And I have a small turned mallet for whacking chisels.

I admit to having a weakness for spokeshaves. I love the way they look and handle. Because they don't take up much room, I carry several, including 1½-in. and 2-in. models. If you prefer the more common cast-iron style with a flat sole, either the Stanley No. 51 or the Record No. 501 will do nicely. Flat card scrapers don't take up much room, either, but they are great for smoothing surfaces, removing plane tracks and scraping finishes. I carry several.

Layout and marking tools

I made my own marking knife. It has a slender, pointed blade and a full handle custom-shaped to fit my hand. It is very handy for

Photos: Michael Pekovich

SPOKESHAVES AND SCRAPERS

Rodriguez packs three spokeshaves; the smallest has a 1½-in.-wide blade. Flat card scrapers take up virtually no room but are versatile performers for smoothing surfaces and removing plane marks. The Grobet detail file and Italian rasp are used for cleanup and shaping.

scribing clean lines, scribing dovetail pins, trimming veneer, sharpening pencils and even removing splinters. I use an old Reed marking gauge that is no longer made. But Starrett makes a similar model.

A 12-in. combination square is essential for checking 90° and 45° angles and for general layout work. Although a 6-in. square would be more compact and accomplish the same basic function as a 12-in. one, I prefer the bigger model because the base is sturdier and the ruler is longer. I think the extra capacity offsets the added weight. A 3-in. engineer's square is useful for checking the squareness of plane blades and chisel edges and for laying out joints.

A sliding T-bevel makes it easy to lay out and copy angles. I use a compact Shinwa model that folds down to the size of a ball-point pen. A small compass is used for drawing circles and curves and also for scribing trim or the edge of a cabinet that fits against an irregular or tapered surface.

LAYOUT AND MARKING TOOLS

A 12-in. combination square is essential, while a 3-in. engineer's square is useful for checking tools as well as for laying out joinery. Rodriguez also carries a sliding T-bevel for marking angles, a handmade marking knife, a folding ruler, a marking gauge and a compass.

Tools for filing and sharpening

I always have 6-in. and 8-in. mill files and sometimes a 10-in. file as well. I use them not only for jointing scrapers and sawteeth but also for filing down nail heads and for removing burrs from metal tools and parts. In a pinch, these files also can be used on wood to obtain a smooth finish, for cutting light chamfers and for flushing the protruding ends of dovetails.

SHARPENING

For the inevitable sharpening, Rodriguez prefers waterstones. But he also carries a coarse diamond stone for quick removal of dings and chips in tool edges. A honing guide speeds up the process.

A Grobet detail file is a tapered, half-round file originally designed for carving wax in the jewelry trade. One end is used for rough work, and the other is for fine work. I use it for cleaning up carvings, for trimming veneer and sometimes as a lathe tool. A companion to the Grobet is a 6-in. Italian rasp, which has a compact design for fine shaping. It cuts more aggressively than the Grobet, but the cut and the finish can be controlled by how much pressure is applied to the work.

Because I sharpen my own saws, I also carry a good selection of saw files, starting with a 4-in. double extra-tapered slim for my dovetail saws up to a 6-in. extra slim for my crosscut saw.

Sharpening is a fact of life, and I like to have a 1,000/6,000 combination stone on hand. I prefer waterstones over oilstones. I also like to have a coarse diamond stone with me. It's dead flat and cuts quickly, and it's helpful for removing dings and chips that are too much for the 1,000/6,000 stone. A Veritas honing guide may not be

SAWS

Used for joinery and cutting stock to size, handsaws are essential travel companions. They include (from left): a backsaw, two dovetail saws, two crosscutting saws and a ripsaw. A jeweler's saw (bottom) is useful for cutting veneer inlays and for removing waste from dovetails.

essential (some woodworkers refer to these jigs as "training wheels"), but it helps me restore dull edges quickly without thinking too hard about it.

Saws and odds and ends

Handsaws are fundamental and especially important if you don't have access to a tablesaw or chopsaw. I carry six saws: a 10-in. dovetail saw with 18 tpi that I use for general tasks; a 10-in. modified dovetail saw that I've refiled from a crosscut to an 11-tpi rip pattern; a 10-in. backsaw for cutting mortise-and-tenon joints and for crosscutting small boards; two crosscut saws for cutting solid wood and veneered panels; and, finally, a 26-in. ripsaw (5 tpi).

Tools that don't fit any particular category but manage to fill some important niche include: a 13-oz. hammer (you must have one hammer); screwdrivers, including a #1 and #2 Phillips and a standard flat tip; a pair of wire clippers (great for clipping off nail heads); a pair of 6-in. locking pliers, indispensable for holding small parts and as a quick-release clamp; a set of folding metric and standard Allen keys; and a flexible 1-in. putty knife for applying epoxy and wood filler.

Special-purpose tools

In addition to the tools I carry most of the time, there also is a set of special-purpose tools. I don't need them every day, but they are essential for studio or shop work: a No. 8 jointer plane, because nothing beats the heft and weight of this tool for flattening surfaces or shooting long edges; a saw vise and saw set; veneer saw and veneer hammer; a quad electrical box with an 8-ft. cord (useful for situations where there aren't enough outlets, or where you have to share scarce outlets with other workers); a jeweler's saw, similar to a coping saw but with a finer blade, which is used to cut veneer inlays and for cleaning waste from dovetails. □

Mario Rodriguez is a contributing editor.

ODDS AND ENDS

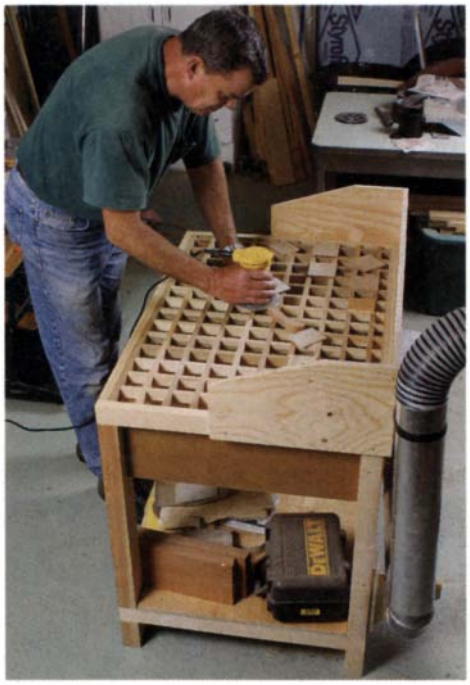
A process of trial and error has helped Rodriguez add a selection of tools that don't fit any particular category but are essential all the same. Among them: screwdrivers, a putty knife, Allen wrenches, magnifiers and pliers.

Portable power tools

If there's room, the kit includes a router, cordless drill, jigsaw, biscuit joiner and a shopmade quad power box.

Portable power tools increase my speed and accuracy, and I carry several if I have the room. Some brands are tedious and difficult to adjust, and some have fragile plastic parts. Over time, I've come to like Bosch tools, but you may have your own favorite. Whatever the brand, the tool should not make your work harder than it already is. The power tools I use the most include:

- **A 12-volt cordless drill, which has a good power-to-weight ratio**
- **A barrel-style jigsaw**
- **A 1½-hp router with a soft-start feature**
- **A DeWalt biscuit joiner (this model comes close to the performance of a Lamello at a third of the price)**
- **A quad electrical box with an 8-ft. cord.**



A Downdraft Sanding Table

This shopmade unit conquers dust without breaking the bank

BY PETER BROWN

My shop was originally a 20-ft. by 40-ft. hog barn. In the early years, before it could really be called a shop, I conveniently ignored the dust created from sanding. However, after I added a floor and finished the interior, I became more conscious of the dust and began to take large sanding projects out to another barn, where I could let the dust fly. The solution was clear: I had to find some way to collect sanding dust.

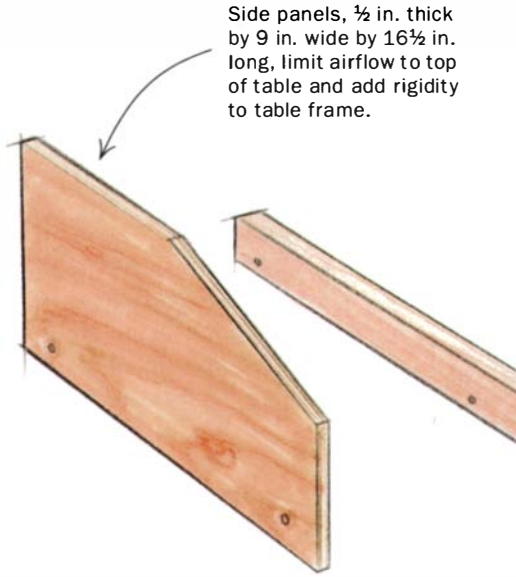
When I first noticed downdraft sanding tables that were for sale, I was intrigued. They were just what I needed, but I could not afford any of them. It was then that I decided to make my own downdraft table utilizing the central dust-collection system in my shop. I use a shopmade system built with the motor and impeller from a portable Dust Boy—rated to move 1,100 cu. ft. of air per minute (cfm) at a velocity of 5,400 ft. per minute (fpm)—adapted to an Oneida Air Systems cyclone. I was confident that by locating my 2-hp Dust Boy close to the downdraft table, my system would do the job.

I based the size of the sanding tabletop—24 in. deep by 36 in. wide—on the average dimension of my workpieces. I then calculated the area of the tabletop (864 sq. in.) and subtracted the area taken up by the grid material (330 sq. in.), leaving an open area of 534 sq. in. This is equivalent to a 26-in.-dia. duct, and I began to get a feeling that I might have a problem. With even a minimum 3,000-fpm velocity at the table, I would need a flow rate of more than 10,000 cfm. All of a sudden my central dust-collection system looked very inadequate.

Undaunted, I resolved to give it a try regardless of what the calculations told me. I decided to build the framework of the table and then make cardboard mock-ups of the interior to determine the best flow characteristics. I built the sanding table entirely from scraps, and the size of the scraps dictated the size of the components.

After making the frame, I made the first mock-up of the table interior. The mock-up had a flat bottom with straight sides and an 8-in.-dia. duct at the bottom of the table. Regardless of what adjustments I made, the airflow wasn't evenly distributed across the table: It was fair near the outlet but poor elsewhere. For the second mock-up, I changed the outlet duct from the round to a standard 4-in. by 12-in. heating duct made of sheet metal, and I moved the outlet to the back of the table. I sloped the interior bottom from front to back and added the side pieces that slope toward the center and the back of the table.

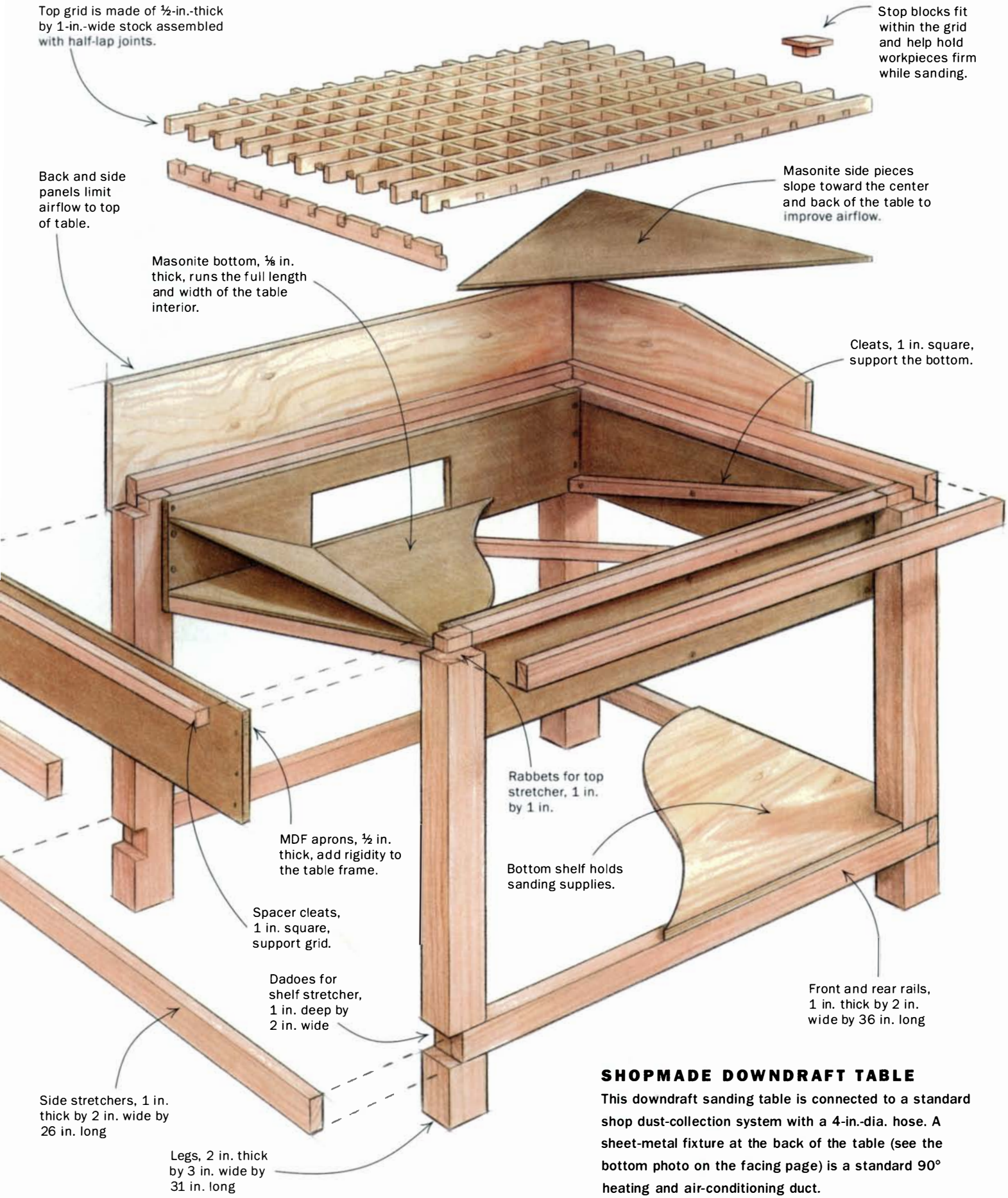
An inexpensive connection. *Brown used a standard sheet-metal air-conditioning duct to tie the sanding table to his shop dust system.*



The second mock-up made a significant improvement in the airflow, giving me good dust collection. I replaced the cardboard mock-up with ⅛-in.-thick Masonite. The addition of the ½-in.-thick MDF back and side apron pieces at the top of the table adds rigidity to the frame and keeps stray dust within the collection area. □

Peter Brown works as an engineer developing repairs for jet engines.

Photos: William Duckworth



SHOPMADE DOWNDRAFT TABLE

This downdraft sanding table is connected to a standard shop dust-collection system with a 4-in.-dia. hose. A sheet-metal fixture at the back of the table (see the bottom photo on the facing page) is a standard 90° heating and air-conditioning duct.

Drawing: Bob La Pointe

My Five Essential Power Tools

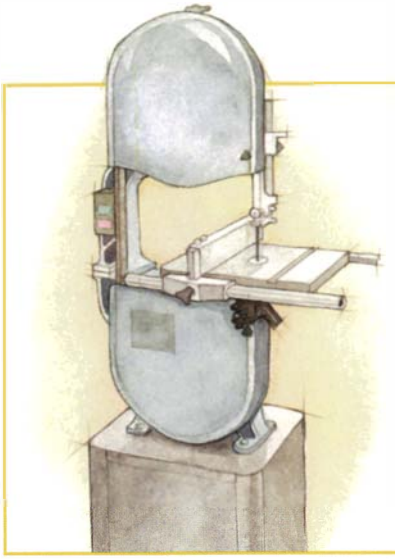
Why the tablesaw would not be at the top of my list

BY GARY ROGOWSKI

One of the few things woodworkers agree upon is that we all love tools. It is this love that got many of us hooked on woodworking in the first place. We also need *good* tools so that we can do *good* work. From this benign and congenial starting point, all hell breaks loose. It seems as if everyone has the correct opinion about which tools to have in the shop, their type, their capacity and, above all, in what order to buy them.

Leaving aside the important and absolutely essential world of hand tools, let me venture into these dragon-filled waters with my own opinions about power tools and how best to outfit a shop step by step. I can't speak to every situation or shop environment, but I can offer my perspective on how I'd buy machines if I had to start all over again. This article will help you figure out the tasks that are most important

Photos: Mark Schofield



1. Bandsaw

A bandsaw can be fitted with a good fence for accurate ripping and resawing, and merely by changing blades, you can change jobs from sawing up small logs to cutting delicate inlay.

No jig is necessary. *When using a bandsaw, the fence acts as a tenoning jig. Doing this on a tablesaw requires a special jig.*

and which machines will help you accomplish these jobs.

Never go shopping without a list

Tools are not bought the same way as groceries. You don't load up your shopping cart with some tools you need, a few items on sale and a couple of impulse buys on your way out. You don't put one tool back because it's too expensive and get the cheaper version so you can afford another cheap tool in the next aisle. You don't let tools just fall into your basket as you head to the checkout counter. Or do you?

Many woodworkers don't consider how the tools might fit into the grand scheme of their woodshop and the kind of woodworking they'd like to do. Your projects will go a long way toward determining your choice of equipment and vice versa. When I started out, I had only a radial-arm saw. Consequently, all of my work consisted of very precise dadoes. I wanted to build secretaries and armoires, but all I could push out of my shop were bookshelves and plant stands. Experience will play a major role in your accumulation of machines and the projects you take on, but keep in mind where you'd like your woodwork to be going so that you can plan your tool purchases.

Also, if your intent is to build furniture and not just to collect machinery, buy your tools as if they're the last ones you'll ever buy. Looking around my shop, it is the economies that I now regret, not the extravagances. Buy your tools one at a time and take a while to learn each of their habits. Try to develop the patience that will also serve you well as a furniture maker and slowly develop your skills with each machine. You may not be able to build that armoire right off the bat, but you will develop solid woodworking skills.

Your first machine should be a bandsaw

In most cabinet shops, where the work is mostly straight-lined and rectilinear, the maypole around which every other tool dances is the tablesaw. It's also the first big machine purchase for most woodworkers. If you want to build cabinets, your first purchase should be a tablesaw.

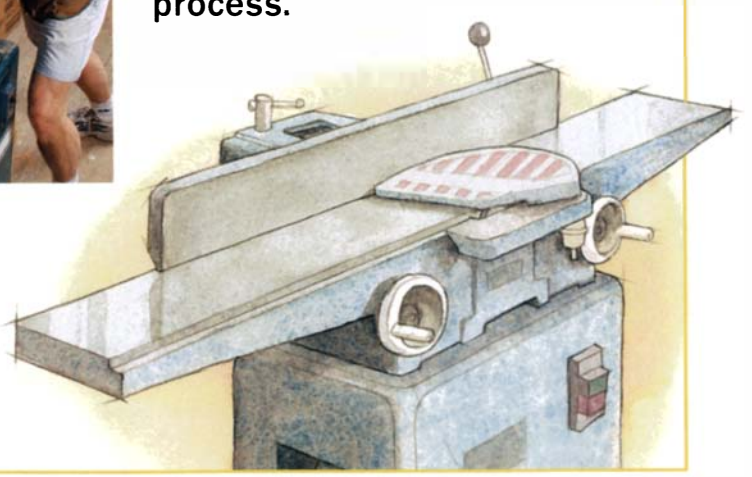
But the choice of a first machine must, in my mind, offer greater flexibility than this. There isn't one woodworker out of 10 or one machine manufacturer out of 100 that will agree with me on this, but I think your first machine should be a bandsaw. It is the most important power tool in my shop. I can do more work of a greater variety with the bandsaw than with any other two machines combined.

A bandsaw can start the rough milling: slabbing out boards from logs, roughing out bowl blanks, trimming out shapes for carved work, ripping boards to thickness and width, and resawing. The saw will then cover your joinery needs: cutting tenons, finger joints, slot mortise and tenons, slot

Jointing a board. *Rogowski first establishes a clean face along one edge of the board. After ripping the board to width on the bandsaw, he face-joints the board.*

2. Jointer

The jointer can flatten a face or edge to begin the milling process.



Drawings: Jim Richey

dovetails, half-lap joints and through-dovetails. Finally, the bandsaw can also be used for shaping, tapering, cutting circles, curves and templates, edge work and trimming joints.

All of this work is done with greater safety and ease, less waste and a lot less dust than with a tablesaw. There is no danger of kickback from a blade because all of the force is down into the table, not coming at you. Even if a board closes up as it's being ripped, the blade is too narrow for the board to pinch it. This narrow kerf also means that a lot less wood gets lost to a cut than on a tablesaw. A bandsaw can be fitted with a good fence for accurate ripping and resawing, and merely by changing blades, you can change jobs from sawing up small logs to cutting delicate inlay.

Now this presumes that you're using a bandsaw with some real weight and well-balanced wheels, with a cast-iron table that is well supported and has a good fence. If not, you'll be frustrated by the cheap piece of sheet metal that is masquerading as a bandsaw. This also presumes that you're building most of your pieces in solid wood. If you're going to be using strictly plywood, buy a tablesaw and a router.

The next four tools cover milling and joinery

The second machine is actually tougher to choose than the first. Do you want to be able to crosscut perfectly to length, or do you need a quicker way to mill lumber? The answer partly depends on whether you can sharpen and use a handplane or whether it is just a nice idea up there in the tool cabinet.

A handplane is no substitute for the jointer—If you can't use a handplane fluently, the ability to put a straight edge or face on a board is your next big challenge. Getting wood flat is so crucial when building furniture that your next tool purchase should be a jointer. Even if you are an accomplished handplane user—and I use mine daily—I still wouldn't make someone flatten all of his or her lumber by hand.

The jointer can flatten a face or edge to begin the milling process. From there you can resaw or rip to thickness or width on the bandsaw. The tool does only this one job. It will not plane faces or edges perfectly parallel. But it is such a time- and sweat saver that I think it is worth a spot on your shop floor sooner rather than later.

The router is the most versatile portable power tool in the shop—Your next tool purchase should be a router: You can use one to cut pieces exactly to length, running it topside against a straightedge. Put a fence on one, and you can cut rabbets, tongues and dadoes for cabinetry. Use that same fence to cut mortises and tenons. With a flush-trimming bit you can shape pieces to match templates or use router jigs to cut dovetail and finger joints.

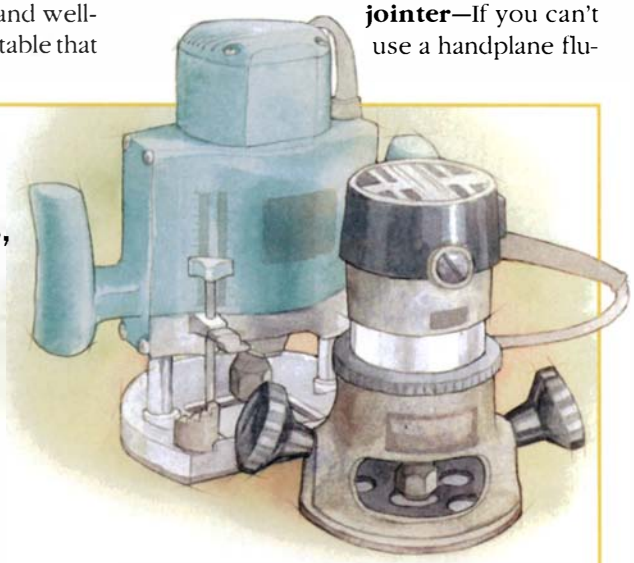
With jigs or fences, a router can cut tapers, circles, ovals, squares, rectangles and recesses for inlay. All of this is done with the router above the workpiece.

Buy an extra base for a fixed-base router and mount it under a flat table, and you have a router table. On this you can cut even more joints, stopped or through, on almost any size piece of wood. You can pass small pieces held in jigs safely past the bit. With a good fence and an efficient dust port, your accuracy and dust problems are solved. A simple setup will turn the router table into an edge jointer. You can template-rout safely and accurately and put decorative edges on boards just by changing bits. There are few jobs a router cannot handle with the simple addition of a jig or a fixture to guide it properly.

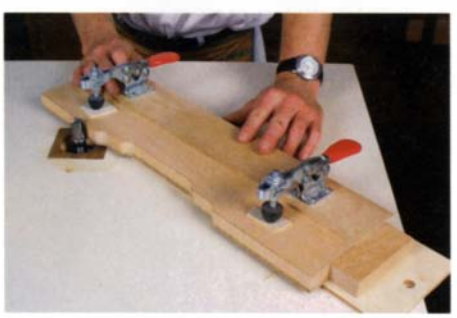
A good compound-miter saw comes next—The ability to crosscut exactly to length is a time-saver. So the next tool you need to buy is a good compound-miter saw. Notice that I said good. Don't waste your money on a lightweight, throw-in-the-back-of-your-pickup chopsaw. Get one that can cut accurately and repeatedly to length. Put it close to your bench, and you can nip off the ends of a thousand dif-

3. Router

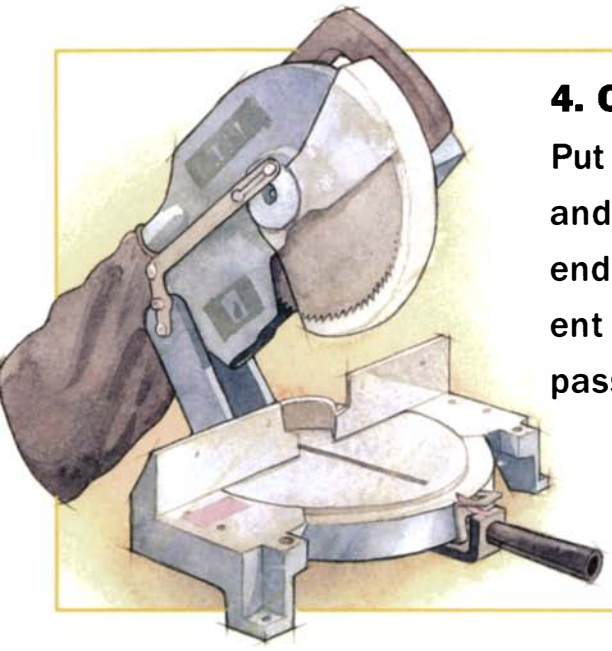
With jigs or fences, a router can cut tapers, circles, ovals, squares, rectangles and recesses for inlay.



No need for a dado blade. *A router guided by a straightedge clamped to the workpiece (left) cuts a neater dado than a dado blade and with less danger.*



Using a template. *A straight bit with a bearing guide can transfer the pattern to a workpiece (above). Mounting the router under a table provides greater stability.*



4. Compound-Miter Saw

Put it close to your bench, and you can nip off the ends of a thousand different boards for projects that pass across the bench.

Miters are easy. *With a stop block clamped to the fence, a miter can be cut at the correct angle and location.*

ferent boards for projects that pass across the bench. I didn't have one for the first 25 years in the shop, an absence I regret each time I now use mine.

The drill press in the corner is often underused—Because joinery is so important in furniture making, the next tool is another joinery tool: the drill press. It is such a basic machine that it is often overlooked, but the ability to drill accurate holes is essential for making jigs or joints. You can cut mortises on the drill press, drill a series of holes parallel to an edge for shelving support pins, drill for dowel joints, countersink for plugs or drill for screws. You can also make templates or any of a hundred other little jobs that are just too hard to do accurately with a handheld power drill.

The remaining tools can wait

I would have to include the tablesaw in this list eventually. I like mine, and if all I did was build cabinets, it would absolutely be my first purchase. Once you have one, you'll realize how great a tool it is for cutting boards exactly to width and length. It can also cut many joints, from miters to dovetails to tenons. You can shape with it and use it to cut tapers and coves. I use it more than some of my other tools, but I don't think that it's a must-have machine for furniture making. Don't rush out just to have one: You can live surprisingly well without one. When the time comes, have your money saved up and buy a good tablesaw that will last.

Finally, get a planer to finish the chore of milling your lumber flat and with parallel faces. After first using your jointer to flatten a face, you can then run the wood through the planer to finish your milling quickly.

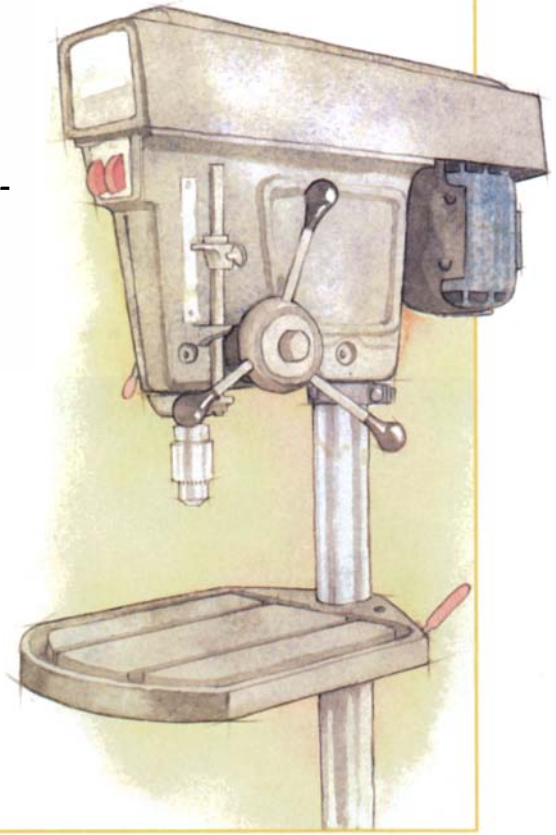
As for the other tools you could acquire, every shop has different needs. Some people need their thickness sander; others would be lost without a biscuit joiner; I personally love my spindle sander. But I think you could do a lot of work with the first five tools I've outlined here, and with time you could fill in the rest. Consider the work you'd like to do most, then buy well and wisely. If you buy top shelf, you won't be disappointed. □

Gary Rogowski teaches furniture making at The Northwest Woodworking Studio in Portland, Ore.

5. Drill Press

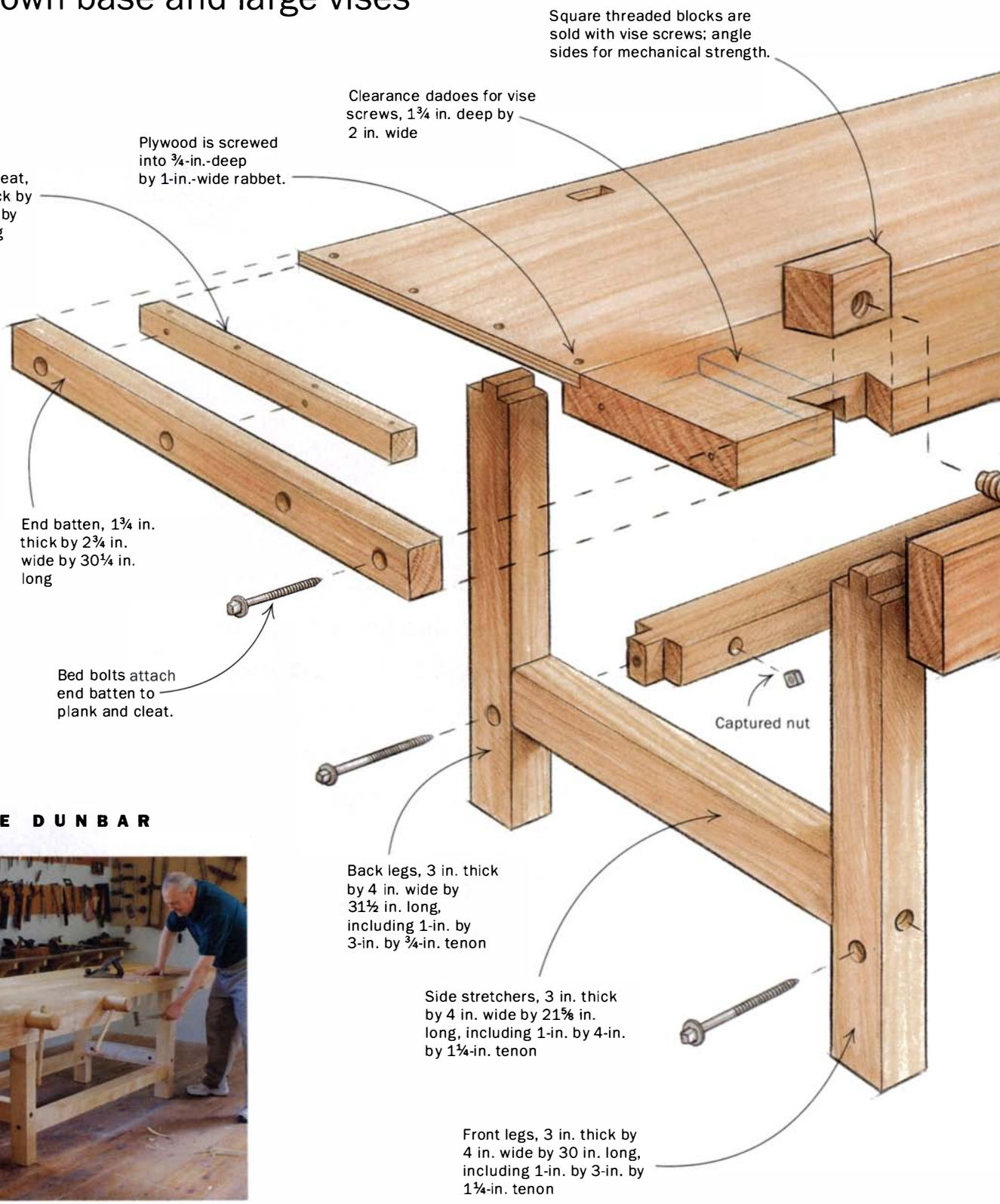
It is such a basic machine that it is often overlooked, but the ability to drill accurate holes is essential for making jigs or joints.

Precise mortising. *With the table and fence square to the drill bit and the depth of cut set, mortises can be drilled accurately.*



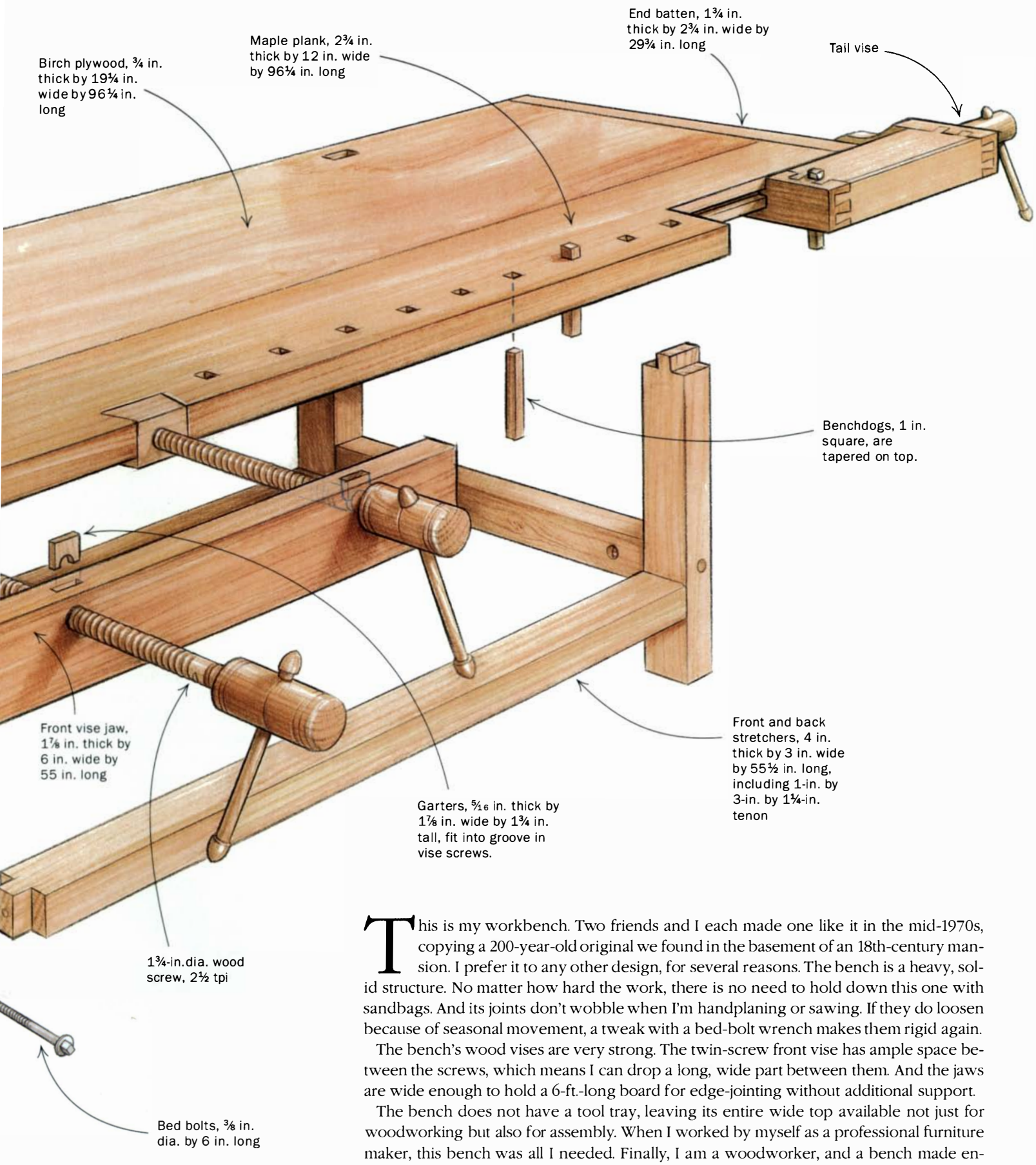
Mike Dunbar's Workbench

Heavy-duty bench has a wide top, knockdown base and large vises



BY MIKE DUNBAR

Photo, this page: Michael Pekovich



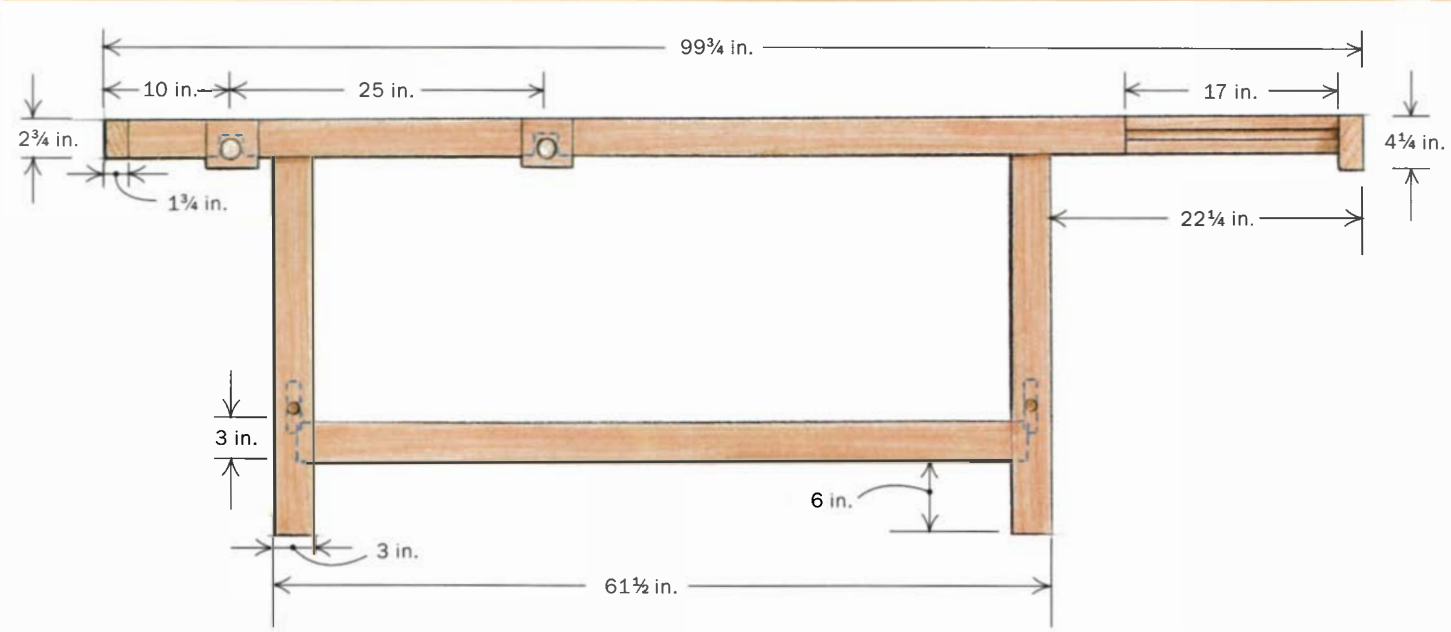
This is my workbench. Two friends and I each made one like it in the mid-1970s, copying a 200-year-old original we found in the basement of an 18th-century mansion. I prefer it to any other design, for several reasons. The bench is a heavy, solid structure. No matter how hard the work, there is no need to hold down this one with sandbags. And its joints don't wobble when I'm handplaning or sawing. If they do loosen because of seasonal movement, a tweak with a bed-bolt wrench makes them rigid again.

The bench's wood vises are very strong. The twin-screw front vise has ample space between the screws, which means I can drop a long, wide part between them. And the jaws are wide enough to hold a 6-ft.-long board for edge-jointing without additional support.

The bench does not have a tool tray, leaving its entire wide top available not just for woodworking but also for assembly. When I worked by myself as a professional furniture maker, this bench was all I needed. Finally, I am a woodworker, and a bench made entirely of wood has a deep appeal for me.

Making this bench is more heavy work than it is hard, although the tail vise is somewhat

Drawings: Bob La Pointe



complicated. Many of the parts are so large that joining them borders on timber framing. A second pair of hands comes in handy for some stages on the project.

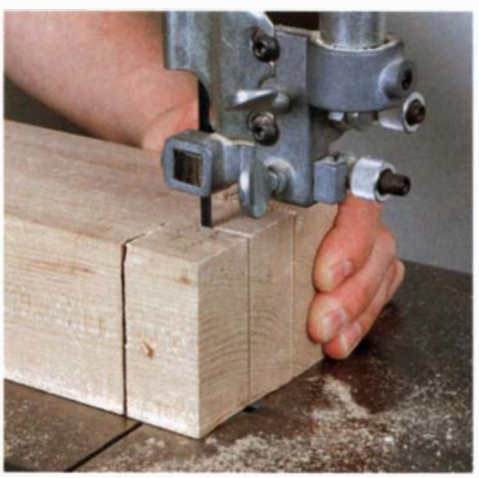
Some heavy lifting will be required

The bench can be made of just about any type of hardwood. Because this is a workbench, practicality governed my choices. In my region, yellow birch is cheaper than maple but isn't available above 10/4. So I used birch for the 2-in.-thick parts and hard maple for the thicker ones. If you cannot find 12/4 hardwood, you can glue up your stock.

Before cutting any wood, determine what bench height is comfortable for you. When working with hand tools, it is more efficient and easier if you can bring into play all of the larger muscle groups in your body, above all those in your legs and back. Most benches are too high for me, forcing me to work only with my shoulders and arms. I am 5 ft. 9 in. and a little short in the leg. My benchtop is 32 in. high.

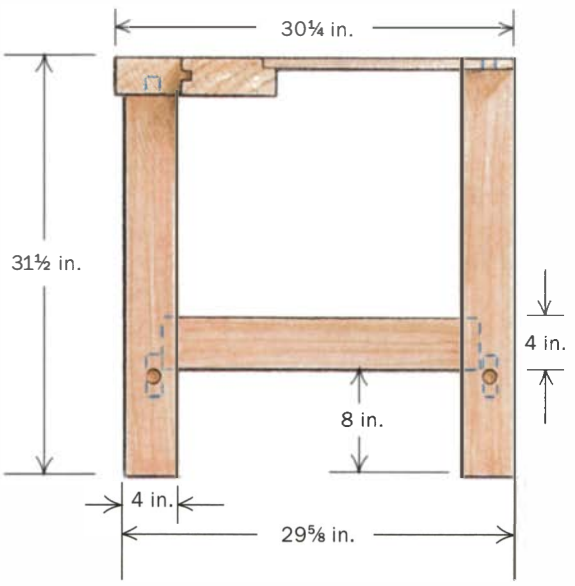
Besides wood, you will need to order two other items: 1¾-in.-dia. wooden bench screws and threaded blocks, which you can get from Crystal Creek Mill (P.O. Box 41, DeWitt, NY 13214; 315-446-1229). Mention this project to get the same components I used. The three screw-and-block sets will run you $195.

You can cut your own threads if you have a large tap and die suited for this job (one that's at least 1½ in. dia. with 5 tpi or fewer). Antique tap-and-die sets for wood may be found at a flea market or tag sale. The tap would be the most useful of the two, because it would allow you to make the threaded end batten near the tail vise out of one piece of wood. Without it you'll have to join one of the threaded blocks to the end of the batten. The Beall Tool Co. (800-331-4718; bealltool.com) offers wood-threading kits for making 1½-in.-dia., 5-tpi screws and nuts. It includes a router jig



Timber-frame techniques. *Use a circular saw to cut the tenon shoulders on these large beams. The cheeks are then cut on the bandsaw. Get an assistant, if you can find one, to help you support the long, heavy timbers. For the mortises in the legs, first drill out the waste, then square with a chisel. Afterward, the tenons are pared to fit the mortises.*

Photos, except where noted: Asa Christiana



and bit and a 1½-in.-dia. tap, which would solve the aforementioned joinery problem.

You'll also need 16 bed bolts and a wrench, which you can get from Ball and Ball Hardware Reproductions (800-257-3711).

A knockdown base is easy to move

The original bench knocks down completely. This leads me to suspect that it belonged to an interior joiner, what we would call today a finish carpenter. These guys were the elite of the building tradesmen and were responsible for raised-panel walls, wainscoting, staircases, mantels, moldings and doors.

Working on a magnificent Portsmouth, N.H., mansion, a joiner could be on the job site for months. He would move his bench and toolbox right into the house. When finished, he'd put them in a wagon and move them onto the next job site. A bench that knocks down is still a good idea today because it is easier to move to a new shop.

The legs and stretchers are joined with mortises and tenons held together with bed bolts. The joints can't be at the same height or the bed bolts would bump each other, so offset their elevations. Notice that there are tenons on the tops of the legs, as well, to secure the top to the base. Cut all of the joints at the same time.

Cut the shoulders of these large tenons with a circular saw and then rip the cheeks on the bandsaw. Bore out the mortises with a drill bit and square the corners with a chisel. I used a shoulder plane to fit the tenons.

Bed-bolt basics—Bed bolts are very effective fasteners and, when tightened, will not allow the slightest wiggle. The bolt has a square head with a large flange and requires a two-step hole. Drill the counterbore for the flange first. The long hole for the bolt goes into the bottom of the mortise, through the length of the tenon and past the location of the nut.

The nut sits in a hole drilled into the back of the rail. Assembling the joint is easy: Tap the mortise and tenon together, hold the nut in place and slide a bed bolt into the hole. A couple of quick turns

Locate the leg mortises on the plank. *First turn everything upside down and level the back legs.*

End battens support the plywood portion of the benchtop. *Each batten is bolted to the thick plank and also to a cleat that supports the plywood and keeps it level with the plank. The plywood is screwed onto the cleat and into a rabbet at the back edge of the plank.*

Size and strength. *The thick wooden screws are far enough apart to accommodate a wide workpiece, and the jaw is long enough to support a 6-ft. board for edge-jointing.*

catches the nut. When all of the fasteners are hand-tight, grab the bed-bolt wrench and finish the job.

The plank is the key to the top

The top of the bench is made of two pieces: a 3-in.-thick plank at the front and a thinner plywood panel behind. The front and back legs are different heights as a result. The thick front plank anchors the vises and provides a durable surface for your heaviest and most forceful work. The rear panel will not take the same punishment as the front and does not have to be as thick. Its role is to provide a wide, level surface. On the original bench this was a wide pine board, but I used birch plywood for its stability.

The width of the front plank is a variable and can depend on whatever you can find or glue up. A piece of wood this thick is seldom flat as it comes from the lumber dealer and will need to be planed. If your machines are not up to a job this heavy, you may have to find someone who can do the work for you. I surfaced my 12-in.-wide plank in my planer, because it wouldn't fit on my jointer. Luckily it was straight but just cupped a bit. I took a couple of passes off the domed (heart) side, just to get a flat to work on. Then, I took light passes off the concave side. Because this surface is not seen, there is no need to flatten it completely. Finally, I flipped the plank again and finished dressing the upper surface. Set the plank aside for several days and let it equalize before flattening it again with a light pass. While you are at it, joint the front edge so that it is straight and square to the upper surface.

This plank requires a few operations before it's ready to drop into place on the substructure. First, lay out the leg mortises in the underside and cut and fit them to the tenons on the top of the front legs. Next, rout the rabbet in the back edge to create a lip that will support the plywood portion of the top, which will be secured with wood screws.

Make room for the vises—The front vise is secured to the bench with wood screws threaded through two dovetail-shaped nuts,

After angling the sides of the threaded blocks, lay out their recesses. *The trapezoidal shape gives mechanical strength to this joint, which is also glued.*

Circular saw comes in handy again. *Cut the shoulders first, then cut some kerfs through the waste section.*

After chopping out the waste, pare the sides. *Use one of the threaded blocks to guide your chisel.*

which are set into the plank. Bevel the sides of two of the three threaded blocks (the other one is for the tail-vise assembly). Then use the blocks to lay out their recesses. Lay out these notches so that the blocks project slightly from the front edge of the benchtop; plane them flush later. Cut the deep notches with a handsaw or circular saw, and clean up the walls with a wide chisel.

The top is far too thick for the wood screws to clear it on the bottom side, so you have to cut channels for clearance. Tap the nuts into place temporarily to see where the threaded holes line up with the bench. Cut the channel edges first, with a straightedge clamped on the plank to guide your circular saw. Then make a lot of kerf cuts through the center and chop out the waste.

Now you can glue in the threaded nuts. Leave the tops slightly proud and plane them flush after the glue is dry. Plane the front edges flush, too. Next, cut out the large notch for the tail vise. A circular saw will cut through most of the stock, but you will need a handsaw to complete the corner. Clean up the sawcuts with a handplane, keeping everything square (not the easiest task but very important). Rout the long groove along the notch, and finish it with a sharp chisel.

The last task in preparing the front plank is to cut the dog holes. Although you can use any type of dog you prefer, I chose the clever, low-tech type I found on the original. The dog holes are ⅞ in. square, and each square dog has a slight taper planed onto one face. There is a dog for each hole in the bench. Each is tapped into place from below, narrow-side up, and sits flush with the top until it is needed. Tap it with a mallet until it projects slightly above the surface and tightens in place. The dog holes are roughly 6½ in. apart, but some are offset to avoid the screws for the front vise.

The plywood section—The bench's end battens are bed-bolted to the thick plank and have support cleats along their inside edges for securing the plywood. The plywood is also screwed into the rabbet on the back edge of the thick plank. With the thick plank in place on the front legs, place the plywood in its rabbet to locate the mortises for the rear legs. Cut these mortises, then attach the plywood to the plank and the end battens.

A trick for vise handles

Each wood screw has a thick hub with lines scribed into it. These are both for decoration and for laying out the holes for the handles. Drill a 1-in.-dia. hole. You can make the handles out of a piece of dowel with pins in the ends or end caps to keep them from falling out. However, I prefer the old technology used by the original maker. Turn your handles using wood that is still slightly green. You can split some from a firewood pile. Leave the ends ⅛ in. bigger than the hole in the vise-screw hub.

Boil one of the bullet-shaped ends to soften it, and drive it through the hub with a mallet. The wood will compress as it passes through the hole (some may be sheared away by the hole's edges), then it will spring back on the other side.

Front vise jaw wears a garter

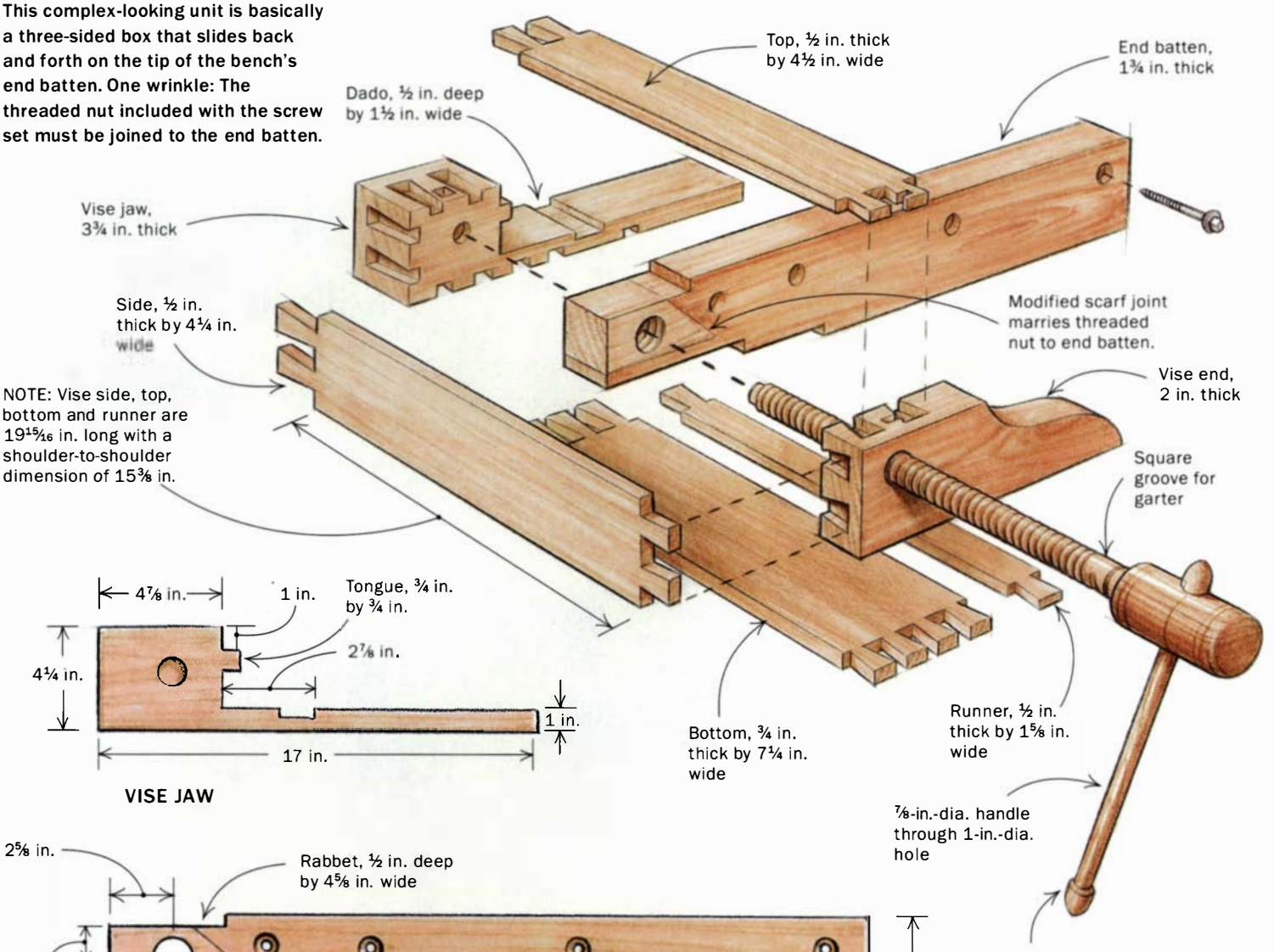
The jaw is a piece of 8/4 hardwood. Its width is not critical and can depend on the wood you have on hand. Unlike most period

Cut clearance channels for the vise screws. *Tap the threaded blocks into place temporarily to determine the location of these channels. Remove the blocks before cutting. Define the edges with a circular saw, kerf out the middle, then chop out the waste.*

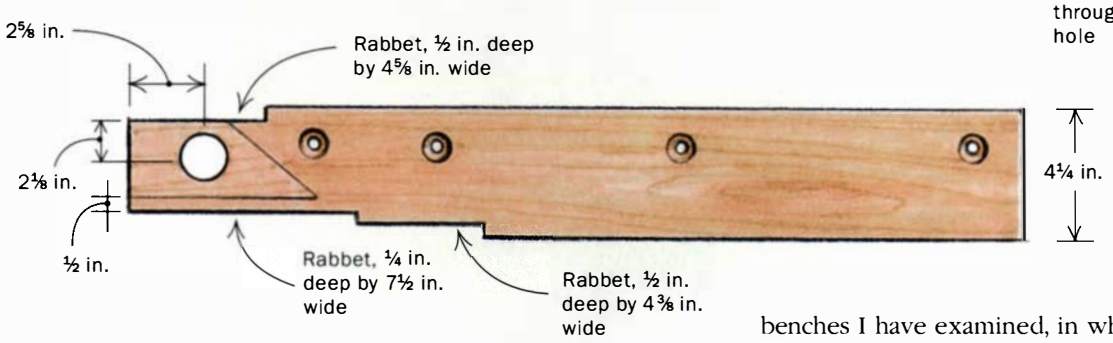
A garter keeps the vise jaw moving with the screw. *This thin strip is mortised into the jaw and fits into a groove near the screw hub.*

TAIL VISE

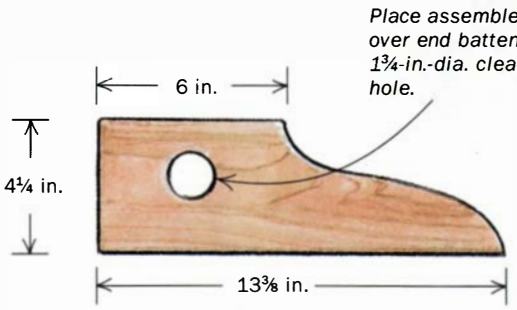
This complex-looking unit is basically a three-sided box that slides back and forth on the tip of the bench's end batten. One wrinkle: The threaded nut included with the screw set must be joined to the end batten.



VISE JAW



END BATTEN



VISE END

benches I have examined, in which the user has to pull the vise jaw backward after loosening the screws, the jaw on this bench has garters that mate with a groove in the screws and keep the jaw and screws moving together.

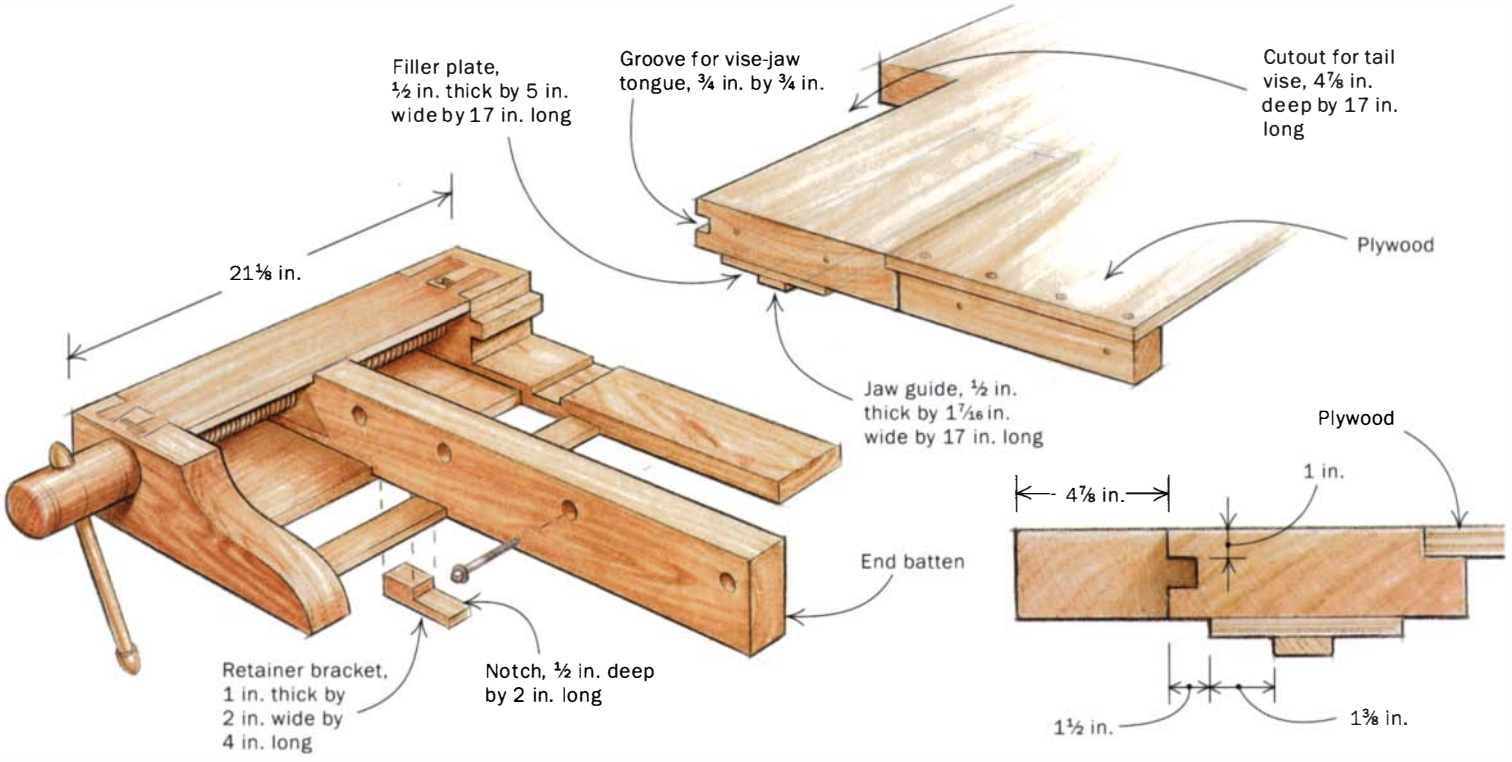
Drill the two holes in the jaw for the wooden screws. Then cut the slots for the garters. Make the garters out of hardwood. One at a time, place a screw through the jaw and tap the garter into place. Turn the screws to test the fit of the garters. Before gluing them into place, be sure they aren't rubbing too tightly against the screw.

Tail vise is the tough part

The tail vise and its associated assembly make for some complicated joinery. A lot is going on at one time as the vise travels. The batten that stiffens the end of the benchtop and holds the front plank and plywood level is threaded for the tail-vise screw. It also acts as one of the guides for the vise. Without a large tap to cut the

Think of the vise as a three-sided box with closed ends. *Build up the jaw end (foreground) from thinner stock. An ogee contour decorates the opposite end piece. The top, side and bottom are joined to the ends with large dovetails.*

Slide the assembled tail vise into place to locate the holes for the vise screw. *This measurement determines where the vise screw will pass through the end of the tail vise and where it will enter the jaw end (at right).*



threads in the batten, I had to find a way to join one of the threaded blocks to it. I settled on a version of a scarf joint that provides some mechanical support and plenty of glue surface.

The vise itself is a three-sided box with closed ends. The jaw end is a 4-in.-square piece of hardwood. I glued up mine in a sandwich from thinner stock, which made it easier to create the tongue that protrudes from this block. A hole in the inside surface of the jaw receives the end of the vise screw. The other end piece is 8/4 and has a clearance hole drilled through it for the screw. The ogee contour on this piece is more decorative than functional.

The top and side pieces of this box are ½ in. thick and joined to the jaw with large half-blind dovetails. The bottom is ¾ in. thick and joined the same way. There also is a guide strip on the bottom, which is ½ in. thick and also dovetailed to the jaw and end pieces. Make all of the parts for the tail vise, then test their fit and action before glue-up.

Cut the mortise for the garter and tap it into place. You cannot avoid cutting into the dovetails when you make this mortise. Drill and square the dog hole in the jaw the same way as those in the benchtop. This hole should fit between the dovetails.

Use bed bolts to secure the end batten to the thick part of the benchtop. Make the small retainer bracket through which the narrow guide strip passes and screw it into place on the end batten.

The vise may work somewhat stiffly at first but will eventually wear in so that it moves smoothly and without effort. Waxing the moving surfaces will help the action.

I completed my bench by finishing it with several coats of boiled linseed oil thinned with a little turpentine. Let the wood absorb as much oil as possible before wiping off the excess. □

Mike Dunbar is a contributing editor. He and his wife, Sue, run a Windsor chair-making school in Hampton, N.H.

CONVERTIBLE SHOP

A small shop can't be all things at all times. Design it with adaptability in mind.

1. A roller, clamped to the bed of the jointer, which is placed close to the tablesaw, helps support wide stock for crosscutting.
2. To gain space in the center of the shop for assembly, the jointer may be moved.
3. The outfeed table wheels away to create a finishing area.
4. In preparation for spraying, a drop cloth is tossed over machines.
5. A wooden duct extension fits between the shopmade air cleaner and window frame to exhaust overspray.
6. The fine-particle filter has been replaced with a coarse furnace filter to capture finish before it blows outdoors.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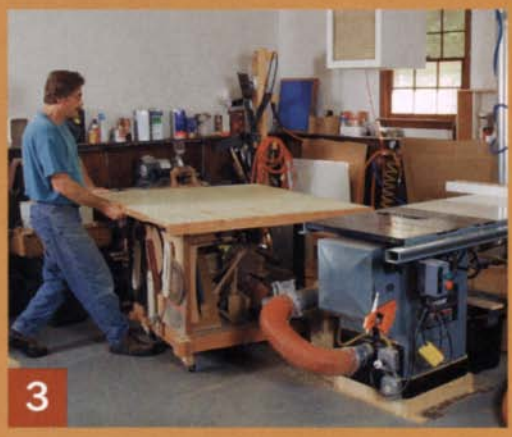

3


4

My first shop was an old garage nestled on a bank above Puget Sound near Seattle. It had an old plank floor with gaps wide enough to swallow small tools and hardware. For power I had one extension cord that snaked back to the house, and lighting was provided by an open garage door. I have fond memories of that shop, bundled up against the cold, working under natural light, hacking away and successfully cutting my first dovetail joint. I remind myself of those days when confronted by the limitations of my current shop, which by comparison is a dream.

My basement shop is only 20 ft. by 21 ft.—about the size of a two-car garage—but I've tackled projects as large as a run of kitchen cabinets. The secret to getting the most out of this small space is mobility. Almost everything rests on locking casters—machines, tables and shop-built tool chests.

Storage and organization are also vital in a small space. The area under every machine tool or bench is utilized for storage. Yes, it does get crowded when I undertake a large project. But I can reconfigure the space as needed for milling, assembling and finishing.

Layout for a small shop

Some tools are best left stationary. My tablesaw stays put because it's very bulky and heavy. And the dust collector must have a permanent home because of the metal ductwork attached to it. The rest of the shop was designed to work around these machines.

Machine tools, as well as benches, must be located where they can handle the largest piece of stock I am likely to use. And with a small dust collector, I have to keep duct runs to a minimum (for more on dust collection, see *FWW* #141, pp. 82-87). I try to keep most of the mobile tools parked where they can be put into service easily.

In a small shop, you'll often see the tablesaw angled. This orientation takes advantage of the room's diagonal dimensions. That's a good solution, but it typically means the saw reaches into the center of the room. When I have a large project going, such as a run of cabinets, I like having the center of the shop available for assembly. I orient the tablesaw parallel and close to the shop's longest wall, which leaves me with more than enough room to

Photos: Michael Pekovich

Basement Shop on Wheels

With mobile machines and tables, the shop can change shape as needed

BY ANATOLE BURKIN

5

6

cut a full sheet of plywood. The tablesaw's outfeed table is set on casters so that I can wheel it out of the way and use that space for spray finishing.

In a crowded space, adjoining tools can be set up to work with, not hinder, one another. Although I'd like to have a sliding table for my tablesaw, I haven't the space. But I use my 8-in. jointer, which is parked to the left of the saw, to assist with sheet goods. At a scrap metal yard I picked up a set of metal rollers from a conveyor assembly. I made a wooden frame for the roller that allows it to be clamped to the jointer bed and provides support when handling sheet goods. Total outlay was about $2.

The jointer-tablesaw pairing didn't work at first because the jointer fence was higher than the tabletop of the saw. Lowering the jointer seemed like a lot of work, so I raised the tablesaw on blocks. It turns out that the added height has made repetitive tasks, such as tenoning, much more comfortable for my 6-ft. frame.

Plenty of room for the chopsaw

Although the chopsaw is small, it's called upon to handle very long stock. Finding the perfect spot was a compromise. There isn't room for a dedicated chopsaw stand with 8-ft.-long wings on both sides, so I use my European-style workbench to serve as one wing. A piece of scrap laid across the table serves as a low-tech outfeed support. To the left of the chopsaw, I use another one of those scrap-yard conveyor rollers to make it easy to slide stock into place.

Chopsaws spray sawdust all over the place, and while I haven't totally solved the

Sawdust is captured by a box, which is connected to the dust collector. *A roller bolted to the left of the table provides stock support. The workbench (with the aid of a piece of scrap) provides support to the right of the chopsaw.*

problem, my method works okay. The key component is a capture box behind the saw to catch dust that's kicked back. A 5-in. port is added to the top of the box and connects to my dust-collection system. Additionally, I run a small hose from the saw's dust port (where the bag goes) and snake it a few inches into the 5-in. dust-collector hose. Whatever doesn't go up the hoses eventually settles into the capture box.

In a crowded space, adjoining tools can be set up to work with, not hinder, one another.

Thicknessing machines

I have more thicknessing machines than I really have a right to own, but I've figured out a way to keep them from being a nuisance. For taking a thin pass or thicknessing highly figured woods, nothing beats a portable thickness planer with rubber infeed and outfeed rollers. Bigger machines, such as my 15-in. thickness planer, are good for hogging off material, not delicate passes. And when it comes to removing tearout from highly figured woods or sanding shopmade veneer, I appreciate every penny I spent on my drum-style thickness sander.

Because I only use one of these tools at a time, I have one dust hose hanging from the ceiling to serve them all. To save space, I mounted the small planer piggyback on the larger one. Although the portable unit can be lifted off and placed on a bench, I typically just leave it in place and plane boards at chest height. Below the planer and sander I've installed shelving to store sanding belts and other tools.

A simple, functional router table

My router table has evolved over the years. It now features dust collection above and below, bit storage and a top large enough to hold a second router.

The dust collection might not meet the standards of John White's router cabinet (see pp. 55-61), but I'm happy with it. A large reducer (10 in. to 5 in.) is set into the base of the cabinet and connects to the dust collector. On top, the fence has a port for a 2½-in.-dia. hose. A pair of doors allows easy access to the router. The cabinet is set on wheels so that it can be moved to a corner when not in use.

Places to store tools

I have a small, simple tool rack near my workbench in which I keep chisels, handsaws, mallets and hammers. The workbench has two shelves to store all of the handplanes I own. Now that the shelves are full, I know I have enough of them.

Most other small tools are kept in mobile shop-built carts. One houses everything I

Machines to surface stock. *The 15-in. planer can remove stock quickly. The benchtop planer riding piggyback excels at taking light passes without leaving knife marks. And a drum sander (not shown) speeds up what most consider the least enjoyable part of woodworking.*

Traveling router cabinet. *Dust collection is provided below, via a 10-in. to 5-in. reducer, and above, via a 2½-in.-dia. hose connected to the fence. The table is big enough to add another router if needed.*

own for drilling and screwing. Most of the time it sits next to the drill press, but when I'm assembling parts, I roll the cart to where I'm working. The other cart contains measuring tools as well as all-around stuff, such as mechanic's wrenches and drivers. Both carts can also serve as stock carriers, for moving parts from one machine to another. (The mobile router table can also be used this way.)

The idea of putting all of my clamps in a trash can isn't new. But to keep the long pipe clamps from tipping over the can, I built a simple rack that is screwed into the can and keeps the clamps more or less upright. The can is mounted on a dolly, so I can move it around.

Low-cost electrics and pneumatics

I originally lit my shop using cheap shoplight fixtures that cost about $7 apiece, and that worked out to about a buck a year before they began failing. I recently swapped them with flush-mount fixtures of a higher quality that have electronic ballasts, which are quieter and turn on instantly. The fixtures also use T-8 bulbs, which are more energy efficient. I connected them using a plastic track system that is quite compact and easy to install. Most home centers sell these fixtures, and it's an inexpensive way for a nonelectrician to set up a very satisfactory lighting system. I spent about $250 for the five fixtures and hardware.

The shop did not have 240-volt power when I moved in. To keep down costs, I went with PVC conduit, installed on the rear outside wall of the house. Then I routed enough wire through the conduit to give me a gang of three 240-volt circuits. A 12-gauge extension cord, snaked along the main dust-collection duct, brings 240-volt power to the middle of the shop.

I find a lot of uses for compressed air: everything from pneumatic tools to clearing out dust from wood pores before spray finishing. I didn't want to go to the trouble of plumbing my shop, but at the same time I didn't want just one large coil of hose to drag from one part of the shop to the other. The solution is a three-in-one manifold and filter that allows me to provide clean, dry air to three locations both inexpensively and quickly. One long hose runs out to the garage. Another long one snakes along the ductwork and provides air to the opposite side of the shop. Near the compressor, a short run of hose provides air for spray finishing.

Storage and organization are vital in a small space. The area under every machine tool or bench is utilized for storage.

Spray finishing without a booth

I like to spray finish. You can't beat a spray gun for speed and the amount of control it brings to the task. But I don't have room for a spray booth. Nonetheless, I can spray in the shop without worrying about dust specks by using a two-pronged approach. First, I clean the shop before finishing. I'm not overly fussy about the cleanup except in the corner where I spray. Second, I use fast-drying finishes, such as water-based products or shellac. I don't spray slow-drying or highly flammable finishes.

Spray finishing also requires a method of removing the overspray. I installed a large industrial fan in a box made of medium-density fiberboard (MDF) and hung it in front of a window. When I spray, I open the window and press-fit an extension duct to the fan box, which helps direct the air outdoors without fouling the window casing. The fan box has a slot for a coarse furnace filter in front, which catches much of the finish before it reaches the fan. Without the extension duct in place, the fan doubles as an air cleaner. For that application, I use a fine-particle filter. (In warm weather, one could just flush the air outdoors.)

The tablesaw outfeed table doubles as my spray-finish bench for small objects. To keep it and the saw clean, I cover the entire setup with a large drop cloth. For larger pieces, I unclamp the outfeed table from the saw and roll it out of the way. And to keep finish off the walls and floor, I keep on hand large pieces of cardboard, such as those used to package appliances.

A shop is never done

I've been itching to get my hands on an old lathe but haven't found one yet. In the meantime, I've rearranged the shop in my head a number of times to make room for a newcomer. Try as I might, I'm not sure I can fit one more large tool in that space. Which leaves me thinking that maybe it's time to consider a freestanding building or moving to another location with the sort of shop space everyone craves: a large barn with a loft. I could get a few hundred bucks selling all of the used casters, enough to buy a nice, new handplane. But until then, I'll enjoy the space I have. □

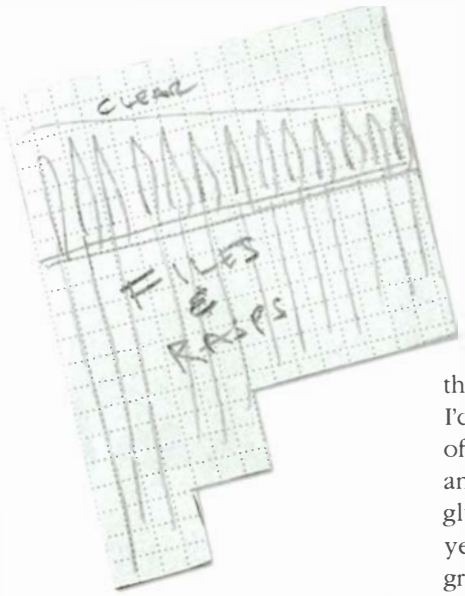
Anatole Burkin is the executive editor.

Clamps to go. *Stored in a metal trash can, clamps can be wheeled to the assembly area, then rolled into an out-of-the way corner when not needed.*

Tool-Cabinet Design

Every shop has specific needs, but the strategies for storing hand tools are universal

BY CHRIS BECKSVOORT



I built my toolboxes right when I got out of high school, with only the materials at hand, no thought to joinery and little thought to layout. So for years I'd worked out of boxes made of fir plywood and knotty pine and held together with nails, glue and barn hinges. Over the years, my tool collection had grown until I had planes, chisels and saws sitting on top of, next to and underneath the boxes. I needed a new toolbox.

Having 30 years' experience, I knew what I wanted and didn't want. Like most woodworkers, I'd developed habits and preferences. I am a furniture maker, not an itinerant carpenter. I don't take tools to job sites, and I'm definitely not going to sea. For my purposes a tool chest was useless. I didn't want to take out three trays to reach the fourth. Like a chest freezer, the items in the bottom get lost and forgotten. I wanted to see my tools and be able to reach them with a minimum of contortions and movement of other tools. I didn't want a rolling tool cabinet, nor did I want one that looks like a piece of furniture or a building. I wanted a wall-hung

Photos: Michael Pekovich

box behind my workbench: simple, accessible, open and totally utilitarian.

Your needs and preferences are likely to be different, but the process of planning and layout will be similar to what I went through when building the cabinet shown here. My point in this article is to help you through the planning process and layout. The actual dimensions and building decisions—such as materials and joinery—are yours to make as you see fit.

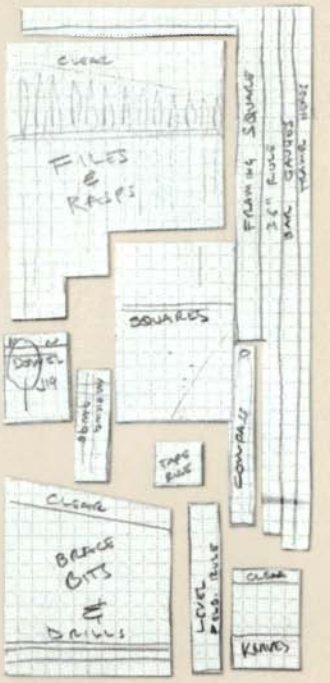
My design is based on a Shaker toolbox at Sabbathday Lake, Maine. It's a large, relatively shallow, wall-mounted box with framed doors for additional storage. With the design in mind, the first order of business was to determine the layout of the tools for the most efficient use of space and size. I could have placed my tools all over the shop floor and regrouped them until I found the most efficient layout. That would have been pretty time-consuming, so I opted for graph paper instead (¼ in. = 1 in.). When possible, I grouped the tools into a single cutout. Drill and brace bits fit into a 10-in. by 12-in. area, while my multitudes of chisels required a space 18 in. by 21 in. For the cutouts to be accurate, I had to start thinking about methods of hanging or storing the tools.

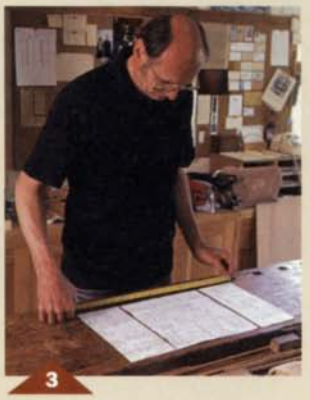
For example, if the chisels were to sit on a rail and be held with magnets, they could be removed straight out. However, if they were to fit in a slotted block, I would need 2 in. to 3 in. of clearance above the chisels

DRAW ALL OF YOUR TOOLS TO SCALE

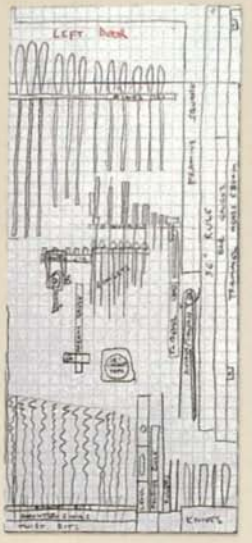
1 ***Measure the tools.*** *Begin by measuring all of the tools to be housed and draw them to scale on graph paper.*

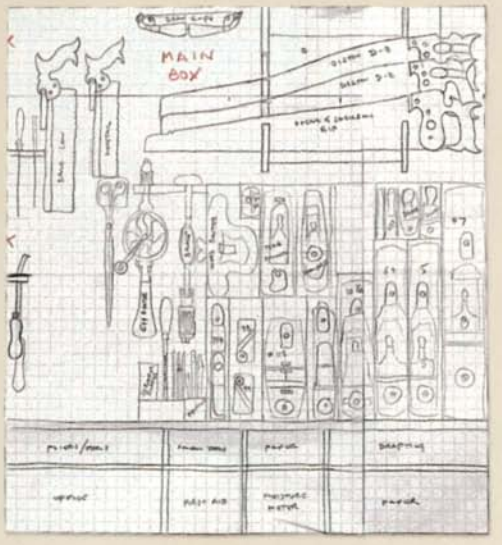
2 ***Arrange cutouts.*** *Sort tools by type and begin to lay them out in the imaginary toolbox.*

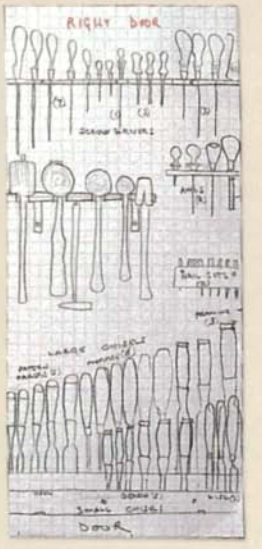




3 ***Determine the size of the box.*** *Once tools are laid out, overall dimensions are determined, and the box begins to take shape.*







so that I could remove them from the block. So the cutouts had to include clearance space above the tools, where needed.

It was pretty easy to group chisels, files, knives, squares and drill bits—even planes and most saws—together on the cutouts. However, some tools, such as the brace, drawknife, scissors, straightedge and framing square, needed individual cutouts. When designing the cabinet, you should consider saving room for tools you plan to get. Are you a chisel junkie? Would you really like to have that new Lie-Nielsen No. 10¼ rabbet plane? If so, make allowances in the chisel- or plane-group cutouts.

Once I had a little stack of odd-shaped, labeled pieces of graph paper, I started sliding them around to see how things fit. I kept related tools close to one another: chisels and mallets together, all saws and planes together and all of the diverse measuring and layout tools near each other. More shifting of patterns. I arranged the tools into a rough rectangular form and started visualizing the main box in the center, with the doors on both sides. Planes and saws, as well as other heavy, bulky tools, got moved into the main box. Layout tools, chisels, files, bits and shallow and lightweight tools fit best in the shallow doors.

At this point, overall size became a consideration. I had my tools arranged in an acceptable manner. The chisels, slated to go into the door, were the widest group at 21 in. So with a

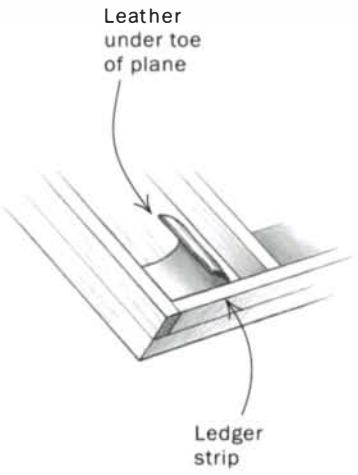
little fudging and two ¾-in.-thick frames, I made the doors 22 in. wide. That meant that the main box would be 44 in. wide and a whopping 88 in. overall when open.

The height was more difficult to pin down. From my layout, I had one door at 44 in. high, the other at 48 in. high and the box at 35 in. high. I wanted a few drawers at the bottom of the box for pliers, punches, glass cutters, papers, drafting supplies, moisture meter, carving tools and other little-used tools. The overall height of your cabinet will depend on your own height. The taller you are, the higher you can reach. I can easily reach 7 ft. into the toolbox. I also wanted 10 in. of clearance between the counter and the toolbox. With a little more fudging and rearranging, I settled on a height of 47 in. It accommodated the drawers and tools in both doors, was slightly taller than wide and seemed to allow for a bit more tool collecting.

Determining the depth of the box and the doors took a little work. Decisions needed to be made on how the tools would be stored. I also needed to visualize drawer depth and how far certain groups would stick out from the surface of the doors or box. The shelf for my small squares was only 7 in. wide but protruded 6 in. from the inside of the door. I estimated the drawer depth and the angle of the plane tray and settled on a box depth of 11 in. and a door depth of 4 in., both including ⅝-in.-thick panels.

It helped me to visualize in three dimensions, so I redrew the arrangement of the tools on three sheets of graph paper: the two doors and the main box, with all of the tools and drawers in place. I knew I wanted the drawers to be flush, with ½-in. protrusions for the pulls. So the bottom 10 in. of both doors needed to have ½ in. of clear-

HANDPLANES



Planes within easy reach. *Ledger strips locate planes on the shelf, and small pieces of leather are used to protect the blades.*

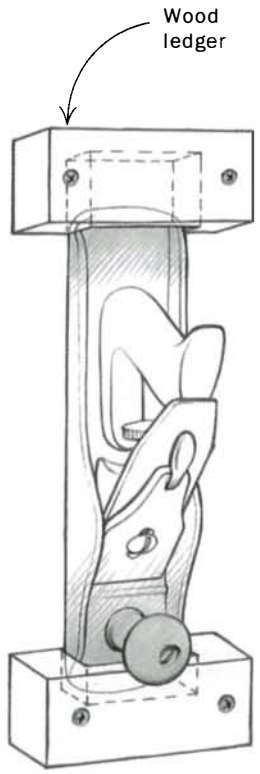
Planes take up a fair amount of space, no matter how you store them. But you have several options to make them accessible.

Believe it or not, many woodworkers like to hang planes vertically. A wooden plane can be fitted with a screw eye in the end and hung from a hook. For a metal plane, a fitted ledger strip will support the weight at the bottom. A similar strip with extra clearance is fitted at the top end. To remove, slide the plane upward (hence the clearance) until the nose comes out of the bottom ledger, pull the plane forward and down to clear the bottom and then the top ledger. Or you may opt for a fitted ledger on the bottom only and a high-power rare-earth magnet near the top. Of course, this won't work for wood or bronze planes.

To save space you can also store planes on their sides, on fitted shelves. With the judicious use of dividers, the planes can be fitted into the appropriately sized rectangular shelf case. Short planes will fit front to back, and longer ones go in sideways.

Fitting a tool. *Odd-shaped tools, such as this side rabbet plane, fit into french cutouts in the shelf.*

I chose to store my planes on an angled tray with small (½-in. by ⅝-in.) ledger strips between them. The tray is angled at 60° so that a strip in front of each plane is all that's needed to keep the tools in place. The tray is hinged at the top and has three shelves inside. I don't like to waste space, so I store seldom-used items in there: spare parts, blades and fences. The tray needs to be emptied to gain access, because the 17 planes stored on it probably weigh close to 40 lbs.



VERTICAL OPTION

Clearance in the top ledger allows you to lift up and remove the plane easily. The bottom ledger supports the plane.

Drawings: Michael Gellatly

ance. Above that, most of the interior of the box was empty, allowing mallet heads, squares and chisel handles to stick out into space.

Once I had a layout that worked well, I built the toolbox with drawers and doors. Then I made the tool racks and hangers. As I assembled the racks and actually hung the tools, I noticed that a few had to be shifted a bit to allow for easier access. A few items were moved once or twice, until they felt right in place. The first time I tried to close the doors, I discovered that they wouldn't. The compass plane stuck out right where the two door frames came together. I shifted the planes until I got the layout I liked, then screwed the dividers into place.

The layout took about 11 hours, and the case, doors and drawers took an additional 48 hours. The almost 40 racks, holders, shelves and trays took 60 hours, and the finishing, hanging, placing and rearranging took another 10 hours.

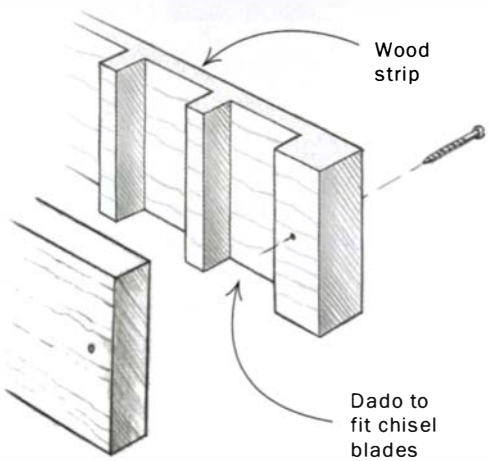
All things considered, the box turned out well. It works! Of course, it was months before I got used to the new arrangements. Thirty years of reaching for the tape measure on the right-hand door doesn't change overnight. A few of the lesser-used tools are, in fact, in out-of-the-way places. The gimlets, for example, live behind the hanging blades of the squares. But they are easy to reach, with good clearances.

Once I got everything placed and made the necessary changes, the cabinet became the centerpiece of the shop. And although the fine-tuning may still take a few more weeks, the time spent planning, laying out and anticipating paid off handsomely. □

Chris Becksvoort is a contributing editor.

CHISELS

Tiered chisels. *Inside the door, chisels are stored in dadoed strips to protect their cutting edges.*



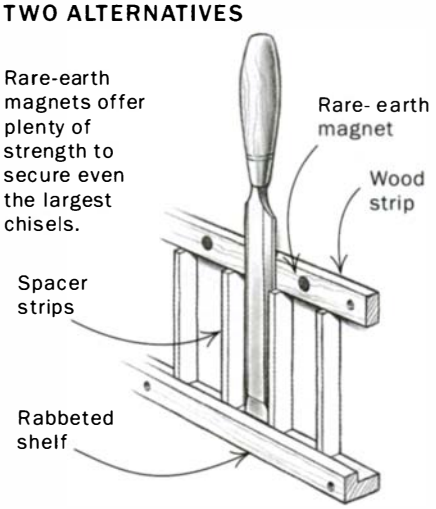
Chisel storage devices are easy and relatively quick to build. Chisels are all the same shape but different in width and thickness. Sets can be stored together, graduated from the shortest to the tallest. Here are three commonly used alternatives.

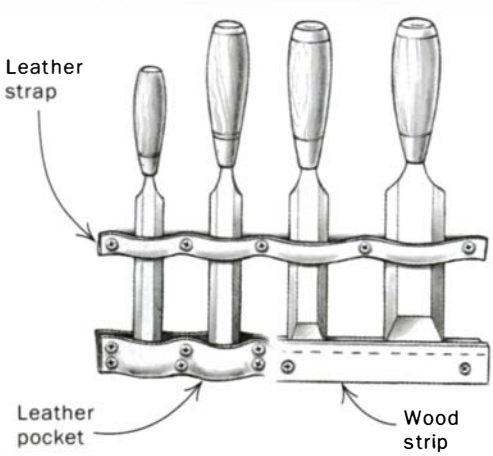
Many woodworkers hang their chisels, but I'm not in favor of this method. I don't like to have razor-sharp edges exposed to fingers or other nearby tools. My current favorite method for chisel holding is a wood strip dadoed to accept chisels of various widths. Vary the spacing between narrow chisels, to allow clearance for the handles. As the chisel blades become wider than the handles, the spaces get narrower. All chisel slots are a bit wider than the blades. A 1½-in. to 2-in. strip is all that's required to hold the chisels upright. That requires only 2 in. to 2½ in. of clearance over the tops of the chisels to pull them out.

Another option is to use a rabbeted wood shelf at the bottom to support and protect the blades. Vertical divider strips determine the spacing of the chisels. High-power rare-earth magnets hold the chisels upright and in place. The magnets will have to be drilled into a horizontal strip to allow clearance for the chisel handle against the panel.

In my previous toolbox I used leather straps to hold the chisels. They can be used above and below or with leather on top and a wood strip below.

TWO ALTERNATIVES





Leather straps will hold chisels in place, but a wood strip might last longer against the sharp edges.

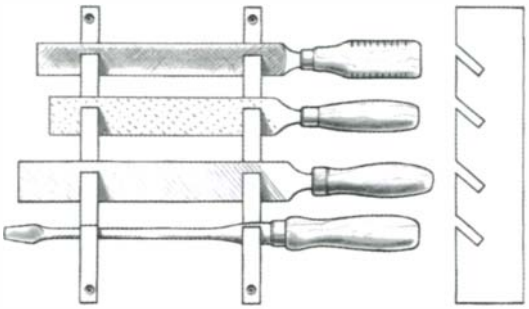
SCREWDRIVERS, FILES AND AWLS

Simple is often best. *Awls and screwdrivers rest in holes drilled into a small shelf.*

Screwdrivers, flies and awls can be stored like hammers. After all, they are nothing more than metal rods or bars stuck into wood handles.

My favorite method is to hang these tools. A ¾-in. by 2-in. strip of the correct length will suffice. Measure the ferrules or the base diameters of the tools, space them as needed and drill slightly oversized holes partway into the strip. Then locate the hole centers and saw a slot to the back of the hole. This yields a small shoulder on both sides of the cut, which supports the ferrule. The slot allows for easy removal. Simply lift the tool a mere ½ in.

Flies and screwdrivers with large flats on the upper shaft can be stored horizontally on racks or trees, consisting of two parallel uprights with 45° slots cut into them. Trees are merely uprights with holes drilled through the sides.



OPTION FOR HORIZONTAL STORAGE

A few passes over the tablesaw will make a quick horizontal storage rack.

Like chisels, screwdrivers and flies can be stored with leather retainer straps.

LAYOUT TOOLS

Layout and measuring tools are an odd bunch, because there are so many different individual shapes. A framing square can be hung by the short leg either on a 16-in.-long strip with a groove for the edge or on two small ledger blocks—one at the end and the other right at the inner corner. The ledger strips should have small lips.

Long rulers and straightedges are most easily hung from a round-head screw through a hole in the end. Remember to hang the ruler at least ⅜ in. proud of the surface or carve finger-relief holes to make grabbing the ruler easier. The same method can be used for story sticks, trammel heads on a beam and winding sticks.

Small squares can be stored in a variety of ways. The best-looking but most time-consuming method for any tool is the french cutout. Trace the tool onto an oversized board, then cut out the tracing with a coping saw. The tool can then be placed into its own custom-cut hole. Much faster and easier is to let the head of the square rest on a ledger strip, similar to the one used on the framing square. The method I prefer, especially with an assortment of squares, is to mount them on a 6-in.-deep shelf with slots in the front to accept the blades of each square.

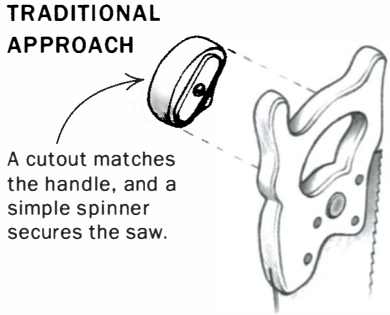
Shelved squares. *Becksvoort's squares slide into sawkerfs cut on a small shelf, which takes up much less space than laying them out flat.*

HANDSAWS

An aesthetic choice. *Becksvoort prefers to store saws so that their shapes and engravings can be seen.*

Handsaws are fairly easy to store. What method you choose depends on how many saws you have, how much space you have and whether you want to see the handles. The easiest method, which also takes up the most room, is to hang the saw flat, either vertically or horizontally. Make a cutout to fit exactly inside the handle hole and then screw it into place. A spinner can be added if you're worried about earthquakes or if the saw will be stored in the door of the tool cabinet. A saw can be hung horizontally from a peg, set onto a ledger or fitted to a shelf, as I did.

TRADITIONAL APPROACH



A cutout matches the handle, and a simple spinner secures the saw.

A Woodworker's Apron

Keeping essential tools within reach makes you a more efficient woodworker

BY STEVE LATTA

At the shop I apprenticed in, all of the cabinetmakers wore shop aprons. I soon figured out why, and my productivity took a giant leap forward. A lot less time got wasted chasing down misplaced tape measures, safety glasses, pencils and the other basic essentials. Because the tools I needed most often were within immediate reach, the quality of my work improved as well. Today, I still wear an apron, even when I'm teaching, and I advise students to do likewise.

The size of your shop, its tooling and the nature of your work will determine what tools find their way into your apron pockets. But for starters, I suggest stocking your apron with basic marking and measuring tools. I've chosen light, compact and high-quality measuring tools. Among my favorite brands are Starrett, Lufkin and Lee Valley. My students often balk at the prices of top-end tools, such as the $75 Starrett adjustable bevel. But if you're going to do accurate work and carry around this stuff all day, choose tools built to high tolerances that are light in weight and bulk. In the long haul, you'll be glad you did.

Tools aren't the only items that belong in a shop apron. A lot of cabinetwork involves boring small holes and fitting screws for hinges and hardware, usually #6 or #8 sizes. Many jigs may also be constructed with screws. So I keep bits, drivers and various screws on hand. Used prescription or film canisters make good storage devices for small items.

Years ago, I had a batch of five aprons custom made, because I

prefer flaps on the upper pockets, which keep out most sawdust (and small squares from falling in front of spinning tablesaw blades), and shoulder straps that crisscross in back, which, at the end of the day, prevent an aching neck. But the commercially made shop aprons, such as those sold by Duluth Trading Co. (800-505-8888) work well as long as you don't overload them. What you decide to carry around in your apron is ultimately an individual decision, but once you start wearing one, I think you'll find it a real timesaver. □

Steve Latta is an instructor at the Thaddeus Stevens College of Technology in Lancaster, Pa.

Photos: Anatole Burkin (this page); Erika Marks (facing page)

SAFETY GLASSES
Choose eyewear that offers plenty of protection to the sides as well as to the front.

ADJUSTABLE BEVEL
The Starrett #47 is compact and precise.

LAMINATE SCRAPS
These make perfect shims for fitting doors with just the right amount of reveal.

6-IN. RULER
Choose one with 1/64-in. graduations.

LUMBER CRAYONS
Use multiple colors to label stock for multiple runs.

FINGER PADS
These are great at protecting your fingers from heat buildup when using a card scraper.

STOP BLOCK
This shopmade block is hinged, which allows it to swing out of the way when making the first cut to square an end.

C-CLAMP
Use this small one primarily for clamping a stop block to a fence.

MAGNETIC BIT HOLDER WITH MULTIPLE TIPS
Phillips #1 and #2, a #2 square drive and a few slotted tips should cover most situations.

PARAFFIN WAX
A small chunk is good for lubricating such things as screw threads and miter-gauge slots.

TAPE MEASURE
Choose a good-quality 12-ft. or 16-ft. measure with a 3/4-in.-wide blade.

DRILL BITS
Keep small bits on hand to drill pilot holes for hardware and jigs. A small tube makes a practical storage container.

KNIFE
Cover with the cap when returning the knife to your apron.

14-in. Bandsaws Reviewed

Low-cost models might get the job done, but more power and better features come at a price

BY TOM BEGNAL AND JOHN WHITE

What we tested...

1 WHEEL ROUNDNESS

With the tires in, we checked all of the wheels for runout by mounting a dial indicator and measuring the blade as it passed over the wheel.

It's always an advantage to have versatility, which is probably why the bandsaw enjoys a prominent place in most woodworking shops. It rips, resaws, crosscuts and cuts curves. And when the table is tilted, it makes all kinds of angle cuts, too. Plus it can be used to cut tenons, dovetails and various other joints.

Bandsaws commonly range in size from 8-in. benchtops to 24-in. floor-mounted heavyweights. But for many small shops, the 14-in. size offers a good compromise. It has adequate size and power for most requirements, and it does not take up a lot of space. Plus, compared to most of its bigger siblings, a 14-in. saw is softer on the budget.

Almost a dozen 14-in. bandsaws are on the market, with prices that vary from about $300 to nearly $900. So the challenge is to find the one that suits your needs at a price that's affordable.

To help with the selection process, we tested nine popular 14-in. models: seven with cast-iron frames and two with European-style welded-steel frames. The cast-iron group included the Central Machinery 32206-1VGA (sold by Harbor Freight), Craftsman 22414 (sold by Sears), Delta 28-280, Grizzly G1019, Jet JWBS-14CS, Reliant DD90 (sold by Trendlines) and Ridgid BS1400 (sold by The Home Depot). The welded-steel look was provided by the General 90-100 M1 and Shop Fox G9970 (sold by Grizzly). A new 14-in. bandsaw from Laguna (800-234-1976) arrived too late to be included here. However, we plan to review it in an upcoming issue.

A number of things were considered as we evaluated the saws. First we checked the general quality of several important components. After that, we installed a blade in each one to see just how fussy that process is and to check out how well the related controls and adjustments work. And, finally, we got down to the nitty-gritty, putting the blade to wood and making a series of test cuts to see how well the saw could resaw stock and cut curves.

A BEVY OF BANDSAWS

With the nine most popular 14-in. bandsaws in our shop, each one was given a head-to-toe examination.

Once the saws were assembled, we immediately noticed that some appeared to be related. As it turned out, we had several pairs of twins, all fathered in the Republic of Taiwan. Only the Delta bandsaw is born and bred in the United States. We did notice, though, that even Delta has a touch of far-Eastern pedigree—its thrust bearings are made in China.

The Central Machinery and Reliant are closest to being identical; the only differences are that the Reliant does not have a dust port, and it has four speeds.

We also found the General and Shop Fox saws to be pretty close to being the same machine. The General has bigger hinges in the doors and a foam strip to help seal the doors from dust. And while both have a 1-hp motor, the motors are not identical.

From the stand on up, the Craftsman and Grizzly can also pass as twins. The main differences show up in the table and rip fence. And even though the motors are both ¾ hp, they are not the same ones. Also, there are some differences in the hardware used on the thrust-bearing and guide-block systems. All of the other above-the-stand parts appear to be interchangeable.

Good parts are a good start

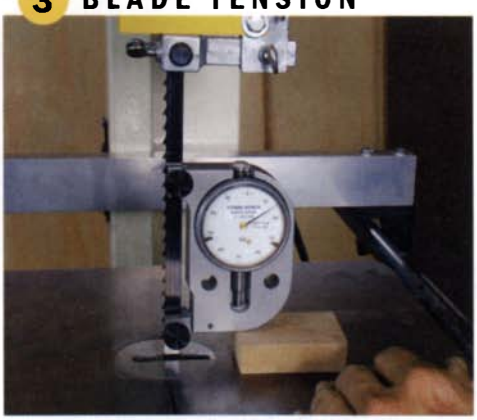
A bandsaw has hundreds of parts. All of them are important, but we spent a good deal of time looking closely at the parts we think can have the most impact on the quality of a saw. Results that can be quantified are listed in the chart (see p. 94).

Round wheels and tires run smoother—Just as an out-of-round automobile tire creates vibration as it spins, a bandsaw wheel that's not quite round is going to do the same thing. And it's hard to follow a line when cutting on a shaky bandsaw. A shaky wheel can have a couple of sources. The metal wheel itself can be

2 ALIGNMENT

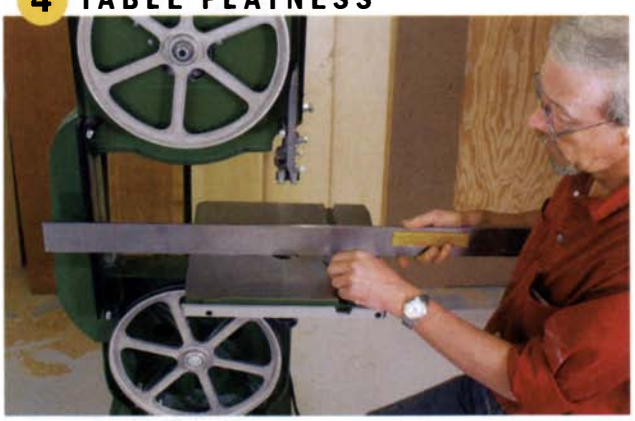
A long straightedge helped us find out if the wheels were in the same plane.

3 BLADE TENSION



A tension gauge was used to measure the tension on the blades when the scale on the saw was set to the ¾-in. mark.

4 TABLE FLATNESS



Using a straightedge and feeler gauge, we were able to check each of the tables for flatness.

Photos, except where noted: Tom Begnal; facing page (bandsaw): Erika Marks

out of round, or the tire that wraps around the wheel can be bumpy. But all of the machines fared well in this test.

Wheels should be aligned—For the blade of the bandsaw to track well, the wheels need to be in the same plane. A long straightedge is all that's needed to find out if that's the case. Simply place the straightedge against the outside of the bottom wheel, then use the blade-tracking knob to adjust the top wheel until it's parallel with the straightedge. Any gap between the straightedge and the upper wheel represents the amount that the wheels are misaligned in that plane.

When facing the front of the saw, if the extreme left and right edges of the top wheel don't align with the bottom wheel, the wheels are misaligned horizontally. If the very top and bottom edges of the wheels don't align, they are misaligned vertically.

Our test showed that the wheels on all of the saws aligned horizontally. However, only the Craftsman, Grizzly, Jet and Ridgid were dead-on vertically. Among the others, the General had the most misalignment by far, with the top wheel ½ in. in front of the bottom wheel.

Remarkably, we were still able to get a blade to track on the General. But it took some extra fussing. And once tracked, the teeth of the ½-in.-wide blade were at the very front of the tire on the bottom wheel, while at the top wheel, the back of the blade was almost to the back of the tire.

Telltale tension test—To cut properly, a bandsaw blade needs the proper tension. When cutting relatively thin wood or narrow stock, manufacturers of carbon-steel blades generally suggest a blade tension of around 8,000 psi. And when ripping thick stock or resawing wide boards, a tension of 15,000 psi is even better.

We decided to find out how many pounds per square inch (psi) actually get applied to a blade when the built-in tension scale on the saw is used as a guide to set the tension. We equipped each cast-iron bandsaw with an identical ½-in.-wide blade and raised the scale to the ¾-in. mark to provide maximum tension. Then we used a tension gauge to measure the actual tension on the blade.

The Ridgid stood out among the cast-iron saws, showing 15,000 psi on the gauge. At 7,000 psi, the Grizzly had the lowest tension.

One more point. The General and Shop Fox don't have a tension

...and how they did

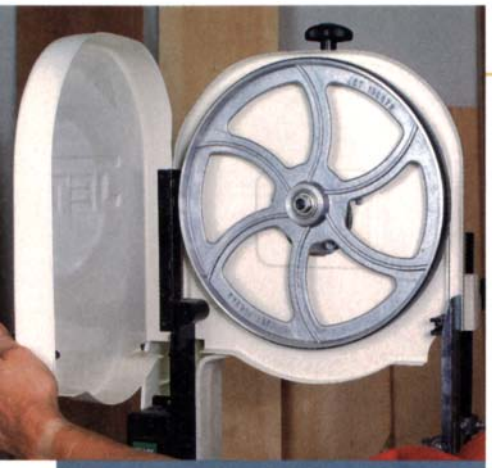
BRAND	WHEEL/TIRE RUNOUT	WHEEL MISALIGNMENT	TENSION AT ¾ IN.	TABLE FLATNESS
CENTRAL MACHINERY 32206-1VGA	Upper: 0.012 in. Lower: 0.004 in.	0.185 in.	8,000 psi	0.010 in. (dish)
CRAFTSMAN 22414	Upper: 0.012 in. Lower: 0.011 in.	0.000 in.	10,000 psi	0.003 in. (crown)
DELTA 28-280	Upper: 0.015 in. Lower: 0.011 in.	0.080 in.	10,000 psi	0.002 in. (dish)
GENERAL 90-100 M1	Upper: 0.007 in. Lower: 0.011 in.	0.500 in.	15,000 psi	0.010 in. (dish)
GRIZZLY G1019	Upper: 0.007 in. Lower: 0.010 in.	0.000 in.	7,000 psi	0.007 in. (crown)
JET JWBS-14CS	Upper: 0.004 in. Lower: 0.006 in.	0.000 in.	10,000 psi	0.016 in. (dish)
RELIANT DD90	Upper: 0.006 in. Lower: 0.007 in.	0.040 in.	11,000 psi	0.015 in. (dish)
RIDGID BS1400	Upper: 0.006 in. Lower: 0.013 in.	0.000 in.	15,000 psi	0.009 in. (dish)
SHOP FOX G9970	Upper: 0.008 in. Lower: 0.012 in.	0.150 in.	15,000 psi	0.006 in. (crown)

scale, so we used a tension gauge to see if they could reach 15,000 psi. Both did, with ease.

A flat table is a plus, but deflection is a minus—A well-machined cast-iron table on a 14-in. bandsaw should be reasonably close to flat. If it isn't, it can be difficult to square the blade or the fence to the table.

We used a dead-flat straightedge and a feeler gauge to check for any dips or crowns. Four checks were made on each table: two across the center (front to back and side to side) and one across each diagonal. All of the measurements fell within what we consider acceptable limits for a bandsaw table. The Delta was the flattest, showing a dish of only 0.002 in. The Craftsman also did well in this test, with a crown of only 0.003 in.

The table and trunnion on a bandsaw should be strong enough to support a heavy workpiece without any serious deflection. The Delta has by far the biggest trunnion and the only one made of cast iron. All of the other saws in the bunch have a trunnion made of cast aluminum.



Watch it on the web

Visit finewoodworking.com for tips on evaluating a bandsaw.

Wheel covers

Hinged wheel covers open like a door, making it easy to access the wheels. Covers held in place by threaded knobs are inconvenient.

Blade installation: blue sky or the blues

The dictionary definition of the word fussy could very easily read, "the start-to-finish process of installing a bandsaw blade." After all, there's no shortage of steps when it comes to mounting the blade. And most of those steps require careful adjustments.

We wanted to find out if any saws make the process faster or easier, which would be a big plus for anyone who changes blades regularly for different kinds of cuts. So to get a sense of the effort required, we removed the factory-supplied blade from each saw and replaced it with a new ½-in.-wide blade. Then we tensioned the blade and adjusted all of the thrust bearings and guide blocks.

Wheel covers—Most of these saws have hinged wheel covers that simply swing open when you pull on them. But the covers on the Central Machinery and Reliant saws aren't hinged. Instead, they are held in place with a pair of knobs that screw onto threaded studs. The hinged covers are clearly more convenient.

Tension knobs—All of the bandsaws have some sort of knob that's turned to add or remove blade tension. On most of the saws,

CENTRAL MACHINERY 32206-1VGA

(800) 444-3353

Street price: $300

Motor: 1 hp, 9 amps

Ripping capacity: 13½ in.

Resaw capacity: 6 in.

Table size: 13¾ in. square

Measured table tilt: 16° left, 52°right

Rip fence included: Yes

Riser-block option: Yes

This is the lowest-priced saw of the bunch and a near twin to the Reliant. The saw mustered only 8,000 psi in the tension test, but it produced acceptable resaw and curve cuts. When resawing, the motor bogged down when the stock was pushed too fast, a problem corrected by slowing the feed rate. The fence doesn't adjust for blade drift; the table insert is flimsy plastic. Yet, if price is a big issue, and you're only an occasional bandsaw user, it's worth considering.

CRAFTSMAN 22414

(800) 697-3277

Street price: $500

Motor: 1½ hp (max. developed), 10 amps

Ripping capacity: 13½ in.

Resaw capacity: 6¼ in.

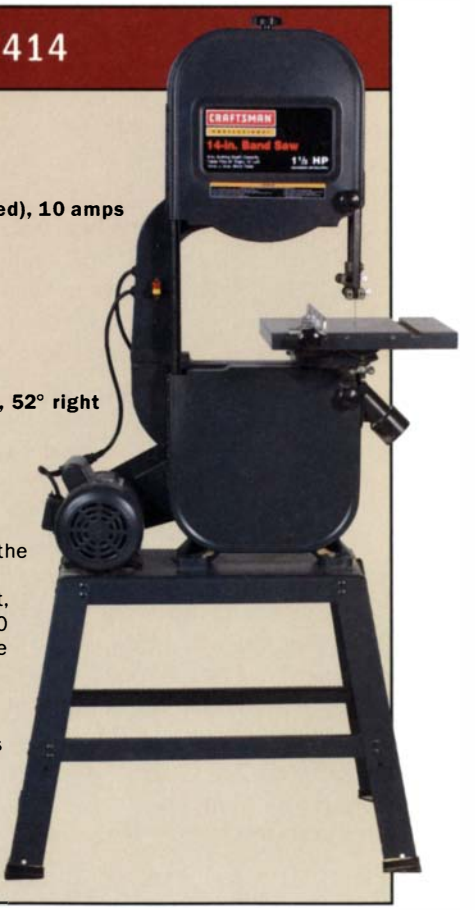
Table size: 14 in. square

Measured table tilt: 16° left, 52° right

Rip fence included: No

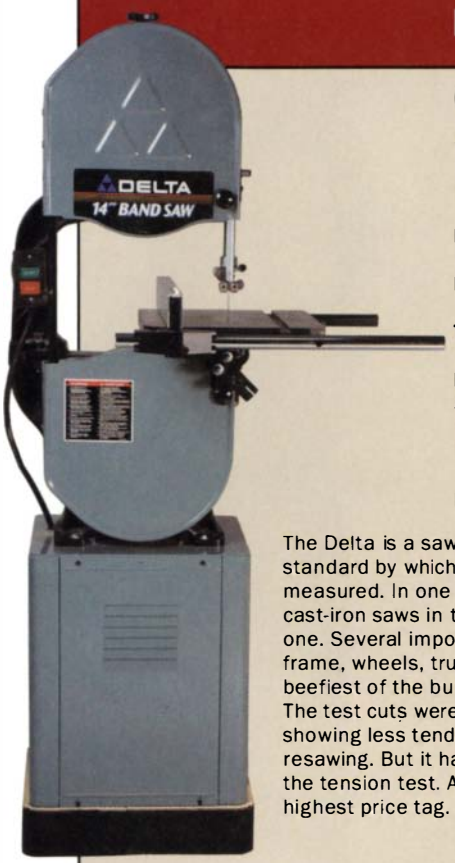
Riser-block option: No

This saw is a close cousin to the Grizzly, but it sells for almost 60% more. In the tension test, the Craftsman yielded 10,000 psi, slightly under the average of 11,225 psi. All of the test cuts were acceptable, but when resawing, the motor bogged down when stock was fed too fast. Its resaw capacity measured 6¼ in., best among all of the cast-iron saws. The fence can't be adjusted for drift.



Photos, this page (top and bottom right): Erika Marks

DELTA 28-280



(800) 438-2486

Street price: $850

Motor: 1 hp, 9.6 amps

Ripping capacity: 13⅝ in.

Resaw capacity: 6⅜ in.

Table size: 14 in. square

Measured table tilt: 9° left, 50° right

Rip fence included: No

Riser-block option: Yes

The Delta is a saw built for everyday use and the standard by which all other 14-in. bandsaws are measured. In one form or another, all of the cast-iron saws in this review are clones of this one. Several important parts, including the frame, wheels, trunnion and table, are the beefiest of the bunch. The fence is our favorite. The test cuts were acceptable, with the motor showing less tendency to bog down when resawing. But it had a below-average score on the tension test. And it carries, by far, the highest price tag.

GENERAL 90-100 M1

(819) 472-1161

Street price: $540

Motor: 1 hp, 11 amps

Ripping capacity: 13⅝ in.

Resaw capacity: 7³⁄₁₆ in.

Table size: 13¾ in. square

Measured table tilt: 10° left, 50° right

Rip fence included: Yes

Riser-block option: No

The General is a twin of the Shop Fox. The 15,000 psi of tension it applied to the blade was matched only by its twin (neither has a built-in tension gauge). It tied for the highest resaw capacity. Test cuts were acceptable but required a slightly slower feed rate when resawing. It has a decent fence, but blade-drift adjustment is limited. Vertical alignment of the wheels was poor, and the guide bar and attached thrust-bearing deflected easily when pushed front to back.

the knob extends above the top of the saw, making it easier to fully grab and turn. The knobs on the Central Machinery, Grizzly and Reliant are harder to use because they're positioned below the top. The General and Shop Fox have big, easy-to-grab knobs that are by far the easiest to work with.

Upper and lower thrust bearings—During a cut, a pair of thrust bearings—one above the table and one below—support the back of the blade, helping to counteract any front-to-back deflection. When properly adjusted, the bearings are positioned so that there's a gap of a few thousandths of an inch between the bearings and the back of the blade. Each bearing mounts to the end of a horizontal sleeve. This sleeve moves front to back, allowing the gap to be adjusted. And once it's set just right, the sleeve is secured in place with a locking screw.

Four of the saws; the Ridgid, Jet, Delta and Craftsman, use a threaded metal-knob arrangement to move the sleeve. To direct the sleeve in or out, simply turn the knob. The manufacturers like to refer to this knob arrangement as a micro-adjust system, and while that might be a loose interpretation of what it does, they all prove helpful to some degree.

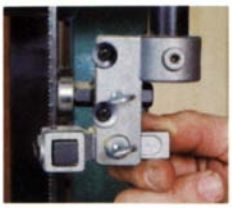
The Central Machinery, General, Grizzly, Reliant and Shop Fox machines don't provide a mechanism to adjust the sleeve. Instead, you push or pull on the end of the sleeve as needed to create the gap. It's easier to do than you might think, although it does take somewhat of a delicate touch. The push-pull versions are less desirable than the micro-adjust mechanisms.

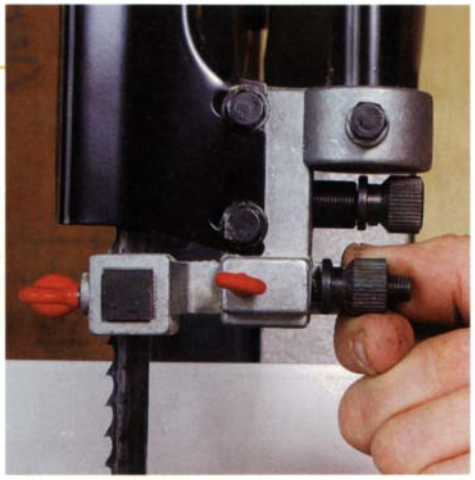
Upper and lower guide blocks—To prevent the blade from twisting, particularly during curved cuts, a bandsaw incorporates two pairs of guide blocks—one mounted above the table and the other below. Each pair sandwiches the blade. The guide blocks should be positioned a few thousandths of an inch away from the blade. And to prevent the blocks from damaging the blade, they need to be positioned 1/32 in. or so behind the gullets of the teeth.

Tension knobs

A tension knob that extends above the saw (left) is easier to grip than a knob that doesn't (above). A small point, perhaps, but one your knuckles will appreciate.

Guides





Some thrust bearings and guide blocks are adjusted by pushing or pulling a sleeve (above). We preferred the micro-adjust systems (right).

The guide blocks mount to a support bracket that can slide front to back, allowing the guide blocks to be positioned relative to the blade. Again, the Ridgid, Jet, Delta and Craftsman use a micro-adjust system. And all of the locking hardware is the same.

The guide-block screws seem like the perfect place to incorporate the convenience of a thumbscrew head, but several of these saws use an Allen head. Only the Central Machinery, Jet, Reliant, Ridgid and Shop Fox make things a little easier with a thumbscrew.

The Delta incorporates a unique system designed to elevate the position of the lower guide blocks so that they're closer to the underside of the table. Having the lower guide blocks closer to the upper guide blocks gives the blade better support. That should be helpful when cutting curves, which tend to twist the blade. But because the guide blocks on the underside of the table are angled, it becomes an extrafussy job to set them.

Blade-changing champ—All things considered, when it came to the ease of changing a blade, we gave the Jet and Ridgid saws the best scores. The wheel covers are hinged. They have micro-adjust systems both above and below the table. And all of the locking screws are thumbscrews, so there's no need to find and fiddle with Allen or adjustable wrenches. And a wing nut makes it easy to lock the blade-tracking knob in place.

Factor in the fences

If you plan to do heavy ripping or resawing, a good, sturdy fence is going to make things easier. But a fence is not a standard accessory on all saws. Check the individual specs to find out if a fence comes with your saw or if it must be bought separately.

Our favorite fence among this group turned out to be Delta's. The fence locked securely, thanks in part to a large threaded knob. Stock can be run off both faces. But we liked it because it was the only fence that offered plenty of adjustment for blade drift—the tendency for a bandsaw blade to wander off a straight line.

How do they cut?

Once we had a new blade installed in each saw, we were ready to do some test cuts. The test was divided into two parts: resawing and curve cutting.

Resawing—To level the field, we put identical blades in each saw (Promaster I, a 0.025-in.-thick, ½-in.-wide, 3-tpi, hook-tooth, car-

GRIZZLY G1019

(800) 523-4777

Street price: $315

Motor: ¾ hp, 12 amps

Ripping capacity: 13½ in.

Resaw capacity: 6⅛ in.

Table size: 14¼ in. square

Measured table tilt: 16° left, 52° right

Rip fence included: Yes

Riser-block option: Yes

The Grizzly is a close cousin of the moderately priced Craftsman, yet it sells for only a few bucks more than the low-cost Central Machinery. Wheels aligned perfectly. And although the blade-tension maxed out at 7,000 psi, the lowest value, the saw cut acceptably in the cutting test. When resawing, however, the motor quickly bogged down when stock was fed too fast. The fence can't be adjusted for blade drift.

JET JWBS-14CS

(800) 274-6848

Street price: $580

Motor: 1 hp, 10 amps

Ripping capacity: 13½ in.

Resaw capacity: 6 in.

Table size: 15⅛ in. square

Measured table tilt: 14° left, 50° right

Rip fence included: No

Riser-block option: Yes

The Jet, along with the Ridgid, ranked first in blade-changing ease. Its fit and finish were second only to the Delta. The wheels aligned perfectly. And the fence would have been an easy favorite had it allowed for more blade-drift adjustment. It cut acceptably during the cutting test. During the resaw test, when compared to all but the Delta, the Jet motor had less of a tendency to bog down. Also, it's beefier than any saws in the test, except for the Delta.

Photos, facing page (top right and left) and this page (top and bottom right): Erika Marks

RELIANT DD90

(888) 234-8665

Street price: $350

Motor: 1 hp, 9 amps

Ripping capacity: 13½ in.

Resaw capacity: 5 13/16 in.

Table size: 13¾ in. square

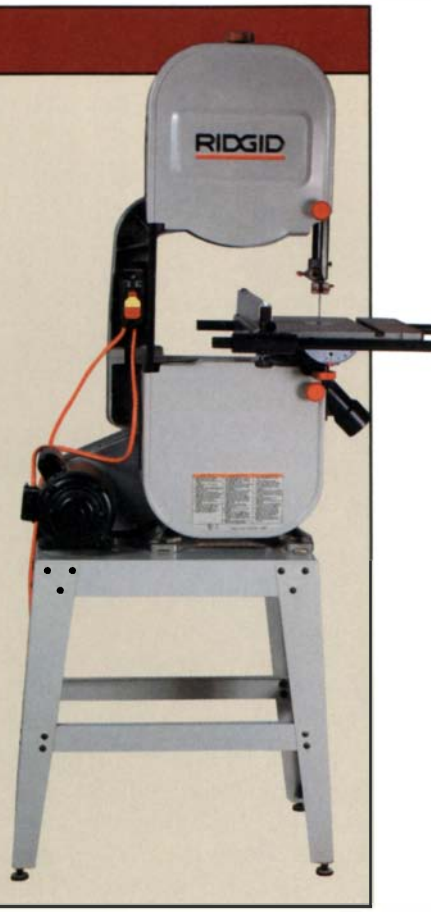
Measured table tilt: 16° left, 52° right

Rip fence included: No

Riser-block option: Yes

One of the lowest-priced saws and a near twin to the Central Machinery, the Reliant is the only saw in the test with four speeds, a plus for metal cutting. It made acceptable resaw and curve cuts. But while resawing, the motor quickly bogged down when the stock was pushed too fast, a problem corrected by slowing the feed rate slightly. The fence doesn't adjust for blade drift; the table insert is a piece of flimsy plastic. There's no dust port. Yet, if price is a big consideration, and you're only an occasional bandsaw user, the Reliant is worth considering.

RIDGID BS1400



(800) 474-3443

Street price: $500

Motor: ¾ hp, 10 amps

Ripping capacity: 13½ in.

Resaw capacity: 5 15/16 in.

Table size: 14 in. square

Measured table tilt: 16° left, 50° right

Rip fence included: No

Riser-block option: Yes

All things considered, this saw was the best value of the bunch. It tied with the Jet for the highest marks when it came to ease of blade changing. The wheels aligned perfectly. It was the only cast-iron saw that could be tensioned to 15,000 psi, and the fit and finish almost matched that of the Delta and Jet. It made acceptable cuts and has a decent fence, but blade-drift adjustment is limited.

bon-steel blade made by Lennox). Each blade was tensioned to 7,000 psi, which is the maximum tension of the Grizzly.

Because we wanted to focus only on the cutting capabilities of the saws, we set aside the factory-made rip fences and used our own shopmade fence for all of the cuts. Our cutting blanks were 36-in. lengths of 1½-in.-thick by 6-in.-wide soft maple.

Before cutting, we made sure the blade and fence were square to the table. Then we adjusted the fence to account for blade drift. The fence was positioned to make a ¼-in.-wide cut. And the upper guide blocks were set ⅛ in. above the top edge of the blank.

We had several things to consider. We looked at how quickly we could feed the stock before the motor bogged down. And after the board was cut, we checked the resawn piece to find out if the top and bottom edges maintained the ¼-in. thickness from one end to the other. We also looked at the general smoothness of cut.

We were pleasantly surprised to see how well each of the saws performed. Every cut was reasonably smooth, requiring only a light pass with a thickness planer to clean up the blade marks. The top and bottom edges held the ¼-in. thickness from one end to the other. And there wasn't any evidence of a bowed cut that sometimes results when resawing a board.

The main differences were related to feed rate, but even those were reasonably close. The Delta cut slightly faster than the others, roughly 30 in. per minute, or about ½ in. per second. The other saws tended to be a little slower, closer to 20 in. per minute.

When we fed the blank too quickly, most of the saws tended to slow for a few moments before bogging down completely. Those moments gave us time to slow the feed rate to avoid stalling the motor. However, the Central Machinery and the Reliant saws tended to stall without warning the instant we pushed too fast.

Some saws offer a riser block as an option. This block installs between the end of the post and the lower body of the saw, effectively adding about 6 in. of resaw capacity.

Cutting curves—To test the curve-cutting capabilities of each saw, we switched to a narrower blade. Again, to level the playing field, we installed new, identical blades in the saws (Promaster I, 0.025-in.-thick, 3/16-in.-wide, 10-tpi carbon-steel blades made by Lennox). Then each blade was tensioned to 7,000 psi. The cutting blanks were 6-in. squares of 1¼-in.-thick soft maple.

We cut two tight serpentine curves across each blank: one paral-

Fences

Our favorite rip fence was on the Delta saw, the only one that allowed plenty of adjustment for blade drift. The fence is sold as an accessory for $100.

lel to the grain and one across the grain. Then we cut a disc to 1½ in. dia., about the smallest cutting diameter recommended for the blade. We also looked at the general smoothness of cut.

When the tests were completed, we were once again surprised at how well all of the saws performed. All of them handled the cuts with little effort. And none showed any inclination to bog down.

Picks of the litter

Selecting the "best" tool in this review was not a black-and-white decision. When all of these saws were properly set up with a sharp blade, they handled the resaw and curve-cutting tests without serious problems. So before we could choose any favorites, we had to look at additional things, such as cost, quality of parts and ease of blade changing. Once those factors were added to the decision-making equation, the choices became clearer.

At around $300 each, the Central Machinery and Reliant are the lowest-priced saws in the group—roughly a third less than the average price of $496. If your budget is tight, and you expect to run a bandsaw for only a few hours each year, these saws are worth considering. But compared to the other saws tested, the Central Machinery and Reliant required more time to change a blade. In the resaw test, we had to feed the stock a bit slower to keep these saws from bogging down. And as soon as the stock was fed too hard, they tended to stall without warning.

Resawing

Using 6-in.-wide hardwood blanks, each saw was given a resaw test.

The two welded-steel saws, the General and Shop Fox, were unmatched when it came to applying blade tension. We were able to apply 15,000 psi to the ½-in.-wide blade with tension to spare. And the big handle made it easy to crank up the tension, although there's no built-in tensioning scale to help you. The wheels on the General were a full ½ in. out of alignment, by far the most, and that made blade tracking a challenge. The feed rate on these saws was slightly slower. At $550, they're about 10% above the average price of all of the saws in this review.

As mentioned earlier, above the stand, the Craftsman and Grizzly saws are similar. The Craftsman stand is open, and the Grizzly stand is closed. Both models have ¾-hp motors. The Craftsman did better on the tension test (10,000 psi vs. 7,000 psi for the Grizzly), but we couldn't relate that to differences in the two designs. Both of these saws had perfect wheel alignment. But the Craftsman sells for $500; the Grizzly sells for $315. So as we see it, choosing between the two is a no-brainer—the Grizzly gets you pretty much the same saw as the Craftsman for about 35% less.

SHOP FOX G9970

(800) 523-4777

Street price: $550

Motor: 1 hp, 15 amps

Ripping capacity: 13¾ in.

Resaw capacity: 7 1/16 in.

Table size: 13¾ in. square

Measured table tilt: 10° left, 50° right

Rip fence included: Yes

Riser-block option: No

The Shop Fox is a twin of the General. The 15,000 psi of tension it applied to the blade was matched only by its twin (although neither has a built-in tension gauge). It tied for the highest resaw capacity. Test cuts were acceptable but required a slightly slower feed rate when resawing. It has a decent fence, but blade-drift adjustment is limited. The guide bar and attached thrust bearing deflected easily when pushed front to back, which could cause the blade to twist.

When it came to blade changing, the Jet JWBS-14CS was a half step ahead of the Craftsman and Grizzly. Plus, it has a 1-hp motor. We were able to resaw slightly faster than we could with the other ¾-hp models. And it had a better fit and finish than most of the other cast-iron models. But at $580, it's about 16% above the average price in this group and more than 80% higher than the Grizzly. A little extra speed and convenience come at a price.

The Jet JWBS-14OS (not shown) is the same as the JWBS-14CS, except it has an open stand and a smaller motor (¾ hp, 8 amp). The JWBS-14OS sells for around $530.

The Ridgid saw got the highest marks when it came to changing blades, and it allowed us to tension the blade to 15,000 psi. The wheels aligned dead on. And the fit and finish almost matched that of the Jet. Plus it comes with a lifetime guarantee. At $500, this machine is a good value.

The Delta 28-280 was clearly the beefiest saw we tested. And we rated the general fit and finish as excellent. It's the only one with a cast-iron trunnion. The wheels have nine spokes, more than all of the other saws. The lower wheel bearings are bigger by far than any other. This saw cut slightly faster than the rest and didn't bog down as easily. Anyone planning to use a bandsaw almost every day should give this one a good look.

If the hefty price tag of the Delta 28-280 is a budget-buster, take a look at its model 28-275 (not shown). For $600, the 28-275 gets you the same saw as the 28-280, except for an open stand and a smaller motor (¾ hp, 9 amp). Unless you're resawing wide stock every day, we think the 28-275 is the best value of the two. □

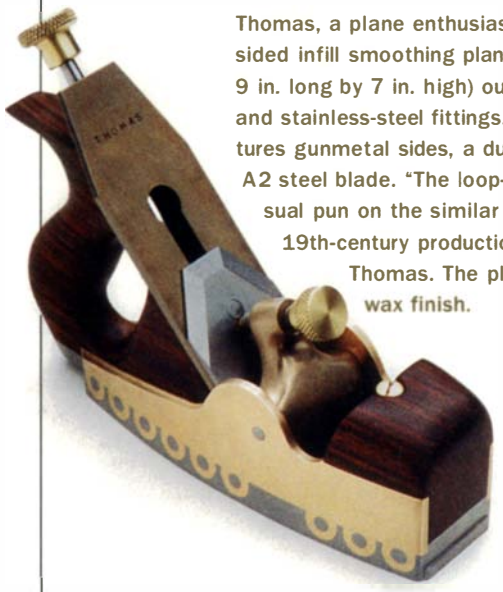
Tom Begnal is an associate editor. John White is a contributing editor.

Photos, facing page (top left and right) and this page (right): Erika Marks

Current Work

Current Work provides design inspiration by showcasing the work of our readers. For our first annual Tools & Shops issue, we asked readers to submit their most accomplished handmade tools. For more details and an entry form, visit our web site: finewoodworking.com. Send photos and entry forms to Current Work, *Fine Woodworking*, 63 S. Main St., Newtown, CT 06470.

Stephen M. Thomas Elmira, N.Y.



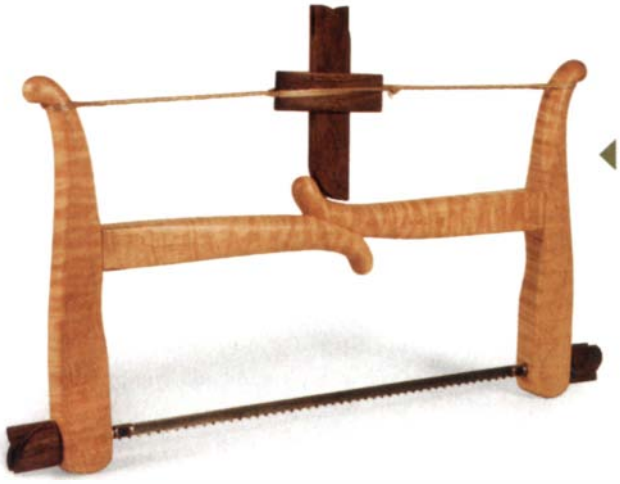
Thomas, a plane enthusiast, made this round-sided infill smoothing plane (2½ in. wide by 9 in. long by 7 in. high) out of cocobolo, brass and stainless-steel fittings. The plane also features gunmetal sides, a ductile-iron sole and an A2 steel blade. "The loop-and-pin joint is a visual pun on the similar joinery used in late 19th-century production-drawer joints," said Thomas. The plane has an oil and wax finish.

Dan Beyer Seattle, Wash.

Beyer made this toolbox (15 in. deep by 36 in. wide by 18 in. tall) as one of his final projects for a course he took at Seattle Central Community College's Wood Construction Center. Though the entire piece is built out of 35 species of tropical woods from Africa, Asia and South America, the box itself was constructed of jatoba plywood. The inside of the lid is Japanese ash, and zebrawood was used extensively for the corner posts and tool holders. Burl edge-banding and a combination of hand-crafted and commercial inlay provide additional decorative elements. It was hand-finished using four coats of Sam Maloof's Poly/Oil recipe.

Louis Yelgin Merrimack, N.H.

Yelgin crafted these three planes over a two-year period. The chisel plane in the middle (1⅝ in. wide by 6½ in. long by 2½ in. high) is constructed of Queensland ironwood, brass and steel. The English thumb plane on the left (1⅝ in. wide by 5⅛ in. long by 2½ in. high) and the English shoulder plane on the right (1⅜ in. wide by 8 in. long by 2¾ in. high) are both made from rosewood, bronze and steel. All three planes have a buff finish on the metal and an oil finish on the wood.



Jamie Yagee West Jordan, Utah

After reading Sandor Nagyszalanczy's *The Art of Fine Tools* (The Taunton Press, 1998), Yagee was inspired to create a tool with an artistic and sculptural emphasis. Made entirely with hand tools, this bowsaw (1¼ in. thick by 16 in. long by 10 in. high) is made of curly maple and walnut, and the finish is a hand-rubbed tung oil.

Brandon Pierce St. Joseph, Mich.

Pierce, a just-turned professional woodworker, built this workbench (25 in. deep by 95 in. wide by 35 in. tall) as his third woodworking project. Made of purpleheart, it weighs 450 lbs., and "it does not move, even under aggressive planing." Working sporadically, it took Pierce approximately three years to complete. The bench has a Watco oil and wax finish.

Paul Hamler Snellville, Ga.

Hamler embarked on a major undertaking in 1999 when he made five full-scale reproductions of the John Mosely plow plane. The original is a one-of-a-kind plane, which is thought to have been built for the Paris 1855 World's Fair. The plane's history is unique because it was lost for many years, rediscovered in 1980 hidden in a workbench of an English tool company and then stolen a few years later. To date, the Mosely plow plane has not been recovered. This reproduction (8½ in. wide by 8½ in. long by 4½ in. high), duplicated from photographs alone, is made of pre-ban ivory and sterling silver and decorated with scrimshaw.

Wayne Anderson
Elk River, Minn.

Having made a few tools—saw and chisel handles mostly—one day Anderson read about Bill Carter, a British plane maker, and it occurred to him that he should try making a handplane. This miter plane (1½ in. wide by 6 in. long by 2 in. high) is constructed of walnut burl, brass and steel. It took Anderson approximately 30 hours to complete.

Matt Morian Jasper, Texas

A woodworker and antique-tool collector, Morian, after viewing many antique gauges, set out to build this panel gauge. Made of curly maple with pink ivory knobs, the gauge (9 in. wide by 28 in. long by 3 in. high) features a scratch point that can also be threaded under the headstock to form an adjustable beam compass. It has a lacquer and wax finish.

James S. Leamy
East Earl, Pa.

An avid collector and student of antique planes for the last 20 years, Leamy started to make wooden planes based on originals that he could never afford or find. This rosewood double-bevel plane (7 in. wide by 13 in. long by 6 in. high) is an exact reproduction of a rare plane made by Marcus B. Tidey in 1854. Secondary materials used in the plane's construction include ivory, brass and steel. The finish is varnish.

Chris Gochnour Salt Lake City, Utah

Gochnour, a devoted user of handplanes of all types and author of "Low-Angle Block Planes" (pp. 40-47), makes many of his own planes because finding antique ones can prove challenging. Built to his own specifications based on an 18th-century original, this panel-raising plane (2½ in. wide by 14 in. long by 5 in. high) is constructed of cherry, lignum vitae and steel. The plane has a padded shellac finish.

Brian Buckner
Tallahassee, Fla.

Buckner enjoys not only making furniture but also building a wide range of hand tools. This pair of bowsaws is based on an English design. The larger saw (⅞ in. thick by 28 in. long by 18 in. high) is made of curly maple with pear knobs, toggle and stretcher. The smaller version (⅞ in. thick by 16 in. long by 11 in. high), which uses standard coping-saw blades, is made of kingwood with oak burl knobs. Both saws were finished with shellac.

Robert A. Schultz
Appleton, Wis.

Based loosely on plans by Stephen Thomas and rough castings from the St. James Bay Tool Co., Schultz teamed up with his brother John, a machinist, to make a pair of infill smoothing planes with adjustable throat and differential screw blade adjustment, which would equal or the surpass the Norris. Their planes (2⅞ in. wide by 9¾ in. long by 6½ in. high) have silicon bronze bodies and use iron, steel and brass fittings, as well as maple burl and cocobolo. The wood handles and infills were finished with oil.

Ed Gladney San Diego, Calif.

Gladney made this tool tote and four handplanes for several classes he was attending at Palomar College. The tote (10 in. wide by 24 in. long by 18 in. high) is made of cherry and maple and features a pull-out drawer. The cocobolo jointer plane is 26 in. long with a homemade 2⅜-in.-wide blade and chip iron. The side rabbet plane has a 1-in.-wide cherry body, with a ⅛-in.-thick cocobolo sole. The jack plane is made of cocobolo and has a 2-in.-wide Hock blade. The small smoothing plane is made of cherry and has a cocobolo sole. All four planes and the tote were finished with oil and wax.
Photo by Archie Breeden

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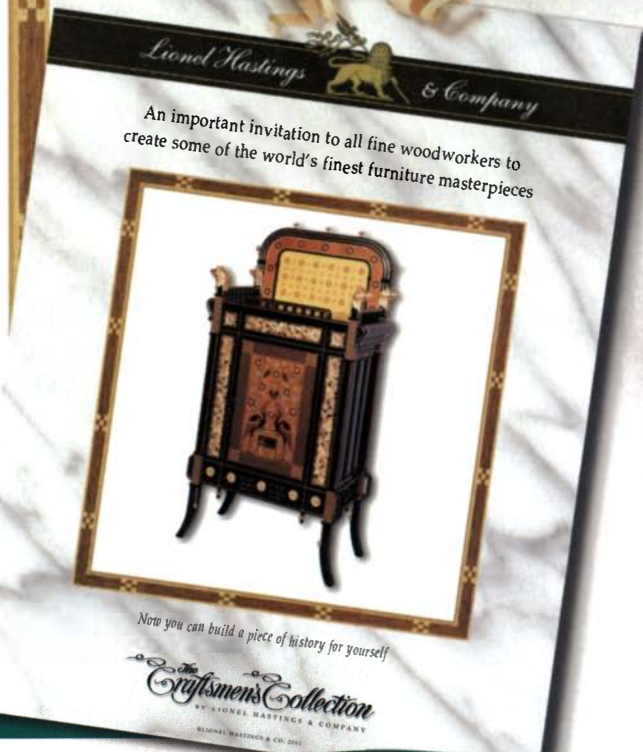

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Rules of Thumb

BY ASA CHRISTIANA

Making your own tools

In our travels as *Fine Woodworking* editors, we look over the shoulders of some of the country's best woodworkers. It's one of the reasons why a lot of us took the job. In these working shops, we see which techniques are truly useful and which are a waste of time. The same goes for tools.

Accomplished woodworkers tend to go beyond the tools available in stores and catalogs and simply make or adapt their own. Near almost every benchtop, from Connecticut to Kentucky to California, I find an assortment of shopmade hand tools. Next to gleaming sets of finely manufactured chisels, handplanes and layout tools, there usually is a small row of makeshift implements, from chisels shaped for a specific task to marking and whittling knives, layout jigs and other assorted gizmos.

While these handmade tools usually don't represent the height of the toolmaker's art—most would look more at home under a mattress on Riker's Island—their edges are razor sharp, and their sometimes crude handles show signs of constant use.

Sometimes it's simply quicker and easier to find a bit of steel in your shop and create what you need than it is to hunt down the item in a catalog and wait for it to arrive. Certainly it's cheaper. Other times the specialty tool you need simply doesn't exist in today's marketplace.

The ability to imagine and create your own tools when necessary is a matter of confidence and knowing a few metalworking basics (Rules of Thumb, *FWW* #151, pp. 100, 102). When you learn what you can do with a bench grinder, for instance, new tool will ideas follow.

Finally, we all enjoy creating furniture and other woodwork, and making the tools to do so just takes that sense of creativity and self-reliance one step further.

Edmundson's "convict line"

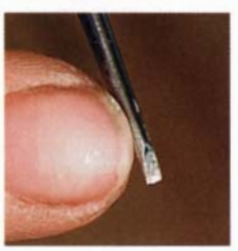
Mark Edmundson, a custom furniture maker in northern Idaho, calls his set of marking knives and specialty chisels his "convict line." Time is money, so the emphasis is on utility over beauty. He made his favorite marking knife from a dull planer blade, first removing the sharp edge with a belt sander, then grinding a sharp bevel on one end and wrapping blue tape around the other end to protect his hand.

Planer and jointer knives make good stock for shopmade tools, because they are high-speed steel and don't need to be hardened or tempered after grinding. Just be careful not to overheat them on the grinding wheel. If the steel begins to change color, it's getting too hot. Dunk it often in water, and use a light touch on the wheel.

Edmundson's tool collection also includes two narrow chisels he made from triangular files. He uses the thinnest one to chop out waste in the tight spaces between dovetails. He uses the other, which is narrow rather than thin, when making grooves for stringing. Although the bulk of the narrow grooves are cut using a router, with a template-and-bushing setup, the bit leaves round corners. The tiny, narrow chisel quickly squares off these areas.

A custom tool doesn't have to be an edge tool. Edmundson reaches just as often for a simple dovetail guide he made from two scraps of hardwood fit and glued together.

INLAY CHISEL



This narrow chisel squares the corners of grooves for stringing.

DOVETAILING AIDS

Shopmade dovetail guide. *Made of two bits of hardwood, this simple layout guide has given Mark Edmundson years of service.*

Thin chisel for thin pins. *Edmundson uses this shopmade chisel to clean out the narrow sockets between dovetails.*

Part chair maker, part inventor

As woodworkers progress, they gravitate toward favorite designs and techniques. Then, as they repeat tasks again and again, they

Photos, this page: Kelly J. Dunton (top left); Asa Christiana (all others)

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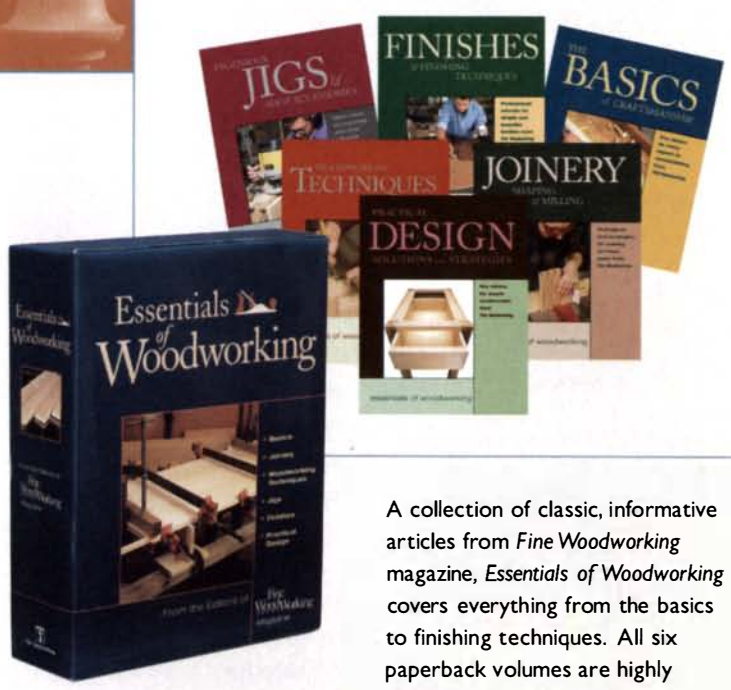

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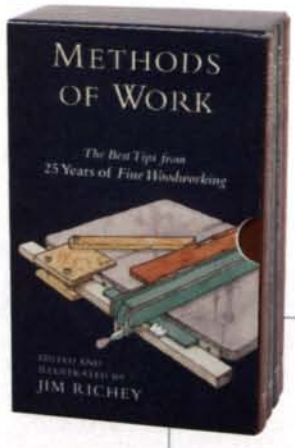

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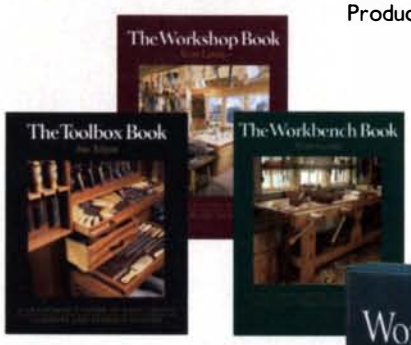

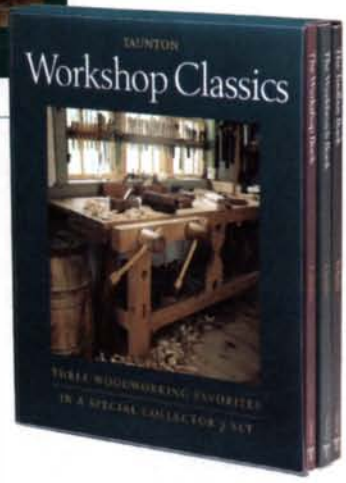

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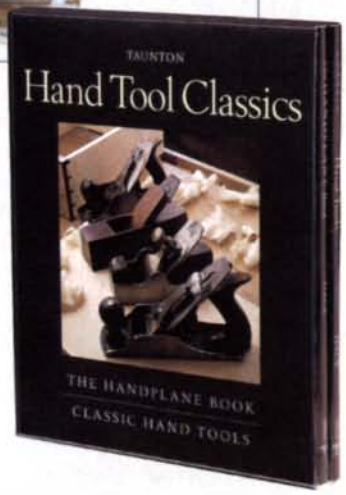

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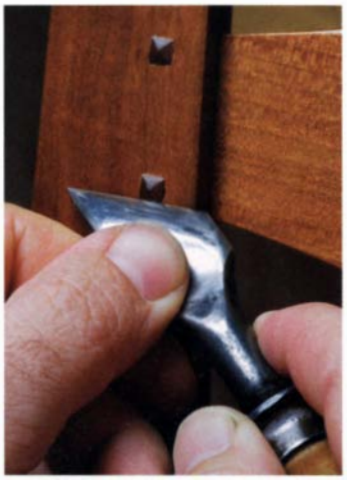
find points where standard tools fall short. Brian Boggs, a chair maker in Berea, Ky., has a favorite finishing touch for the pinned mortise-and-tenon joints on the back posts of his chairs. He leaves the pins about ⅛ in. proud and cuts facets into each one, creating a shallow pyramid shape.

Boggs, who works to streamline and perfect every process in his shop, found that a standard chisel wouldn't do the job properly. He needed a "tight, rotating cut to get into the bottom and up the pyramid" and a "wide bearing surface that wouldn't bruise the wood" as he was levering against it. He ground and polished a round surface onto both sides of a chisel and found he could slice perfect facets every time, from either direction.

Boggs encountered another problem with mortising the thin chair slats into the back posts. He had trouble cleaning out the bottoms of the deep, narrow mortises. He ground a sharp hook onto the bottom of an antique screwdriver, putting the cutting edge at a right angle to the shaft. The finished tool is very similar to the Japanese chisels used to clean out mortises in shoji screens. He didn't need to harden the edge because he uses the tool more like a scoop than a chisel, scraping chips off the bottom and dragging them out of the mortise.

A PAIR OF CHAIR MAKER'S TOOLS



Round sides for flat facets. *By rounding the sides and angling the edge of this chisel, Brian Boggs found he could cut cleaner facets on the ends of his pins. The tool can cut in either direction, pivoting off its round back.*

Hooked chisel cleans out deep, narrow mortises. *Boggs made this tool from a screwdriver and uses it to hook and extract chips from the bottom of a mortise (see the top photo on p. 106 for another view of the tool).*

Boggs' ingenuity hasn't stopped at simple hand tools. As he has worked over the years to refine the Appalachian ladder-back form, he has also worked to refine the tools of his trade. His shopmade innovations include a pressurized steam chamber, a curved chair maker's spokeshave (now available from Lee Valley Tools) and a Rube Goldberg-like machine that takes rough hickory bark in one end and turns out rolls of perfect seat-weaving material on the other, slicing it to uniform width and thickness with a series of oscillating razor blades and jets of lubricating fluid. Boggs designed the machine and then worked with a local machinist to build it. While

Make a chisel from a file

BY J. PETROVICH

A great number of tools can be made by the average woodworker using common materials and equipment. A specialty chisel, for example, can be made using a worn-out file, a bench grinder and your kitchen oven (think TV's MacGyver).

Files are a good choice for tool stock for three reasons. First of all, they are carbon steel, so they respond to heat treatment, allowing the toolmaker to control the hardness through tempering. Second, files are already fully hardened and require only a moderate heat source (kitchen oven) to make them useful. Third, files come in useful shapes that already suggest their second life: triangular file for a dovetail chisel, heavy wood rasp for a lathe tool, flat file for a custom screwdriver. This reduces grinding time.

1

Trade some hardness for toughness. *Placing the file in the oven for one hour at a little over 425°F will temper the steel, making it more suitable for an edge tool.*

Initially, a file is too hard and brittle to make a useful cutting edge. Under any pounding blows the edge would shatter. Tempering the steel trades some of this hardness for toughness. By raising the temperature of the steel to 428°F, the hardness is lowered from 68 to 70 Rockwell C hardness to 58 to 60.

Normally a toolmaker would "read" this temperature in the color (a pale straw color, in this case) produced by a heat source on the smooth surface of the steel. But you can control the temperature with the thermostat on the kitchen oven.

Place the file on a rack near the top of the oven. Set the dial for a little more than 425°F and bake the file for one hour. "Kitchen tempering" complete, the tool blank is ready to grind.

First, grind off the file's teeth and reshape the file slightly. I like to do this grinding without the tool rest, using the bottom side of the wheel. This

2

Grind away the file teeth. *You can do this freehand, holding the file sideways. Dunk it in water often to keep it from overheating.*

Photos, this page: Kelly J. Dunton (left); J. Petrovich (sidebar)

I may never go this far to refine my craft, examples like Boggs' have inspired me to take greater risks and to venture beyond the tools available in catalogs.

Yankee ingenuity

Another frequent contributor to the magazine, Philip C. Lowe, who helped develop the cabinetmaking curriculum at Boston's North Bennet Street School and has hundreds of period reproductions and restorations to his credit, now runs a school of his own in Beverly, Mass. His cabinetmaking students are always curious about the specialty tools Lowe drags out from time to time. Before long they are making their own versions. A favorite is the custom scraper Lowe uses for turning decorative faces on small knobs. Starting with an old file, recent graduate Jason Rivers made a custom tool like this to spruce up one of the required projects, a tool

SCRAPER FOR ELEGANT KNOBS

Philip C. Lowe teaches his students to make this custom scraper for decorating the knobs on a tool chest.

chest. Then, with one plunge cut on the lathe, he cut an attractive rosette into the face of each knob, each one identical to the rest.

Lowe and his students don't temper the brittle steel of the file after reshaping it on the grinding wheel because it doesn't take as much shock and stress as a chisel does (for more on making a chisel from a file, see the story on p. 108). Only ½ in. of the tool should hang over the lathe's tool rest—not enough to snap it off.

Some of the most helpful tools in Lowe's shopmade collection are the simplest. His drawerful of sanding dowels is an example. He uses them to sand cove moldings and cuts off one end of each dowel at a 45° angle so that he can reach into inside corners.

Usually, the time it takes to make a custom tool is negligible compared to the time and effort it will save you. All it takes is the confidence to try. Once you've solved a problem with a shopmade tool, other tools and gizmos will follow. And because you made them, they'll look as attractive hanging on your wall as your set of $200 chisels. (For beautiful examples of shopmade tools, see Current Work, pp. 100-103.) □

Make a chisel (continued)

3

Smooth the surfaces with a file. *A normal file will cut your tool blank, which has been softened slightly.*

takes a little practice, but ultimately you will find that you can adjust your body and hands to serve as a very accommodating and accurate jig. Because grinding can produce temperatures high enough to remove the hardness from the edge, I do not wear gloves. Bare hands are very sensitive above 100°F and tell me when the temperature is too high. Keep a cup of water handy for cooling the tool (and your fingers), and use it often.

When the grinding is done, you can flatten the surface further with a file. A smoother surface still can be made with progressive grades of wet-or-dry sandpaper using a light oil or thinner for lubricant.

Remount the grinder's tool rest and establish a cutting edge as you normally would.

Handles for these tools can be made from almost any scrap of hardwood. Shape it to taste and comfort. Because the file already has a tang for mounting, little more is required than drilling the handle to accommodate the tang. The hole should be stepped—smaller at the bottom. Open up the hole until you can insert a half to two-thirds of the tang into the hole. Then wrap the blade portion of the tool in a wet washcloth and heat the bottom quarter of the tang using a propane torch or a gas flame on the kitchen stove until it glows very slightly. Next, insert the tang into the handle as far as you can, then tap the end of the handle with a small hammer. Should this fail, let everything cool and drill the hole larger. Should you go too large, set the tang with epoxy.

4

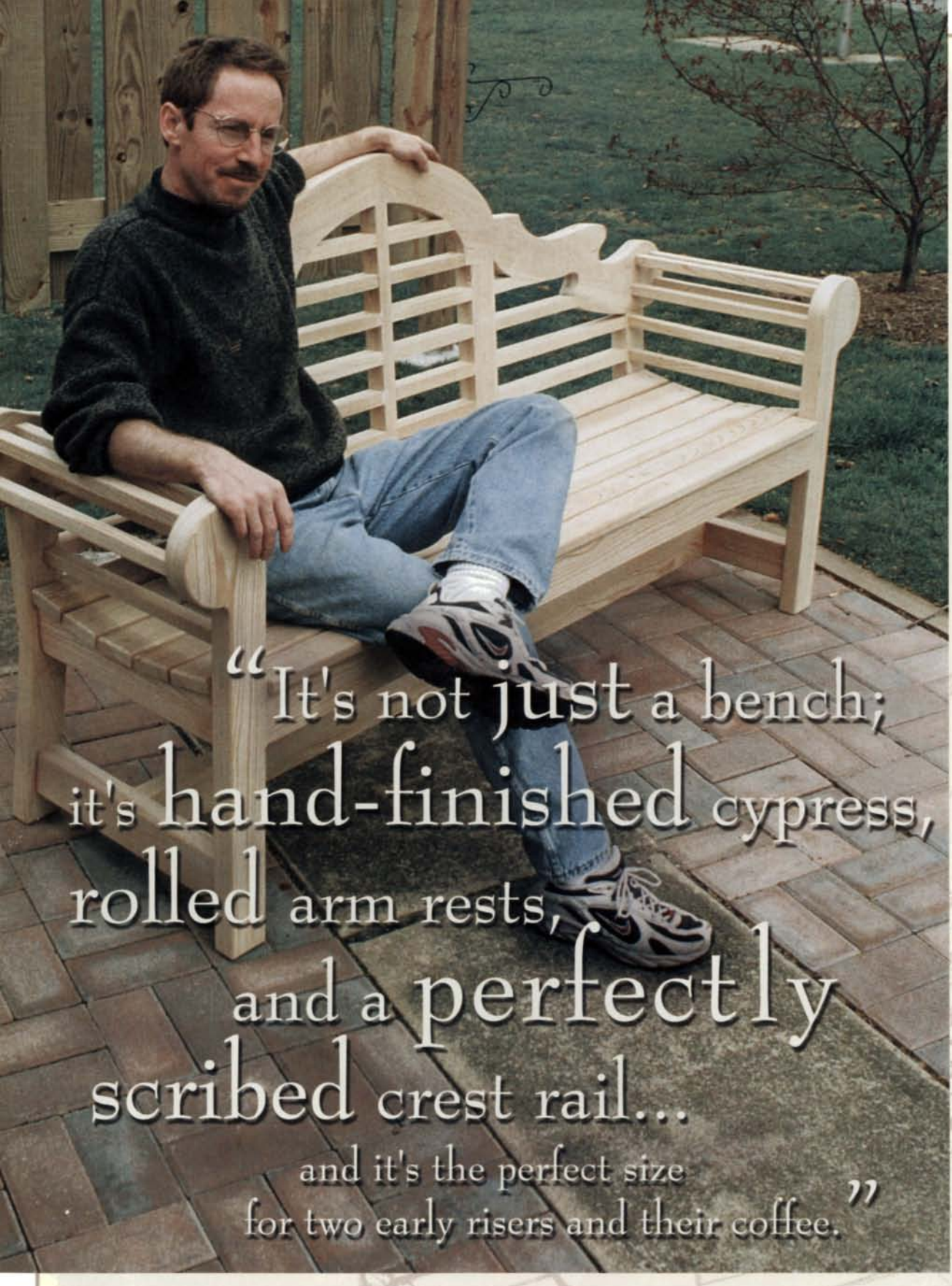
Grind the chisel tip. *A tool rest helps at this point to establish an even bevel. Use a light touch when grinding, and cool the tool often.*

5

Attach a handle. *Drill a stepped hole in the handle and heat the tang. The hot metal will burn its way into the hole for a tight fit.*

J. Petrovich is a furniture maker in Salinas, Calif.

Photos, this page: Michael Pekovich (left); J. Petrovich (sidebar)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Q&A

Storing woodworking machinery

I am building a new shop, but I don't expect it to be ready for two years and want advice on storing my machinery (tablesaw, planer-jointer, lathe, drill press, bandsaw and radial-arm saw). Will an unheated self-storage locker be sufficient? What preparation, if any, should be made to prevent rust?

—Bruce Haims, New York, N.Y.

Lon Schleining replies: Your machines should be fine in storage indefinitely as long as you take some precautions. Built-up sawdust will soak up moisture like a sponge, so start with a thorough cleaning. Use a vacuum, brush and air hose to blow out the motors, and dig out every speck of sawdust you can. Don't forget to clean out the electrical boxes.

Then use some synthetic steel wool lubricated with paint thinner, penetrating oil (such as WD-40) or kerosene to remove existing rust or tarnish on the bare steel or cast-iron surfaces, including gears and trunnion tracks on your tablesaw and the vertical support tube and quill on your drill press.

Next, apply a heavy coat of automotive or lithium grease to every unpainted steel or cast-iron surface, including all of the gears. Imbed a piece of heavy plastic sheeting into the grease, wrapping up the plastic using tape or string. Next, to help keep out the critters, wrap the motors tightly with plastic or cloth.

It's possible for a heavy cast-iron tabletop to warp if it isn't supported properly, so be sure your machines sit level and are supported on all four legs. Because you'll no doubt be piling boxes atop your machines, cut a piece of heavy plywood to sit on top of the plastic sheeting.

Release the tension on all of the belts, remove the bandsaw and tablesaw blades and don't neglect such things as the chuck on your drill press. Squirt some motor oil in the chuck and wrap it with plastic and tape.

When you unwrap everything, remove the grease with solvent, and be sure to blow out the motors and switch boxes again with compressed air. One more thing. Check to make sure mice or other varmints haven't made a meal of the insulation on the wires while you were busy building your new shop.

[Lon Schleining is a contributing editor.]

Pipe clamps slipping on galvanized pipe

In FWW #132 (p. 83) Gary Rogowski said he used galvanized pipe instead of black pipe with his pipe clamps because they won't oxidize from contact with glue and cause black stains on the wood. So I had 36 pieces of pipe cut and threaded. Guess what? The clamps slip and won't hold. Apparently the galvanized coating is too soft. Now I have a big pile of pipe that is good for nothing. Why recommend galvanized? —Dan Nemeth, via e-mail

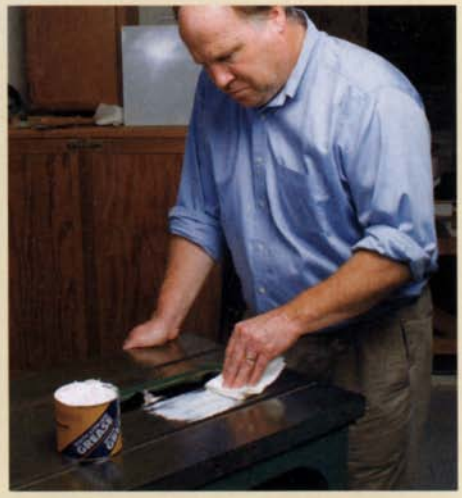
Gary Rogowski replies: I have had my clamp heads slip occasionally on galvanized pipe as well. For me this hasn't been a big enough problem to offset the benefit of the coating. However, the galvanized surface is definitely a bit softer than black pipe. But I don't think your culprit is the galvanizing. I think the pipe is too small in diameter. I spoke to customer service at Adjustable Clamp Co. (which manufactures clamps sold under the Pony, Jorgensen and Adjustable names), and they gave me the company's engineering specs for pipe clamps.

In a perfect world, ¾-in. (inside diameter) pipe should measure 1.050 in. (outside diameter), but Pony pipe clamps have a gripping tolerance from 1.019 in. to 1.113 in. (plus or minus 0.0625 in.). If the pipe is over or under those numbers, the clutch discs just won't grab it. Half-inch pipe is supposed to be 0.840 in.

PREPPING MACHINERY FOR STORAGE

Remove the electrical box and clean out the dust. *Also, remove all arbor adjustments and knobs to eliminate the possibility of someone picking up the machine by one of these elements.*

Brush out all dust. *After vacuuming and blowing out the dust, take a brush to all stubborn dust spots, particularly gears and other areas that are lubricated.*



Remove rust from unpainted surfaces. *Then rub a generous portion of grease on the surface. Next, lay plastic sheeting on top and imbed it into the grease to form a good moisture barrier.*

Photos: Timothy Sams

(outside diameter) plus or minus the same tolerance.

Customer service at Adjustable (if yours are Pony-brand clamps) suggests that you send some of the clamp heads back to the company for quality checking. Every once in a while, some discs come out of the factory at the wrong size, but I find it unlikely that 36 of these disc groups are undersized.

By the way, over time the clutch discs on these clamps get a bit worn and start to slip. If this occurs, the company recommends that you reverse them in the spring-loaded clamp head. I have found that this is very helpful on galvanized pipe.

[Gary Rogowski is a contributing editor.]

Trouble fitting Clifton cap iron to plane

I recently bought a Clifton Stay Set cap iron for one of my planes, and I'm having a problem fitting it to the blade of my handplane. The iron projects too far, even with the adjuster pulled all the way back. Are there any adjustments I can make, or should I send it back?

—Walter Smith, Tacoma, Wash.

Garrett Hack replies: Since reviewing the Clifton Stay Set cap iron in May/June 1999 (*FWW* #136, pp. 38-48), I've heard from a few people having difficulty fitting it to their bench planes. I checked with Garrett Wade's technical department, and evidently this has been a problem in some of the newer Stanleys and Records—especially with the wider 2⅜-in. cap iron.

The problem...

The Clifton Stay Set cap iron (left) is sometimes much longer than the cap iron (right) that comes with a plane. Line up the notches at the top with a square and look to see whether the leading edges are far apart. Then make adjustments as needed (see the photos below).

The likely problem is that the slot in the Clifton cap for the adjuster pawl is farther from the leading edge than on your original cap iron. Because the depth of cut is entirely related to this slot, it's as if you are fitting a longer iron to the plane. The adjusters on most planes just don't have the range to accommodate this difference.

The critical distance between the leading edge and the adjuster slot varies widely among cap irons. The simplest solution to try first is to set the Clifton cap very close to the cutting edge—in effect shortening your iron. If this doesn't work, hold your old cap and new Clifton together with the adjuster slots exactly lined up. Mark the difference with a permanent marker and file it to match the old cap. Make sure you hone the leading edge sharp with a smooth transition along the top surface of the cap iron. Evidently Clifton has anticipated this tuning—the leading edge of the cap has a wide flat that can be filed back 3⁄16 in., if necessary.

[Garrett Hack is a contributing editor and the author of *The Handplane Book* (The Taunton Press, 1997).]

Radial-arm saw: push or pull?

Please help me solve a running dispute between "experts" in the woodworking field. Is a radial-arm saw a push or pull saw? ***—Bill Glass, New Milford, Conn.***

Lon Schleining replies: The short answer is that you push with a sliding compound-miter saw, but the radial-arm saw is normally pulled, partly because of safety concerns, partly for cut quality and partly because it's simply the more conventional cutting direction.

Pulling the radial-arm saw, or "climb cutting," does seem weird, and indeed the

...The solution

Highlight the area that needs to be removed from the leading edge. Use a square to get a straight line.

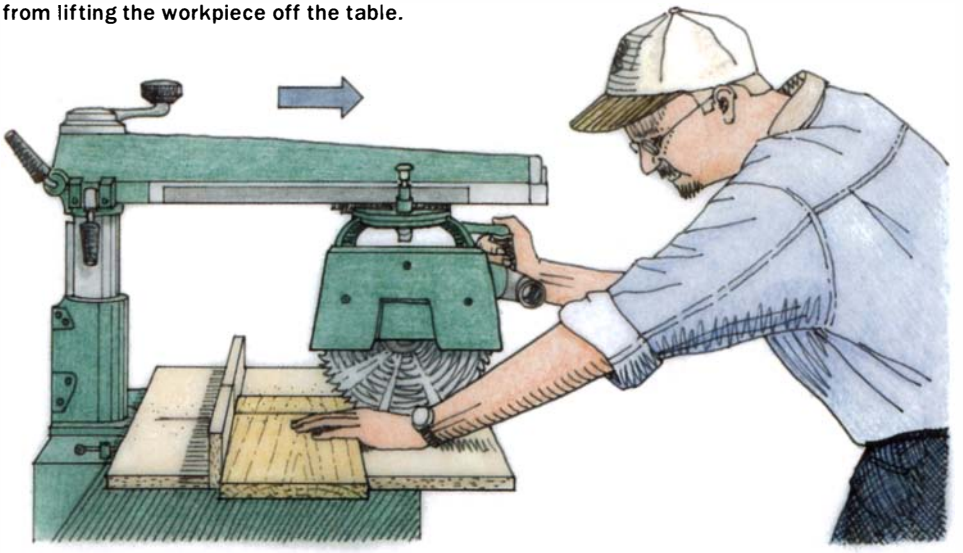
Remove all of the material down to the line with a file (left). Next, round the top of the iron (right). Be sure to check often to see that the leading edge remains flat.

After filing, flatten and hone the bottom of the iron so that it fits snugly against the blade.

Drawing (p. 118): Vince Babak

PULL, DON'T PUSH

Pulling produces a cleaner cut and prevents the blade from lifting the workpiece off the table.



machine is unique in this respect. It's as though you were to make a cut by pulling your compound-miter or portable circular saw *toward* you instead of pushing it away from you.

A radial-arm saw is a fundamentally different machine from these other saws. The blade cannot rise like that on a compound-miter saw or a circular saw. If you pull too fast or if the kerf pinches closed, the motor might stall, but the blade won't come up out of the cut. But the climb cutting does seem counterintuitive. So why not push?

If you cut on the push stroke, the blade will cut upward, producing chipout on the top surface. More important, however, is the slight upward pull of the blade. As long as the board stays down on the table, it should be fine. But if you apply too much cutting pressure or have the kerf suddenly pinch the blade, the board being cut might be lifted off the table and over the normally low rear fence. An even more harrowing possibility is for the saw to kick back toward the operator if the kerf pinches closed on the blade.

Also, I don't think rip cuts are safe on the radial-arm saw, and I would never use it that way.

Do you have a question you'd like us to consider for the column? Send it to Q&A, Fine Woodworking, P.O. Box 5506, Newtown, CT 06470-5506 or e-mail it to fwqa@taunton.com.

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INDEX TO ADVERTISERS

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Reader Service No.	ADVERTISER, page #
35	Adams Wood Products, p. 35
18	Airstream, p. 126
80	Allred & Associates, Inc., p. 126
198	Altendorf America, p. 17
53	American Furniture Designs, p. 125
57	Apollo Sprayers, p. 22
87	Arts & Crafts Hardware, p. 125
114	Ashman Technical Ltd., p. 28
29	Auton Motorized Systems, p. 121
14	Ball & Ball Reproduction Hardware, p. 21
	Barr Specialty Tools, p. 124
75	The Bartley Collection, Ltd., p. 123
74	Bauhaus Apprenticeship Institute, p. 124
36	The Beall Tool Co., p. 124
147	Belcher Veneer Co., p. 126
199	Bench Dog, p. 119
91	Berea Hardwoods, p. 12
90	Berea Hardwoods, p. 120
213	Blue Tornado Cyclones, p. 9
	BrandNew, p. 122
	Cabinetparts.com, p. 121
233	Carter Products, p. 120
220	CentralVac International, p. 7
17	Certainly Wood, p. 124
82	The Chippendale School of Furniture, p. 28
192	Classic Designs by Matthew Burak, p. 17
32	Clayton Machine Corp., p. 33
50	Colonial Saw Company, p. 109
181	Colonial Times Clock Company, p. 126
131	Conover Lathes, p. 17
86	Conover Workshops, p. 121
182	Cormark International, p. 124
81	CraftWood Veneer Products, p. 123
105	The Cutting Edge, Inc., p. 126
139	Crown Plane, p. 124
171	Dakota County Technical College, p. 111
25	Dana Robes Wood Craftsmen, p. 20
	David Warren Direct, p. 123
173	Delta Machinery, p. 29
178	Delta Machinery, p. 131
157	Denray Machine, p. 7
103	Diefenbach Benches, p. 125
	Diefenbacher Tools, p. 124
132	Dimitrios Klitsas, p. 125
38	Dust Boy, Inc., p. 124
206	Eagle America, p. 25
172	Eagle Tools/EuroShop, p. 12
187	Eagle Tools/EuroShop, p. 35
37	Eagle Woodworking, p. 123
54	Ebac Lumber Dryers, p. 122
	Electrophysics, p. 34
108	Engraving Arts, p. 126
	Enviro-Safety Products, p. 123
39	Fein Power Tools, p. 23
223	Felder USA, p. 27
138	Flamingo Specialty Veneer, p. 122
55	Flexaust, p. 121
	Forrest Manufacturing, p. 19
177	Franklin International, p. 15
92	Fuji Industrial Spray Equip., p. 109
59	The Furniture Institute of Massachusetts, p. 124
191	G & W Tool Company, p. 10
109	Garrett Wade Company, p. 20
110	Garrett Wade Company, p. 119
218	General Manufacturing Co., p. 13
69	Gilmer Wood Company, p. 125
88	Goby's Walnut Wood Products, p. 125
150	Good Hope Hardwoods, p. 122
13	Gougeon Brothers, p. 122
1	Groff & Groff Lumber, p. 28
152	Guild of Master Craftsmen, p. 125
	Guitar Making, p. 125
33	HTC Products, Inc., p. 31
	Haddon Tool Inc., p. 126
222	Hammer USA, p. 109
99	Hartville Tool Company , p. 115
41	Hearne Hardwoods, p. 120
49	HerSaf/Safranek, p. 28
196	Hida Tool & Hardware, p. 35
8	Highland Hardware, p. 10
	Homestead Finishing Products, p. 121
	Homestead Heritage Craft Center, p. 124
60	Hut Products For Wood, p. 10
	Irion Lumber Co., p. 122
190	Iturra Design, p. 33
107	J.B. Dawn, p. 122
94	Japan Woodworker, p. 25
202	Jesada Tools, p. 9
224	JessEm Tool Co., p. 17
3	Jet Equipment, p. 2, 3
214	Jointech, p. 37
210	Journeyman Tools, p. 7
	K.C. Jig, p. 14
217	Katana Bits, p. 118
136	Katie Jig, p. 111
124	Kay Industries, Inc., p. 12
	Kayne & Son Hardware, p. 122
9	Keller & Company, p. 9
211	Kenco Safety Products, p. 126
169	Kreg Tool Company, p. 28
100	Kremer Pigments, p. 124
164	L.R.H. Enterprises, Inc., p. 117
230	Laguna Tools, p. 14
229	Laguna Tools, p. 31
228	Laguna Tools, p. 35
226	Laguna Tools, p. 119
227	Laguna Tools, p. 120
68	Launstein Hardwoods, p. 35
144	Lee Valley/Veritas, p. 38-39
112	Legacy Woodworking, p. 123
	Leigh Industries, p. 119
	LeNeave Supply Company, p. 18
61	Librawood, p. 126
102	Lie-Nielsen Toolworks, p. 120
154	Lin Mar Distributing, p. 9
	Lionel Hastings and Company, p. 105
158	Lumber Liquidators, p. 122
20	Luthiers Mercantile Intl., p. 14
58	M.L. Condon Lumber, p. 111
85	MEG Products, p. 126
64	Mao Shan Machinery, p. 111
186	Mark's Tool School, p. 124
70	Martin Donnelly Antique Tools, p. 125
7	Mass Bay Wood Products, p. 123
142	McFeely's Square Drive, p. 20
179	Micro Fence, p. 10
83	Microplane, p. 28
115	Micro-Rip 2000, p. 125
76	Misugi Designs, p. 122
219	Mule Cabinetmaker Machine, p. 25
	Museum of Woodworking Tools, p. 124
134	Noah's, p. 126
167	North Bennet Street School, p. 122
153	Northend Hardwoods, p. 119
118	Northland Forest Products, p. 123
	Northwest Timber, p. 21
79	Norwood Sawmills, p. 122
234	Oakwood Veneer, p. 126
183	Olson Saw Company, p. 33
140	Omer Direct, p. 12
215	Oneida Air Systems, p. 109
130	Osborne Wood Products, p. 123
96	Packard WoodWorks, p. 123
24	Patrick's Turning Point, p. 125
	Peck Tool, p. 126
212	Penn State Industries, p. 28
175	PlansNow.com, p. 125
201	Powermatic, p. 21
66	Productive Workspace, p. 122
65	Productive Workspace, p. 124
101	Purdys LLC, p. 126
6	Quality VAKuum Products, p. 117
	QuickTenon, p. 17
155	Rare Earth Hardwoods, p. 126
133	Red Hill Corporation, p. 34
12	Ridge Carbide Tool Co, p. 124
26	Robert Larson Company, p. 126
159	Roberts Plywood Co., p. 20
149	Rockingham Community College, p. 122
207	Rosewood Studio, p. 7
209	Rousseau Company, p. 18
44	Router Bits on the Web, p. 14
46	Routerbitsonline.com, p. 123
27	Sandy Pond Hardwoods, p. 123
180	Sawhelper, p. 22
84	Scherr's Cabinet & Doors, p. 36
193	Scooter Board, p. 121
	Screw Products, Inc., p. 125
200	Shark Corporation, p. 21
189	SharpToolsUSA, p. 123
16	Shopbot Tools, Inc., p. 10
128	Simp'l Products, Inc., p. 9
111	Specialtytools.com, p. 125
	St. James Bay Tool, p. 126
106	Suffolk Machinery, p. 121
78	Talarico Hardwoods, p. 125
123	Target Enterprises, p. 34
	Taunton Books, p. 107
	Taunton Books, p. 117, 118
	Taunton Press, p. 104, 128
194	Tech Mark Inc., p. 37
62	Tech-Wood Inc., p. 126
11	Tenryu America, Inc., p. 36
63	Thewindsorinstitute.com, p. 125
72	Thomas Golding School, p. 122
148	Tool Center, p. 122
97	The Tool Chest, p. 124
203	Toolcrib.Amazon.com , p. 18
204	Toolcrib.Amazon.com , p. 33
205	Toolcrib.Amazon.com, p. 120
221	Tools On Sale, p. 25
156	Tracrac Inc., p. 13
19	Tropical Exotic Hardwoods, p. 125
208	Turbinaire, p. 27
232	Tyler Tool Company, p. 31
195	United States Saw, p. 11
188	Vac-U-Clamp, p. 14
137	Vacuum Pressing System, p. 9
71	Vass, Incorporated, p. 111
145	Vintage Chair, p. 122
30	Virutex.com, p. 35
98	W. Moore Profiles, p. 31
170	WGB Glass, p. 20
119	Waterlox Chemical & Coating, p. 17
116	West Penn Hardwoods, Inc., p. 126
5	Wetzler Clamp Company, p. 123
216	Whitechapel Ltd., p. 111
52	Wilke Machinery Co./ Bridgewood, p. 22
28	Williams & Hussey, p. 27
141	Wizard Detectors, p. 13
	Wood Finish Supply, p. 121
15	Wood River Veneer, p. 123
23	Woodbooks, p. 124
197	Woodcraft Supply, p. 37
	Woodfinder by Woodrose, p. 124
163	Woodjoy Tools, p. 125
42	Woodmaster Power Tools, p. 25
43	Woodmaster Power Tools, p. 111
	Wood-Mizer, p. 14
	Woodpeckers, p. 31
	Woodpeckers, p. 34
	Woodpeckers, p. 111
135	Wood-Ply Lumber Corp, p. 125
48	WoodRat, p. 117
93	Woodsmith Store, p. 31
174	Woodsmithstore.com, p. 123
185	Woodworker's Depot, p. 25
231	Woodworker's Hardware, p. 33
162	Woodworker's Source, p. 122
146	Woodworker's Supply, p. 28
	The Woodworking Shows, p. 112
184	Worcester Center for Crafts, p. 36
40	World Timber Corp., p. 121
161	Yankee Hardwood Specialties, p. 125
45	Yestermorrow, p. 34

BY VINCENT LAURENCE

Waste Not, Want Not

Make the most of workshop waste, from offcuts to sawdust

Even a moderately productive home shop can generate phenomenal amounts of waste, especially if you buy your wood flitch-cut or roughsawn and do your own milling. Dealing with all of those shavings and all of that sawdust, not to mention the offcuts, can be a major hassle. Or it can be an opportunity. Viewed not as waste but as raw materials, this woodshop detritus can have many productive uses.

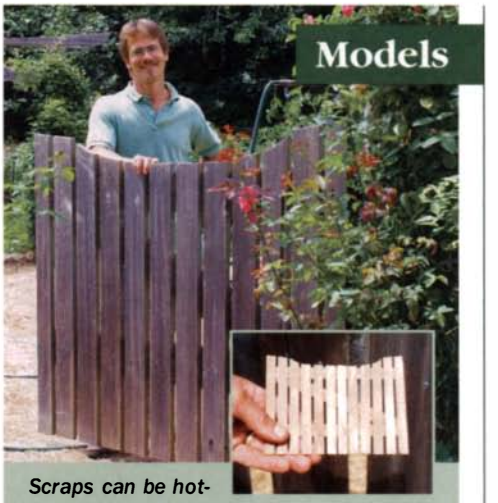
An offcut's destiny depends on the type of wood

Let's start with the largest pieces of waste. When it comes to precious stuff and "detail" woods (such as ebony, rosewood, purpleheart, holly and pear), I keep the offcuts, no matter how small. Even a tiny block may be enough for a knob or handle, and very thin stock can still be used as inlay or beading.

Storing lots of blocks of different sizes and shapes can present a challenge, but there are quite a few inexpensive solutions that work well. For long, thin stock (waste from ripping), heavy-duty shipping tubes or large-diameter PVC pipe sections work well. For shorter, wider pieces, old milk crates and 5-gal. buckets make good bins.

For midsized material—stuff too short to put on a lumber rack but too large for a 5-gal. bucket—recycled 55-gal. drums work well. These often are available cheap or free from beverage companies, and you won't have to deal with residual solvents in drums that once held juice concentrate.

A bucket of hardwood and softwood offcuts can be turned into children's play blocks with very little effort.



Scraps can be hot-glued and pinned together to form models for full-sized furniture and garden projects. Models allow you to view the proportions and test the joinery.

Common hardwood scraps (cherry, walnut, birch and maple) as well as softwoods are excellent for making building blocks for kids. A friend made a block set with arches and columns. It took only an evening to shape and sand a 5-gal. bucket of blocks, and his kids loved it.

Much of my woodworking these days is garden-related, so I deal with a fair amount of softwoods. I use scraps from these projects to work out details on future projects, building models of garden structures (arbors, fences, gates and so on) as well as furniture designs. A scale of 1 in. = 1 ft. works well for me, but I don't get real finicky about precision. I just try to get a rough sense of proportion and to figure out the joinery. I use a hot-glue gun and brads to assemble these models.

Burn, baby, burn

When the scrap situation gets out of hand, I resort to fire. Both hardwoods and softwoods make good kindling for a woodstove or fireplace, and a few pleasant afternoons spent with a kindling hatchet in September or October can reduce a large pile of scrap to a season's worth of kindling. Of course, if you prefer, a bandsaw will do the job almost as well.

In addition to starting fires for winter warmth, hardwood scraps are also great for summer barbecuing in a kettle-style grill or in a hibachi. With a few sheets of newspaper and a pile of kindling, you can produce a wonderful bed of coals for burgers, chicken or fish, or to roast vegetables. Hickory, apple, cherry, alder and maple all add a subtle flavor to food, something you don't get on a gas grill. Just make sure any fruitwoods are from your backyard or from long-abandoned noncommercial orchards. Most pesticides used in commercial orchards are systemic, meaning the chemicals translocate throughout the trees and remain in the wood. You don't want to use this wood to cook your food.

There are many uses for shavings and sawdust

Shavings from fruitwoods and nut woods are great for smoking food. The same warning about wood from commercial orchards applies here, too. Pieces of scrap

Compost is the best fertilizer for your garden that money can't buy. The high carbon content of sawdust combines perfectly with nitrogen-rich lawn clippings and other garden waste.

Photos, except where noted: Mark Schofield; this page (left, middle): Erika Marks

that are large enough to be run safely across the jointer (or through the planer) make great shavings for smoking food. Using the kettle-style grill, I build a large fire with cutoffs, let it burn down to a glowing (but no longer flaming) mass of coals, then push it over to one side of the kettle, just above an air intake. Then I set several handfuls of moist, but not soaking wet, shavings atop the pile of coals. I put on the wire grill, quickly but carefully position some good-sized salmon fillets on the opposite side of the grill from the coals and put the lid on the grill, its exhaust port just above the fish. Twenty minutes or so later, the salmon is ready.

Another excellent use for shavings is as animal bedding. Anyone who keeps horses or other livestock, including poultry, is likely purchasing shavings from the local farm-supply store. If you're producing a significant quantity of shavings, it's a good idea to contact a local stable or farm to see if they can use your shavings. They may even pick them up, saving you the trip and the time. If you live in the city, talk to the zoo, ask a local pet shop if they can use the shavings, or give the cops a call. If they have an equestrian unit, they're sure to need bedding.

Potters who make raku, a Japanese style of pottery, need shavings for their kiln firings. Potters who use forms to make slip-cast objects or vessels may be able to use sawdust as the binder for molds. These craftspeople may be willing to pick up the material, and you might even be able to get a mug or a bowl in exchange for your valuable raw material.

My principal obsession these days is gardening. As a result, I've come to realize the many uses of shavings and sawdust in the garden. Even if you don't have a garden, chances are you have a friend or relative who does. One of the best uses for shavings and sawdust is as an ingredient in compost. Mixed with kitchen scraps, lawn clippings, weeds and other yard or garden trimmings, shavings and sawdust help to make excellent compost, the best possible garden fertilizer.

Used as-is, shavings and sawdust can be put on woodland or rustic garden paths or applied as mulch to garden beds. Mulch helps retain soil moisture (reducing the need for watering) and helps suppress weed-seed germination (reducing your labor). If you use sawdust or shavings as mulch, first add some nitrogen-rich fertilizer such as bloodmeal or cottonseed meal to the soil, because wood products temporarily tie up soil nitrogen.

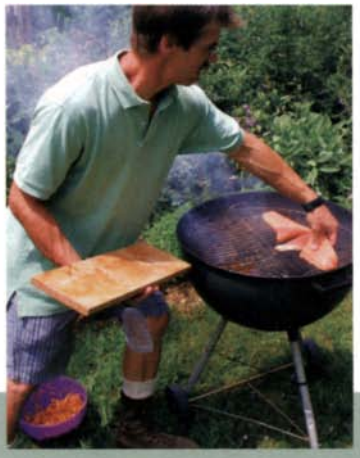
Some trees (walnut and butternut, most notably) contain chemicals that discourage the germination and growth of plants around the trees. The same goes for sawdust from these species. For that reason, shavings or sawdust from these woods are best used where you want to discourage plant growth—in paths, for example.

Because they're organic and biodegradable, both compost and mulch break down over time. So you can add these materials to your garden several times over the course of a growing season. □

Mulch

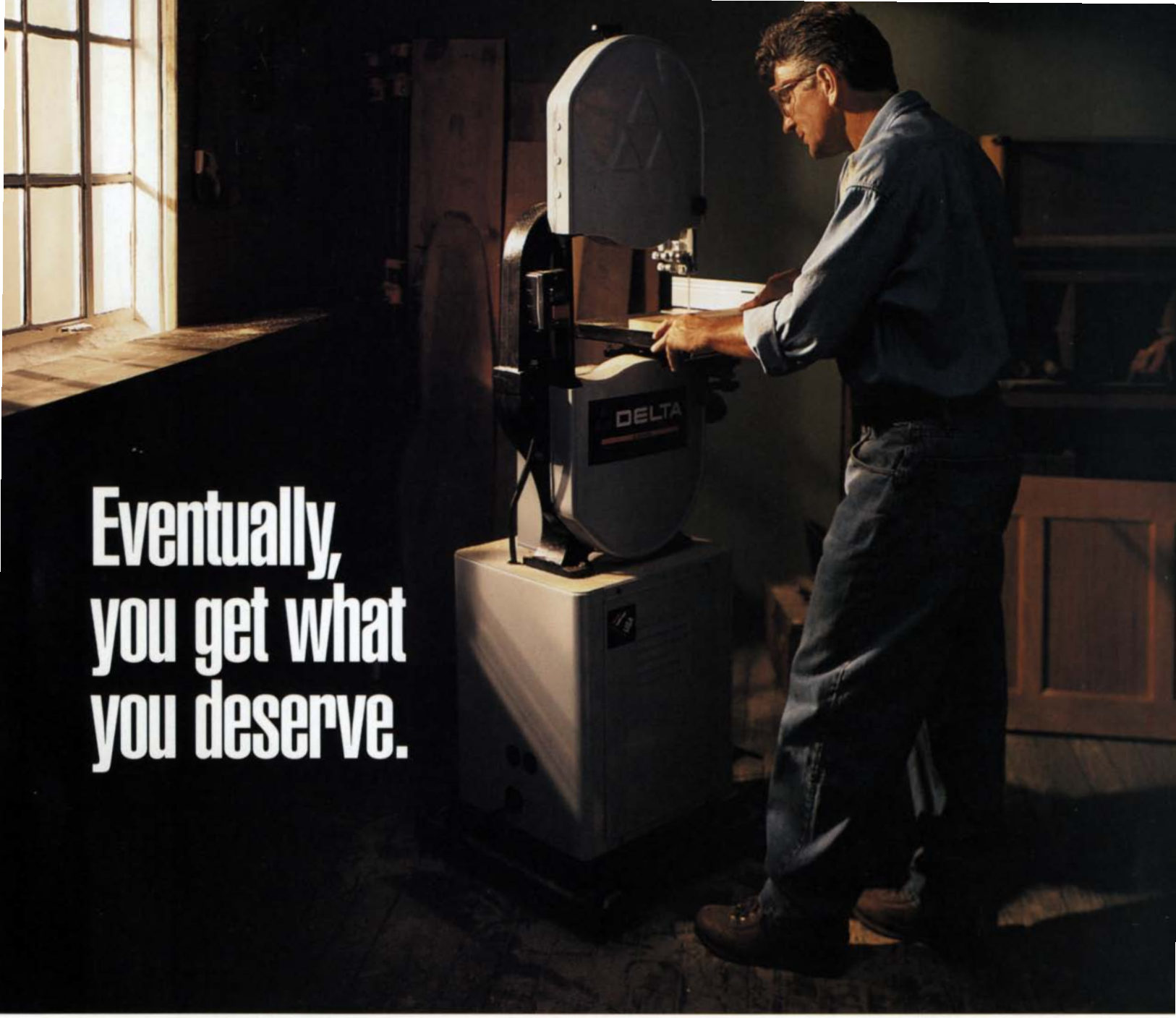
A thick layer of sawdust chokes any weed seedlings in their tracks as well as temporarily tying up soil nitrogen. A layer of shredded bark on top is for aesthetic reasons.

Grilling



The subtle flavors imparted by cooking with hickory, maple, cherry and other hardwood scraps cannot be matched by either charcoal or gas. Dampened cherry shavings are placed on top of the hot coals and pushed to one side of the kettle. The wire grill, the food and the lid must be placed quickly before the shavings can catch fire. A final seasoning with pepper and salt, and Laurence is ready to taste his smoked pasta dish with grilled smoked salmon, bell pepper, fresh mango and toasted almonds.

Photos, this page (top and bottom right): Erika Marks



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A Chair Maker's Workshop

It's 7:30 in the morning and Curtis Buchanan is already in his backyard shop, where he builds Windsors, and only Windsors. When he set up shop 18 years ago in Jonesborough, Tenn., being a chair maker simplified things. For Buchanan, the question wasn't whether to buy a tablesaw or bandsaw first—it was whether to wire his shop for electricity. "Using all hand tools," Buchanan said, "it wasn't really necessary. With practice I could become proficient on a pole lathe."

Though Buchanan did break down and wire his shop, his power tools are limited to a lathe and a bandsaw. He works quietly and steadily, with the sounds of songbirds and crickets as constant as the crack of an ax or the shaving of a drawknife. It is so peaceful, in fact, that on most days you'll notice a wren perched in the corner of the workshop, looking on as Buchanan shaves spindles or carves a seat.

Buchanan is diligent about starting work early, but he's just as diligent about knocking off by 12:30. "It's important to me that I'm done working by the time my daughters get home from school," he said. "I figured out what I need to do to make a living, which is sell about one chair a week. I don't need more than that, so that's what I make."

Photos: Matthew Teague