Fine Woodworking

Winter 2003/2004
No. 167

Tools & Shops

ANNUAL ISSUE

Building the essential workbench

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Versatile shop in a two-car garage

Ripping and crosscutting basics

Mobile bases

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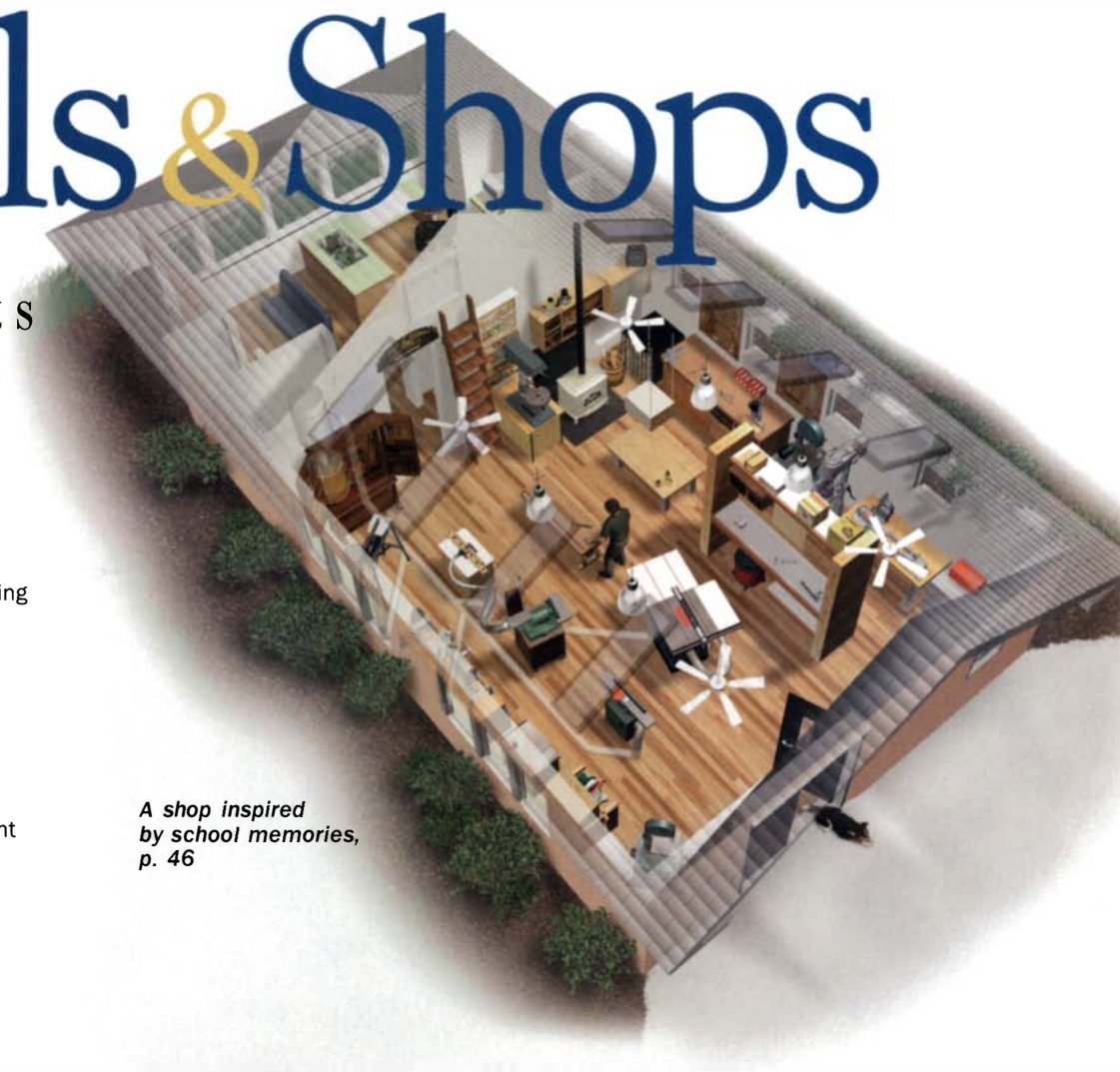

A shop inspired by school memories, p. 46

On the Cover:
Contributing editor Lon Schleining puts the finishing touches on a robust workbench. For plans, see p. 38. Photo: Asa Christiana

A clever tool case, p. 75

Roll-away garage workshop, p. 70

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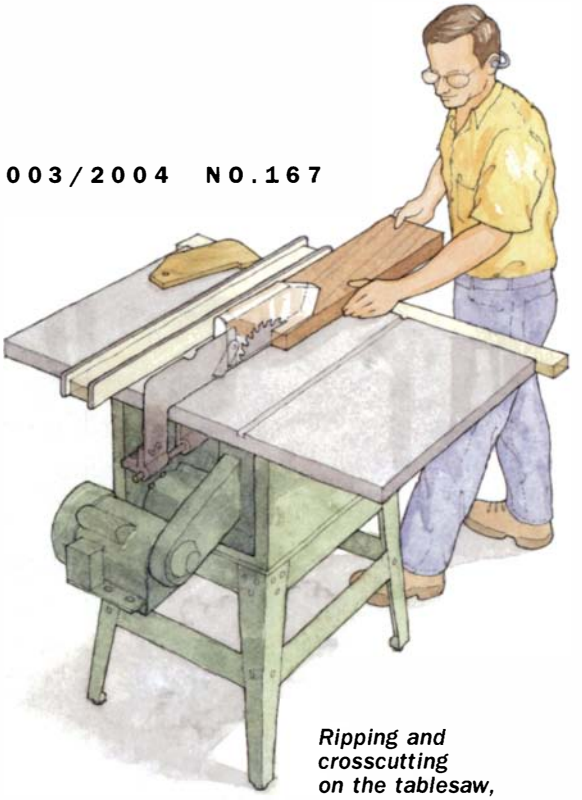
Articles



Ripping and crosscutting on the tablesaw, p. 56

Protecting surfaces in the shop, p. 62

Mobile bases, p. 82

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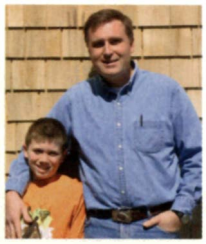
Contributors

The unique hand-drawn illustrations found in *Fine Woodworking* convey not only concepts and construction but the beauty of woodworking as well. Bob La Pointe has been illustrating for us for more than 15 years. In this digital age, he still relies on markers and color pencils to render his masterpieces (see "The Essential Workbench"). La Pointe lives on Cape Cod (Massachusetts) with his wife and daughter. When not parked in front of the drawing board, La Pointe is likely to be knee-deep in Wellfleet harbor tending to the acres of clams and oysters that he cultivates for restaurants both in New England and across the country.



Cliff Colley ("Mobile Bases") is a shop instructor at Plymouth South High School in Plymouth, Mass. A graduate of North Bennet Street School's Cabinet and Furniture Making program, he has published work in *Design Book Seven* (The Taunton Press, 1996). Although his woodworking and teaching skills may be impressive, he is most proud of his new role as father to his three stepchildren, Sarah, Paul (with Colley above), and Olivia.

Rick McCaskill (Shop Design) has been a woodworker for more than 35 years. He is vice president of business development and marketing for a biometric company and lives in Simi Valley, Calif. He spends a lot of his spare time enjoying his new woodshop, especially the times he gets to help his grandchildren assemble their own projects on a child-size workbench.

Barry Wixey (A Closer Look) has been designing tools for more than 20 years and woodworking machinery in particular for more than 15 years. His company has designed products for a number of manufacturers, including Delta and DeWalt. His interest in woodworking started as a child and peaked when he and his wife, Cora, designed and built their first home. Now they spend their spare time remodeling a 1901 bungalow in Seattle.

Tom LeRoy (Rules of Thumb) is a physical therapist in Brunswick, Maine, who travels throughout the state to provide safety training to companies, to treat injured workers, and to modify employee work habits and workstations. LeRoy uses these same safe work habits in his woodshop, a converted Boy Scout camp building.

Mark Bellonby ("A Shop Inspired by School Memories"), an architect, came to the profession by way of woodworking, studying in the late 1960s under Karl M. Pacanovsky at the Hill School in Pottstown, Pa. The school's strong woodworking program emphasized design and drafting skills in a setting that encouraged close collaboration among the fine arts, metalworking, and woodworking studios. Bellonby currently is a design partner in a Washington, D.C., architecture firm, designing office and apartment buildings, condominiums, and hotels.

Yeung Chan ("A Clever Tool Case") escaped Communist China in 1968, avoiding armed patrols and negotiating rugged, icy mountains to get to Hong Kong, and eventually landed in New York. After a few years on the East Coast, Chan moved to San Francisco, where he took a job with a furniture manufacturer. In 1989, he began his present career as a furniture maker and is well known for his handmade tools. A line of Veritas detail chisels modeled after Chan's set is available from Lee Valley Tools (www.leevalley.com).

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Letters

Elongated holes made easy

In his article "Anatomy of a Chest of Drawers" (*FWW* #163, pp. 36-43), Will Neptune recommends using slotted screw holes. I've never shied away from using them, but you must admit they are a lot more complicated than popping in a drill hole.

Apart from the fact that I don't keep router bits around that fit the shank of a #8 or #10 wood screw, on some occasions I have to use flat-head screws. The solution to this problem is to chuck up a countersink in the router, but setting the stops is a pain.

In most cases, I use round-head screws, drill two holes, and cut out the waste between with a coping saw, then take the piece back to the drill press and run it back and forth along the sides of the drill bit. Maybe on occasion I'll touch that up with a file.

How does Neptune cut his elongated screw holes?

—Robert Braczyk, New York, N.Y.

WILL NEPTUNE REPLIES: "Sloppy" screws are a quick and effective way to connect parts and allow for seasonal movement. First, drill a regular hole and countersink it. Then, on the inner face (where the movement is), drill two more holes, angling them so that they are aimed at the bottom of the countersunk recess. Chisel away any waste left between the holes, and it's done. The goal is to have the screw head fully supported by the countersunk recess, but allow the shaft of the screw to tip back and forth in the angled slot. The slot is kept the same size as the screw shank, allowing movement in one plane while keeping things aligned in the cross direction.

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.

—Anatole Burkin, editor

A view on editorial content

I've never written to a magazine before; however, I felt compelled to respond to Duane Yoder's letter, "A disgruntled reader" (*FWW* #163, pp. 8-10).

I'm in my early 50s and have just taken up woodworking. Your latest *Tools & Shops* issue (*FWW* #160) was of enormous help to me. Several things occurred after I read the issue. First, I realized that I would need both a jointer and planer to improve my box-making attempts. And second, your reviews allowed for making a much better-informed purchase.

People start various challenges and interests at different times of their lives. I would like to thank *FWW* for your most positive attitude in including articles that reach across the broad spectrum from the beginner to the most experienced.

—Jim Johnson, Brisbane, Queensland, Australia

Demystifying cover lines

For all the years I have subscribed to your magazine, I have intended to write and relay my satisfaction to you for such a great magazine. I have saved them all and have many boxes of them.

In addition to the praise I have preserved for you for several years, I have a complaint that has been with me in receiving each issue you publish. But your magazine is not the only one that does this; it's rampant in most magazines.

My complaint is this: Why not title your feature items inside the magazine the same as you title them on the cover?

—Jim Norwood, Charlotte, N.C.

EDITOR REPLIES: The headlines we write for the inside of the magazine don't always fit in the space allotted for the cover lines (or vice versa). But you raise a valid point: Finding an article should not be a struggle. We'll try harder to make the connection between the cover lines and the articles less cryptic.

A turner's delight

I enjoyed Andy Barnum's "Midi-lathes" (*FWW* #158, pp. 68-73) and found the

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comparison to be very helpful. Recently, I bought a Nova Mercury midi-lathe based on that article—a beautiful machine even though the lathe with bed extension apparently amounted to only 20 in. between centers.

However, it may be of interest to your readers that additional 12-in. extensions can be bolted on to increase the bed length even more for long spindle turning.

—Julian Hamer, Ashland, Ore.

A better way to remember

Gary Rogowski's article "How to Get Straight, Stable Stock" (*FWW* #165, pp. 32-37) covers a subject that I have struggled with on many an occasion. In the article, Rogowski talked about his FEE system (Faces, Edges, and Ends) for the proper sequence during final milling.

I mounted a sign on the wall near my planer with FEE written boldly. When I went to use the acronym, I found that I had forgotten which E stood for Edges and which E stood for Ends. Short-term memory loss is something I sadly suffer from; just ask my wife.

I solved the problem by changing the last E to an N. Instead of FEE, my sign soon read FEN, which of course stands for Faces, Edges, and Ns (eNds): Now *that* I can remember.

—John H. DeRosa, West Dundee, Ill.

Removing glue squeeze-out

I found Jeff Jewitt's Rules of Thumb, "No-mess glue-ups" (*FWW* #165, pp. 86-90), quite interesting. I would like to add one tip that I have found useful when removing glue squeeze-out.

Instead of using a toothbrush like Jewitt suggests, I use a 2-in.- to 3-in.-wide flagged end brush with artificial bristles. First dip the brush in a pail of water, then shake off the excess. Remove the glue while it is wet, and rinse and shake off the brush frequently during the process. The flagged ends will get into sharp corners and down into the grain without leaving behind much water.

Be sure to use a good-size bucket of water, and change it often to avoid making a glue wash. This process has eliminated glue stains for me.

—Robert Geers, Cedar Key, Fla.

Demise of the old ways

I was fortunate enough to attend an engineering high school that required two years of woodworking shop. Some of our shop work occasionally would be interrupted by a crusty old instructor storming out of his office to berate a student who left a plane blade down on the bench, a chisel bevel up, or was storing away a file without wire-brushing the teeth clean.

It seems to me that at least one of these shop rules is now ignored routinely. In the October 2003 issue (*FWW* #165), I see two planes on the front cover that are blade down, as well as other instances on pp. 30 and 56.

Have many folks forgotten that a blade dulled by any reason requires time to sharpen it, or is this just one more old shop tradition that is dying out?

—Wallace C. Knapp, Ellicott City, Md.

EDITOR REPLIES: Okay, I'll take the bait. Ask two or more woodworkers, and you'll get into an argument on this subject. As for me, I have found that a plane lying on its side is a waiting target for other tools (or bare skin) to bump into the exposed iron. When sole-side down on a clean piece of wood, whether bench or workpiece, a plane iron is protected—unless you inadvertently lay it down on another tool or piece of hardware. I keep my bench uncluttered when planing for that very reason. But do what works best for you.

Clarification

A few dimensions were omitted from the article "Chair Making Simplified" by Garrett Hack (*FWW* #166, pp. 80-87). The lengths of the seat rails are as follows, measured from outside shoulder to outside shoulder, along the top edge: front rail, 15⅜ in.; side rails, 15³⁄₁₆ in.; rear rail, 11½ in.

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*, PO Box 5506, Newtown, CT 06470-5506.

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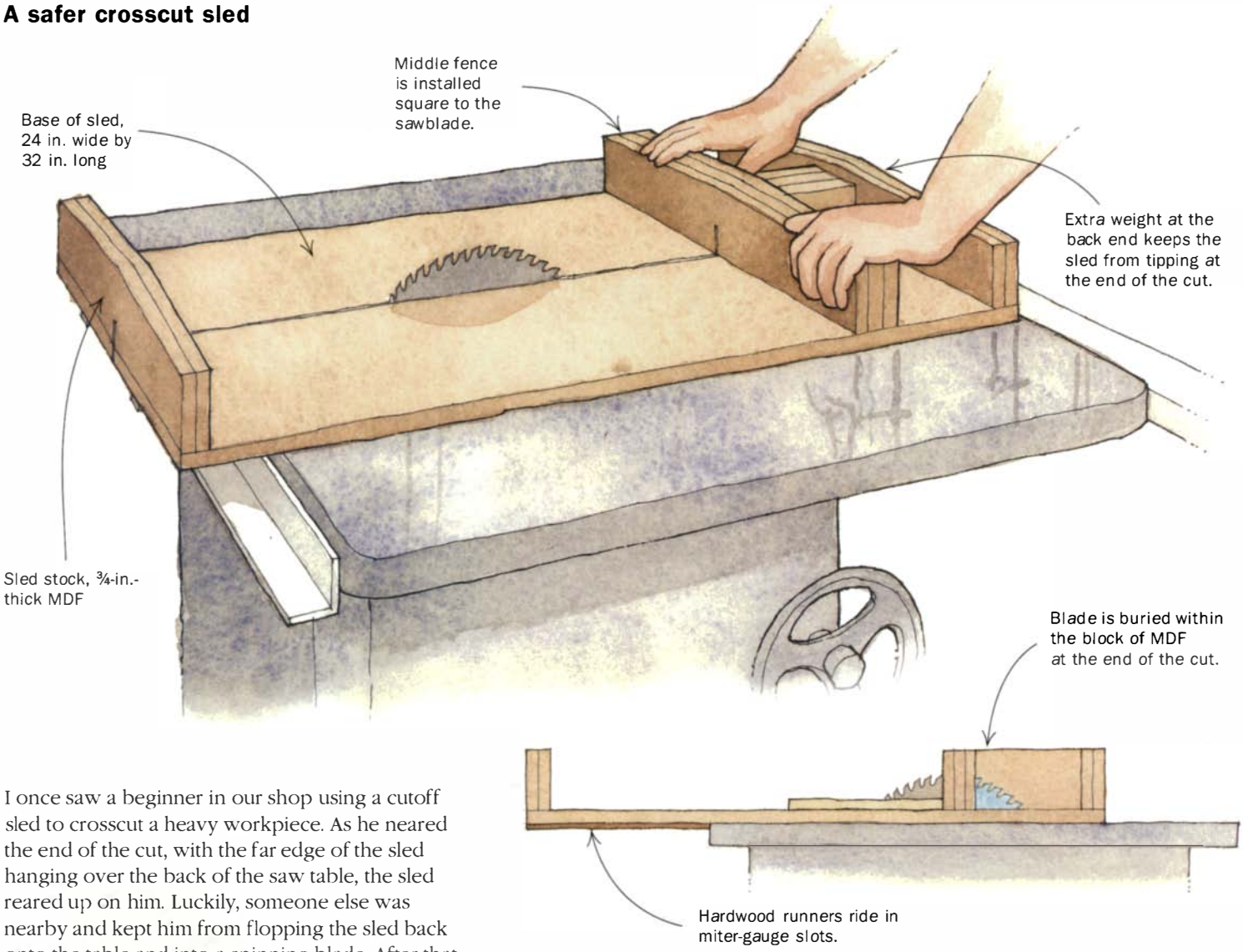
A safer crosscut sled



I once saw a beginner in our shop using a cutoff sled to crosscut a heavy workpiece. As he neared the end of the cut, with the far edge of the sled hanging over the back of the saw table, the sled reared up on him. Luckily, someone else was nearby and kept him from flopping the sled back onto the table and into a spinning blade. After that, the first thing we did was to build an outfeed table for that saw. I also decided to make a new, safer crosscut sled as shown in the drawings above.

I chose to make the new sled of ¾-in.-thick medium-density fiberboard (MDF) because it's inexpensive, it's about as hard as soft maple, and it's very stable. I milled some scraps of hardwood lumber for the runners and cut a 24-in. by 32-in. piece of MDF for the base of the sliding jig. I laminated two pieces of MDF for the front and back fences and three pieces for the middle fence.

I secured the runners with glue and screws because I didn't want to risk any possibility of them coming loose during a cutting operation. After installing the runners, I sealed and lubricated them with several coats of paste wax.

Before attaching the fences, I cut a kerf into the base of the sled to give me a reference edge to which I could square them. Last, I added a block of MDF (three pieces thick) to fit between the middle and back fences. That block of MDF makes it virtually

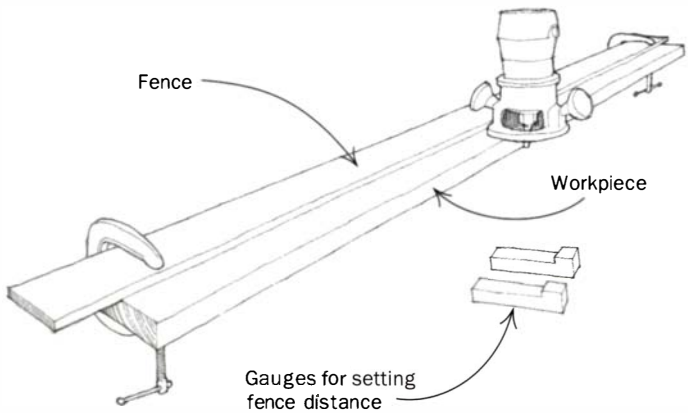
A reward for the best tip

Joe Santapau was inspired to design a safer tablesaw crosscut sled after realizing the inherent dangers in typical shop-built sleds. With his sled (above), the blade is buried completely at the end of the cut. Santapau constructs high-end millwork (doors, moldings, wainscot paneling) for a living, but for fun he spends time turning small boxes on a lathe. For his winning tip, Santapau will receive a set of hand-forged chisels (www.barrtools.com). Send your best tip, along with any photos or sketches (we'll redraw them), to Methods of Work, Fine Woodworking, PO Box 5506, Newtown, CT 06470-5506.

impossible to cut your fingers at the end of a crosscut operation because the blade is completely buried within the MDF.

—Joe Santapau, Yardley, Pa.

Edge-jointing long boards with a router

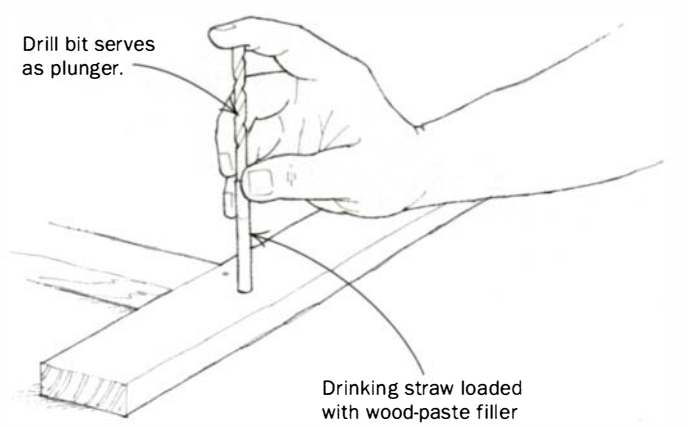


An easy way to achieve an absolutely straight, square edge on a long board is to clamp a reliable straightedge to it and cut it with a router. This works especially well for long and heavy boards, such as those you might use to glue up a tabletop.

I use a ½-in. straight bit in my router and have had great success with this method. The key is an absolutely straight straightedge set just the right distance from the edge so that the router takes a fine cut. To speed the setup, I made a pair of little L-shaped gauges, which let me quickly position the straightedge just the right distance from the workpiece edge. The whole procedure doesn't take much longer than using the jointer, and it is accurate.

—Tom Flader, Fond du Lac, Wis.

Filling nail holes with a straw guide



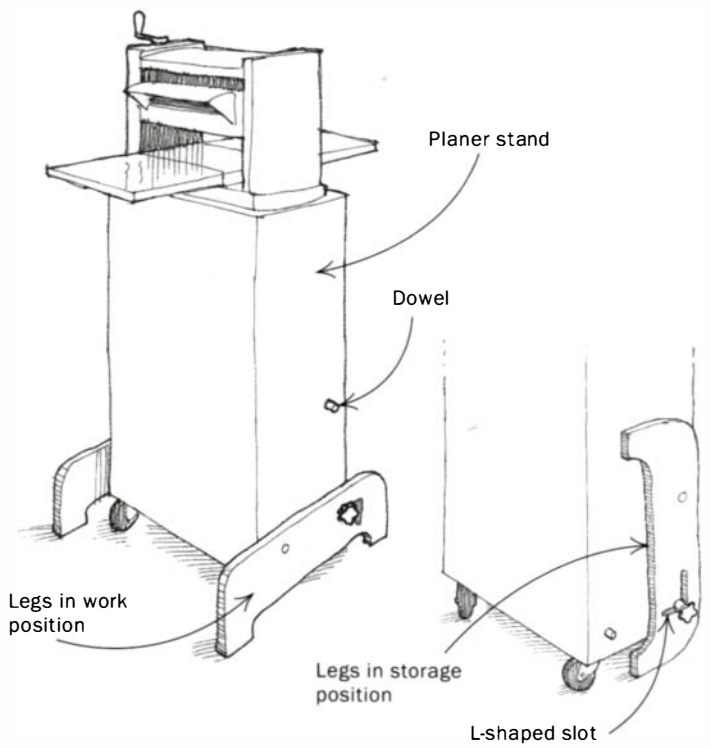
I recently built a mantel that required a lot of finish nails. I wanted a quick and efficient way to fill the nail holes. Here's the simple solution I hit upon that works well and saves both time and filler. Start by cutting about 2½ in. from an ordinary plastic drinking straw and insert the blunt end of a 15/64-in. drill bit (the interior diameter of the straw) into one end to act as a plunger. Dip the other end into a can of filler to force the filler into the straw.

To fill a nail hole, place the straw over the hole at 90° to the workpiece and push down on the drill-bit plunger as you drag the end of the straw across the hole. The result is a perfectly filled hole with no filler residue on the surface. An added bonus is that the filler stays fresh and workable in the straw, not drying out as you work, and you can fill many holes on one charge. Cleanup is a snap, and there is very little sanding to do. When the end of the straw wears out, trim it away. If the filler is too stiff, knead in enough solvent to make it soft and pliable. Also, you can cover the sharp end of the drill bit with a little duct tape to make it more comfortable.

—Jim Hardy, Pisgah Forest, N.C.

Quick tip: When using a drill press to rough out a mortise, the normal procedure is to clamp a fence on the drill-press table to align the holes. To further increase the accuracy of the bored holes, score a small groove down the centerline of the mortise with a marking gauge. The groove produces a center-punch effect to center the bit and keep it from wandering when the wood grain wants to steer it off center. *—Robert R. Starr, San Jose, Calif.*

A compact, stable planer stand



Because I use my planer intensively at times, I needed a stand that put the planer at a comfortable working height, wouldn't tip over during use, and was compact for easy storage. These conflicting criteria yielded a stand that, when stored, is 12 in. deep by 21 in. wide by 41 in. tall, roughly the external dimensions of the planer itself. Unfortunately, a base that stands 41 in. tall but only 12 in. deep is rather unstable when feeding 6-ft. boards through the planer. So I added folding feet (shown in the sketch above) to increase the stability.

The 24-in. by 4-in. feet are mounted on the left and right sides of the stand and can be positioned either vertically for storage or horizontally for work. With the feet in the vertical position, the planer

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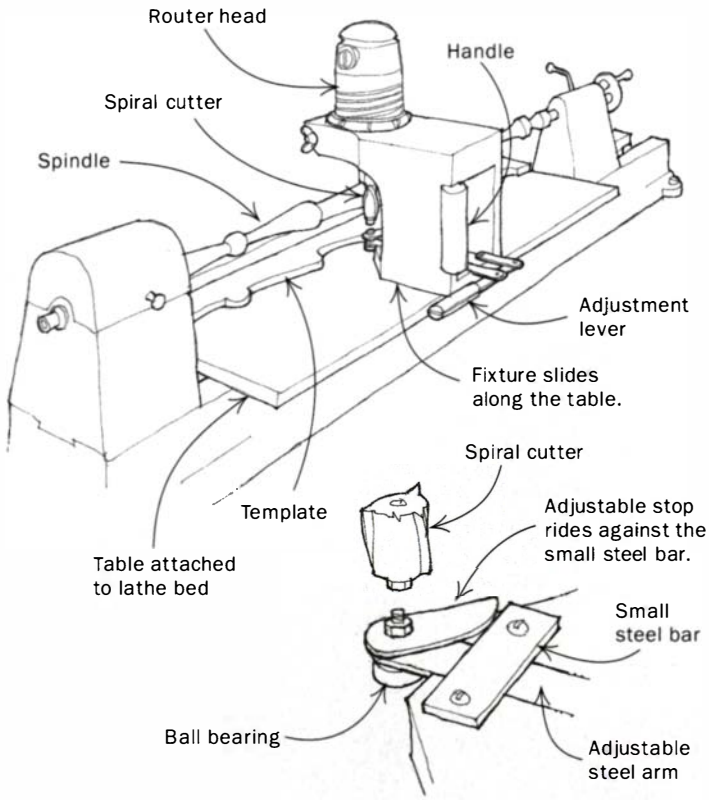
moves easily on casters. However, when the feet are lowered to the horizontal position, they raise the stand off the casters to prevent movement. They also increase the base's footprint to 23 in. by 24 in.—large enough to ensure stability during planing. Each foot is attached to the stand by a ⅜-in. carriage bolt and a plastic knob. An L-shaped groove in the foot allows me to swing the foot from one position to the other without removing the knob.

In addition to the L-groove, I drilled a ½-in. hole in each foot that fits over one of two ½-in. dowels in either the storage or the work position. Thus, moving a foot from one position to the other is simply a matter of loosening the knob and swinging the foot to the other dowel. *—Dean McWilliams, Athens, Ohio*

Router jig for duplicating spindles on the lathe



This shopmade fixture cranks out duplicate spindles quickly, accurately, and with a smooth finish. The one slight disadvantage is that the spiral cutter will not cut sharp spindle profiles such as beads. You will need to keep this in mind when designing your template, or simply add any sharp spindle profiles by hand later.

To make the fixture, first build and attach a flat table to your lathe bed. This table provides a surface on which to slide the fixture back and forth and an attachment location for the duplication template. In building the fixture, you will need to adapt the dimensions to your lathe and router. Just make sure that when the spiral cutter is mounted in the router, the bit is vertically centered, more or less, on the axis of the workpiece.

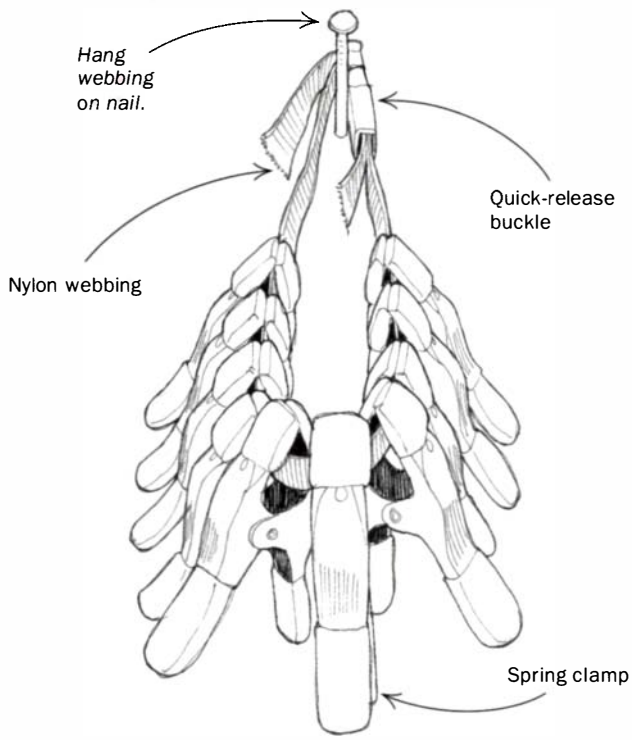
You will need to provide some bearing surface centered underneath the cutter to follow the template. I used a small ball bearing mounted on an adjustable steel arm, but ideally, the bearing should be the same diameter as the cutter. The arm adjusts in and out at the back with a lever. An adjustable stop attached to the bearing end of the arm stops the cutting action at the desired finish radius. I also added a handle to the left side of the fixture so that I can slide it easily back and forth on the table.

To use, I first cut the template in the desired shape and mount it to the flat table under the workpiece. Then I extend the bearing so that the spiral cutter barely touches the spindle workpiece. In a series of shallow cuts, I slide the fixture down the length of the template, increasing the depth a bit before each run. Eventually, the bearing will hit the stop to make the desired final radius on the spindle.

—Claude Graham, Jacksonville, Fla.

Quick tip: I line the bottom of my tool drawers with scraps of carpet. This protects both the tools and the drawers and keeps the tools from sliding around. *—Don Klimesh, Brownstown, Pa.*

Storing spring clamps



I have several dozen spring clamps, and I've struggled for years to find a simple, organized way to store and transport them between jobs. Recalling how my climbing buddies keep large amounts of gear organized and available on slings, I made a simple sling with a 2-ft. length of 1-in.-wide nylon webbing (available at most camping and climbing stores). This sling easily holds 10 of my 2-in.-capacity clamps. Keeping the same number of clamps on each sling is an easy way to quickly grab the number you need without counting. Use a narrower width of webbing for smaller clamps.

The sling makes it easy to carry a large number of clamps and to hang them over a nail or peg in my workshop or at a job site. You can tie the sling with a loose knot or use a quick-release buckle (also sold at camping stores). You can open the sling easily to dump the clamps onto a worksurface, or thread them back onto the sling without having to squeeze them all.

—Philip Jacobs, Saint Paul, Minn.

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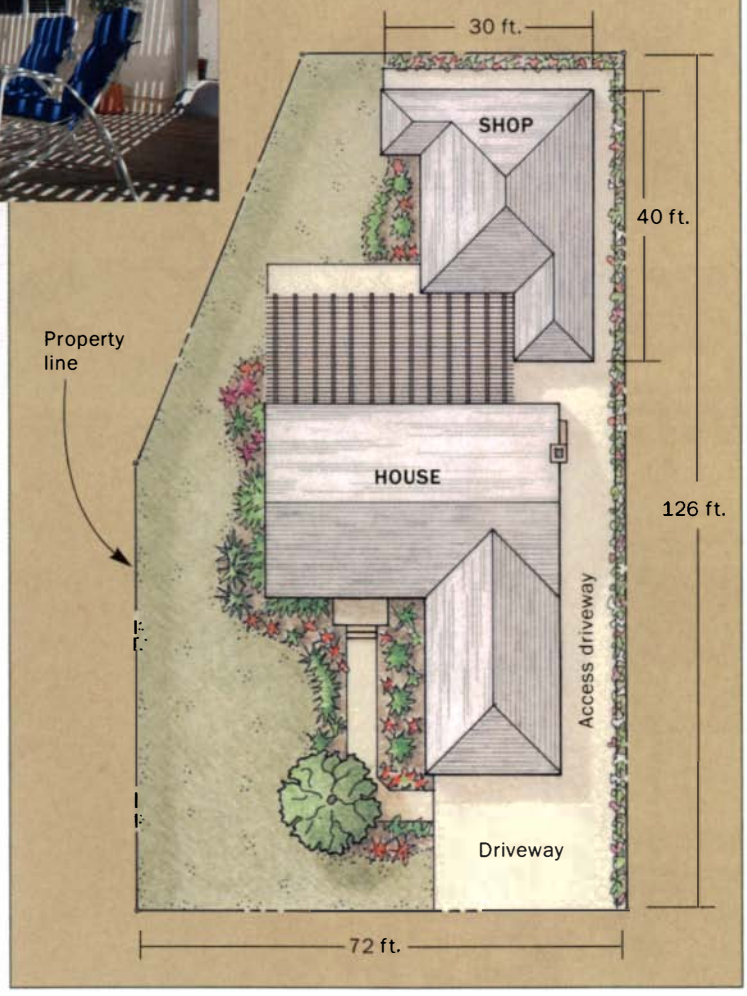
BY RICK McCASKILL

A shop in the backyard

GOOD PLANNING ENSURES THE BEST USE OF LIMITED SPACE

To conform to zoning regulations, the footprint of McCaskill's shop couldn't exceed 40% of the backyard area. The building couldn't be any closer than 6 ft. to another structure or 5 ft. to the property line, and its height could not exceed 15 ft. In addition, the building's exterior had to match that of the house.



I have been building furniture for 35 years. Along the way, it seems I acquired most every woodworking machine and hand tool imaginable. Eventually, I had a problem finding a place for them in my two-car garage. I'd long ago given up parking my car there and was beginning to have trouble finding room for my wife's car. And every time I wanted to do some woodworking, the car had to be backed out before the machines could be rolled into open spaces.

Then, one evening last summer, as my wife and I sat on our patio, it occurred to us that the backyard represented a lot of space that wasn't getting much good use, especially since our children were grown and out of the house. We decided the perfect use for the space would be the woodworking shop I'd always wanted.

Working around zoning regulations

My first step was to check with the city zoning officials to learn if I could build such a structure in our backyard. Their answer, in short, was no. However, a specific reason for the rejection was hard to get at, so I politely began asking more questions. Eventually, after an inspector got involved and consulted a book on zoning restrictions, he concluded that an accessory building would be okay as long as it didn't have a kitchen or bath.

The inspector's okay came with some limitations. The building footprint couldn't exceed 40% of the backyard area. Also, it could not be any closer than 6 ft. to a structure or 5 ft. to the property line. The building had to have an exterior that matched our house, and it couldn't exceed 15 ft. in height.

With these restrictions factored in, I determined I had room for a 940-sq.-ft. building. I then sketched a plot plan for the zoning officials to show both the house and workshop building. After their review, I had the zoning okay I needed.

Designing the shop building

Having cleared zoning, I started designing the shop. I purchased computer-aided design (CAD) software from Punch called Home Design Architectural Series (available at many home-electronics stores). It allowed me to design the building with relative ease.

Based on research and personal requirements, I concluded that the shop should have three rooms: one big and two small. The main shop room would have all the electrically powered machinery and tools. It also would house a long cutting bench for my radial-arm saw and miter saw. A smaller assembly room with a workbench, separate from the main room, also was important. So, too, was a small storage room to contain some of the especially noisy equipment, like the vacuum system and air compressor.

The cutting bench extends nearly the full length of a 40-ft.-long wall so that I can easily crosscut long boards. To make efficient use of space, my design included storage underneath the bench. And

Photos, except where noted: Dean Dellaventura; drawings: Vince Babak

because the wall was windowless, I added a bank of cabinets above the bench.

I determined that the assembly room would work nicely just off the west end of the patio. That location allowed for a 5-ft.-wide sliding door that opens to an access driveway, making it convenient to bring wood in and finished furniture out.

The next key item was lots of power, both 115v and 220v. Because I was pulling the main power off my existing home, I had 100 amps available for the shop. That was enough to allow multiple circuits, including one for each of my heavy, power-consuming tools.

Starting small. *A scale model, with a removable roof, provided a useful three-dimensional view of the shop plan.*

To provide clearance when working with long boards or 4-ft. by 8-ft. sheet goods, I wanted a 10-ft.-high ceiling. Also, I didn't want support posts in the open area of the shop, as posts always seem to get in the way. But it took some extra planning to meet those two requirements. Indeed, I had to get some help from a structural engineer. We devised a gable-roof design using two 25-ft.-long, 8-in. by 14-in. solid-wood beams, each weighing 1,000 lb. The result is an attractive open-beam look.

With the floor plan worked out, I was ready to tackle the placement of the machines, an important step because it would define where I should place the electrical components and the drops for the air compressor and vacuum system. The CAD software made it easy to add scaled-down drawings of the machines and to move them around the floor plan until I was satisfied there was adequate access to each one.

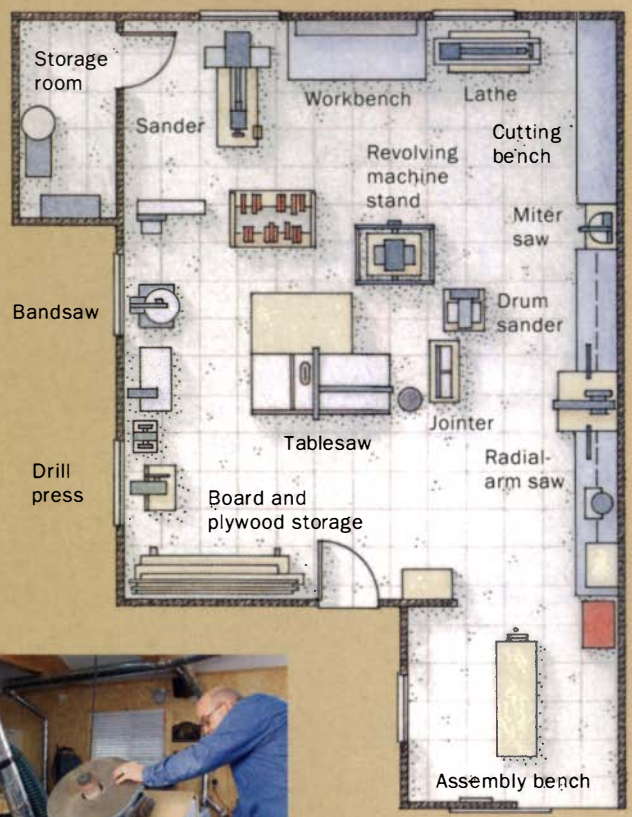
To make sure I was correct, though, I wanted to have a 3D view of the building. So, using Foamboard, I built a scale model of the shop, including the cutting bench and machines. Looking at the model allowed me to foresee that the large beams were going to create problems with the windows, skylights, machinery placement, and sliding door. Working with the model proved to be time well spent, as it is much easier to change Foamboard than wood.

The last of the planning focused on making the shop comfortable. I wanted to have as much natural light as possible, so windows and skylights were important. I included in my design five large, energy-efficient, low-E, low-noise windows along with four skylights. I also included a 2-ton central heating and air-conditioning system, a practical addition in Southern California. Because I spend a lot of time in the shop, I also installed a 19-in. television, a DVD and VCR player, and a surround-sound speaker system.

To reduce the use of air conditioning, I planned for five ceiling fans. For additional energy efficiency and to diminish the amount of machine noise getting out into the neighborhood, I installed extra insulation—R30 value in the ceiling and R13 in the walls. Last, I decided to make the floor more comfortable by covering it with interlocking ⅝-in.-thick by 2-ft.-square rubber mats. The mats also are friendlier on dropped tools.

A WIDE-OPEN FLOOR PLAN

Engineered beams eliminate the need for support posts that take up space and get in the way. The entire shop floor is covered with interlocking rubber mats that are easy on the feet.



Space-saving stand. *A Sears/Craftsman revolving workstation holds three benchtop machines: a spindle sander, a benchtop planer, and a pocket-hole cutter.*

For safety, I wanted all of the electrical outlets to have ground-fault circuit interrupters (GFCI). This device recognizes when current has escaped from its intended circuit and instantaneously shuts off any further current flow. And although not required by code, an overhead sprinkler system was installed to provide added peace of mind.

In addition, I included a 2-hp dust-collection system with a 1-micron filter, one that automatically activates the vacuum and

Photos, this page: Tom Begnal

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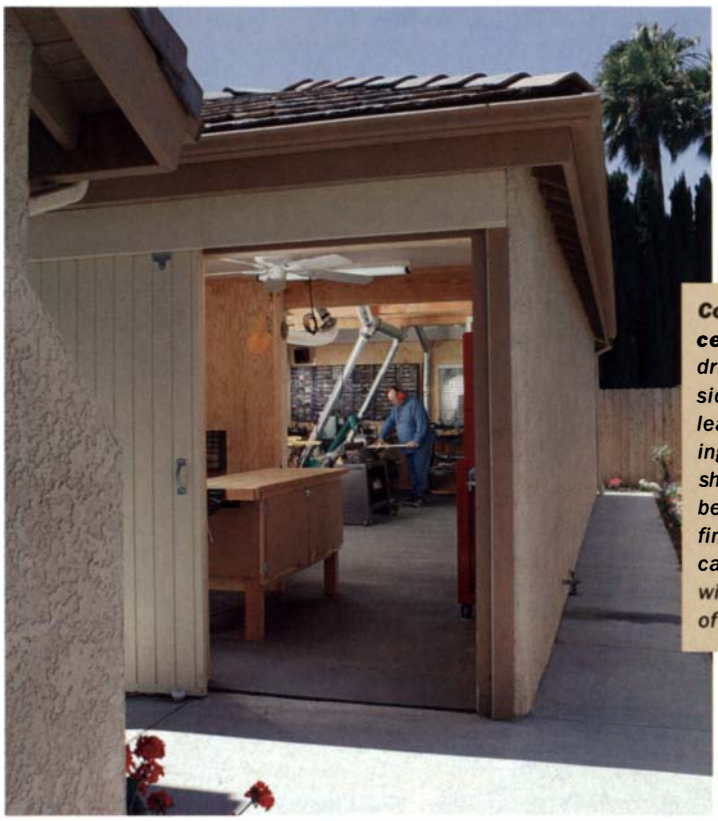

Convenient access. *An auxiliary driveway along one side of the house leads to a wide sliding door at the shop, so wood can be brought in and finished furniture can be removed with a minimum of hassle.*

gates when a machine is turned on. Steel ducts eliminate any static discharge, and dust missed by the collection system is picked up by a ceiling-mounted air cleaner, also with a 1-micron filter.

Construction went smoothly

The contractor and city officials accepted my CAD drawings, so there was no need to hire an architect, a savings of about $5,000. I also saved about $35,000 by doing much of the work myself. Contractors were used only to build the cement foundation, the exterior structure, and the roof; to install the heating and air conditioning; and to bring in the main power.

I had no problem doing the electrical, plumbing, and finishing work. From start to finish, the shop construction took about five and a half months. For the ceiling, I decided on drywall, painted white for added brightness. Beadboard-plywood interior walls provide a warm wood look that goes nicely with the wood beams in the cathedral. It's also a good surface for mounting cabinets and hanging tools.

Sticking to my original budget was tough, but I managed to keep it close. The total construction cost of the shop was about $83,000, less the tools, benches, and cabinets that I moved from the garage. A not-so-small side benefit: My wife and I now have plenty of room to park both of our cars in the garage. □

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Tools & Materials

Battery-powered nailers

Every now and then, someone designs a tool that forever changes the way we look at all other similar tools. Senco has done just that with its new AirFree series of power nailers. No need for a compressor, air line, or gas cartridge—all of the required energy comes courtesy of a single rechargeable battery.

Senco's AirFree 25 handles 18-ga. brad nails up to 2 in. long, while the AirFree 41 drives 15-ga. finish nails in sizes up to 2½ in. long.

A small electric motor provides all the nail-driving power that's needed. It takes no more than a second or so for the nailer to power up for single shots. For continuous nailing, nails can be fired less than a second apart.

A fully charged battery typically can drive more than 500 nails, although the exact number is going to vary based on the nail size and the material being joined. When the battery charge gets low, the motor won't power up fast enough to trigger the plunger. That's a plus because it practically eliminates partially driven nails. The batteries on both AirFree models recharge in less than an hour.

In my tests, each tool was equipped with the largest nails they accept. Then I drove the nails into hardwood, setting them just below the surface. Both nailers worked well, showing plenty of power. Occasionally, I'd get an unset nail, but no more frequently than with my air-powered nailers.

The safety bar on the brad nailer is a bit large and awkward for nailing small trim. I either couldn't get the brad placed far enough into small coves, or the bar would slip off small half-rounds, resulting in misplaced or misfired brads.

SENCO AIRFREE 41
Nails: 15-ga. finish
Battery: 14.4v
Price: About $335

SENCO AIRFREE 25
Nails: 18-ga. brads
Battery: 12v
Price: About $290

Shim-free slot cutter from Amana Tool

A new slot-cutting router bit from Amana, called the E-Z Dial, makes it easy to adjust the width of a slot cut. Changing the width is just a matter of turning a built-in dial and then tightening a locking nut. It would be especially useful for those who struggle to get a snug fit when using plywood that's less than full thickness.

The carbide-tipped bit is available in two size ranges: ⅛ in. to ¼ in. thick and ¼ in. to ½ in. thick. Turning the dial lets you adjust the slot to any size between the upper and lower ranges. Both bits cut a ½-in.-deep slot, although a shallower depth can be had simply by repositioning the router-table fence.

With a ⅛-in. to ¼-in. bit set up in a router table, I made several full-depth cuts in some hard-maple stock. The cuts were made on both edge and end grain at several widths, with adjustments made between each cut. The cuts looked smooth, with no noticeable

Variable slot-width. *A new slot cutter from Amana, available in two sizes, lets you easily fine-tune the width of the slot.*

Photos, except where noted: Rodney Diaz

No hose necessary. *Senco's two new battery-powered nailers eliminate the need for a compressor, air line, or gas cartridge—and both worked remarkably well.*

A depth-of-drive control is located conveniently on the back side of the motor housing, making it quick and intuitively easy to adjust the nailset depth. The only complaint I have about the device is that the drive-control knob is almost too easy to adjust: I found myself inadvertently changing the depth of set by moving it with the back of my hand when working in tight corners. A few protruding nails in hard-to-reach spots makes one careful not to massage the control again.

Since the arrival of these nailers, my compressed-air nailers are gathering dust. Now, if only Senco could use this technology to make a small, airless pin nailer, I'd be in nailer Nirvana.

For more information, contact Senco at 800-543-4596 or visit the company's Web site at www.senco.com.

—Roland Johnson is a furniture maker in Sauk Rapids, Minn.

chipout or tearing of the wood. Dialing in a wider or narrower cut required little fussing.

Each cutter sells for about $100. For more information, contact Amana at 800-445-0077 (www.amanatool.com).

—Tom Begnal is an associate editor.

Dial-a-slot. *Turning a dial on the bit allows for adjustments in width as small as 0.004 in.*

Trade shows spotlight the latest tools

Two big woodworking trade shows were held once again this past summer. In Anaheim, Calif., at the Anaheim Convention Center, the biannual Association of Woodworking & Furnishings Suppliers (AWFS) Fair ran for four days. Less than a week later, in Chicago, McCormick Place opened its doors for three days to host the National Hardware Show.

With more than 800 exhibitors filling some 400,000 sq. ft. of floor space, the AWFS show attracted more than 20,000 attendees. The National Hardware Show took up 475,000 sq. ft. inside McCormick Place and drew more than 27,500 attendees. Not surprisingly, at both shows few topics were more widely discussed than good choices for comfortable shoes.

Many manufacturers use these shows to introduce new tools. This year was no different. Here's a quick summary of what I saw. Look for several of these tools to get hands-on testing in future issues of *Fine Woodworking*.

New router from Porter-Cable

Routers keep getting better at adapting to router tables, as evidenced by this new addition to the Porter-Cable line. Model 890 has a fixed base with a 2¼-hp, soft-start, variable-speed motor. An electronic-feedback system maintains speed, even when the bit suddenly has to work harder, as when cutting through a knot.

The 890 has several worthwhile features, some of them unique to this router. For starters, when in a router table, the motor can be locked to the base—or unlocked—from above the table using a standard 3/16-in. hex socket or an accessory socket wrench available from Porter-Cable. That same wrench lets you adjust the height of the bit and fine-tune the setting. To access the router with the wrench, though, a hole must be drilled in the table.

A couple of good things happen when the router collet is fully raised. First, the collet nut extends well above the table, so it can be grabbed easily with a collet wrench to provide for above-the-table bit changes. And second, the collet automatically locks in place, so it takes just one wrench to make the change. Also, when fully raised, the switch automatically locks in the off position to prevent the motor from inadvertently starting while the collet is locked.

Porter-Cable also has created two other bases that accept the 890 motor: an open-grip D-handle base, which includes a dust port, and a plunge base. Switching the motor from one base to another is just a matter of unlocking it, slipping it into the new base, and then relocking it. The 890 sells for about $200. Several combination kits that match the motor to one or

Photos, this page: Roland Johnson (top left); courtesy of Porter-Cable (right)

Woodjoy standard scraper

With its long maple handle, the Woodjoy standard scraper is comfortable to use. A brass insert firmly secures the A2-steel blade in place and also serves as the sole of the scraper. I was impressed with the transparent shavings and fine finish the scraper produced. Anyone in need of a high-quality scraper will find this one, priced at $50, to be a good value. For more information, contact Woodjoy at 508-669-5245 (www.woodjoytools.com).

—Chris Gochnour is a furniture maker in Murray, Utah.

Smooth surfaces on curved work. *The new standard scraper from Woodjoy will appeal to those who demand a blemish-free finish on sculpted or contoured work.*

Tormek now offers a universal support that's micro-adjustable

I've used a Tormek sharpening system for years. The machine is a slow-turning water wheel that is available with a variety of attachments for sharpening just about anything under the sun. All of the attachments mount on a universal support rod, which is raised or lowered to adjust the sharpening angle. The Tormek system now features a universal support rod with a micro-adjust feature, which allows for quick and precise height adjustments. It worked well and proved to be an improvement to an already nice machine.

The new support rod is standard on all new machines, but owners of earlier machines can purchase the support for about $30.

For more information, go to www.tormek.com.

—Mike Pekovich is the art director.

Micromanagement. *Setting the height of the support rod on the Tormek is easier thanks to a new micro-adjust feature.*

Trade shows (continued)

more bases also are available. For more information, call Porter-Cable at 800-487-8665, or log onto www.porter-cable.com.

Laguna 14-in. bandsaw has 12-in. resaw capacity

Other 14-in. bandsaws require the addition of a riser block to resaw 12-in.-wide boards. Laguna's new LT14SE, a stretched-out version of its LT14 saw, comes from the factory with that capacity, so a riser block isn't needed. It also has a 2-hp, 220v motor and ceramic guides, and it accepts blades from 1/16 in. to 1 in. wide.

Unlike most other 14-in. bandsaws that have the trunnions and trunnion support made from die-cast aluminum, the Laguna's are cast iron. As a result, the table is less likely to flex when cutting a heavy board.

The LT14SE sells for about $1,095. For more details, contact Laguna at 800-234-1976 (www.lagunatools.com).

Felder upgrades 700 Series combination machines

Felder has made some noteworthy upgrades to its CF731 and CF741 combination machines: The machines have a better sliding table and, for the first time, they accept a special dado cutter.

The sliding table, new to the 700 Series, is the same system used on the pricier 900 Series sliding tablesaw. With larger bearings arranged in an "X" pattern, the weight of the table is better distributed on the ways, according to Felder.

The ability to accept the cutter—Felder calls it a slot cutter—is a standard feature on all Felder machines equipped with the "professional package" (including stand-alone tablesaws). It's an option on all other models. The 9-in.-dia. slot cutter essentially is a molding head with four reversible insert cutters.

Prices start at about $11,000 for the standard CF731 and $13,500 for the standard CF741. For more information, contact Felder USA East at 866-792-5288 or Felder USA West at 800-572-0061 (www.felderusa.com).

Shimless stacked dado from Freud

Freud's SD608 Dial-A-Width Stacked Dado Set adjusts to make cuts of various widths without the need for shims. And it can cut dadoes from 1/4 in. to 29/32 in. wide.

All it takes to change the cutting width is a quick turn of a dial. Each mark on the dial represents 0.004 in. And adjustments can be made while the dado cutter is in the saw. According to Freud,

Photos, this page: Chris Gochnour (top left); courtesy of Laguna Tools (right)

Wood-movement reference guide

For many woodworkers, predicting how much a board is going to change in width due to seasonal changes in humidity is pretty much a seat-of-the-pants guessing game. Of course, there has long been a formula for calculating wood movement, available in the *Wood Handbook* (U.S. Department of Agriculture), but the formula has just enough uppercase letters to scare off most liberal-arts majors.

Now, however, the *Wood Movement Reference Guide* from Lee Valley Tools (800-871-8158; www.leevalley.com) takes that same information from the government's book and makes it more convenient and user-friendly. Simply spin the dial to the desired wood species and use the resulting data to determine the amount of movement. The guide sells for about $4.95. —*T.B.*

Manufacturers' news

Changes at Ridge Tool

Keeping track of who makes what and where isn't always easy these days. For example, Ridge Tool Co., maker of Ridgid tools and part of St. Louis-based Emerson Electric, recently announced that it is no longer in the business of manufacturing woodworking power tools. Instead, the company will license the Ridgid brand name to One World Technologies, which will build the tools overseas.

One World Technologies, located in Anderson, S.C., is part of Techtronic Industries (TTI), a Hong Kong company. Ridge Tool will continue to be involved in the design and quality standards of the line.

TTI has owned Ryobi Power Tools in North America since August 2000. TTI also builds some power tools for the Sears/Craftsman line.

In related news, this past August, Ridge Tool introduced a new 35-tool lineup of corded, cordless, benchtop, and stationary equipment for professional contractors, builders, and woodworkers. In the past, The Home Depot has been the exclusive outlet for Ridgid woodworking tools. Now, however, although The Home Depot is still the exclusive home-center retailer of the line, the tools also are sold nationally in electrical, plumbing, and industrial-supply centers.

In addition, Ridge Tool has revised its product warranty for this new line. Instead of the previous lifetime warranty, which covered material defects and workmanship, the company now has a 90-day satisfaction guarantee and a three-year limited warranty.

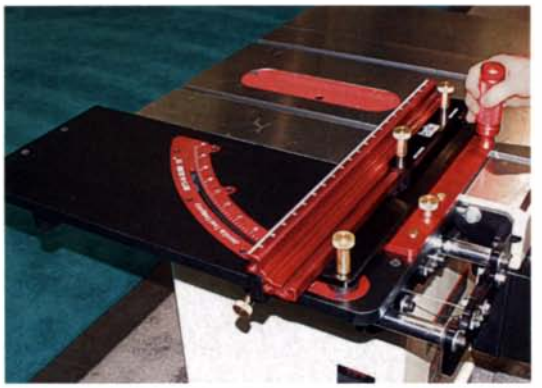
—*T. B.*

Trade shows (continued)

the set cuts dadoes with flat bottoms. That's a feature some other quick-adjusting dado cutters have had trouble with.

The SD608 includes two 8-in.-dia. outside blades with 24 carbide-tipped teeth, five chippers, a wrench, and a plastic carrying case. it sells for about $250. For more information, contact Freud at 800-334-4107 (www.freudtools.com).

Tablesaw sliding table from JessEm



The Mite-R-Slide TS, a new product from JessEm, is a sliding table that mounts to the left side of most cabinet saws to provide 24 in. of crosscut capacity. it includes a miter fence adjustable to 45°. The Mite-R-Slide TS sells for about $450. Further details are available toll-free at 866-272-7492 or at www.jessem.com.

Jet minilathe has variable speed

A turn of a knob is all it takes to vary the spindle speed from 500 rpm to 3,900 rpm on Jet's new Model JML-1014VS minilathe. Variable speed eliminates fussing with belts or pulleys.

Also featured is a ½-hp totally enclosed fan cooled (TEFC) motor and a cast-iron lathe bed. A TEFC motor is less likely to suffer from clogged chips or sawdust. And cast iron is good at absorbing vibration. Model JML-1014VS sells for about $380. More information is available from Jet at 800-274-6848 (www.jettools.com).

Not your father's Delta bandsaw

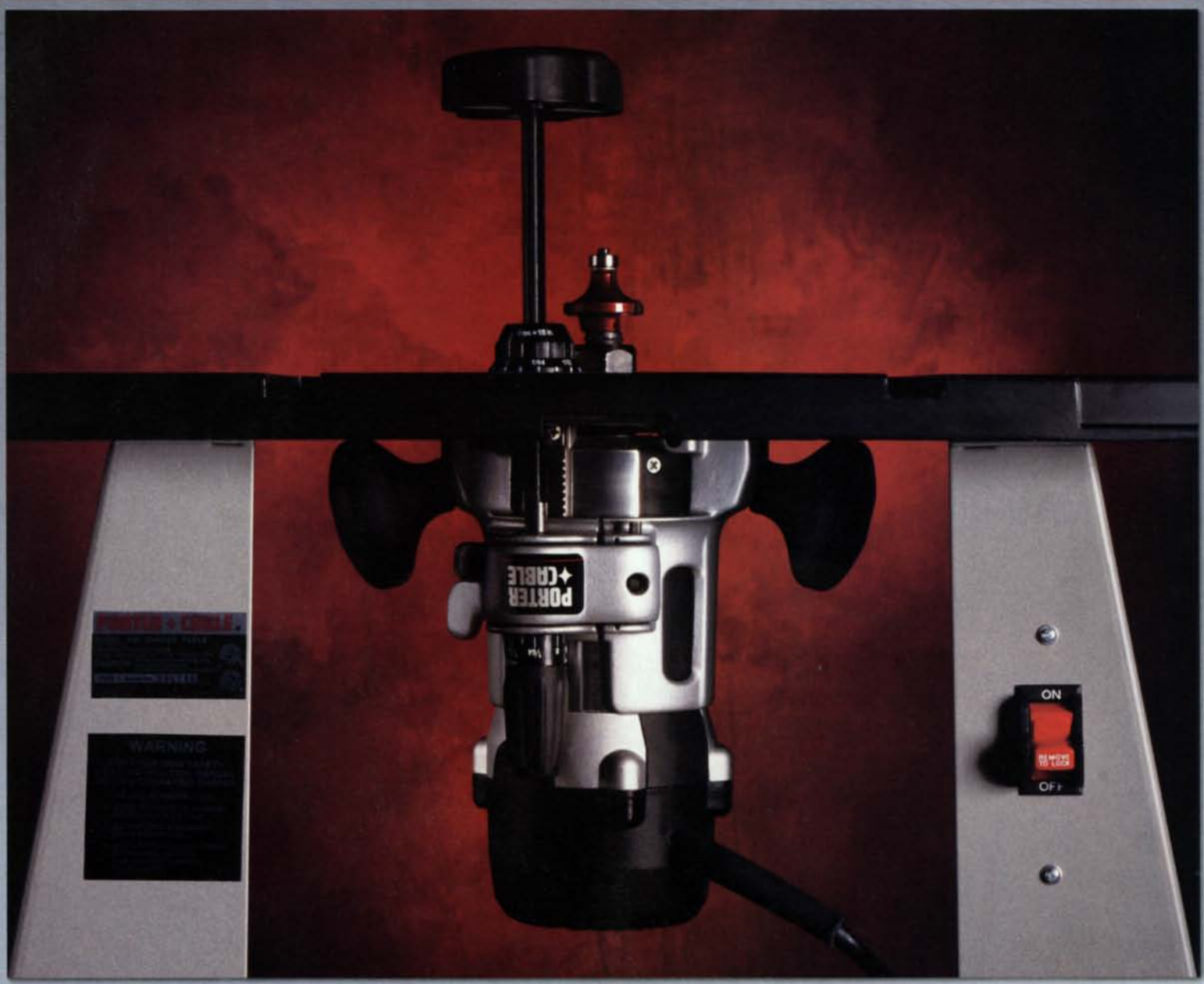
The folks at Delta have added some useful bells and whistles to their venerable 14-In. bandsaw. Dubbed the X5, it features a 1½-hp motor, a 16-In. by 16-In. cast-iron table, a table insert with a small dust-extraction hole just behind the blade, a 4-In. dust port, an upper blade-guide assembly that won't free-fall when loosened, and a quick-release tension gauge. Unlike most other 14-In. bandsaws, Delta makes the trunnion support from cast iron to minimize table flexing when cutting a heavy board.

The Delta 14-In. X5 bandsaw sells for about $900. As part of the X5 promotional series, purchasers can select from one of four free tools or a $50 rebate. A coupon book is included as part of the promotion. You can get additional information by calling 800-438-2486 or logging on to www.deltamachinery.com.

—T.B.

Photos, this page: courtesy of Lee Valley Tools (left); Asa Christiana (right)

MAKE HEIGHT ADJUSTMENTS UP HERE.



NOT DOWN HERE.

ABOVE THE TABLE AND BELOW, THE NEW 890 IS A ROUTER UNLIKE ANY OTHER. Replace bits and adjust heights without reaching under the table. Shut down from any grip. Change speeds for any project. What's more, the 2 1/4 HP soft-start motor moves effortlessly between fixed, plunge, even model 690 bases. In other words, it's the most versatile router on the market. Looks like someone has turned the router world on its head. For the nearest dealer, call 1-800-4US-TOOL [US], 1-800-463-3582 [CANADA], or visit porter-cable.com. SMOOTH TRANSITIONS AT YOUR FINGERTIPS.

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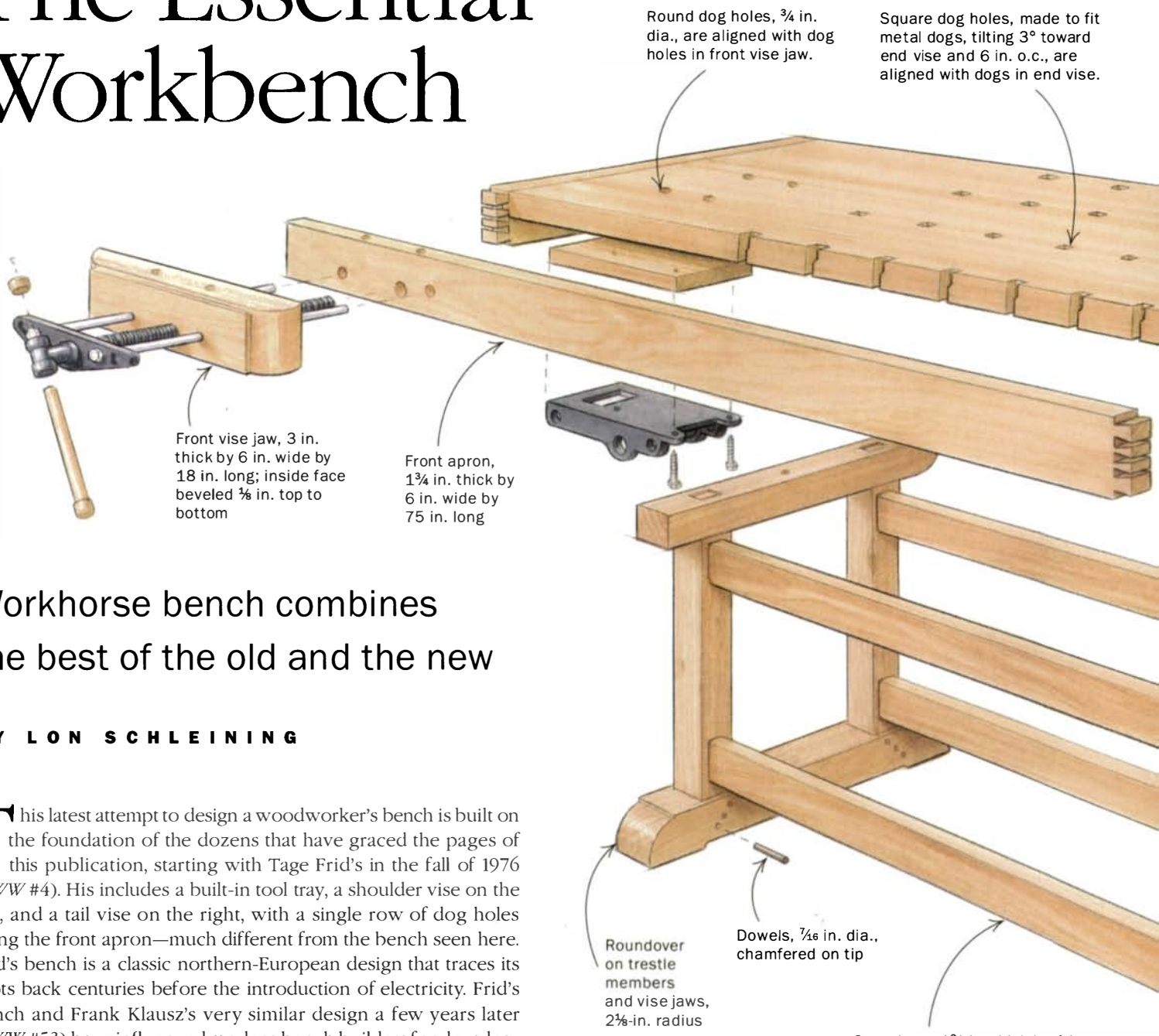


Workhorse bench combines the best of the old and the new

BY LON SCHLEINING

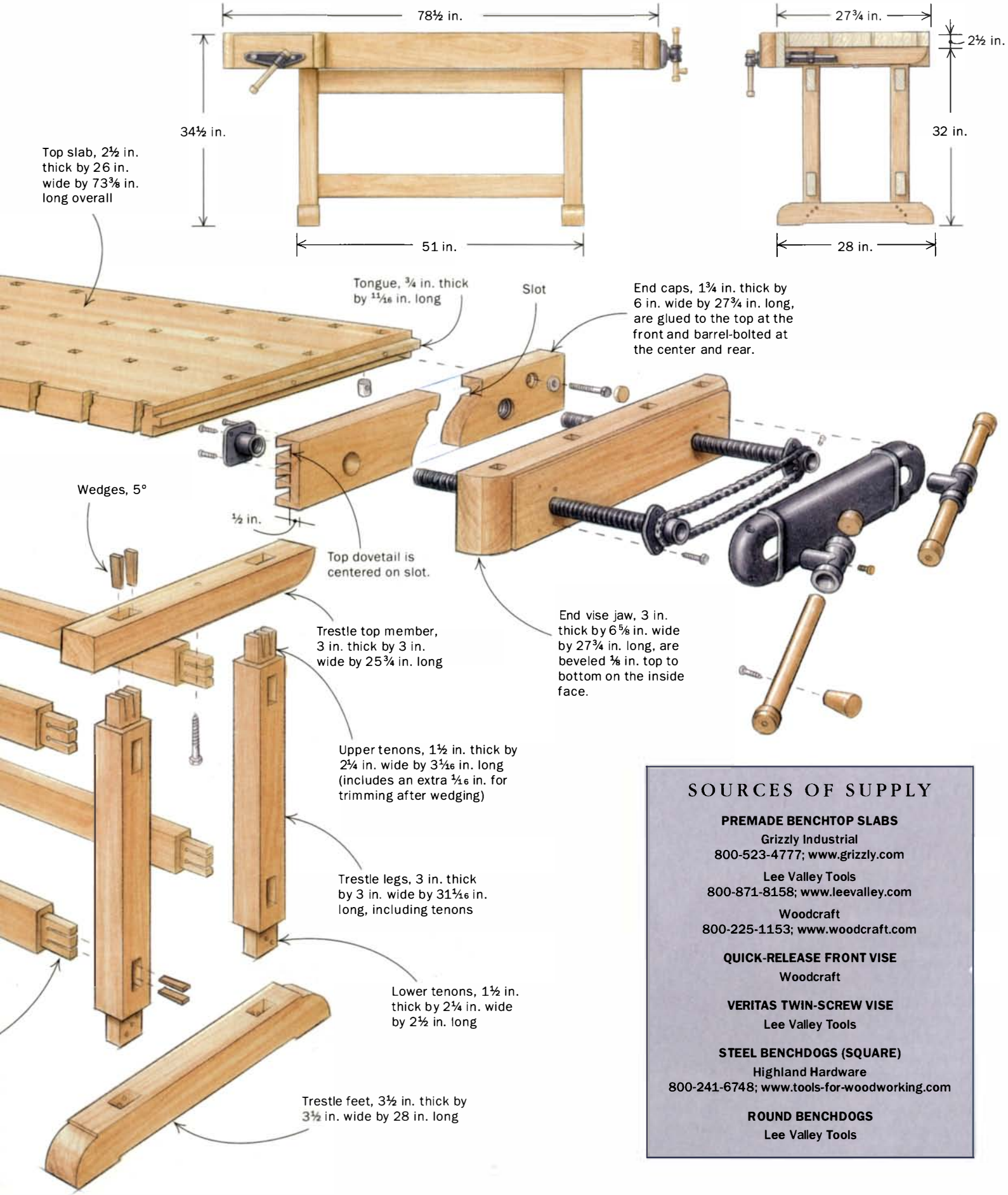
This latest attempt to design a woodworker's bench is built on the foundation of the dozens that have graced the pages of this publication, starting with Tage Frid's in the fall of 1976 (*FWW* #4). His includes a built-in tool tray, a shoulder vise on the left, and a tail vise on the right, with a single row of dog holes along the front apron—much different from the bench seen here. Frid's bench is a classic northern-European design that traces its roots back centuries before the introduction of electricity. Frid's bench and Frank Klausz's very similar design a few years later (*FWW* #53) have influenced modern bench builders for decades.

Several *Fine Woodworking* editors and I recently collaborated on designing an essential workbench for today's woodworker, one that is straightforward to build without compromising performance. This bench was designed to be a tool—more workhorse than showpiece. We did not include traditional components simply for history's sake, and we took advantage of modern innovations. We also wanted this bench to be a project that most woodworkers could build using tools found in an average small shop: tablesaw, portable planer, crosscut saw, router, drill press, and hand tools. The

ANATOMY OF A WORKBENCH

This bench consists of (and construction proceeds in this order): a trestle base joined with mortise-and-tenons; a thick top laminated from boards set on edge; and front and end vises, both with wood jaws.

Drawings: Bob La Pointe



SOURCES OF SUPPLY

PREMADE BENCHTOP SLABS

Grizzly Industrial
800-523-4777; www.grizzly.com

Lee Valley Tools
800-871-8158; www.leevalley.com

Woodcraft
800-225-1153; www.woodcraft.com

QUICK-RELEASE FRONT VISE

Woodcraft

VERITAS TWIN-SCREW VISE

Lee Valley Tools

STEEL BENCHDOGS (SQUARE)

Highland Hardware
800-241-6748; www.tools-for-woodworking.com

ROUND BENCHDOGS

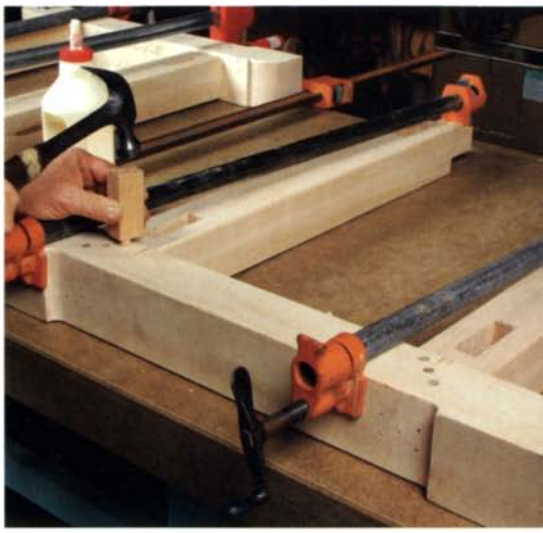
Lee Valley Tools

BASE ASSEMBLY

The deep mortise-and-tenon joints are either draw-pinned or wedged to ensure decades of rigidity. First, assemble the trestles, then add the long stretchers to complete the base.

BLIND MORTISE-AND-TENONS ARE PINNED FOR STRENGTH





The feet are pinned to the legs. *Start by drilling the dowel holes in the feet, dry-fitting the joints, and transferring (left) the dowel-hole locations to the tenons. Then use a center punch (center) to offset those locations slightly on the tenons, creating the draw effect. Last, apply glue to all surfaces, assemble the joint, and drive home the dowels (right).*

only heavy-duty tool I used was a 3-hp tablesaw. Ripping lots of 8/4 maple puts a strain on even a large saw, so use a clean, sharp blade.

A durable workbench requires beefy parts

Avid woodworkers themselves, *FWW* editors regularly visit shops across the country, and they see a wide array of workbench configurations. Like all woodworkers, they know what they like and don't like. In the end we all compromised a bit, but we reached a solid consensus. My own involvement arose from having spent the last year researching and writing a book on workbenches (look for it in the fall of 2004 from The Taunton Press). I was commissioned to finalize this design, write the article, and build the bench.

A thick, solid top—We decided on an overall size of 28 in. wide by 6 ft. long. Add a few inches for vise jaws, and it's a nice, big top. The editors thought 2 in. in top thickness would be plenty, with extra thickness at the edges, but I made this top 2½ in. thick because it wasn't much more difficult to mill and laminate thicker pieces. However, if you start with a premade bench slab, the standard 1¾-in. thickness offers plenty of mass and solidity for serious handtool use, especially after adding the thicker apron and end caps.

Gluing up the slab allowed me to machine the square dog holes before the pieces were assembled. Round dog holes might be a better option for a premade slab because square ones are best cut while the top slab is in pieces.

Heavy, rigid base—I wanted the benchtop and base to be nicely proportioned. Many benches I've seen look like top-heavy slabs on spindly legs. Also, it was important that the bench not rack or skid across the floor under heavy handplaning. A thick trestle base,

A jig makes easy work of mortises

There are 16 mortises (and tenons) in the base but only two different sizes. Make two mortising jigs to speed up layout and guide the chisels. The jig is made from three blocks glued and screwed together, with a fence attached on each side to hug the workpiece.

Locate and lay out the mortises. *With the jig, this job should go quickly.*

Drill out most of the waste. *The layout lines will guide you. For the blind mortises, set the drill press's depth stop.*

Chop out the rest with chisels. *Remove most of the material with a ½-in. chisel before switching to a wider one. The jig will guide the chisels precisely.*

joined with pinned or wedged mortise-and-tenons, guarantees stability. I laminated 8/4 lumber to make these thick members (and the top slab) because 8/4 is readily available in most regions.

Splitting the stretchers, two high and two low, leaves a perfect opening for a future cabinet with drawers. The traditional single, wide stretcher would have saved some time, but it also would have blocked this natural storage area.

Innovative vises—Hundreds of woodworkers probably would say they could not get through a day without a conventional tail vise, which is designed primarily for clamping things flat on the benchtop between dogs. Others would say the same for a shoulder vise, which offers the capability of clamping workpieces between its jaws without interference from guide bars or screws. The Veritas Twin-Screw Vise incorporates some of the capabilities of both types, allowing long boards or large panels to be clamped with benchdogs as well as clamping an upright board up to 15 in. wide for operations such as dovetailing. The two screws are connected with a chain, preventing the jaws from racking no matter where a workpiece is located or which row of dog holes is used.

I've always loved the look and performance of thick wooden jaws on a front vise but found it tedious to crank the long screw in and out constantly. I was tempted to install a cast-iron, quick-action Record-style vise, until I found a German-made quick-action vise screw and guide bars at Woodcraft. That allowed me to design a wooden front jaw to match the one I made for the Veritas end vise

THROUGH-TENONS ARE WEDGED

Wedge the top members and stretchers. *The slots in the tenons are angled 5° to match the wedge angle. A hole is drilled at the base of each slot to prevent splitting. Apply glue to all surfaces, including the wedges and slots; assemble the joint; and drive home the wedges (above), using a block of wood to protect them from direct blows. Last, connect the two trestles with the upper and lower stretchers (below), wedging their tenons in place.*

Photos: Asa Christiana

BENCHTOP GLUE-UP

The benchtop is made of 8/4 maple, set on edge. Make the top in sections narrow enough to fit through the thickness planer.

MAKE UP THE TOP SLAB IN SECTIONS

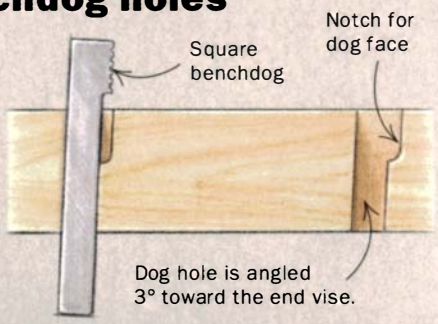
Joint and plane the pieces. *Run them through the planer on edge to ensure uniformity.*

Glue up the top. *The base makes a level glue-up platform, but protect it from drips. Use a notched card to spread glue.*

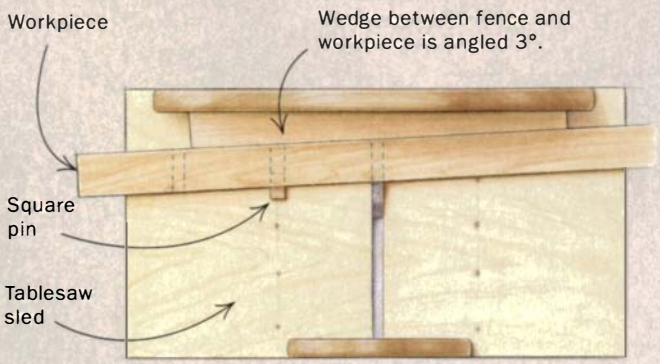
Use cauls to keep the slab flat. *Wrap them with clear tape for easy cleanup. Snug them down first, then clamp across the width.*

Milling benchdog holes

Cut the holes for the square benchdogs with a dado blade before glue-up. The notches for the dog faces can be routed or chopped out with a chisel.



Dado the dog holes. *Use a crosscut sled with a wedge against the fence to cut the slots at a 3° angle. A square pin sets the distance between dog slots.*



TOP VIEW OF SLED

and still have quick action. However, a cast-iron vise also would have been fine (see *FWW* #158, pp. 56-59, for proper installation), and a patternmaker's vise is an interesting option.

Both square and round benchdogs—The debates over round vs. square and wood vs. metal will go on as long as folks work wood. All dogs have advantages, but I prefer square, steel ones. However, lots of accessories are designed to fit into ¾-in. round holes, so I incorporated both types into the bench. For the end vise, I milled square dog holes to fit specific steel dogs. But I can make wood ones if I choose, fitting them to the holes for the metal dogs. I ran two rows of ¾-in. round dog holes for the front vise. This gives me the option of using round dogs as well as hold-downs and holdfasts, which use ¾-in. holes. The round dog holes also provide the option of locating and securing jigs with ¾-in. dowel pins.

No tool tray—I like tool trays, but many woodworkers think they are only good for collecting debris. Although this design lacks one, a tool tray could be attached easily to the back of the benchtop. Keep in mind that the large space between the stretchers will house a small chest of drawers for protected storage close at hand.

Build the base first

It's more glamorous to build the top than the base. But if you build the base first, you can use it for gluing up the top slab. Then, when the top is ready, you can set it on the base to finish installing the vises. Wedged mortise-and-tenons join the legs and stretchers, creating strong resistance to racking; pegged mortise-and-tenons join legs to feet. Laminating two layers of 8/4 material (each 1¾ in. thick after surfacing) creates the right thickness for the base members. Mill the legs and top crossmembers down to 3 in. square but leave the feet at 3½ in. square.

Leave the stretchers the full 1¾ in. in thickness and rip them ⅜ in. oversize in width to allow them to move. When a wide plank is ripped into narrower pieces, tension in it is released, resulting in boards that bow one way or the other. Let the stretcher stock sit for two days, straighten and rip it to rough width, then run it through a

Flatten the slab. *A five-board section of the top slab is narrow enough to fit through a benchtop planer.*

Now glue three sections into one big slab. *Place a try square across the dog holes and use a long bar clamp diagonally to correct any misalignment. Again, use lots of clamps and cauls to keep the sections level.*

portable planer on edge to clean each edge and bring the pieces to final width. If there's any fitting to be done, it's easier to do it on the tenons, so cut the mortises first, using a four-sided guide block to help with the chisel work. Then cut the tenons on the tablesaw, using a dado set.

Cutting the thumbnail profile—For the next task, cutting a large thumbnail profile on the feet, it will be worth your time to install a sharp new blade on the bandsaw. Before cutting the curve, I used a tablesaw and a crosscut sled to cut the small step at the top of the profile. After the bandsaw cut, the smoothing went quickly using a rasp and some files, followed by sandpaper.

Assembling the base—Start with the two trestle assemblies; it's critical that they be flat and square. After the dowels have been driven home and the glue has set, dry-fit and then glue and wedge the stretchers in place. Put glue in the mortises and on the tenons as well as on the wedges and in the wedge slots. At every step of the way, measure diagonally to make sure everything stays square, and sight across the trestle tops to be sure the assembly doesn't twist as you clamp it. Your eye will pick up minute variations.

Build the top

The boards for the top are plainsawn 8/4 stock set on edge and laminated face to face. The top's finished thickness is 2½ in., but you should expect some bowing when you rip the boards from wider stock, so rip the boards for the slab just under 3 in. wide. Once the strips have stabilized for a day or two, joint them straight on one edge, rip them on the tablesaw to about 2¾ in., and then plane them on edge to about 2⅝ in. This leaves the pieces ⅛ in. oversize to allow for finish planing after each section is glued up. Cut the slots for the square dogs now, while the pieces are separate.

TRIM THE ENDS OF THE TOP IN TWO STEPS

Use the simple two-fence jig shown. *Rout deep slots in both sides of the slab, then use a jigsaw to cut off the waste, leaving square shoulders and a tongue that will fit into the end caps.*

INSTALL THE VISES, APRON, AND END CAPS

Because of the half-blind dovetails, the end caps and front apron must be fitted and attached to the bench one at a time, from right to left, as are the vises.

Cut the right-hand set of half-blind dovetails. *First, cut the tails in the front apron, and then clamp the front apron in place with the right-hand end cap behind it to transfer the layout of the dovetails.*

Attach the large vise nuts to the back of the end cap. *Also, finish cutting and fitting the dovetails.*

Most woodworkers have a portable surface planer capable of planing a 12-in.-wide board. So glue up and mill the 26-in. top slab in three sections of five boards, each able to fit through the planer and easier to handle than the full slab.

Clamping with cauls is a two-step process. First, align the boards by applying clamp pressure to the cauls. After the boards are in line, clamp them together horizontally. Aside from straight cauls, the other key to success is a flat gluing surface. The top crossmembers on the base form the perfect platform to prevent the top from twisting during glue-up.

A damp (not wet) toothbrush makes short work of cleaning the glue out of the dog holes as long as this is done immediately after the slab is clamped up. Once the glue has set for an hour or so, remove the cauls and scrape off the excess glue. Let each slab cure overnight before moving on to the next one.

Plane the sections before gluing up the entire slab—If the cauls have been placed correctly, the glued slab sections should be flat with no twist. Remove any leftover glue from the top surfaces. Then, with the top surface of the slabs down on the planer bed, run them through, taking light cuts until the bottom surface is clean. Turn the slabs top-surface-up and run them through again, taking light cuts until the top surface is clean. Turn them over once more and plane the underside until you reach the 2½-in. thickness.

Gluing together the slabs is a lot like gluing up the individual sections. Again, use the top crossmembers on the base and lots of cauls to keep the pieces aligned. Then it's simple to close the last of the glue joints. However, check the dog-hole locations with a square to be sure they all will be the same distance from the end vise.

A neat trick for trimming the slab to length—Not many of us own a saw capable of accurately crosscutting a very heavy slab almost 2½ ft. wide and more than 6 ft. long. For this project, a simple router jig will allow you, in one operation, both to trim each end accurately and to create some necessary joinery (see the bottom photos on p. 43). By cutting deep dadoes on the top and bottom of the slab, a tongue is formed, which fits into a slot milled into the end cap. Cut the remaining ¾-in. tongue to length with a jigsaw (not an important glue surface so not a critical cut). Cut the mating slots in the end caps using a dado set on the tablesaw.

Install the end caps and front apron—The end caps cover the end grain of the top slab and help keep the slab flat. The right-hand end cap also serves as the rear jaw for the end vise. The front apron beefs up the thickness at this critical work area and serves as the rear jaw for the front vise. I not only needed a strong mechanical joint holding the front apron to the end caps, but I also wanted the areas that act as vise jaws to remain flat, with no end grain protruding as it would if I used through-dovetails or finger joints at the corners. Half-blind dovetails seemed to be the perfect solution, oriented as shown in the drawing on p. 39.

After cutting the joinery but before gluing the end caps and front rail in place, use a drill press to bore the holes for the vise hardware. Mount the end caps with cross-barrel bolts. The Veritas vise includes four of these; use two for each end cap. Apply glue only along the front 3 in. or 4 in. of the tongue and the groove. This limits wood movement of the slab toward the back of the bench.

The front apron is attached to the slab with glue only (and help from the half-blind dovetails).

Mount the vises and attach the top

Both vises come with thorough instructions, making the hardware straightforward to mount. The twin-screw vise attaches to the bench rather simply, with its two large screws passing through large nuts attached to the inner face of the end cap. It's critical that holes in the front and rear jaws align perfectly, so drill them at the

Now for the front vise. *Start by attaching the mounting bracket under the benchtop. The blocking under the bracket will increase the clamping capacity.*

Locate the clearance holes in the front apron. *Clamp the front apron accurately in place and tap a brad-point drill bit through the holes in the hardware to transfer their locations. Drill the holes in the front apron and front vise jaw at the same time.*

same time. The length of the chain determines the distance between holes, so careful layout is in order. The vertical location of the holes is determined by adding 1½ in. to the thickness of the top slab to allow the large vise nuts to clear the underside of the benchtop.

Mounting the front-vise hardware and the large wood jaw is even more straightforward. First, the mounting bracket must be bolted to the underside of the benchtop. I used 5⁄16-in. lag screws. Next, the vise screw and guide bars are run through the bracket to locate their clearance holes in the front rail. Last, make the large wood jaw and bolt it to the vise hardware. Somewhere along the way, the front jaws for both vises must receive their large thumbnail profile, identical to the one on the trestle feet.

Once you have all of the hardware and vises in place, mill a 1⁄8-in. bevel on each of the outside jaws to accommodate flex in the hardware as the jaws tighten, which helps them maintain good clamping pressure at the top. Now you can attach the top to the base. Two lag bolts along the centerline of the bench are plenty for attaching the benchtop to the trestle base.

Flatten the top and finish the bench

Do the final flattening after the top has been mounted to the base and all of the vises are in place. If your glue-ups went well, all you will have to do is some scraping and sanding.

I didn't want a slick finish, as beautiful as it might be. Clamps, hold-downs, and vises depend on friction to hold parts securely. The traditional finish for a benchtop is linseed oil thinned with turpentine, which seals the wood enough to make glue removal pretty easy but doesn't make the surface more slippery than it is naturally. However, I wiped on a thinned varnish for greater protection. To make sure moisture absorption is even on all sides, it's important to coat the top and underside of the bench equally. □

Lon Schleining is a contributing editor.

Attach the front-vise hardware to the front jaw. *Use the vise hardware to clamp the front jaw in its proper position before drilling for the attachment screws. Last, cut the half-blind dovetails on the left-hand end cap and attach it.*

Assemble the hardware for the twin-screw end vise. *Clips join the chain at the proper length. Again, use the vise hardware to clamp the jaw in position before drilling for the attachment screws.*

A Shop Inspired by School Memories

This well-lit workspace features an open floor plan organized for efficient workflow

BY MARK BELLONBY

My introduction to woodworking took place in a high-school arts building during the late 1960s. The building included a large, first-floor woodshop with a high ceiling and tall, Gothic windows that provided plenty of natural light and cross ventilation.

Space between machines and benches in the shop was plentiful, and the tools were stored in beautiful, enclosed oak cabinets. Eventually, I had a key to the building, and I sometimes would work until the early hours of the morning, completely lost in the craft of making furniture.

That bright and airy school shop became the standard against which all of my later shops were measured. For many years, I had little choice but to cope with workshops located in dark, dusty, and confined basements or garages. I hoped someday to have a workplace that offered the many advantages of that wonderful school shop.

Must-have design considerations

Two years ago, I finally got the opportunity to design my own free-standing shop. The obvious deficiencies I'd put up with for so long made it easy to come up with a list of goals for the new space.

An architect by profession, I produced the design and drawings using a computer-aided design (CAD) system. The builder, Martin Jarvis, helped keep costs in line, and he was frequently consulted during the design process. He encouraged me to consider a simple building shape and to use standard windows and skylights. He also helped me find cost-effective materials, like the base-grade, strip-oak flooring I ended up using.

To allow room for machinery and work in process, it was most important for me to have a generous amount of floor space. High

Photos: Rodney Diaz

PLANNING PAYS OFF

In designing his dream workshop, Bellonby placed a premium on having lots of light, ventilation, and elbow room. Equally important, however, was having work zones arranged in a logical fashion.

Design room offers additional workspace. *The large desk in the office is a perfect surface for laying out veneer.*

Divider adds storage. *A freestanding partition provides a sturdy wall for storing tools and accessories, and the shelves can be used for wood storage.*

Workbench is centrally located. *The most convenient location for the workbench proved to be approximately in the middle of the shop.*

Tools within easy reach. *A freestanding hand-tool cabinet occupies a corner of the shop not far from the workbench.*

Converting stationary to portable. *Several tools can be moved around the shop on shopmade mobile bases.*

ceilings were a priority, and the floor plan had to be flexible to allow for rearranging machines.

Like my school shop, I wanted mine to be bright and airy, almost an extension of the outside. Evenly distributed natural light was going to be critical to the design, as well as excellent ventilation. That meant the shop had to have large windows and skylights, all located to provide maximum light and quick air changes.

Several other design objectives also were important. I wanted to minimize noise from the air compressor and dust-collection system. Also, the building had to be energy efficient. And, should the need ever arise, I wanted a building that could be converted to an alternate use with relative ease.

A separate finishing room would have been nice, but I figured it would take up too much space. At some point in the future, a nearby outbuilding has the potential to become a finishing room.

A smart, flexible floor plan

Using a scale model for guidance, I sited the shop 20 ft. from an existing farm outbuilding. That allowed me to use part of the outbuilding for storage. A concrete slab between the two buildings is easily accessed through large doors in each building. This small courtyard is protected somewhat by the buildings and nearby trees, and I often use the area to plane or sand when I want to enjoy the outdoors or keep messy operations out of the workshop.

Also, in an open area against one of the walls, I included a deep sink that's handy for cleanup of all sorts.

Separate work zones in the shop room

Using the CAD computer software, I placed drawings of each machine onto the floor plan of the shop room and moved them around. I considered a number of arrangements before finding one that looked best. This process proved most helpful when it came time to add the real machinery to the shop. However, in the course of using the shop for about a year, I have occasionally reshuffled the machines to fine-tune the layout.

The shop machinery is organized into four general work zones: two machine-tool areas, a hand-tool area, and an assembly area. Because the shop room is a relatively small area, most of the machines are on shopmade mobile bases so that they can be moved around to create more floor area as needed. The heavy tools, however, like the tablesaw, wood lathe, and metalworking lathe, are stationary.

Wood and wood storage

Wood-storage areas often take up a lot of space. They also provide an attractive habitat for all kinds of animals and insects. To minimize such problems, I put my lumber racks, sheet-good storage, and veneer-storage crates in the adjacent outbuilding, along with a 12-in. sliding miter saw for cutting boards to rough length.

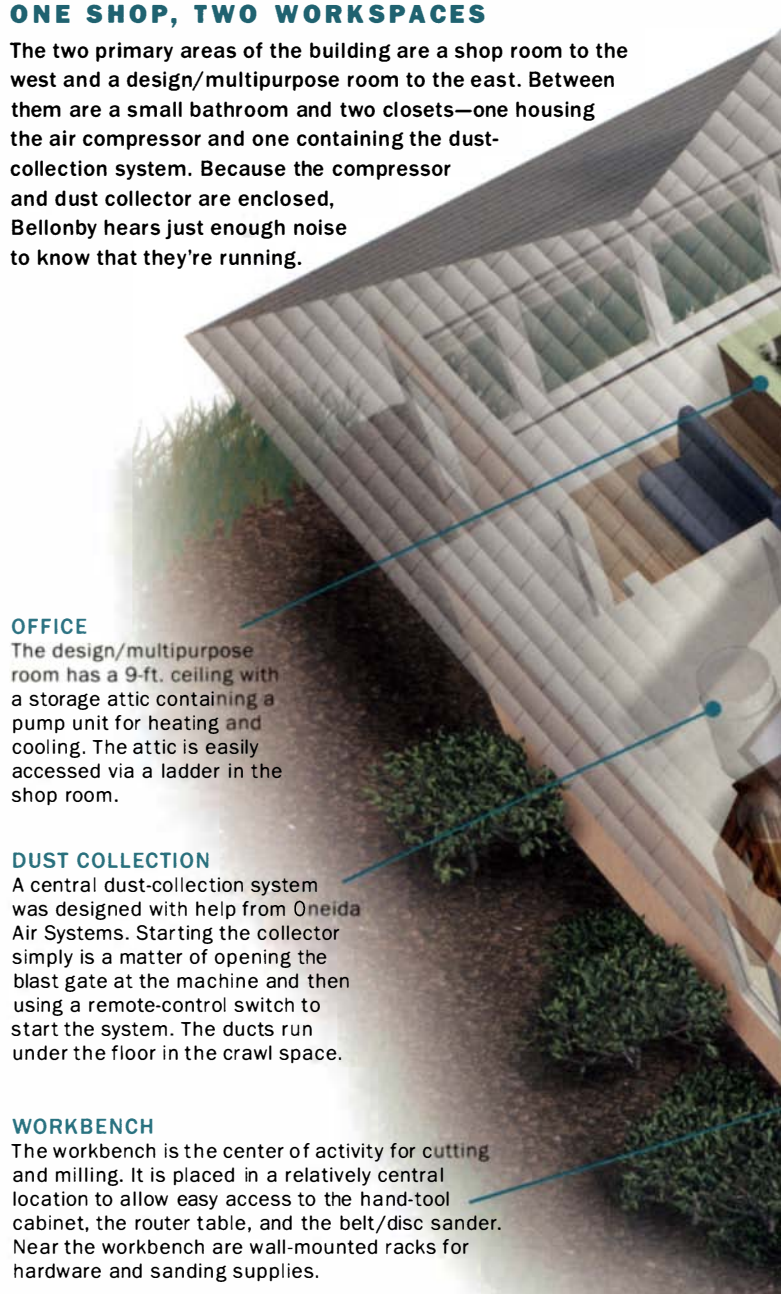
Solid wood goes into the shop as it is needed. So only a limited amount of wood is stored in the main building. Full-size plywood and other sheet goods are either cut to rough size in the courtyard or run through the tablesaw. In the future they will be done on a panel saw I plan to add in the outbuilding.

Convenient accessories

I arranged floor-mounted dust-collection ports and power outlets adjacent to each other, creating a series of utility stations of sorts.

ONE SHOP, TWO WORKSPACES

The two primary areas of the building are a shop room to the west and a design/multipurpose room to the east. Between them are a small bathroom and two closets—one housing the air compressor and one containing the dust-collection system. Because the compressor and dust collector are enclosed, Bellonby hears just enough noise to know that they're running.



OFFICE
The design/multipurpose room has a 9-ft. ceiling with a storage attic containing a pump unit for heating and cooling. The attic is easily accessed via a ladder in the shop room.

DUST COLLECTION
A central dust-collection system was designed with help from Oneida Air Systems. Starting the collector simply is a matter of opening the blast gate at the machine and then using a remote-control switch to start the system. The ducts run under the floor in the crawl space.

WORKBENCH
The workbench is the center of activity for cutting and milling. It is placed in a relatively central location to allow easy access to the hand-tool cabinet, the router table, and the belt/disc sander. Near the workbench are wall-mounted racks for hardware and sanding supplies.

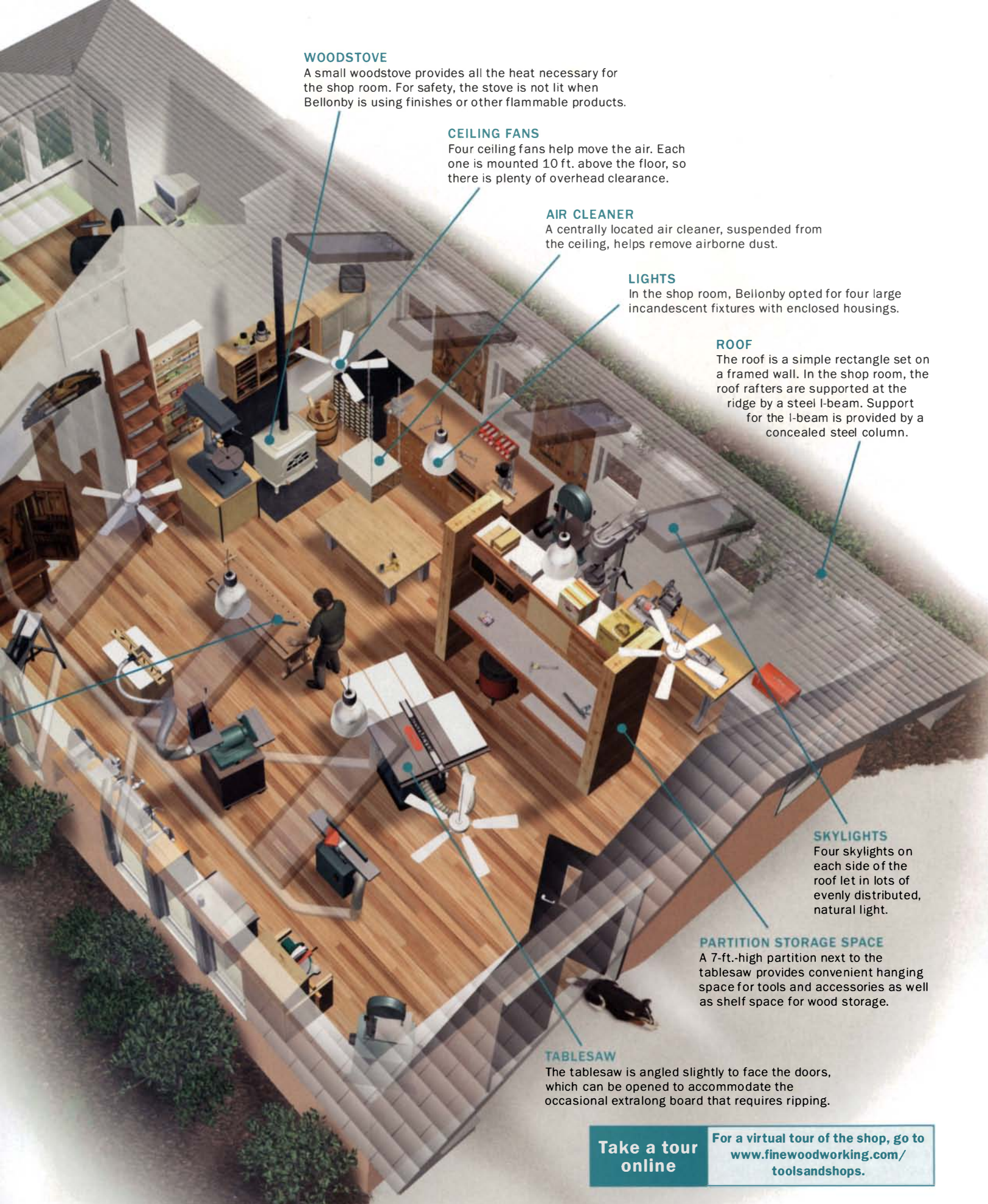
Whenever possible, I tried to locate the stations in areas that always would be likely places to put machinery, even if it all was rearranged some day. In general, this approach has worked out pretty well, although the stations can become obstacles when machinery is wheeled out of the way.

The compressed-air system was designed to include a port within 20 ft. of each machine. A port also is located at the dust collector and outside the building in the courtyard. That outside port gets a lot of use, as I prefer working alfresco for certain woodworking tasks, such as sanding. All of the pipes slope to a drain in the crawl space. It's important for the pipes to slope, because any water that collects at a low spot can wreak havoc with certain air tools.

The generous upper wall spaces, courtesy of the cathedral ceiling, are good places to put speaker mounts. And a television on a high shelf is welcomed at break time. □

Mark Bellonby is an architect and woodworker living in northern Virginia.

Drawings: Toby Welles @ Design Core



WOODSTOVE
A small woodstove provides all the heat necessary for the shop room. For safety, the stove is not lit when Bellonby is using finishes or other flammable products.

CEILING FANS
Four ceiling fans help move the air. Each one is mounted 10 ft. above the floor, so there is plenty of overhead clearance.

AIR CLEANER
A centrally located air cleaner, suspended from the ceiling, helps remove airborne dust.

LIGHTS
In the shop room, Bellonby opted for four large incandescent fixtures with enclosed housings.

ROOF
The roof is a simple rectangle set on a framed wall. In the shop room, the roof rafters are supported at the ridge by a steel I-beam. Support for the I-beam is provided by a concealed steel column.

SKYLIGHTS
Four skylights on each side of the roof let in lots of evenly distributed, natural light.

PARTITION STORAGE SPACE
A 7-ft.-high partition next to the tablesaw provides convenient hanging space for tools and accessories as well as shelf space for wood storage.

TABLESAW
The tablesaw is angled slightly to face the doors, which can be opened to accommodate the occasional extralong board that requires ripping.

Take a tour online

For a virtual tour of the shop, go to www.finewoodworking.com/toolsandshops.

TOOL TEST

9 Midsize Tablesaws

How contractor-style saws and hybrids measure up

BY ROLAND JOHNSON

When setting up a new workshop, the first big purchase for most people is a tablesaw. Priced and sized in between the large cabinet saws and small benchtop saws, a contractor-style saw is the logical choice for many woodworkers. I surveyed several brands on the market and came away from the experience pleasantly surprised.

Seven of the machines I looked at are conventional contractor-style saws: Bridgewood TSC-10CL, Delta 36-426, General 50-185M1, Grizzly 1022ProZ, Jet JWTS-10JF, Powermatic 64A, and Woodtek TSC-B. I also tested two hybrids—the DeWalt DW746 and Jet JWSS-10LFR—which are designed to bridge the gap between contractor's and cabinet saws.

Overall quality has improved

Not too many years ago, reasonably priced woodworking machinery often left a lot to be desired when it came to the quality of materials and machining. When it comes to contractor's saws, that appears to be a thing of the past.

I checked all of the tabletops for flatness. With the exception of the table on the Grizzly, all of the tables were nearly perfectly flat front to back, side to side, and diagonally. The miter slots were within 0.001 in. in width end to end; all of them were within 0.002 to 0.003 in. in width to each other; and all were within 0.004 in. of being perfectly parallel. The only flaws I found were that some of the table extensions tipped up at the outside edge, which could easily be remedied with a shim and a bit of tinkering.

Bevel and height adjusters worked well, and with all of these saws you can make adjustments in the gears that raise and lower the blade and change the angle setting. A lock knob in the crank handle of each saw secures the arbor's location, although the DeWalt would benefit from bigger crank handles.

I used a Forrest 10-in. testing disc—a sawblade blank that is accurate to within plus or minus 0.001 in.—to test for runout at the rim of the blade. Runout on all of the saws was 0.004 in. or less: an acceptable tolerance.

Except for the Delta, which uses cast-aluminum pulleys, all of the

TESTING EACH MACHINE

Using a Starrett straightedge and feeler gauges, Johnson checked the flatness of each table side to side (near right), front to back, and diagonally. All but the Grizzly were notably flat. He used a Forrest testing disc to check runout (far right), and checked whether the factory settings of the trunnions and motors were parallel to the miter-gauge slots in the tops. Johnson also ripped and crosscut 8/4 white oak and hard maple (left) as a real-world test of the machines under load.

saws use machined iron pulleys. A few of the saws could benefit from higher-quality belts, but most of them ran smoothly with little or no vibration. Only the Grizzly comes equipped with a link belt, which reduces vibration and makes the saw run more quietly.

In short, I was impressed with the overall fit and finish of these machines.

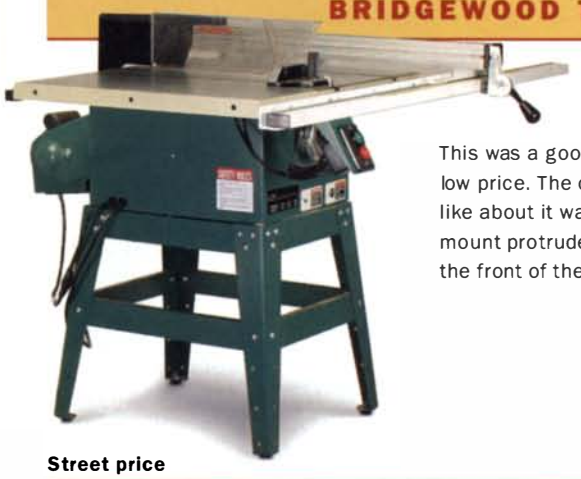
Good fences make good saws

Over the last decade, tablesaw fences have improved. Bill Biesemeyer did the woodworking world a real favor when he designed his simple, effective, beam-style rip fence. The majority of the saws I looked at have a variation on the Biesemeyer-style fence, and the one thing they all have in common is a lack of measurable side deflection. The Powermatic and the Jet JWTS-10JF have identical fences, and the General and Grizzly have fences only slightly different from those. The Woodtek and the Bridgewood saws also have fences identical to each other.

The General uses melamine for the faces of its fence, while the Grizzly, the Jets, and the Powermatic use UHMW (ultrahigh molecular weight) material for reduced friction. The Woodtek and the Bridgewood have a milled face on the aluminum extrusion that makes up the fence on each machine.

The General's fence is a closer copy of the original Biesemeyer fence in that the cam lever that locks it in place and the rail pad on which the fence glides are simpler than the others. Also, a rubber grommet on the cam lever allows the lever to be locked in the up

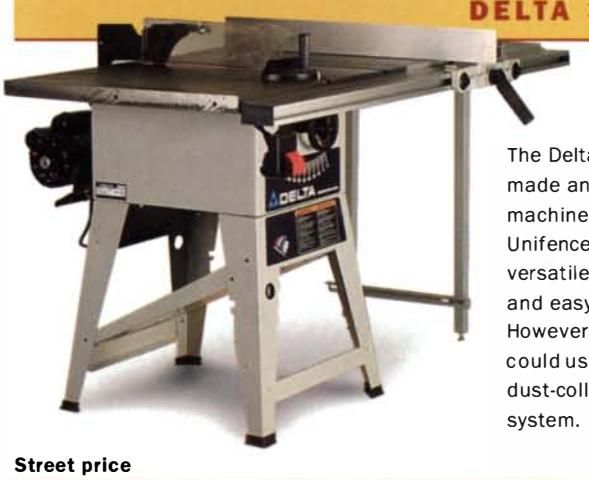
BRIDGEWOOD TSC-10CL



This was a good, solid saw at a low price. The only thing I didn't like about it was that the switch mount protruded too far out at the front of the saw.

Street price	$549
Motor	1½ hp/18 amps at 120v
Blade tilt	Left
Maximum rip capacity	32 in.
Runout at rim of 10-in. testing disc	0.004 in.
Blade alignment	0.005 in. out of parallel
Dust collection	Tray in base of saw cabinet with 4-in.-dia. outlet

DELTA 36-426

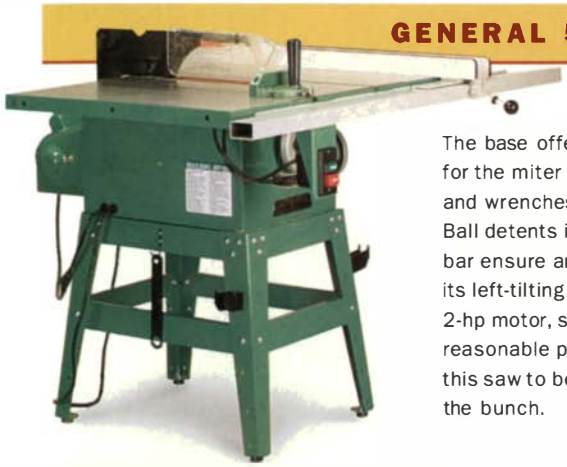


The Delta was a well-made and appointed machine. The Delta Unifence was versatile, accurate, and easy to operate. However, the machine could use a better dust-collection system.

Street price	$849
Motor	1½ hp/12.8 amps at 120v
Blade tilt	Right
Maximum rip capacity	32 in.
Runout at rim of 10-in. testing disc	0.003 in.
Blade alignment	0.002 in. out of parallel
Dust collection	Slanted, open tray between legs of stand

Photos: William Duckworth

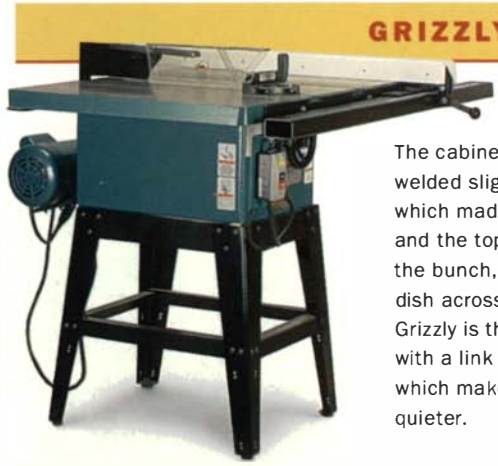
GENERAL 50-185M1



The base offers storage areas for the miter gauge, rip fence, and wrenches—a nice touch. Ball detents in the miter-gauge bar ensure an accurate fit. With its left-tilting blade, powerful 2-hp motor, sturdy fence, and reasonable price, I consider this saw to be the best buy of the bunch.

Street price	$649
Motor	2 hp/15 amps at 120v
Blade tilt	Left
Maximum rip capacity	30⅜ in.
Runout at rim of 10-in. testing disc	0.003 in.
Blade alignment	0.000 in. out of parallel
Dust collection	Tray in base of saw cabinet with 4-in.-dia. outlet

GRIZZLY 1022PROZ



The cabinet of the saw was welded slightly out of square, which made assembly difficult, and the top was the least flat of the bunch, with a 0.02-in.-deep dish across one diagonal. The Grizzly is the only saw that comes with a link belt as standard issue, which makes the machine run quieter.

Street price	$595
Motor	2 hp/16 amps at 120v
Blade tilt	Right
Maximum rip capacity	25 in.
Runout at rim of 10-in. testing disc	0.003 in.
Blade alignment	0.004 in. out of parallel
Dust collection	Tray in base of saw cabinet with 4-in.-dia. outlet

FENCE SHOULD BE EASY TO READ AND ADJUST

READABILITY

Some fences are easier to read than others. *The Align A Rip fence on the Woodtek and Bridgewood machines has a plastic magnifying lens that makes it easy to read the tape (below). The lens and the printed rule on the Jet SuperSaw (right) can be difficult to read from some angles.*

ADJUSTABILITY

Three screws for the DeWalt. *The same three screws in the top of the DeWalt fence are used to set the fence square to the tabletop and parallel to the sawblade.*

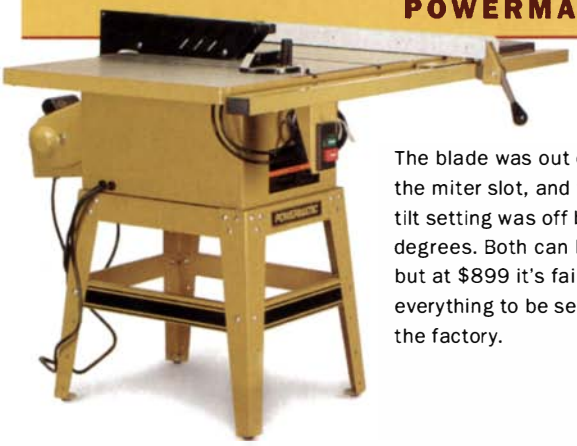
The Delta Unifence is unique. *To adjust the Unifence square to the sawblade, you use the same wrench supplied with the saw for changing blades. The extruded-aluminum fence can be located in either a high or a low profile, to adjust for different ripping operations. Extruded flanges wrap around a flat metal bar that holds the fence tightly to either side of the main carriage to which it's attached.*

JET JWTS-10JF

The Jet was a good-quality machine with a reliable fence. There's a lot of attention to detail, but the machine is more expensive than most of the other saws.

Street price	$899
Motor	1½ hp/18 amps at 120v
Blade tilt	Right
Maximum rip capacity	30 in.
Runout at rim of 10-in. testing disc	0.002 in.
Blade alignment	0.004 in. out of parallel
Dust collection	Tray in base of saw cabinet with 4-in.-dia. outlet

POWERMATIC 64A



The blade was out of parallel with the miter slot, and the factory 45° tilt setting was off by several degrees. Both can be adjusted, but at $899 it's fair to expect everything to be set accurately at the factory.

Street price	$899
Motor	1½ hp/15 amps at 120v
Blade tilt	Left
Maximum rip capacity	30⅜ in.
Runout at rim of 10-in. testing disc	0.003 in.
Blade alignment	0.004 in. out of parallel
Dust collection	Tray in base of saw cabinet with 4-in.-dia. outlet

position, which makes it easier to remove the fence and put it back on the rail.

Most of the fences can be adjusted to be brought parallel with the blade and square with the tabletop. The Delta Unifence is a real gem to adjust: The parallel adjustments on the front of the fence are made with nuts that are the same size as the arbor nut, so the right wrench is always handy. Adjustments to square the face to the table are made with a screwdriver. The Unifence is by far the most user-friendly for setup, and there is no need for a rail at the back of the saw because the fence rides smoothly on a nylon glide. The Unifence is also very versatile because you can configure it for a low profile to perform different ripping operations.

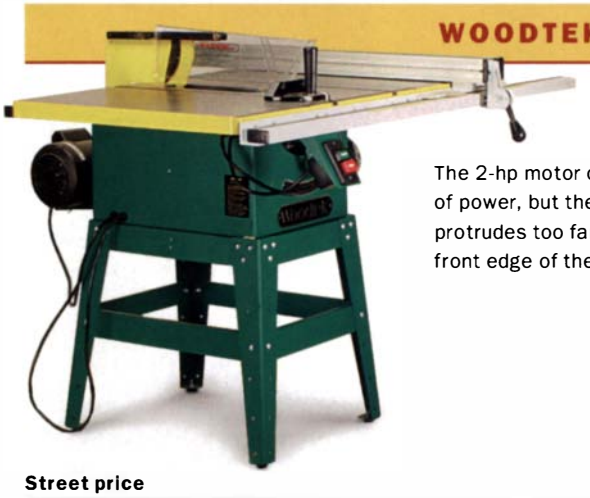
The fence on the Jet SuperSaw (JWSS-10LFR) contains elements of the Biesemeyer style with a few twists, such as a rubber thumbwheel that operates on the front rail for finely tuning the fence setting. The rear support for the fence has a slot that fits over the edge of the back rail, eliminating any tip-up when locking the fence in place. The plastic sight for the tape measure has a small magnifying lens cast into it that made it difficult for me to read the tape.

The DeWalt fence utilizes a three-point clamping system at the front rail and a support rail at the back of the saw, which results in reliably parallel travel to the blade as the fence is moved. Setting the fence square to the table and parallel to the blade (and miter-gauge slots) requires loosening the same three screws, and it took several tries before I got it square and parallel; however, once set, the fence was stout and had no side deflection. The aluminum extrusion that makes up the face of the fence can be removed and switched to the opposite side of the main fence beam, much like the Delta Unifence. Overall, I liked the Unifence for its versatility and the General fence for its bricks-and-mortar simplicity.

Motors rated 1½ hp to 2 hp are sufficient

I made test cuts with all of these saws using 3-ft. and 4-ft. lengths of 8/4 white oak and hard maple, and none of the saws disappointed

WOODTEK TSC-B



The 2-hp motor offered plenty of power, but the switch mount protrudes too far out from the front edge of the saw table.

Street price	$599
Motor	2 hp/24 amps at 120v
Blade tilt	Right (left also available)
Maximum rip capacity	32 in. actual (30 in. stated)
Runout at rim of 10-in. testing disc	0.004 in.
Blade alignment	0.035 in. out of parallel
Dust collection	Tray in base of saw cabinet with 4-in.-dia. outlet

me. Four of them—the Bridgewood, Delta, Jet JWTS-10JF, and Powermatic—are powered by 1½-hp motors and cut through the hardwood with relative ease. With each machine, however, the feed rate was fairly slow. The Jet SuperSaw and the DeWalt have 1¾-hp motors, and I could feel the difference in power when compared with the 1½-hp machines. I was able to use a slightly faster feed rate, and the motors didn't bog down quite as quickly under load. The General, Grizzly, and Woodtek saws have 2-hp motors, and the increased power was even more obvious.

Keeping a sawblade spinning at full speed is critical to the oper-

FEATURES TO CONSIDER

SWITCHES

This big switch is easy to find. *The DeWalt switch is conveniently located and easy to turn off with your knee if your hands are busy elsewhere.*

This switch gets in the way. *Switches on the Bridgewood and Woodtek saws project past the plane of the front rail of the fence, so they're easy to bump into.*

DUST COLLECTION

A chute for directing sawdust. *The Delta saw has an angled pan that sends sawdust out the back of the machine, which, unfortunately, allows fine dust to escape and become airborne.*

An access door and a perforated tray. *The Jet SuperSaw has a fairly airtight base, accessed through a hinged door. Johnson thinks the tray with holes in it on the Jet SuperSaw will work well with fine sawdust, but he found that some dadoing and ripping operations will cause it to clog up.*

ation of most sawblades. As the blade slows due to lack of power or a feed rate that's too fast, the teeth do not cut as efficiently, and excessive heat builds up at the rim of the blade. The heat causes the rim to expand slightly, forcing the blade to wobble, which can burn the wood and even damage the motor. Remedies for this problem are more horsepower, a blade with a thinner kerf, or simply raising the blade to increase the cutting angle.

Switches should be easily accessible

I used to have an older version of the Delta contractor's saw that had a toggle switch located low on the front of the saw—placed there to prevent the user from turning it on unintentionally—but it was difficult to turn off the saw in a hurry. Manufacturers now make switches that are easy to use and logically placed—not only great for convenience but also for safety.

DeWalt's switch is large and well placed and can be shut down with your knee when both hands are needed elsewhere. The Jet SuperSaw has a push-button switch with an oversize off button and a location that makes it easy to use your knee to deactivate the saw. Delta's switch is well placed and can be pressed by hand or knee. The Jet JWTS-10JF, Powermatic, and General use identical push-button switches that are logically placed and easy to reach.

The Woodtek and Bridgewood use the same push-button switch as the Jet, Powermatic, General, and Grizzly, but it extends far enough out from the front rail that you can shut off the saw accidentally by leaning against the switch at the end of a ripcut.

Left-tilting trunnions make most miter rips safer

Ripping miters on a tablesaw is the safest when performed with the sawblade tilted away from the fence. To make a miter ripcut on right-tilting saws, such as the Delta, the Grizzly, the Jet JWTS-10JF, and the Woodtek (which also offers a left-tilt version), the fence must be moved to the left of the sawblade, limiting the width of cut. A blade that tilts to the left eliminates this problem.

Stops for the tilt mechanism are adjustable on all of these saws. The stops positively locate 90° and 45° blade settings. Allen-head screws located in the tabletop make it easy to set the stops on the Delta and the DeWalt. Delta locates the screws in the tabletop, while DeWalt locates them in the miter-gauge slots.

Dust collection is limited

Containing the dust on any contractor-style saw is difficult because the back of the saw cabinet is open to allow the drive belt and the tilt mechanism to function.

The Delta has a metal pan—part of the base support—that angles down toward the back of the saw, directing most of the sawdust into a pile behind the stand. This design makes it easier to sweep up the sawdust pile, but it does nothing to trap fine, airborne dust.

The Bridgewood, General, Grizzly, Jet JWTS-10JF, Powermatic, and Woodtek saws each has a plastic tray with a 4-in.-dia. outlet in the middle that covers the bottom of the saw cabinet. This system allows easy hookup to a dust-collection system, but because the back of the saw is still wide open, the dust collection is marginal.

Jet's SuperSaw has a steel tray in the bottom of the cabinet that is perforated to allow dust to be extracted from the cabinet through a 4-in.-dia. outlet. A plastic tray below the perforated tray acts as a catch-all and seals the system for dust extraction.

The blade shroud (below the table) on the DeWalt was effective at containing the dust around the blade, but the outlet has only a 2¼-in.-dia. opening and is immediately routed into a 90° elbow, which reduces the dust-collection efficiency. Also, the combination of a small outlet and a quick turn in the pipe can result in small offcuts plugging up the opening. The back and the bottom of the saw cabinet are open, so the blade shroud is responsible for all of the dust collection. The system probably would be more effective with a larger collection port.

Guards and splitters could use some improvement

All of these saws come equipped with a splitter with anti-kickback pawls combined with a blade guard. These devices are mounted in one of two locations: on a bar off the back of the saw or onto a fitting right behind the blade, under the table insert. With most of these assemblies, you can fold the guard out of the way when you need to change the blade. The design of the Delta guard is slightly different. It has a notched section on the back of the clear plastic guard that is supposed to hook onto the metal splitter, but I couldn't get it to stay upright (useful if you wish to measure the blade height) without removing the table insert. The Powermatic has a design in which there are two independently pivoting guards on both sides of the blade. Those guards are held by a frame that sits above the splitter, and that frame is riveted to the splitter, so you cannot move the guards out of the way without removing the entire splitter assembly. The DeWalt has the most workable design of them all—a smaller assembly that mounts only to one location, into the trunnion right behind the sawblade. In the case of the DeWalt, smaller and simpler made it better.

All of the saws performed acceptably

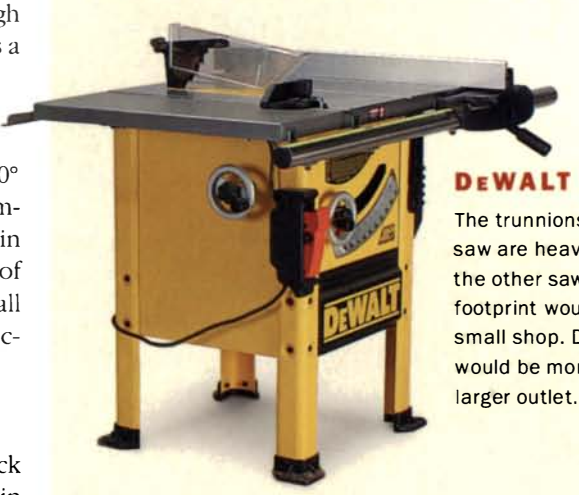
Any one of these saws would be welcome in my shop. But if I had to choose just one from this batch, it would be the General for a variety of reasons. It has plenty of power (with that 2-hp motor), a simple and reliable fence, and little things (such as the mounted hangers for the rip and crosscut fences) that suggest an attention to detail. And though it's not the least expensive, the price is well below that of many of the other machines.

As a second choice, I would pick the DeWalt because I really liked its heavier trunnions and arbor casting. If the dust collection were modified a bit, I could easily find a spot in my shop for that big yellow saw. □

Roland Johnson builds custom cabinetry and architectural millwork in a shop near St. Cloud, Minn.

HYBRID SAWS

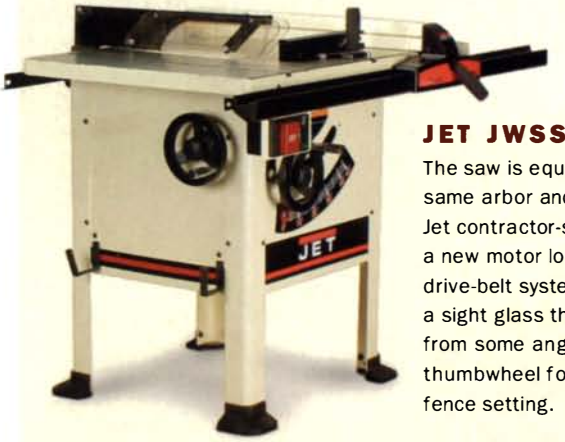
Hybrid saws are a cross between the older style contractor's saws and the heavier-duty standard cabinet saws. Design features on these two saws vary somewhat (see details below). For both the DeWalt and the Jet hybrid saws, you also can purchase sliding-table assemblies as optional accessories. Hybrids may represent the future direction of contractor-style saws.



DEWALT DW746

The trunnions and arbor on this saw are heavier than those on the other saws. Its compact footprint would be nice for the small shop. Dust collection would be more effective with a larger outlet.

Street price	$849
Motor	1¾ hp/15 amps at 120v
Blade tilt	Left
Maximum rip capacity	30⅜ in.
Runout at rim of 10-in. testing disc	0.003 in.
Blade alignment	0.000 in. out of parallel
Dust collection	Blade shroud in base of saw cabinet with attachment for 2¼-in.-dia. vacuum hose



JET JWSS-10LFR

The saw is equipped with the same arbor and trunnions as the Jet contractor-style saw but with a new motor location and a great drive-belt system. The fence has a sight glass that is hard to read from some angles and a rubber thumbwheel for fine-tuning the fence setting.

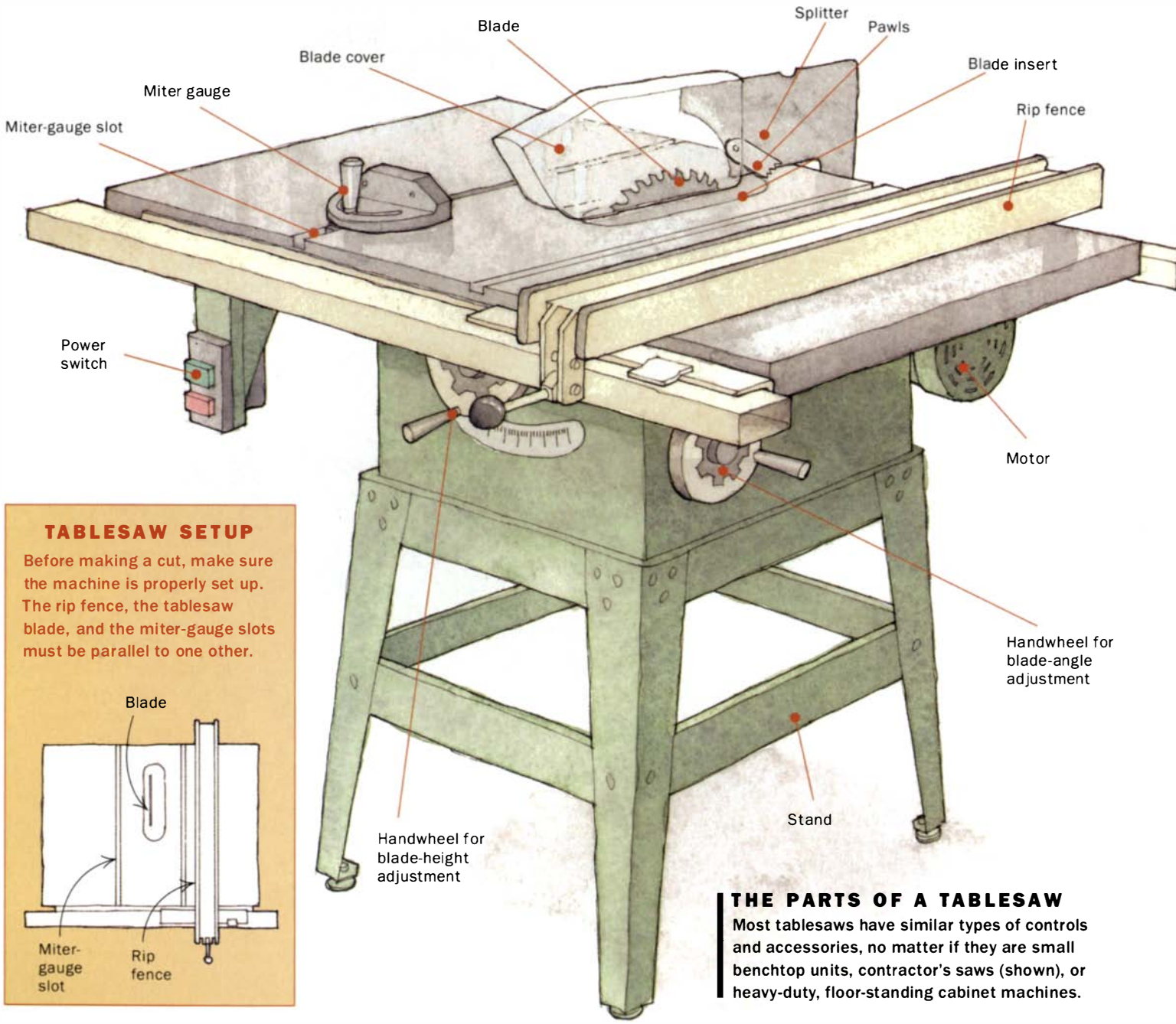
Street price	$849
Motor	1¾ hp/12 amps at 120v
Blade tilt	Left
Maximum rip capacity	33 in.
Runout at rim of 10-in. testing disc	0.003 in.
Blade alignment	0.035 in. out of parallel
Dust collection	Collection tray in cabinet base with 4-in.-dia. outlet

A Tablesaw Primer

Ripping and Crosscutting

The proper techniques help ensure accurate and safe cuts

BY KELLY MEHLER



THE PARTS OF A TABLESAW

Most tablesaws have similar types of controls and accessories, no matter if they are small benchtop units, contractor's saws (shown), or heavy-duty, floor-standing cabinet machines.

TABLESAW SETUP

Before making a cut, make sure the machine is properly set up. The rip fence, the tablesaw blade, and the miter-gauge slots must be parallel to one other.

Drawings: Jim Richey

With its flat, circular spinning blade doing the hard work, the tablesaw can make all sorts of cuts, among them grooves, dadoes, rabbets, and a variety of other woodworking joints. However, the tablesaw most commonly is called upon to do just two basic tasks: make wide boards narrower, a process called ripping, and make long boards shorter, a process called crosscutting. When ripping, the rip fence is used to guide the stock. Crosscutting is done with the aid of the miter gauge.

Because so much tablesaw run time is spent ripping and crosscutting, it's especially important to have good work habits while making these two fundamental cuts. After all, when used properly, a good tablesaw can produce remarkably smooth and accurate cuts safely and with little effort.

The saw must be set up properly for best results

A tablesaw won't cut easily, accurately, or safely if it's improperly set up. So before making any rip- or crosscut, make sure the saw is in good working order and properly adjusted. Also, the table of the saw should be flat, with any deviation limited to no more than 0.010 in. The same goes for any extension tables. And when assembled, those tables all should be flush.

Then, too, the sawblade should be sharp. A sharp combination blade can produce good cuts when ripping and crosscutting.

Use the blade cover, splitter, and pawls—The saw must have a blade guard that includes a cover, splitter, and pawls. Granted, such a guard system isn't a foolproof device, but it does improve safety. The cover itself acts as a barrier, helping to block any misdirected hand or finger from contacting the spinning blade. That's a big plus. Also, the splitter and pawls minimize the chance of kickback or ejection.

Kickback occurs most often during a ripcut, usually when the workpiece twists away from the rip fence just enough to contact the teeth on the back portion of the blade; those are the teeth just coming up through the insert after traveling under the saw. When that happens, those back teeth can grab the workpiece, lifting it and instantly launching it, usually right back at the operator. But a splitter behind the blade helps prevent the workpiece from contacting the back teeth, so kickback is less likely to happen.

Ejection occurs most often when ripping a relatively narrow piece, just after the sawblade cuts the piece free. At that point, if the piece should tip, twist, or bend, it can become pinched between the blade and the rip fence. And if the piece is not supported by a push block or pawls, the force of the spinning blade can send the piece straight back at warp speed. Indeed, I've seen photos of a ¾-in.-square by 4-ft.-long piece that shot back 6 ft. and fully penetrated a sheet of ¾-in.-thick plywood.

Flat, square stock is a must

A warped board or a board with uneven edges can be difficult to control when ripping or crosscutting. Such boards are likely to rock during a cut. When that happens, the wood binds against the side of the blade. At best, you end up with a rough edge that isn't square. At worst, you get kickback or ejection (see the bottom left drawings on p. 58).

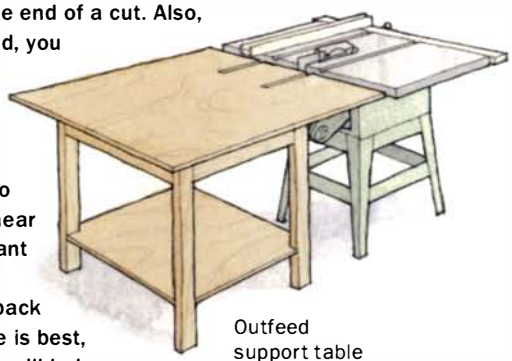
Before you make any tablesaw cuts, check that the face surfaces of the board are flat. Also, any edge that will meet the rip fence or

Essential accessories

Tablesaws come from the factory with everything needed to start making ripcuts and crosscuts. But a few important accessories improve both the safety and accuracy of the saw.

OUTFEED SUPPORT

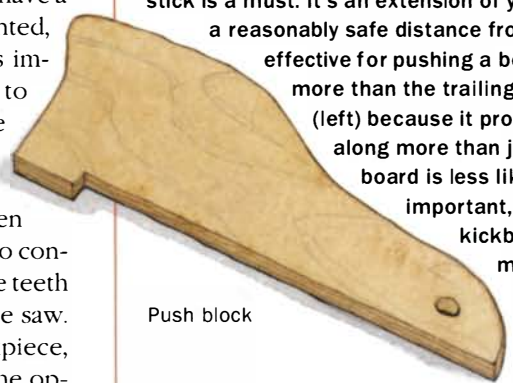
There's not much distance between the back of the blade and the back of the saw table. As a result, boards can end up falling off the back of the saw at the end of a cut. Also, when ripping a long board, you must bear down hard to prevent it from tipping off the back at the end of the cut. That's not something you want to do with your hand passing near the blade. So it's important to have some sort of auxiliary support at the back of the saw. A sturdy table is best, but even a support stand will help.



Outfeed support table

PUSH BLOCKS

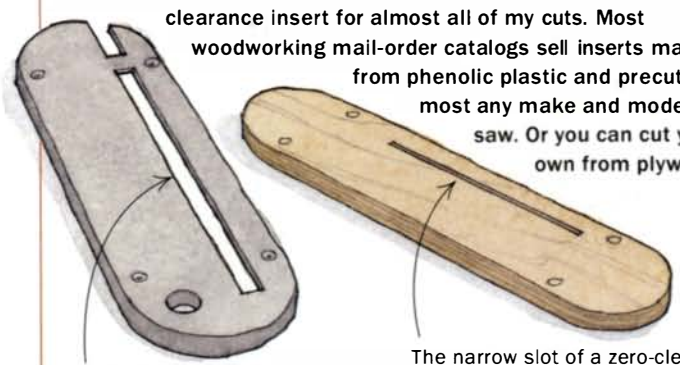
When making a ripcut 8 in. wide or less, a push block or push stick is a must. It's an extension of your hand, so your fingers stay a reasonably safe distance from the blade. A push stick is effective for pushing a board, but it holds down little more than the trailing end. I prefer a push block (left) because it provides downward pressure along more than just the end. That way, the board is less likely to flutter and, more important, is less susceptible to kickback. It takes just a few minutes to make a push block. Use any ¾-in.- or 1-in.-thick stock and cut it to shape with a bandsaw or sabersaw.



Push block

ZERO-CLEARANCE INSERT

When a tablesaw comes from the factory, the blade insert typically has a wide opening. That's fine for bevel cuts or wide ripcuts. But for a narrow ripcut, the trailing end of the piece can drop down through the opening in the insert. As the piece tips, your pushing hand follows it. And you don't want your hand to drop toward a spinning sawblade. If that's not scary enough, you run the risk of kickback, too. To avoid those problems, I use a zero-clearance insert for almost all of my cuts. Most woodworking mail-order catalogs sell inserts made from phenolic plastic and precut to fit most any make and model of saw. Or you can cut your own from plywood.



The wide slot of a factory insert can trap thin stock.

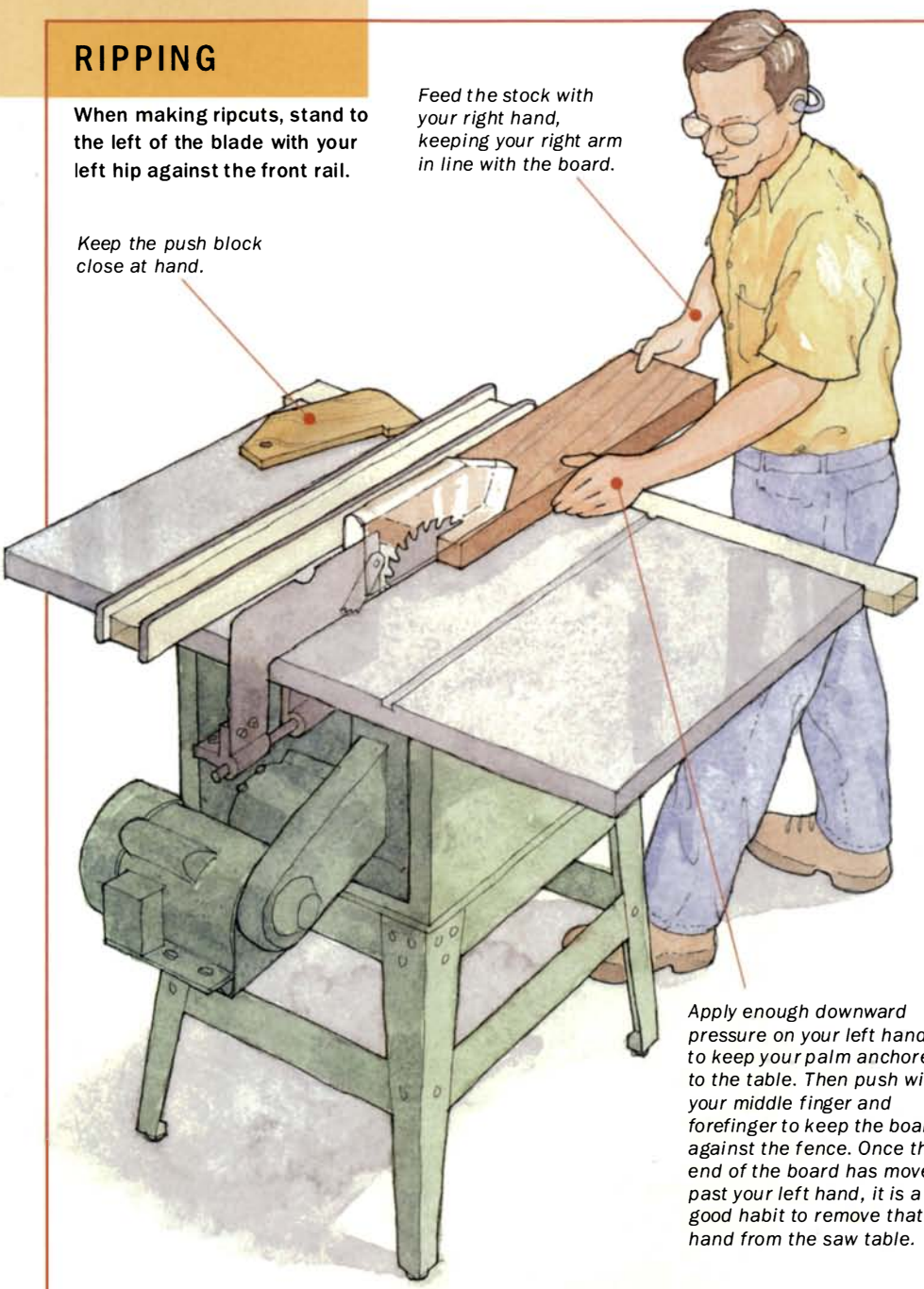
The narrow slot of a zero-clearance insert is created by raising the blade through the insert.

RIPPING

When making ripcuts, stand to the left of the blade with your left hip against the front rail.

Feed the stock with your right hand, keeping your right arm in line with the board.

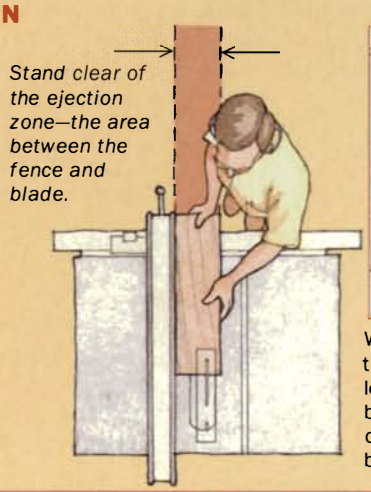
Keep the push block close at hand.

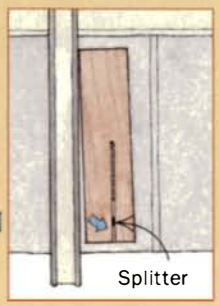


Apply enough downward pressure on your left hand to keep your palm anchored to the table. Then push with your middle finger and forefinger to keep the board against the fence. Once the end of the board has moved past your left hand, it is a good habit to remove that hand from the saw table.

AVOIDING EJECTION AND KICKBACK

Ejection occurs when a cutoff piece gets pinched between the blade and the rip fence. If the piece isn't supported by a push block or pawls, it can shoot straight back. Kickback occurs when a workpiece twists into the upward-spinning blade teeth. The teeth can launch the piece at your nose in an instant.

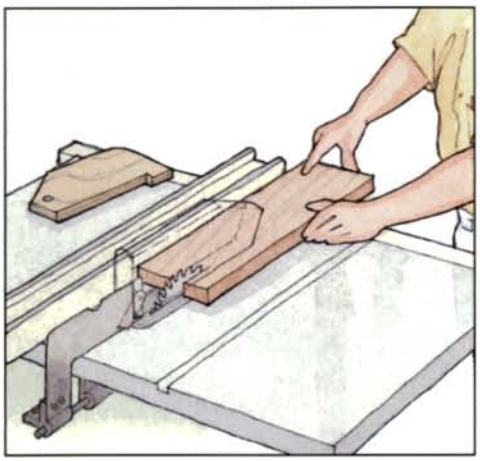




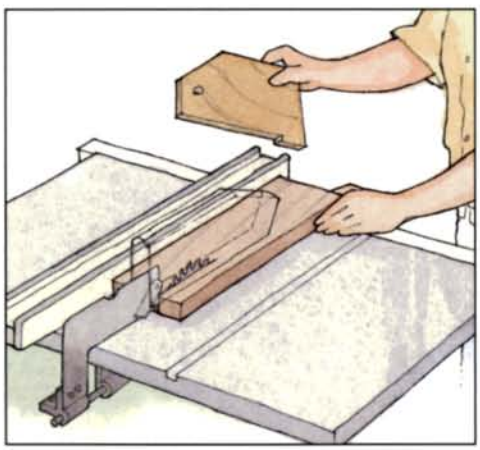
With a splitter behind the blade, kickback is less likely to occur because the workpiece can't easily contact the back teeth of the blade.

A SIMPLE RIPCUT

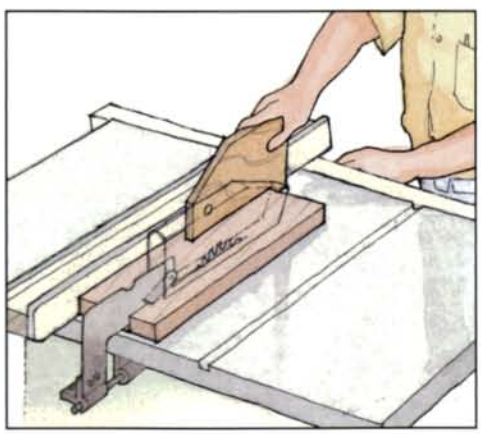
Most tablesaw accidents occur during ripping. By following a few basic techniques, you'll not only get good-quality cuts, but you'll also get them with a better degree of safety.



1. *Place the front end of the board on the saw. Then, with the edge of the board against the rip fence, feed the board into the blade at a steady rate. If the motor slows down, slow the feed rate.*

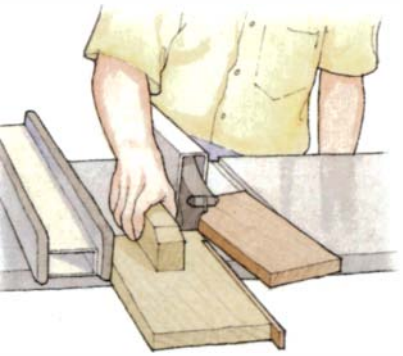


2. *Once the trailing end of the board reaches the front of the table, use the push block to feed the board.*

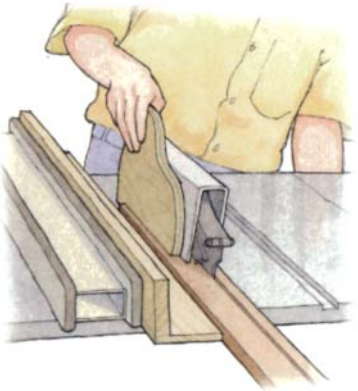


3. *Continue pushing the trailing end of the board with the push block until the board is an inch or two past the sawblade.*

RIPPING NARROW BOARDS



When ripping parts less than about 1¼ in. wide, use a notched sled, guided by the rip fence, to push the stock through the blade. A handle makes for easier pushing.



A shop-made L-shaped fence mounted to the rip fence creates extra space between the blade cover and the rip fence, making it easier to feed the stock, especially when a tall push block is used.

the miter gauge must be straight. If the flat surface or straight edge is missing, the stock needs to be handplaned or jointed.

How to avoid kickback or ejection while ripping

Smooth ripcuts can become routine if you follow a few basic cutting techniques. Not only will you get smooth ripcuts, but you'll also be able to get them with a better degree of safety. That's important, especially when you consider that most table-saw accidents occur during ripcuts. A safety point: Don't rip a board that is wider than it is long. With the shortest edge of the board bearing against the rip fence, the board easily can twist away from the fence and into the side of the blade, an invitation to kickback.

When you're faced with making a narrow ripcut, typically one that's between 1¼ in. wide and 3 in. wide, the blade cover usually ends up interfering with your right hand as you use the push block to feed the board through the blade. To avoid that problem, use a tall push block, which puts your hand well above the cover as the stock is pushed along.

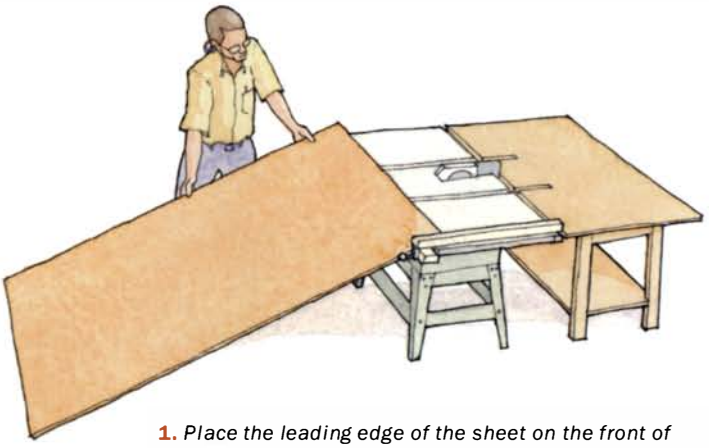
For the narrowest ripcuts, between ⅛ in. wide and 1¼ in. wide, use a notched sled when the stock is less than about 24 in. long (see the left drawing above). A handle on top helps you push the sled while making sure the edge of the sled stays against the rip fence. To set the width of the cut, simply measure the distance from the sled's inside edge to the sawblade's inside edge. For longer parts that require a narrow ripcut, clamp a short auxiliary fence to the rip fence (see the right drawing above). The short fence allows the stock to slide under the blade cover. However, when the front of the push block reaches the cover, you'll have to stop pushing and go to the back of the saw. The pawls will keep the stock in place. Once at the back, you can complete the final few inches of the cut by pulling the narrow piece through the blade.

Use a firm grip while crosscutting

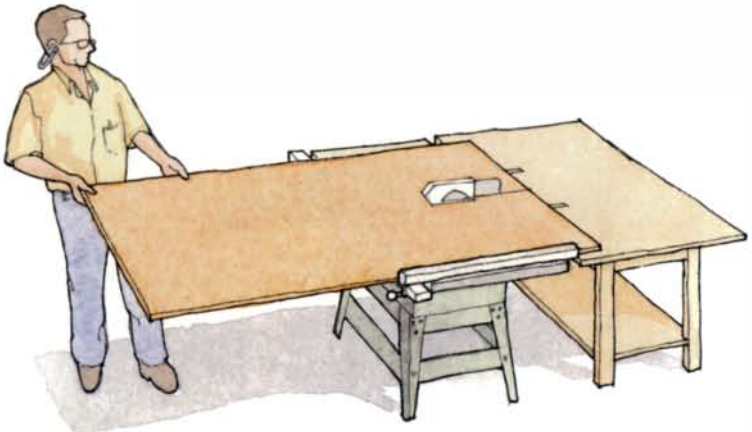
The most common crosscut is made with the miter gauge set at 90° to the miter-gauge slot, resulting in a square cut. However, consis-

RIPPING LARGE PANELS

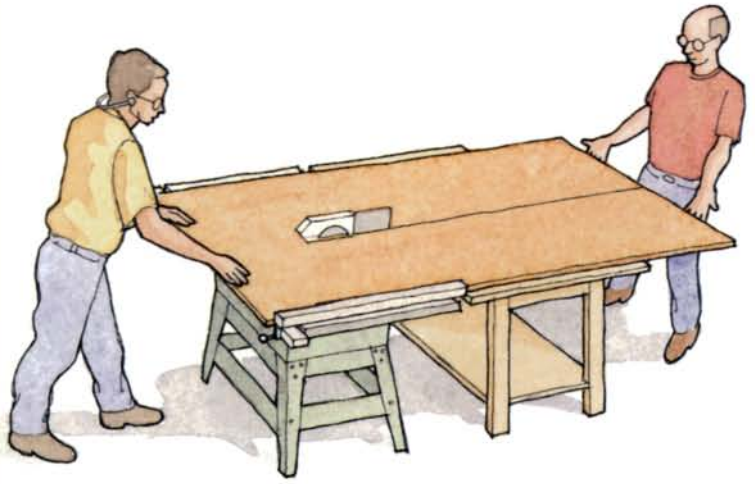
Full-size (4 ft. by 8 ft.) sheets of plywood and other sheet goods are heavy and awkward to handle, which make them a chore to cut. But with a little forethought and practice, the procedure can be reasonably straightforward.



1. *Place the leading edge of the sheet on the front of the saw with the back end resting on the floor.*



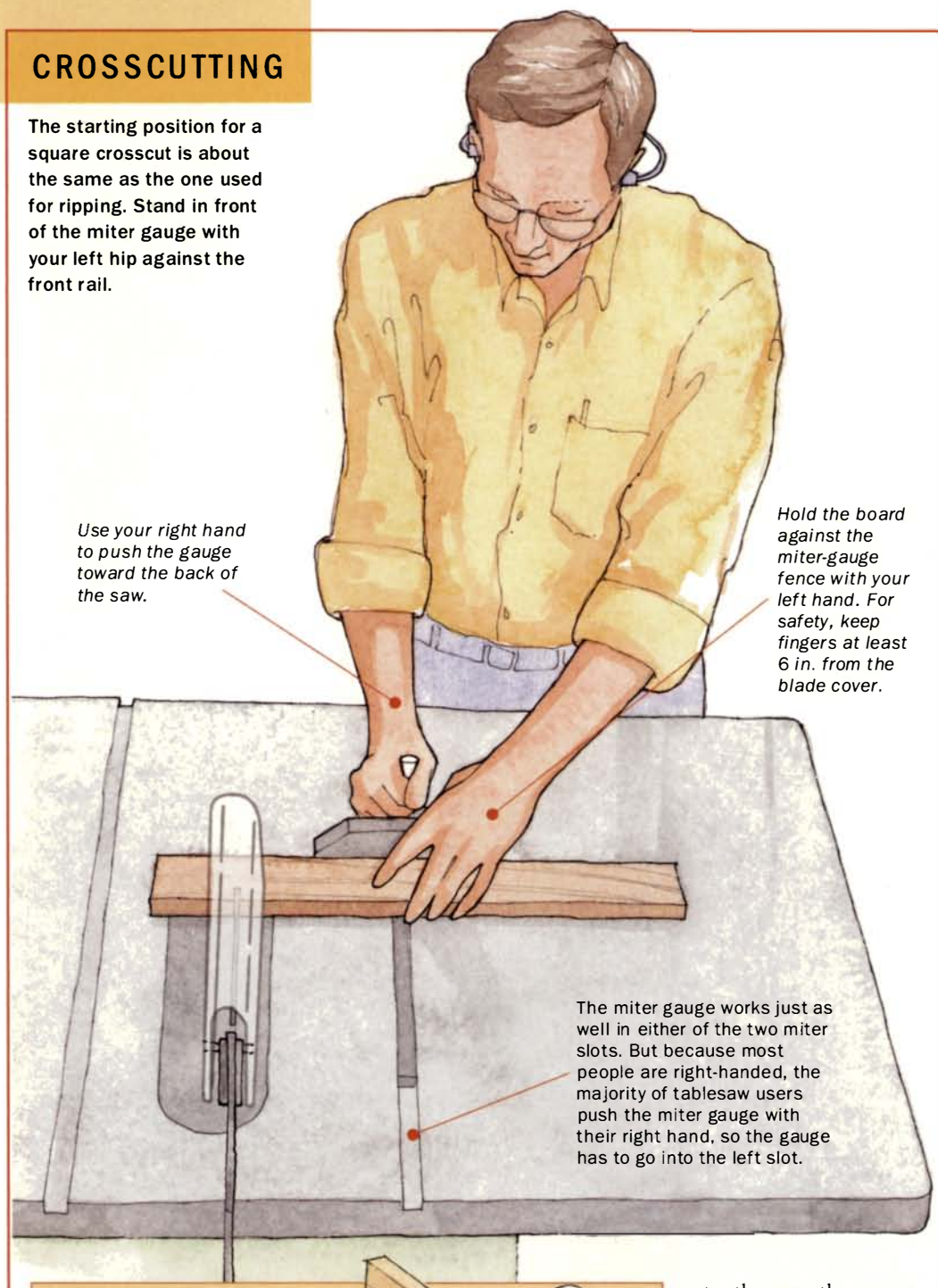
2. *Stand at the left corner of the sheet with your body more alongside the left edge than the end. From that position it's easier to hold the edge of the sheet against the rip fence. When making the cut, both arms should be comfortably outstretched with your left arm along the left edge and your right arm on the end.*



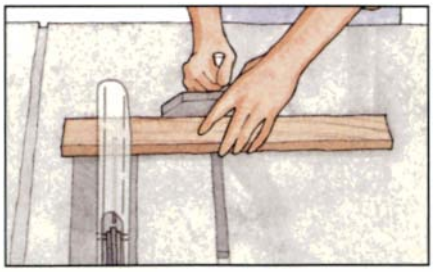
3. *As you feed the sheet and begin to approach the front of the saw, shift your body more to the front of the sheet. Once at the front of the table, assume your normal starting stance to complete the cut. Have a helper support the end of the sheet.*

CROSSCUTTING

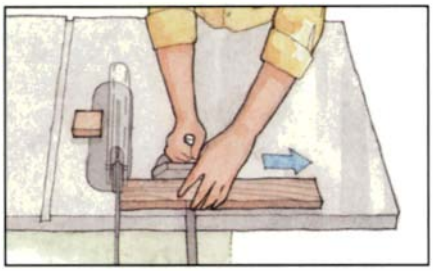
The starting position for a square crosscut is about the same as the one used for ripping. Stand in front of the miter gauge with your left hip against the front rail.



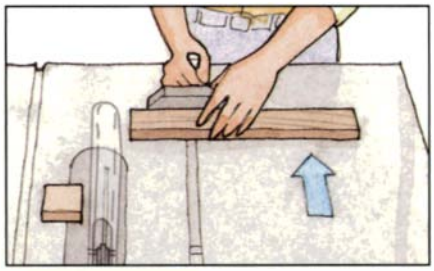
A SIMPLE CROSSCUT



1. *Keep the board away from the blade (an inch or two) before starting the saw. Push the miter gauge with your right hand, feeding the board at a steady speed. Stop pushing after the cut, but continue to hold the board against the fence.*

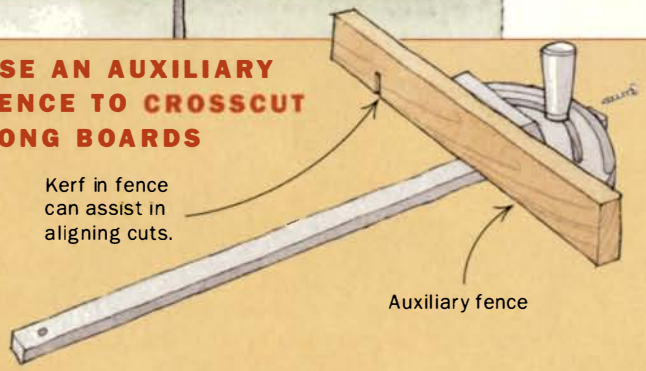


2. *To avoid having the spinning blade touch the cut edge of the board when the miter gauge is pulled back to the starting position, possibly causing a little extra splintering, it's best to shift the board away from the blade slightly.*



3. *While holding the board against the fence, pull both the board and the gauge back to the starting position. Then shut off the saw.*

USE AN AUXILIARY FENCE TO CROSSCUT LONG BOARDS



A typical miter-gauge fence is relatively short, so it doesn't offer a lot of support to long boards. An easy solution is to screw a long auxiliary wood fence to the miter-gauge fence. You can make the wood fence to any length, but just be sure it's flat and straight.

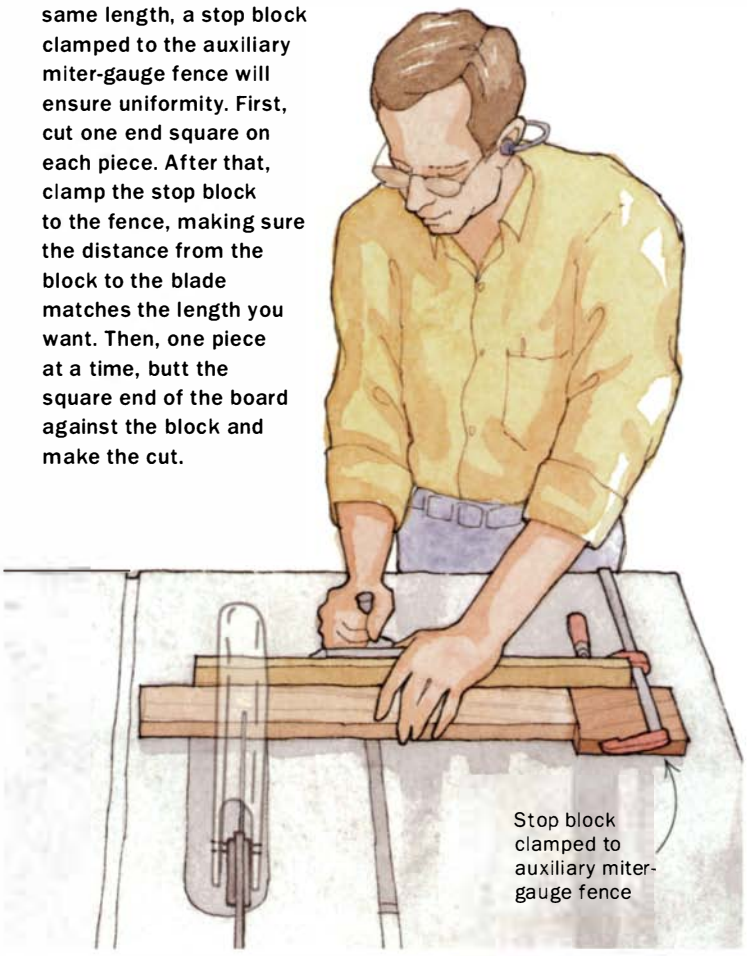
tently smooth, square crosscuts don't happen automatically. You need to follow a few basic procedures.

Position the board on the miter gauge—Place the board on the saw table. Use your left hand to hold the board against the miter-gauge fence and slide the gauge forward with your right hand until the leading edge of the board almost touches the blade. At this point, use one or two hands as needed to align the saw-blade with the cut line on the board.

Push the board through the blade—When everything is aligned, use your left hand to hold the board firmly against the miter-gauge fence until the cut is completed. The holding force you apply should be straight back, and your fingers should be at least 6 in. from the blade cover. Slide the board an inch or two away

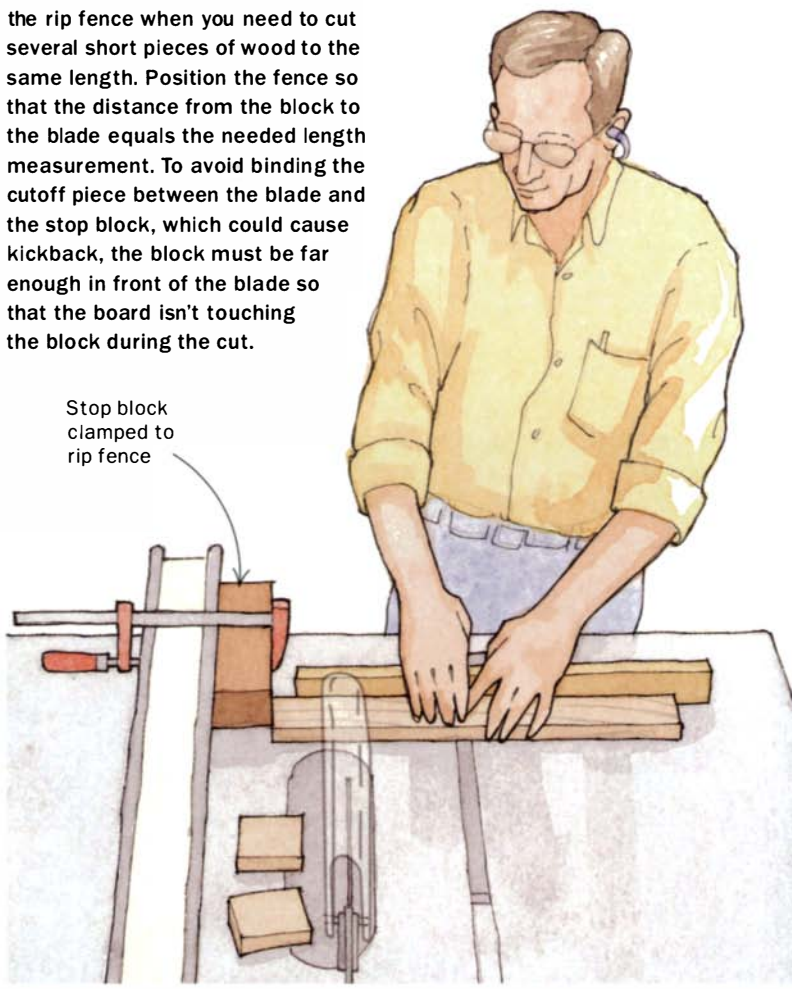
REPEAT CUTS FOR LONG PARTS

When you're cutting several boards to the same length, a stop block clamped to the auxiliary miter-gauge fence will ensure uniformity. First, cut one end square on each piece. After that, clamp the stop block to the fence, making sure the distance from the block to the blade matches the length you want. Then, one piece at a time, butt the square end of the board against the block and make the cut.



REPEAT CUTS FOR SHORT PARTS

To save time, clamp a stop block to the rip fence when you need to cut several short pieces of wood to the same length. Position the fence so that the distance from the block to the blade equals the needed length measurement. To avoid binding the cutoff piece between the blade and the stop block, which could cause kickback, the block must be far enough in front of the blade so that the board isn't touching the block during the cut.



from the blade before starting the saw. Use your right hand to push the gauge toward the back of the saw, and feed the board at a steady speed. Stop pushing once the cut is finished, but continue to hold the board firmly against the miter-gauge fence.

Pull back the board—Once the board has been cut, continue to hold the board firmly against the fence, and pull both the board and the gauge back to the starting position. Once back to the starting point, you can relax your hold on the board and shut off the saw.

Oftentimes, as the board and miter gauge are pulled back, the spinning blade will slightly touch the cut edge of the board and cause a little extra splintering. To avoid the problem—and if the board is small and light enough—I'll use my left hand to shift the board ⅛ in. to ¼ in. away from the blade before pulling it back. Bigger and heavier boards, however, won't move as easily. So if I'm cutting a big board while in splinter-phobic mode, I simply shut off the saw before removing the board and pulling back the gauge.

Add a stop block to the rip fence when cutting several short pieces to the same length—It's not uncommon to need several short pieces of wood, each one the same length. When that's the case, I clamp a stop block to the rip fence. Then the fence is positioned so that the distance from the block to the blade equals the length measurement you need. To avoid kickback, the block must be far enough from the blade so that the board isn't touching the block when it starts being cut by the blade.

Add a stop block to the auxiliary miter-gauge fence when cutting longer boards to the same length—Make sure the distance from the block to the blade matches the length you want. First, though, using only the auxiliary fence, cut one end of each board square. Then butt the square end of each board against the block and cut one piece at a time.

Another versatile jig that gets a lot of use in my shop is the crosscut sled (to see the sled in use, go to www.finewoodworking.com/toolsandshops). The sled makes crosscutting even more accurate and safe.

Once you've mastered the basic techniques of ripping and crosscutting, you'll be ready to tackle the other various tasks suitable for the tablesaw, such as cutting miters, tenons, and tapers. □

Watch it on the Web

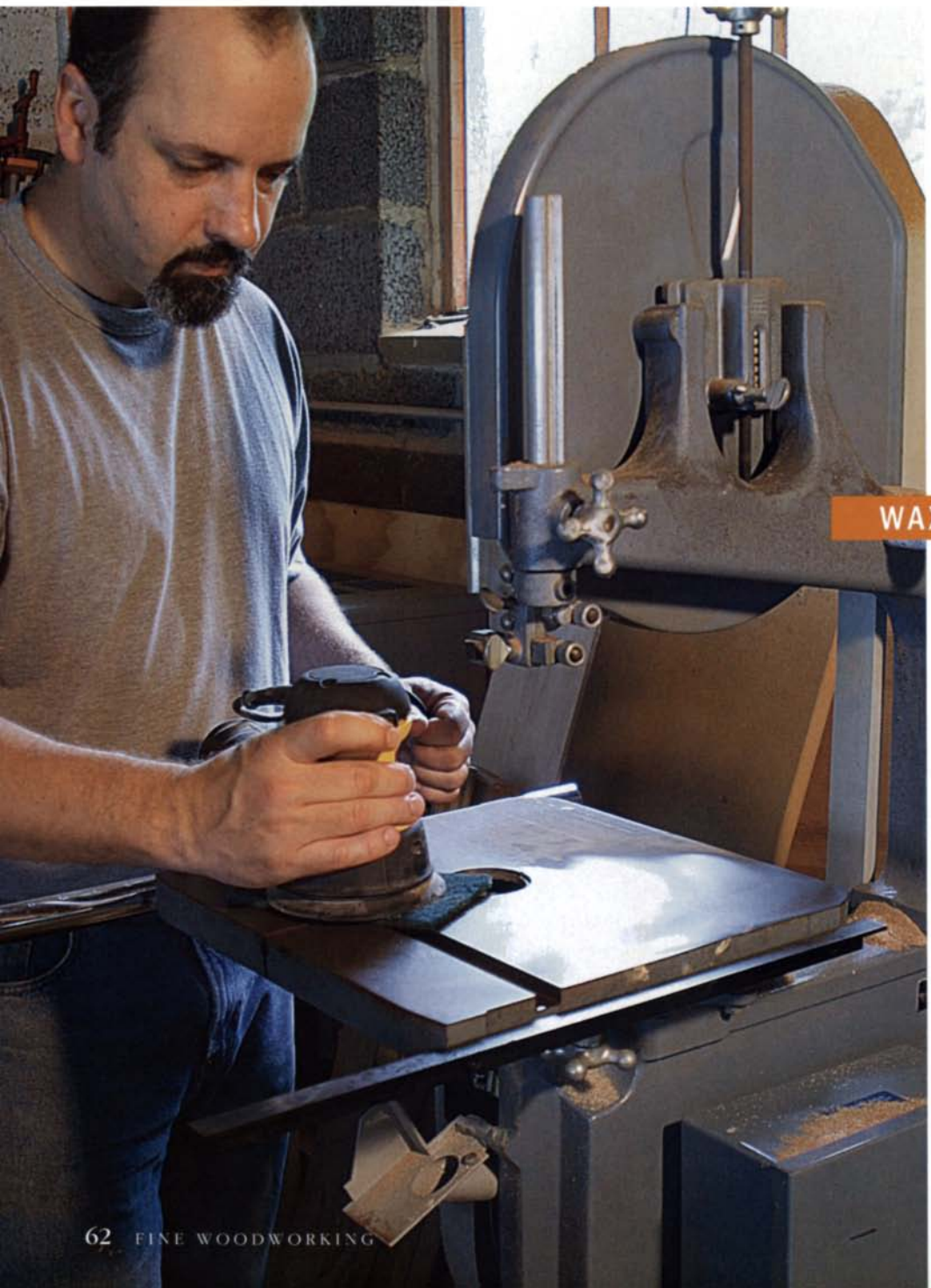
To see a video on using a tablesaw crosscut sled, go to www.finewoodworking.com/toolsandshops.

Kelly Mehler is the author of The Table Saw Book *(The Taunton Press, 2002).*

Protecting Surfaces in the

Machines, jigs, and benches all benefit from being sealed and waxed

BY CHRIS A. MINICK



We go to great lengths to protect the projects that leave our workshops from the rigors of everyday use, yet we often neglect our jigs, fixtures, shop cabinets, workbenches, and tools—the very objects that allow us to create fine furniture in the first place. There's no need to French-polish your crosscut sled, but there are treatments that will make your jigs, benches, and machine tops work better and last longer.

Prevent rust on machine surfaces

Bare metal will rust if not protected or used constantly. There are myriad products that purport to be the last word on metal protection. Each product claims to prevent rust and to leave a slick surface that will not contaminate wood. The ones I've tried have done neither, and I'm leery of applying oil to my saw top or jointer bed. As a consequence, I've adopted my own system for cleaning and protecting metal that works and doesn't require much effort.

I remove the rust by buffing the surface

WAX FOR MACHINE SURFACES

A green pot-scrubbing pad mounted to the hook-and-loop base of a random-orbit sander (left) removes rust and tarnish from machine beds. Kitchen waxed paper (below) can be used to protect and lubricate a machine bed. Simply crumple up the paper and rub it over the surface (right) to lay on a thin layer of wax.

Shop

with a green pot-scrubbing pad. Small items such as planes, chisels, or scrapers are buffed by hand, but large surfaces like my tablesaw or jointer get power-buffed with a 5-in. random-orbit sander. The hook-and-loop sanding pad holds the scrubber firmly while I guide it around the metal surface. Once it's rust-free, I polish the surface with a wadded-up piece of waxed paper. Just enough wax (carnauba, I've been told) transfers to the metal surface to protect it from rusting and to lubricate it simultaneously. Boards glide across the saw or the jointer as if they are floating on air.

High-pressure laminate requires virtually no maintenance and is the ideal surface for router tables, shop-cabinet tops, chopsaw extensions, and the like. Dried glue and finish easily scrape off, and a quick rub-down with waxed paper keeps the laminate slick.

Finishes help jigs last longer

It may seem unnecessary to finish jigs, but there are several good reasons to put in the

FINISHES FOR JIGS

SHELLAC

Shellac not only seals and lubricates, but it's also the best finish for reducing seasonal movement in solid wood.

WAX

The plywood parts of jigs need only a coat of paste wax to protect them from dirt and glue drips. The wax also helps jigs slide during use.

GLUE SIZE

The edges of MDF are far more absorbent than the compressed faces. PVA glue diluted with water (called glue size) seals the edges, after which the whole jig can receive a coat of shellac.

Photos, except where noted: Mark Schofield

TWO WAYS TO PROTECT BENCHTOPS

SACRIFICIAL SURFACE

Benchtops made from sheet goods are best protected with a sacrificial top of hardboard, which can be replaced easily when it gets worn out (left). Use the old surface as a template to mark the outline on the new top (below).

effort. Even simple jigs help us hold, saw, or bore wood precisely. The usefulness of most jigs depends on their accuracy, and they require a fair amount of time and effort to construct, so it makes sense to protect them properly. The type of finish depends on how the jig is used and the material it is made from.

Shellac on solid wood—Finishing jigs with shellac virtually eliminates dimensional changes in solid wood caused by seasonal humidity. Shellac has the lowest moisture-vapor transmission rate of any finish on the market today. That means the moisture content of wood finished with a few coats of shellac will barely change, even if the level of humidity in the shop varies significantly.

I prefer dewaxed shellac to finish furniture, but for jigs I use the hardware-store variety of premixed orange shellac. That cloudy stuff in the can is natural shellac wax, which lubricates the sliding surfaces of the jig and allows it to glide across a tablesaw easily.

Paste wax for plywood—Plywood and tempered hardboard remain dimensionally stable over wide humidity swings, so they are ideal materials for your most critical jigs. Often a coat of furniture paste wax is all the protection needed for jigs made from these stable materials. The paste wax also helps the jig slide more easily during use.

Glue size seals MDF—Medium-density fiberboard (MDF) is less seasonally stable than other manmade sheet goods, but it still can be used for jig construction if properly sealed. The edges of an MDF sheet are considerably more absorbent than the faces. If left unfinished, the unprotected edges can absorb moisture and significantly swell the MDF sheet. A coat or two of finish will not seal the edges adequately, so instead I use glue size—a 50-50 mixture of polyvinyl-acetate (PVA) glue and water. Allow the glue size to dry completely, lightly sand the rough surface, then finish the whole jig with shellac or

Photos, this page: Michael Pekovich

Scrape first. *On a used bench, scrape away any dried glue before applying a new coat of the wipe-on finish.*

Mix the finish. *Minick's mixture of oil, varnish, and paint thinner contains a higher proportion of resin than most Danish oils to give the bench greater protection.*

Lay it on heavy. *Apply the oil-varnish mixture liberally and allow it to soak in for 10 minutes before wiping off the surplus with a clean cloth.*

lacquer. This will provide an effective moisture barrier.

Hold the varnish—For finishing jigs, I prefer shellac or cabinet-grade nitrocellulose lacquer, which dry much faster than oil-based varnish and are available in convenient aerosol cans. More important, shellac and lacquer form harder surface films than varnish, which means that jigs coated with these finishes slide more easily over a tablesaw or router table than their varnish-coated cousins.

Benchtops need protection, too

When it comes to finishing a workbench, I find that woodworkers fall into two camps: Some lavish as much attention on finishing their bench as they would a dining-room table, while others consider any finish to be a waste of time. I fall somewhere in the middle, applying a finish more for protection than for the look it imparts.

Benchtops take plenty of abuse, so an easily renewable finish is in order. My home-brewed wipe-on finish dries fast and gives plenty of protection. Mix 1 cup oil-based polyurethane brushing varnish with ½ cup mineral spirits, then add about 2 oz. boiled linseed oil. Adjust the mixture with mineral spirits for proper wiping consistency, and then apply it like any other wipe-on finish. It will dry to the touch in about one hour. Three coats on a new workbench will resist water better than standard Danish oil; it's a good idea to apply an additional coat or two once a year to maintain this protection.

My shop cabinets are varnished inside and out, so they don't need much attention; however, they still get dings and scratches. Every couple of years, I vacuum off the dust and wipe on my home brew, which makes them look almost as good as new.

If your benchtop is made from layers of plywood or MDF, a better form of protection is to use a sacrificial surface. My benchtop is covered with ⅛-in.-thick hardboard held in place with double-faced carpet tape. When the top gets too dinged to be usable, I pry up the old piece and replace it with fresh hardboard. □

Chris A. Minick is a consulting editor.

Make a Wooden Scraper

This shopmade cabinet scraper will tame the most difficult woods

BY STEPHEN SHEPHERD

Scrapers are among the most useful of all the hand tools in a woodworker's arsenal. Properly sharpened and burnished, a scraper will remove a fine shaving on even the gnarliest wood, leaving the surface with a depth and sheen that you can't achieve with sandpaper. When viewed under magnification, a scraped surface appears crisp, and the pores are clean and free of debris.

Cabinet scrapers offer advantages over the familiar, flat-metal hand scrapers (also called card scrapers). As with a handplane, the fixed relationship of the blade to the sole produces a uniform depth of cut, which you can vary by deflecting the blade with a thumbscrew. The sole also bridges low spots rather than following the contours of the surface as a hand scraper does. Last, the cabinet scraper's outswept handles provide more leverage for aggressive cuts while insulating the user from the heat produced by the scraping action.

All cabinet scrapers vibrate and chatter when the cut is too aggressive or the blade is dull, but metal-bodied cabinet scrapers chatter more because the metal surfaces have no dampening effect on vibration. A shopmade wooden cabinet scraper, on the other hand, chatters less, is more sensitive to the wood surface and can be customized for applications such as smoothing chair seats and rungs.

Three main parts form the scraper

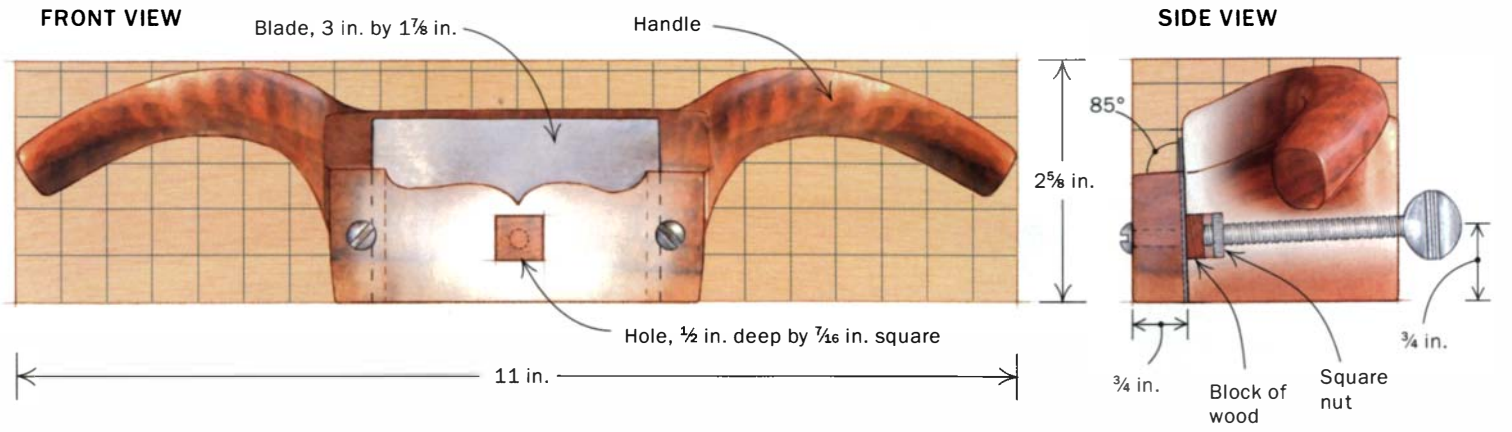
Before preparing the wood for the scraper, determine the width of the blade. You can buy replacement blades for the Stanley or Kunz metal scrapers that are 2¾ in. wide. For this scraper, I used a 1¾-in.-long section from the end of a 2½-in.-wide Sandvik hand scraper. Cut the scraper with a hacksaw or tin snips, then file the edge smooth.

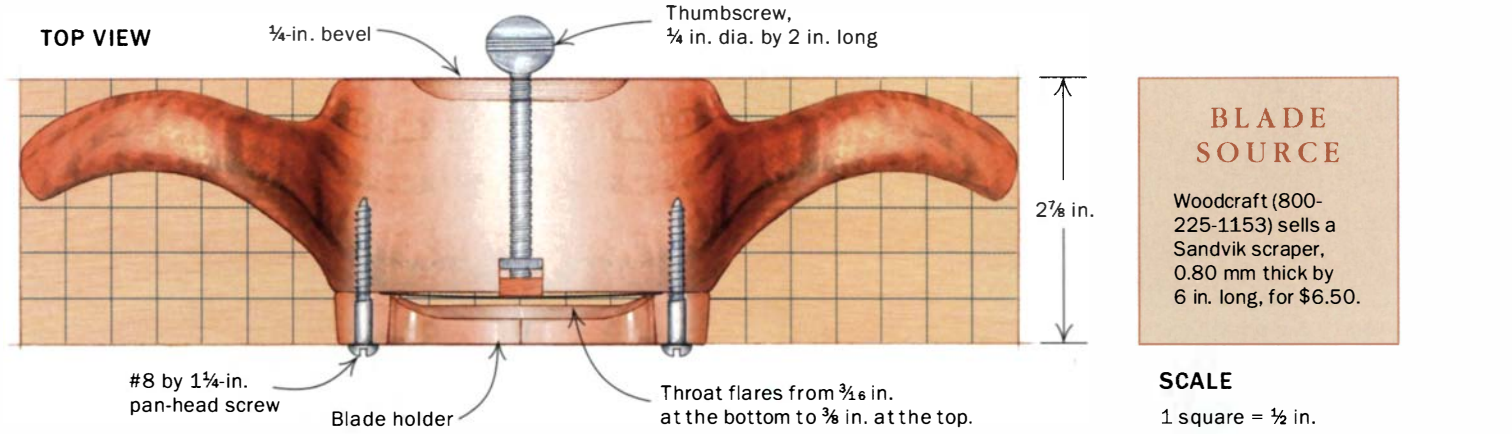
Shape the body first—This design is modeled after an early 19th-century exam-

A cut above. *A wooden cabinet scraper is superior to its metal cousin for its ability to handle figured boards.*

THREE VIEWS OF A WOODEN SCRAPER

These illustrations show a 3-in.-wide blade. Scale the width of your design to reflect the actual width of the blade you use.





BLADE SOURCE

Woodcraft (800-225-1153) sells a Sandvik scraper, 0.80 mm thick by 6 in. long, for $6.50.

SCALE

1 square = ½ in.

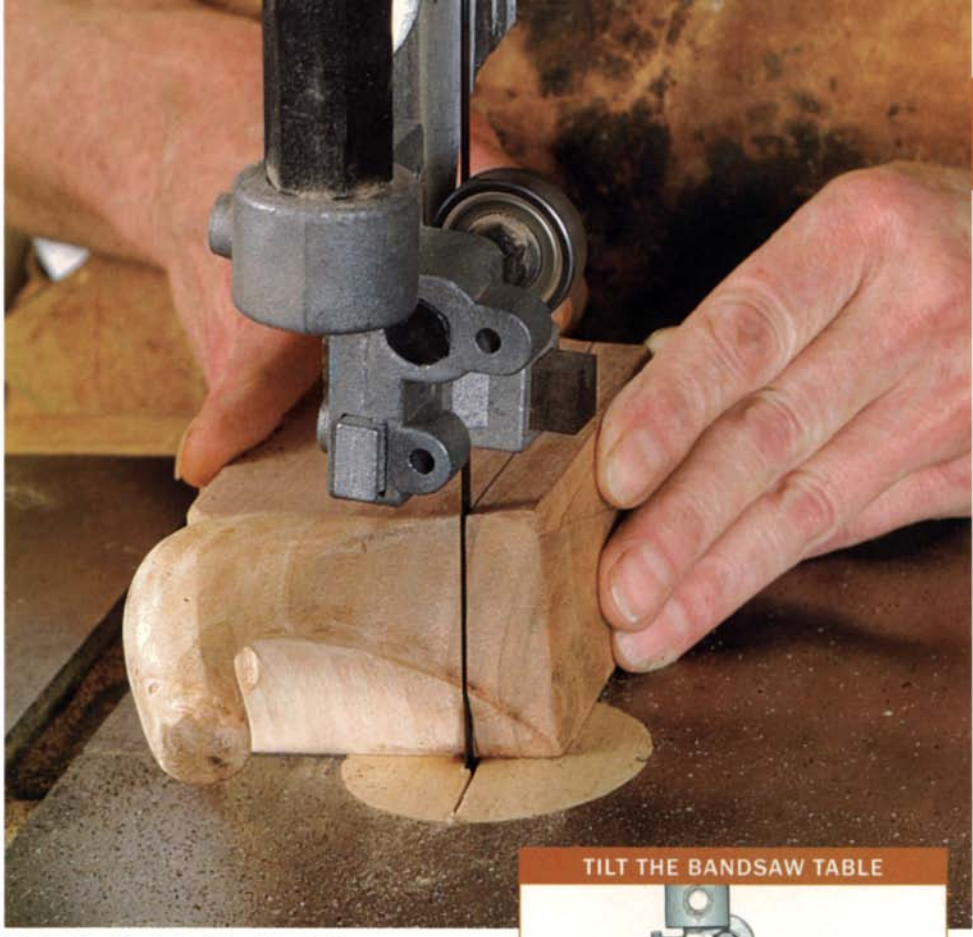
CUT THE BODY ON THE BANDSAW

A large block of wood is used for the body of the scraper. Typically, a smooth-wearing hardwood, such as maple or beech, is used, but historic examples include walnut burl, rosewood and ebony.

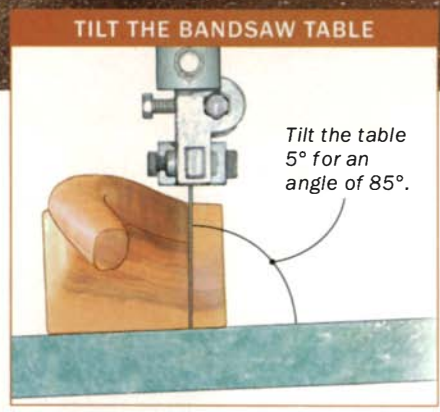
Transfer the image to the block. *Use the top and front profile templates to draw the outline of the scraper on adjacent sides of the wooden block.*

Cut and shape the handles. *After cutting out the top profile on the bandsaw, tape the waste pieces back on to give support while you cut the front profile (left). Use a spokeshave followed by a file and a cabinet scraper to shape and smooth the two handles (above).*

Photos, except where noted: Mark Schofield; facing page: Kelly J. Dunton



Make the blade holder. *Tilt the bandsaw table 5° and cut off the front of the scraper to form the blade holder.*



ple. The body of the cabinet scraper is made of a hard, smooth-wearing wood such as maple or beech, although historic examples include walnut burl, rosewood and ebony.

Start with a piece of wood about 2½ in. wide by 3 in. high and 8 in. longer than the width of your blade. Smooth one wide face with a handplane to form the sole of the scraper. Flip over the block to lay out the handles on the top, then lay out the front profile on an adjacent face. The handles on this scraper taper slightly toward the ends, but you may prefer another handle style. Feel free to mock up different shapes to see which feels best for you.

Cut out the top profile with a fine-tooth bowsaw or bandsaw. Then tape the waste pieces back in place to add support for cutting the front profile. Use a spokeshave to shape the handles, which can be either round or oval. The oval shape, with its longer axis parallel to the sole of the scraper, seems to afford more control.

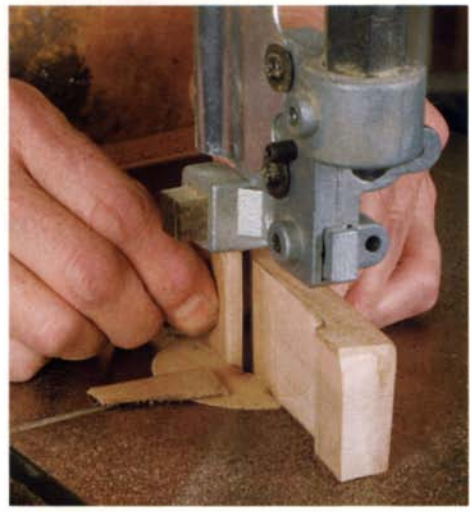
Make an 85° cut on the front of the block (see the left photo above). You can use either a bandsaw with the table tilted 5° (see the drawing above) or a handsaw. Flatten the cut surface with a handplane.

Now form the blade holder—The wood blade holder secures the blade tightly to the block at an 85° angle. The holder is made from the cutoff piece sawn from the block used to make the body of the scraper. First use a handplane to smooth the cut side of the block. Then cut off a ⅝-in. piece from the top edge to ease the ejection of shavings.

Center the blade squarely across the blade-holder blank and score the edges with a marking knife. Then draw two more lines parallel to and ⅛ in. inside these marks. These secondary lines define the throat of the blade holder. Saw out the throat cavity on the bandsaw, then smooth the surface with a file. Flare the throat opening from about 3⁄16 in. at the bottom to about ⅜ in. at

CUT THE BLADE HOLDER FROM THE BODY

Fit the blade to its holder. *After marking the width of the blade on the blade holder, draw another pair of lines ⅛ in. inside to outline the throat opening.*



Cut the throat. *Use a bandsaw to cut the throat on the blade holder. The opening should be wider at the top of the holder.*

Drill the hole. *With the 85° bevel side of the scraper body facing down, use a drill press to make the hole for the thumbscrew.*

Drawings: Melanie Powell

the top to prevent shavings from becoming trapped in the throat.

Saw a shallow cut along the two lines marking the edge of the blade, then use a chisel to pare the ⅛-in. shoulders. The shoulders hold the blade against the body of the cabinet scraper and allow it to flex when you advance the thumbscrew against the back of the blade. Cut the shoulders slightly shallower than the thickness of the blade; if they are too deep, the blade will slip. If you do cut them too deep, plane the wood outside the shoulders.

I use pan-head sheet-metal screws to attach the blade holder to the body. Make the clearance holes in the blade holder just large enough for the screws to pass through; otherwise, the blade holder may slip out of position during use. Drill corresponding pilot holes in the body, but don't make these holes too tight or you might split the wood when you drive the screws. Now, install the blade holder and, if necessary, plane the bottom edge flush with the sole of the scraper body.

Install the thumbscrew—This design calls for a thumbscrew that allows you to adjust the depth of cut.

Make a clearance hole for the thumbscrew, with the 85° bevel down so that the hole exits 90° to the blade (see the bottom right photo on the facing page). Locate the hole so that the tip of the screw contacts the blade in the center of the throat about ½ in. up from the sole.

Although a ¼-in.-dia. by 2½-in.-long thumbscrew would be ideal, the longest I can find is 2 in. Because of the short length of the screw, you'll need to chisel a square recess around the hole on the blade side. Inset a square nut and then install a small block of wood that relays the pressure from the thumbscrew to the blade.

Sand and finish the scraper—Once the construction has been completed, disassemble the cabinet scraper and smooth all of the surfaces. I finish my scrapers with a few coats of boiled linseed oil and a little beeswax rubbed onto the sole to make the tool work smoothly. After an initial wear-in period, the sole becomes "smack smooth" and requires no further wax. □

Stephen Shepherd is a conservator and a tool and furniture maker who lives in Salt Lake City. You can visit his Web site at www.ilovewood.com.

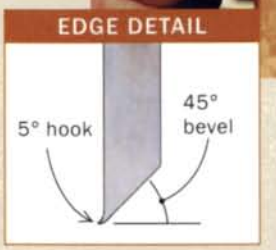
Using the scraper

A sharp, properly burnished blade is the key to excellent scraping performance. The blade of a cabinet scraper is traditionally sharpened at an angle of 45° or more; but the burr is burnished over in a similar manner. File the edge of the blade to 45° with a fine mill file and then burnish over the edge 5° to 10° with a burnisher or hardened screwdriver shank.

Setting up the blade is easy: Install it loosely in the blade holder and set the scraper on a flat workbench, with the edge of the blade resting on the surface of the bench. Tighten the two blade-holder screws and then run in the thumbscrew until it barely begins to bow the center of the blade outward.

To use the scraper, grasp the handles in the palms of your hands, with the blade facing away from you and with your thumbs and forefingers comfortably positioned on the curves where the handles meet the scraper body.

Rest the scraper on your workpiece, with the body of the tool skewed about 10° to 15° to the grain direction. If all's well, a firm push should send a fine shaving floating from the throat of the scraper. If the cut seems too thick, back off the thumbscrew a bit and try again. Keep an eye on the shavings. When they start to break up or resemble dust, it's time to sharpen the blade.



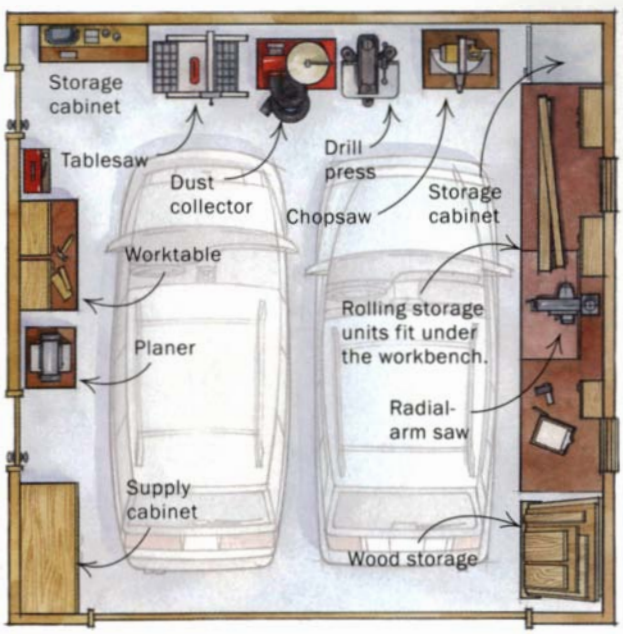
Getting an edge. *After creating a burr, turn it back with a screwdriver held 5° to 10° off the vertical.*

Install the blade. *Set the cabinet scraper on a flat surface and insert the blade flush with the bottom. Tighten the blade-holding screws (left). Turning the thumbscrew pushes the blade outward and, because of the 85° angle to the vertical, downward at the same time (above).*

Scrape both ways. *You can push or pull the scraper, depending on the grain of the wood and what feels comfortable.*

Roll-Away

With wheel-mounted tools and cabinets, a two-car garage easily transforms into a versatile workshop



TWO CARS AND A WORKBENCH

The 23-ft. square space is a workshop by day and a garage by night. A long workbench spanning one wall houses a series of multipurpose rolling cabinets used for storage and as tool stands, worksurfaces, and infeed and outfeed tables.

After many years living in central Florida, I received an invitation to relocate to Tucson, Ariz. Having been an active woodworker for 18 years, I placed adequate shop space high on my list when it came time to buy a home. While it would have been nice to find a house with a separate workshop, my wife and I settled on one with a spacious 23-ft. by 23-ft. two-car garage.

This presented me with a challenge: create an efficient and comfortable workshop that could accommodate big projects but still make room for the family cars. So I began laying out the basic requirements needed to share my tablesaw with my parking space.

The primary requirement was to keep at least one car in the garage at night, even if a half-finished project occupied floor space. The flexibility to park two vehicles in the garage on occasion also was essential. The challenge was balancing these requirements with the elements of a good shop: one that is attractive to work in, easy to clean, and has plenty of organized storage. My philosophy throughout was "a place for everything, and everything in its place."

Making due with limited space

To have plenty of workspace and be able to cut long boards with my radial-arm saw, I knew I would build a long workbench along one of the garage walls. I began sketching idea after idea, looking for inspiration in books, magazines, and on TV woodworking shows.

While paging through magazines, I came upon an article for a

Photos: Matt Berger

Workshop

BY BILL ENDRESS

roll-around tool-storage cabinet designed to be tucked under one wing of a tablesaw. It dawned on me that I could use a similar concept to save space in my garage. Beneath the workbench I could house roll-around cabinets to store tools.

The more I thought about it, the more advantages I could see of this system. With the rolling cabinets built to well-planned heights, they could serve as infeed and outfeed supports for the tablesaw, planer, and miter saw. Work areas also could be adapted to accommodate different projects just by rearranging the rolling cabinets.

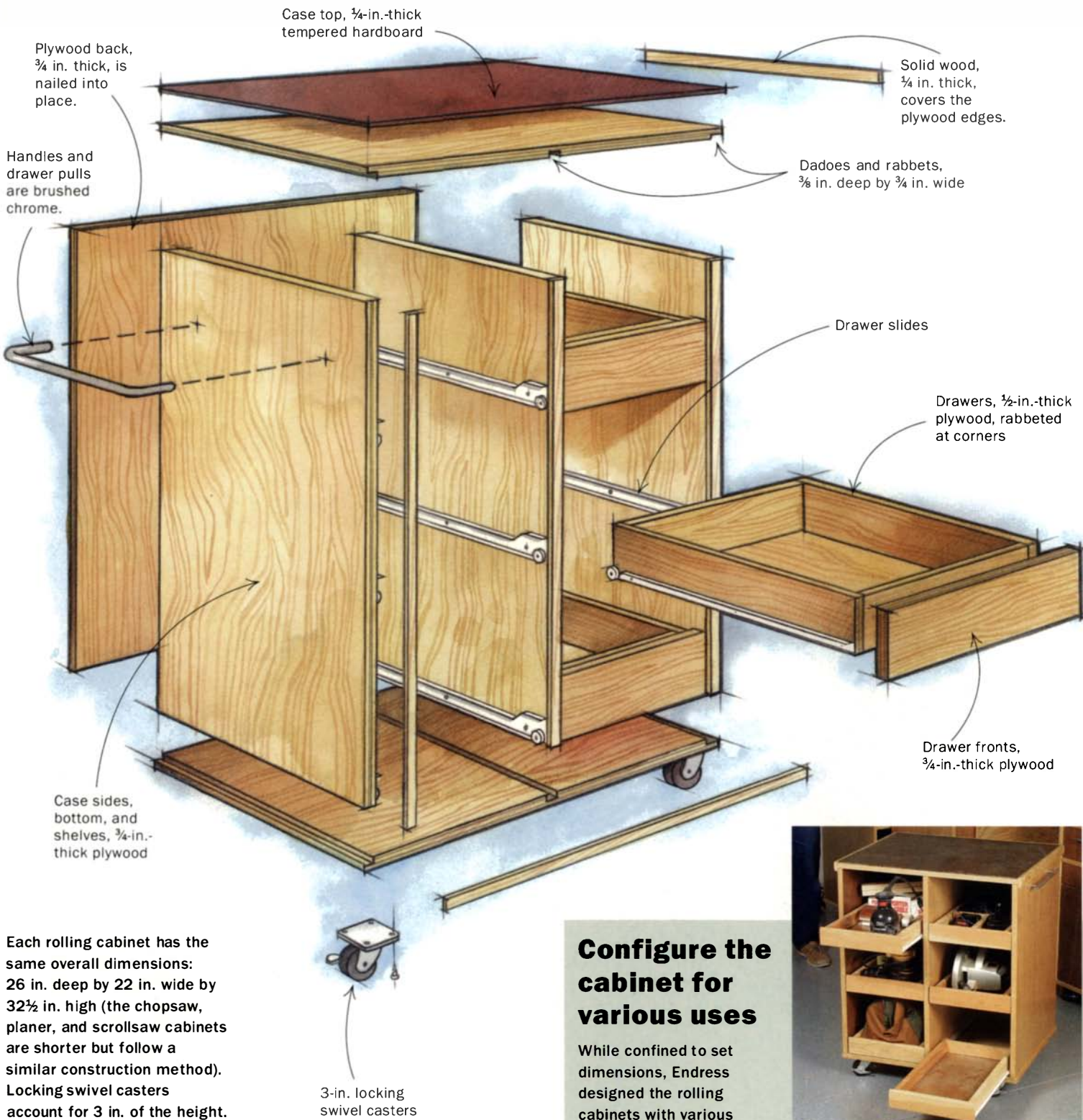
Workbench serves as a garage for rolling cabinets

Constructing the main workbench was the first task. Because of space limitations, I decided to build it in two sections and bolt them together. One section is 8 ft. long, and the other is 6 ft. long. After some measuring of tables and kitchen cabinets, I determined that a worksurface 30 in. deep and 37 in. high would be most comfortable. The workbench was fortified with a 2x4 frame to support the substantial weight of the radial-arm saw. I also installed two electrical-outlet strips on the bench, one on each side of the saw. They're mounted along the front edge to keep power-tool cords from extending across the top of the worksurface.

Cabinets are built for mixing and matching

It was both fun and challenging to design and build the cabinets. Once I knew the workbench measurements, it was easy to back out the dimensions for the rolling cabinets. To keep it simple, the

BASIC CONSTRUCTION OF ROLLING CABINETS



Each rolling cabinet has the same overall dimensions: 26 in. deep by 22 in. wide by 32½ in. high (the chopsaw, planer, and scrollsaw cabinets are shorter but follow a similar construction method). Locking swivel casters account for 3 in. of the height. The basic construction allows for variations in the placement of drawers and shelves. Each cabinet is constructed from ¾-in.-thick plywood and finished with two coats of water-based varnish.

Configure the cabinet for various uses

While confined to set dimensions, Endress designed the rolling cabinets with various arrangements of shelves and drawers so that each one serves a different purpose.

Sliding shelves store power tools visibly and in reach. *Endress built two of these cabinets—one with a left-facing handle, the other with a right-facing handle—to form a large surface when side by side.*

Drawings: Brian Jensen

cabinets follow the same basic design but are configured differently, according to their functions.

Some cabinets have drawers, some have shelves, and some are built to hold large power tools. All of the cabinets roll on swivel casters. Handles are attached to the cabinet faces so that they can be maneuvered around the garage. The handles, drawer pulls, and cabinet-door handles are all matching brushed chrome, giving the final profile of the workbench a handsome look.

Storage cabinets double as worksurfaces—The cabinet used for storing power tools has six sliding shelves that pull out to the left for storing sanders, a jigsaw, and other tools. A second cabinet is built in a mirror image with shelves that pull out to the right. By butting these two cabinets together, a continuous worksurface is created while leaving the shelves accessible.

A third rolling cabinet has five drawers to hold hand tools. A shelf underneath the top of the cabinet is open on three sides, providing a place to set tools and keep them out of the way. The opening also is useful for clamping workpieces to the tabletop, as clamp heads can be tightened against the top's overhang.

The fourth rolling cabinet simply has two shelves that are accessible from three sides. One shelf holds two toolboxes, and the other holds my bench grinder and a small belt sander.

The height of the cabinets is consistent and makes them ideal to serve as infeed and outfeed tables for my miter saw, planer, and tablesaw (see the photo on p. 71).

Stationary tools get wheels, too—The first four cabinets provide adequate storage for my hand tools. But I also needed storage for my assortment of power tools.

The scrollsaw fits below the workbench, sitting on a low, rolling cabinet. While it seems quite short at first glance, the cabinet is just the right height to use the saw while sitting comfortably in a chair.

The router-table cabinet also is on wheels. The table is equipped with a router lift. The lift is offset from the center of the worksurface, leaving room for drawers on one side of the cabinet to hold router bits, collet wrenches, and a laminate trimmer. Two more drawers below the router are large enough to hold another router, associated tools, and auxiliary baseplates.

Following the same design, I built rolling cabinets to hold my planer, miter saw, and tablesaw. Rather than getting stored out of sight, these cabinets fit along the walls of my shop and can be moved easily. The cabinets for these tools also have plenty of storage for any accessories.

Dust collection is easy to incorporate—The only tool in the shop that doesn't have dust collection built into its cabinet is the miter saw. Try as I might, I haven't come up with a good dust-collection system that allows me to store the cabinet against the wall. When using this tool, I usually set it up by the garage door so that the dust generated is thrown outside the shop.

To keep the shop clean, I settled on a 1-hp mobile dust collector that can be attached to one tool at a time, and it has been adequate so far.

Wheels roll in any direction and lock securely—I used four 3-in. locking swivel casters (available at hardware stores) on each rolling cabinet, which enables them to move in any direction.

When all four wheels are locked, the cabinet becomes a stable platform. Unfortunately, due primarily to its weight, moving and locking my tablesaw into place on its low cabinet was a struggle. It always seemed to go in the opposite direction I wanted it to go. On a whim, I decided to try higher-quality, heavy-duty casters from Woodcraft Supply Corp. (www.woodcraft.com). What a difference quality makes! Not only can I move my saw with little effort, but the locking mechanism also is much easier to operate.

Wall cabinets reduce clutter

After taking up as much space as I could afford on the ground, I looked to the walls for more storage. I designed the wall cabinets to accommodate my work habits. I did not want deep cabinets, as things tend to get shoved to the back and become lost. I wanted

Shallow drawers hold hand tools. *An open area below the top of the cabinet keeps tools within reach but out of the way. The cabinet's top has enough overhang for attaching clamps.*

There's no such thing as too much storage. *Two tall, open shelves are used for storing large objects such as a toolbox, benchtop grinder, and belt sander.*

Scrollsaw sits at a comfortable height. *The scrollsaw is mounted to this low rolling cabinet so that it can fit below the workbench when not in use. However, it's just the right height to use while sitting comfortably in a chair.*

Router table holds parts and accessories. *This rolling router table is equipped with a router lift. The lift is offset to accommodate drawers, bits, and accessories. Dust-collection ports are built into the fence and cabinet back.*

Mobile tools and cabinets improve workflow

With the cabinets and tool stands built to corresponding heights, they can be arranged for use in a variety of combinations. The four-station arrangement shown here will accommodate a workflow that includes benchtop planing (1), ripping on the tablesaw (2), crosscutting on the miter saw (3), and routing at the router table (4). After an operation has been completed at one station, the outfeed table is rolled to the next station, where it becomes the infeed table.

Watch it on the Web

To see the roll-away workshop in use, go to www.finewoodworking.com/toolsandshops.

my cabinets just deep enough to hold racks of storage bins. I also did not want them so high that a ladder would be necessary to access the top shelves. This led to a final dimension of 8 in. by 30 in. by 30 in. for a double wide cabinet, and 8 in. by 15 in. by 30 in. for a single wide cabinet.

Cars and projects live in harmony

When I first came up with the idea of a small garage shop based on a mobile storage concept, I wondered how it would work out. After using the shop for more than a year, I continue to be amazed at how easy and how much fun it is to work here. All of my requirements were met, including the ability to park two vehicles in the garage when the shop is not in use.

As with any shop, there are lessons learned for building the next one. In hindsight, it would have been a good idea to plumb the workbench for dust collection and compressed air. But overall I am quite pleased with the current mix of rolling cabinets. If I do add new tools to my shop, I'll build rolling cabinets designed specifically for them. □

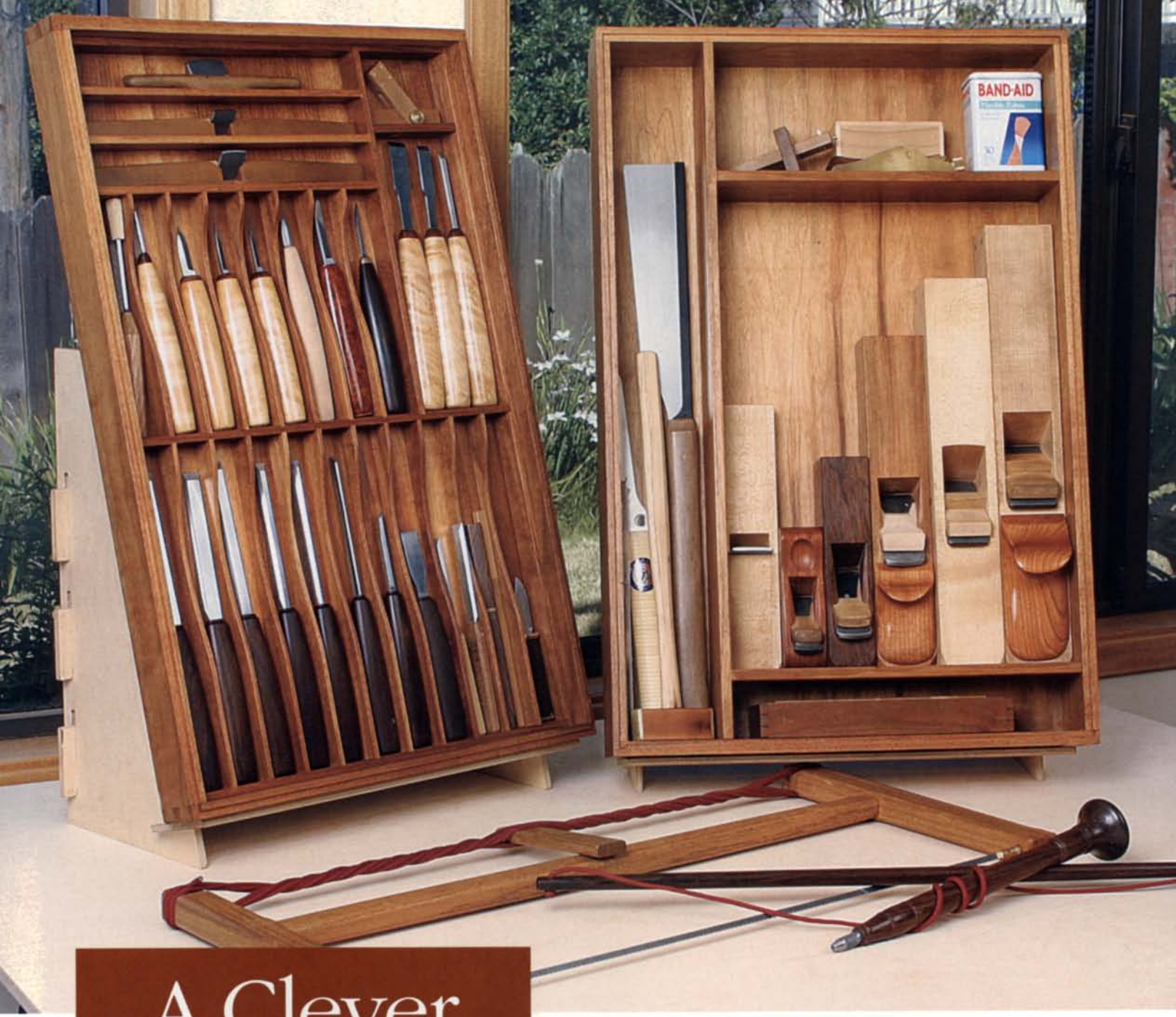
Bill Endress is an aerospace engineer in Tucson, Ariz. In his spare time, he works wood in his two-car garage.

1 ***Room for rough cutting.*** *Endress starts his workflow by milling boards at the thickness planer. Rolling cabinets support the stock on its way in and out of the planer and can be moved to support boards of various lengths.*

2 ***Support for long or wide stock.*** *The planer outfeed table becomes the infeed support at the tablesaw. A second cabinet catches the board on its way out.*

3 ***Instant miter-saw station.*** *Like the other power tools in this shop, the miter saw is built on a rolling cabinet designed so that the saw-cutting worksurface is level with the tops of the other cabinets.*

4 ***Comfortable routing station.*** *After transporting a stack of freshly crosscut material from the miter saw, Endress goes to work at the router table.*



A Clever Tool Case

Built-in stands keep an essential tool kit at the ready

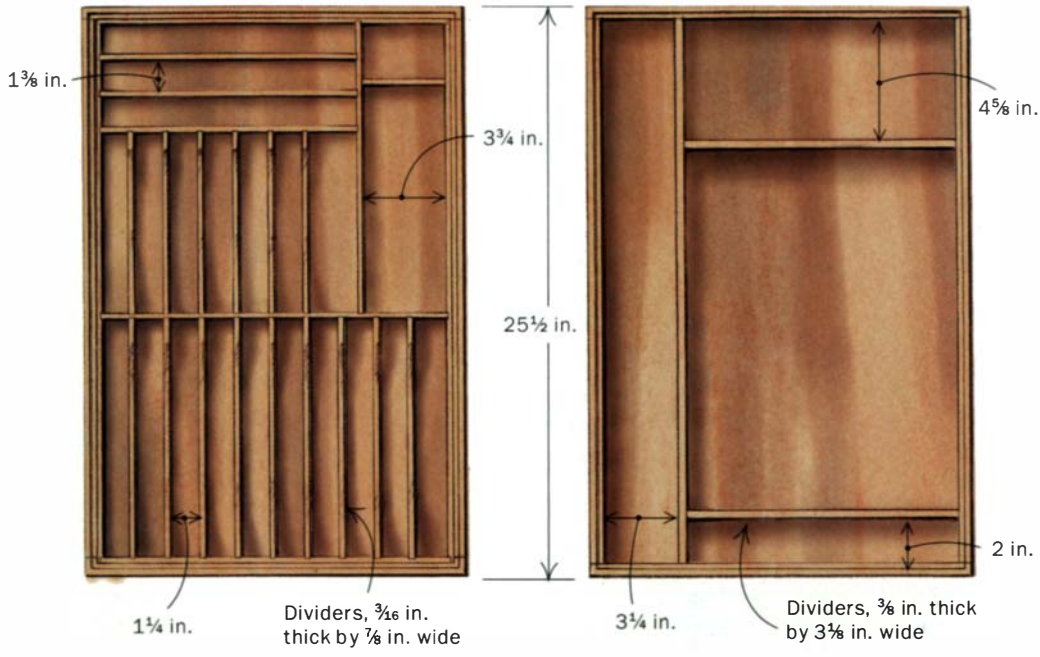
BY YEUNG CHAN

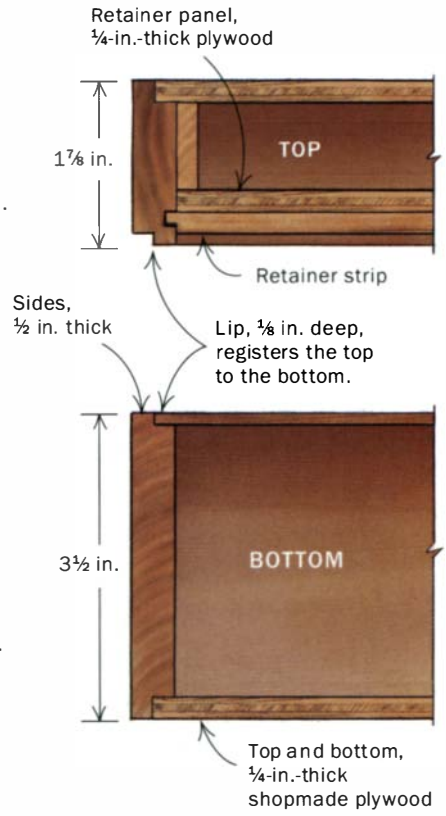
Starting when I was a boy in China, making hand tools became second nature to me. Most of the hand tools I use today are ones I have made. My tools are the extensions of my hands, helping me work faster, safer, and with better results. So I treat them with care, keeping them sharp and well-tuned.

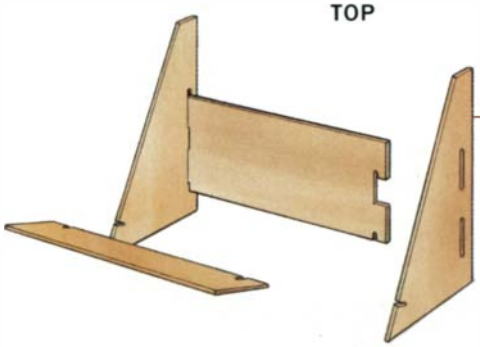
It's not a good idea to store cutting tools in a box without separating each one; tools hitting one another will cause damage and dull the cutting edges. When I went into business as a furniture maker, my first solution for tool storage was a large tool board mounted on the shop wall. However, I soon found that I needed my tools with me when I did installation jobs. And I began to take on a busy teaching schedule, giving classes, seminars, and demos in many different places. It became a big job to remove all of the tools from the tool board and arrange them in

BOX LAYOUT AND CONSTRUCTION

The top section of the box holds chisels, gouges, knives, spokeshaves, and marking gauges. The bottom section holds handplanes, sharpening stones, saws, a hand drill, and a pencil box.

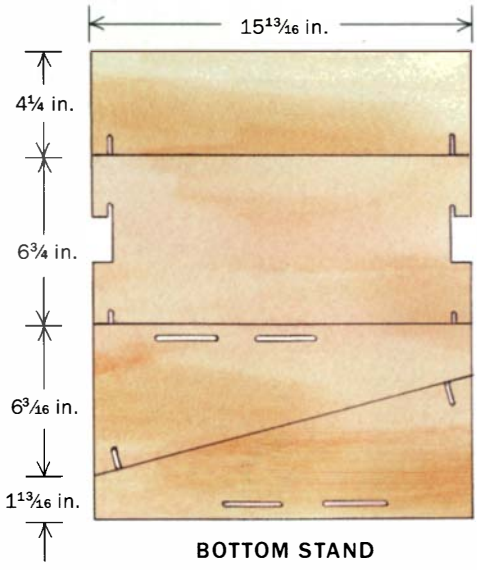


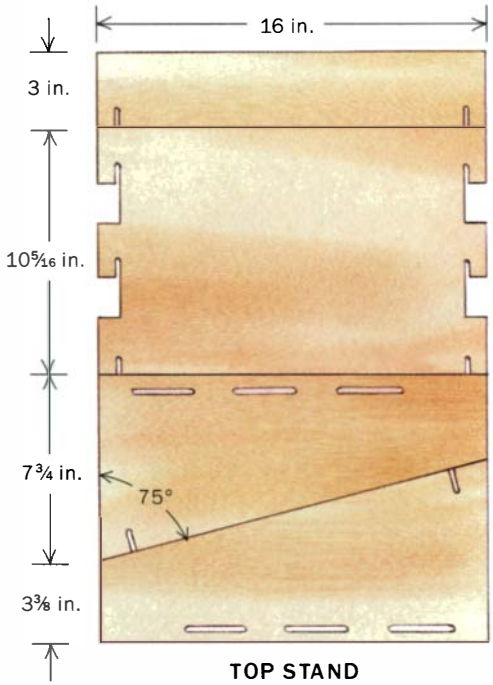


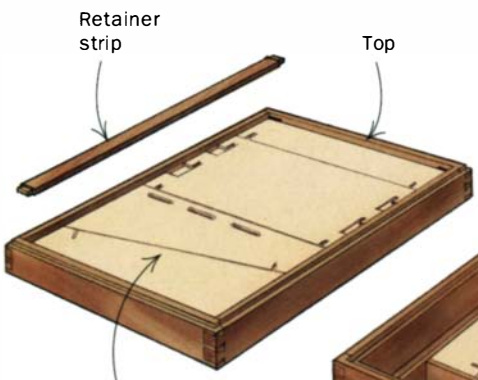


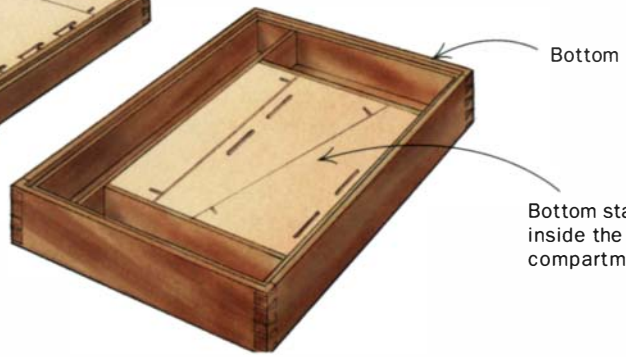
Thin plywood panels fit into each half to keep tools in place. The stand for the top section covers the entire box and is held in place with flexible retainer strips. The stand for the bottom section stacks into the space on top of the handplanes.

RETAINER PANELS ARE ALSO KNOCKDOWN STANDS









Photos: Asa Christiana; drawings: Chuck Lockhart

good order for travel (not to mention putting them all back on the wall afterward).

So I made a toolbox with the following mission in mind: to carry and protect an essential group of hand tools, big enough to handle most situations but not too heavy to carry. My toolbox may be small, but it's efficient.

To keep the tools from tumbling out when the box is closed, I made a retainer panel from ¼-in.-thick Baltic birch plywood for each half of the box. Originally, I was planning on just a simple rectangle of plywood for each side, but then I had another idea: Cut each rectangle in a certain way, and it could form a knockdown stand for its box. To prevent the plywood parts from falling off when the lid is turned upside down, I use two wood retainer strips with a small tenon on each end. The tenons fit into small mortises on the box wall. The strips are bowed slightly so that they put pressure on the middle.

I used plywood for the top and bottom of the toolbox, as I usually do for boxes, allowing me to glue it into its rabbet and strengthen the case. To make the plywood, I glued 1/16-in.-thick shop-cut veneer onto a ⅛-in.-thick core.

Two straps hold the case together. I decided against hinges because the weight of each box would rip them off the thin walls. Plus, I like having the two parts separate because I can put them where I need them.

I was very happy that the idea worked perfectly: The tools stay in place when the box is closed, and the two halves stand up side by side, good for use in the shop or in the classroom. When I give seminars and demos, my handmade tool kit becomes an exhibit, always generating lots of interest and questions. □

Yeung Chan is a woodworker and teacher in Millbrae, Calif.

The case for handmade tools

Like many children in poor countries, I made my own toys—model planes, boats, wooden trucks. There weren't many tools around, and in any case, I had no money to buy them. Often the only tool I used was a pocketknife. But I found out in practice that the quality of the steel was poor. Sometime later I found a broken hacksaw blade. I remember thinking that if this saw could cut metal, it must be very hard, good for making a knife. I ground off the saw teeth, sharpened the edge on the sidewalk, and then mounted it in a handle. This hacksaw-blade knife became my first handmade tool, and I was very satisfied with it.

After making this small knife, I made many other tools—for marking, cutting, and carving—all from high-speed-steel sawblades. Over the years I have made many improvements, both in the shapes and sizes of the blades and the handles, not to mention the quality of the tool steel. Now that I have a motorized grinder and fine stones, the grinding process is faster and easier.

Furniture makers often encounter difficult situations that could be solved easily with the right tool. One of the options is to modify an existing tool; a better way is to create and make one that is perfect for the job.

There are many advantages to starting from scratch: You can choose the steel, design the perfect blade shape for the task, and make a custom handle with your favorite wood, contoured to fit your own hand. My wooden spokeshaves are simple in construction with just a body and a blade—much lighter and smaller than metal ones. I designed my dovetail chisels with a low angle on both sides of the blade to fit into very narrow sockets when fitting fine dovetails. My wooden block plane fits my hand comfortably and is small and lightweight—great for final detail work. And when I could not find a chisel plane that I liked, I made my own out of bronze, which can be adjusted precisely with the turn of a screw. With comfortable handles fitted to my hand, these tools can be used continuously without muscle fatigue.

If you take the plunge and start making your own tools, after some time you will own a collection of beautiful custom tools that suit your hands and your style of work.

Handmade tool collection. *Chan designs each of his tools to improve on others he has used and to suit his way of working.*

Soundproof a Basement Shop

Two-pronged attack arrests both airborne and vibratory noises

BY MARK CORKE

Drawings: Michael Gellatly

Basement shops often are not ideal, but their proximity to the amenities of the house makes a good deal of sense. For instance, alterations to wiring can be accommodated more easily and inexpensively than in a stand-alone workshop. My basement shop is large, 30 ft. by 50 ft., but interrupted by support columns and stairs up to the first floor of the house. Because of the shop's proximity to my family upstairs, my main concern was reducing the noise levels of machinery and tools.

Researching the best way to tackle noise reduction can be daunting. I came across conflicting advice, much of it from manufacturers claiming the superiority of their products. To cut to the chase, I called my friend Terry Phillips, a sound architect I worked with at the BBC in Great Britain. Who better to help me find the solutions than someone who designs radio studios?

I learned there were two types of sounds that I had to deal with: airborne and vibratory. When a large woodworking machine is fired up, most of the noise that's heard is in the form of sound waves transmitted through the air by the motor, bearings, and cutters. Each of these components transmits sound at different frequencies, some of which are audible to the human ear. Noise also is transmitted through the fabric of the house in the form of vibration. If the vibration can be isolated, the noise will diminish. Something as inexpensive as rubber pads under the feet of the machine will reduce noise levels (see the photos above).

The solutions to my noise problem were something of a compromise between cost and versatility. My friend offered sensible advice on what I could achieve without spending a fortune.

FLOOR

DAMPEN VIBRATION

A rubber doormat sliced into small pads and placed under the feet of a machine can significantly reduce the vibration transferred from the shop floor to the framing in the rest of the house.

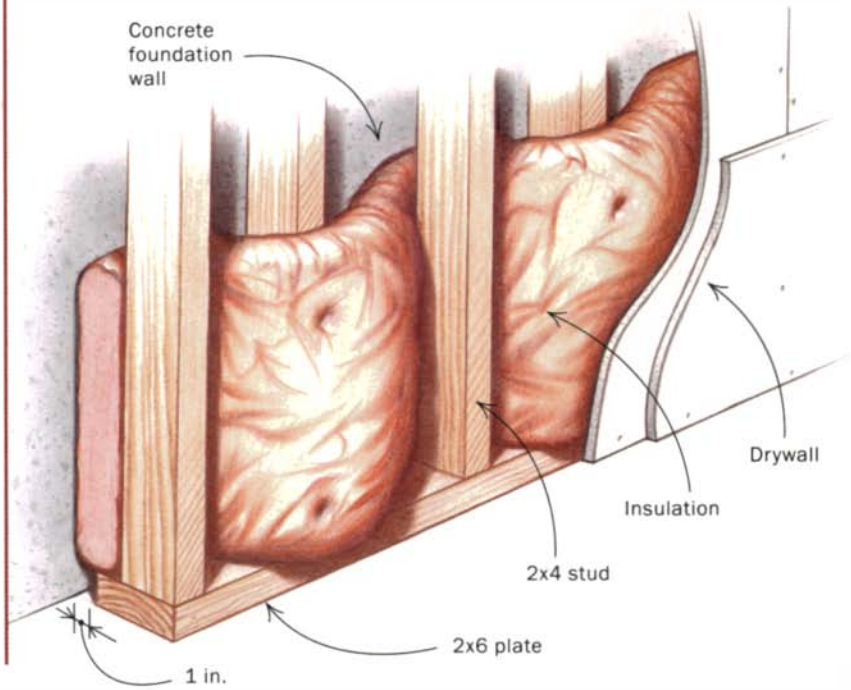
Isolate the foundation with a stud wall and airspace

By adding a stud wall around the foundation perimeter, you can introduce an air

WALLS

ISOLATE THE FOUNDATION

Corke made this wall using 2x4s for the studs (verticals) and 2x6s for the top and bottom plates (horizontals). He alternated the studs front to back along the top and bottom plates and wove fiberglass batting between them, leaving an airspace (1 in.) between the studs and the concrete foundation. He also covered the wall with two layers of drywall, staggering the seams.



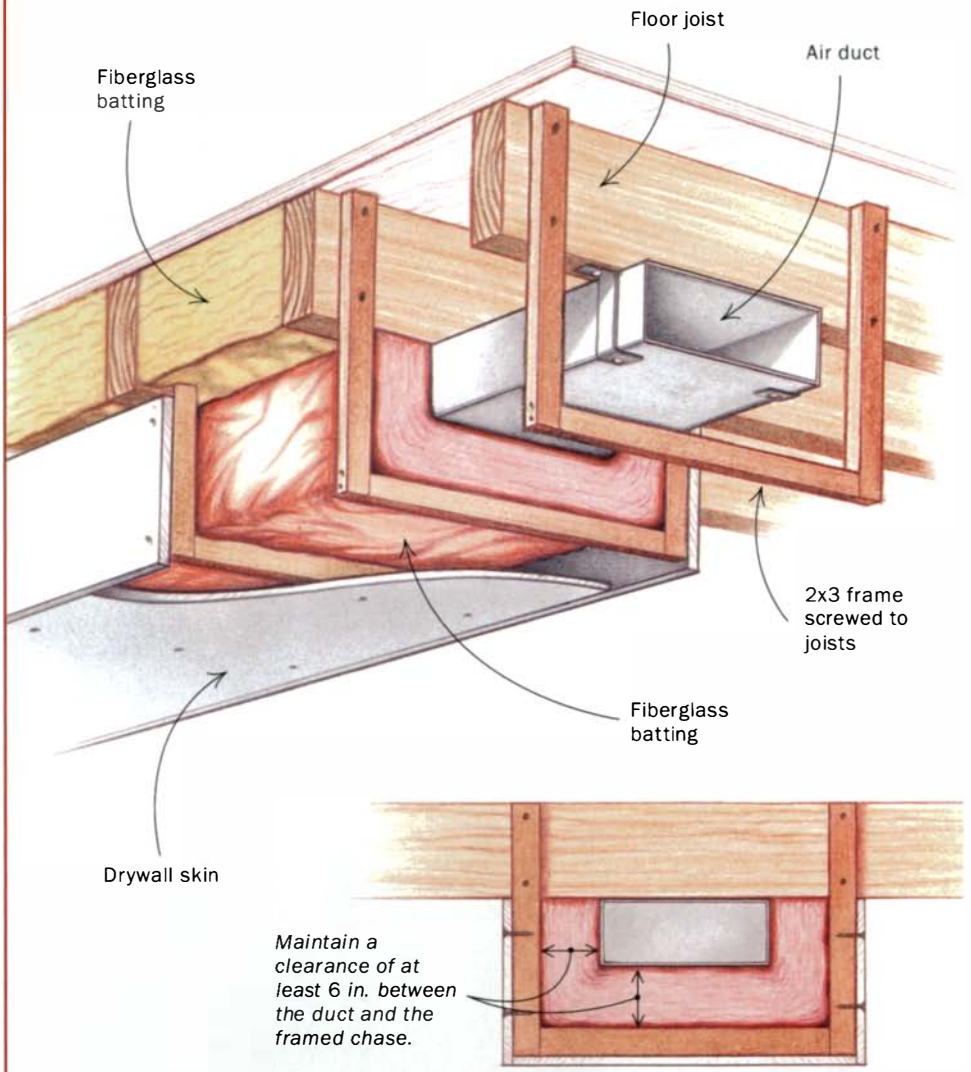
Meant for heat but good for sound. *Standard fiberglass batting, designed and traditionally used as a thermal insulation, also happens to be a pretty good sound dampener. A second layer of drywall will decrease substantially the level of sound that penetrates the structure. Stagger seams to ensure an airtight bond.*

Photos, except where noted: Michael Pekovich; this page: William Duckworth

AIR DUCTS

MAKE AN INSULATED FRAME FOR DUCTWORK

Sound travels through most solid material better than it travels through air. Heating and air-conditioning ducts in a basement shop can transmit loud noises easily up through two floors of a house. An insulated plumbing chase can make a big difference.



gap that reduces vibratory noises. The stud wall also increases thermal insulation and provides a convenient place to hang cabinets and tools. In my shop, I set the stud wall 1 in. out from the concrete wall to create that important dead-air space, and secured it at the bottom with a bead of construction adhesive. This method goes fast because there's no drilling into the concrete wall or floor.

I built the 2x4 stud walls between 2x6 bottom plates and top plates, ensuring that the spacing was right for the double layer of drywall. The studs are spaced 12 in. on center and alternate front to back on the 2x6s (see the bottom drawing and photos on p. 79). The walls can be built in place, but it's easier to build them on the floor in sections, then lift them into position. Make each section a bit undersize and shim it up from the floor or where the top plate meets the joists above it.

After the stud wall has been secured, weave fiberglass batts between the studs, starting at the bottom and working up with each layer. A few staples here and there should stop it from drooping.

As you can see from my experience, not all noise-control efforts need be complicated or expensive. The simplest solution is to isolate machines from the floor with rubber pads to prevent vibration from traveling through the rest of the house. As a final detail, fit weatherstripping around doors and windows and add fireproof caulk around plumbing and wiring holes that penetrate to the rooms upstairs.

Insulate the ceiling

The key to blocking airborne noise is to use loose insulation in conjunction with air gaps.

Cover the duct with a framed opening. *Simple 2x3 frames assembled at the workbench are easily attached to floor joists with screws.*

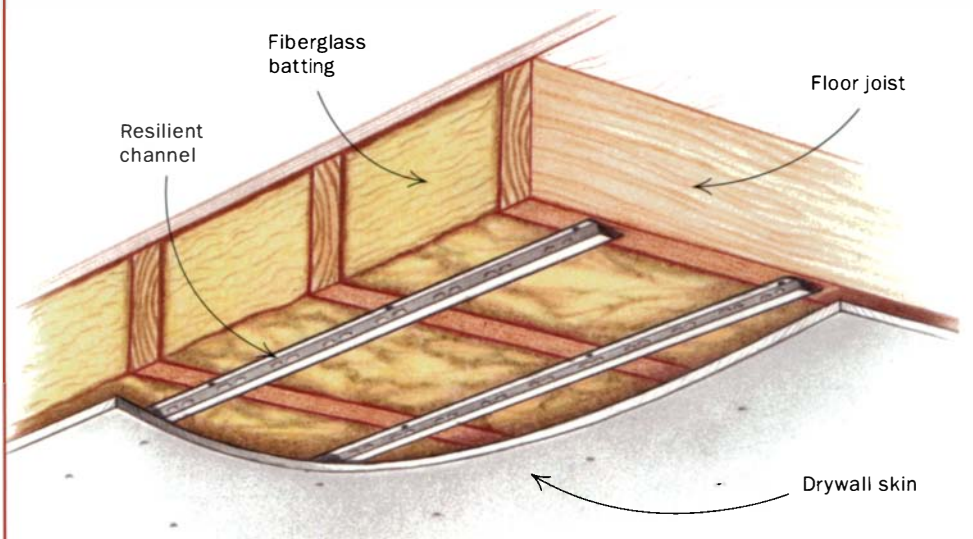
Stuff the airspace with thermal insulation. *Fill the airspace around the duct with good-quality fiberglass insulation. Higher R-values dampen noise more effectively.*

Skin the frame with drywall. *Sheets of gypsum board add mass to the chased opening and deflect much of the airborne sound.*

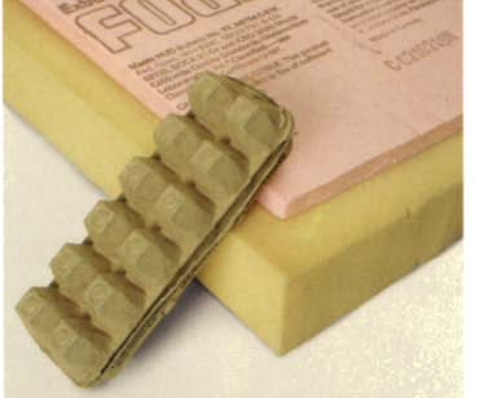
CEILING

SEPARATE THE CEILING FROM THE JOISTS

Hanging the drywall ceiling from the channel hardware shown below greatly reduces the amount of sound that travels through the structure. This technique essentially creates a dead airspace between the basement and the framing above it.



This product is inexpensive and effective. *Called resilient channel, this light-gauge steel furring material creates a sound barrier by separating drywall ceilings and walls from the framework of the house. A 10-ft. length costs about $1.*



Materials to avoid

I have read accounts by people who assert the sound-deadening and cost-effective benefits of covering walls with egg cartons. The reasoning behind this technique is that the undulating surface of the carton will interrupt and refract sound. Although there is some merit to this approach, the results often are disappointing. Also, the carton can be easily damaged, looks horrid, and is a fire hazard.

Foam rubber, which is used to make mattresses, does absorb sound well, but it ignites easily and gives off toxic fumes when burning, so it, too, is best avoided.

Polystyrene has good thermal-insulation properties, but it is too densely packed to make a good acoustic insulator. It is also highly flammable.

Fiberglass batting makes a decent sound barrier, and it's easy to install. In my shop, I stuffed it between the overhead joists. Although my primary goal was to create a sound barrier, the additional thermal value is a plus: I have a warmer shop in winter and a cooler one in summer.

Keep in mind that plumbing pipes and heating or air-conditioning ducts are conduits for carrying loud sounds such as whirring sawblades and hammer blows. Noise bouncing onto ductwork can permeate every room in the house. The foil-backed insulation found around most ducts is intended primarily as thermal insulation, and it's packed too tightly to absorb much noise. Looser material, such as the fiberglass batts that incorporate air gaps, will do a much better job of absorbing sound.

Make a basic framework to enclose pipes and ducts, and stuff fiberglass batts into all of these plumbing chases (see the photos and drawing on the facing page). The framework must be at least 6 in. away from pipes and ducts, or the sound-insulation properties will be negated.

Offset drywall from the ceiling joists

Don't fasten a drywall ceiling directly to the underside of the joists. You can reduce sound transmission considerably by separating the drywall with an airspace created by a product called resilient channel (above). Installed so that it runs perpendicular to the joists, this metal channel is sturdy enough to carry the weight of the ceiling.

Whether installed on ceilings or walls, a double layer of drywall will increase the resistance to how quickly a fire will spread as it also reduces the noise transfer, but you must stagger all of the seams between the two layers for a strong, airtight bond. Run the first layer of drywall the long dimension perpendicular to the resilient channel and parallel to the joists. Place the seams of the long dimension between the joists, not under them, and the seams of the short dimension directly along the resilient channel. I prefer ⅜-in.-thick drywall because I can handle a full sheet with the aid of a T-shaped strut to hold up one end. You can tape and add joint compound on the last layer, but it's not essential for reducing sound. □

Mark Corke is a freelance photographer who enjoys woodworking in his new home on the Connecticut shoreline.

Mobile Bases

For shops large or small, mobility offers convenience, as long as the base is stable and rolls smoothly

BY CLIFF COLLEY

Most woodworkers I know have small shops where space is at a premium. I'm at the other extreme. I teach woodworking in a huge space; nearly 6,000 sq. ft. Two of our four bandsaws spend a significant amount of time on mobile bases, rolling from one end of the shop to the other. Whether to resaw a fresh load of lumber close to the storage stack or to turn the feed path of a long board away from other machines and students, without these bases, our productivity would be hampered severely.

Whether their shops are small or large, woodworkers face space issues sooner or later. Mobile bases offer the convenience of being able to relocate machinery easily, allowing woodworkers to use shop space more efficiently.

I tested seven mobile machine bases to move a couple of bandsaws around the shop. I chose five universal bases—Delta 50-345, General 50-025, HTC 2000, Jet HMB-UMB, and Shop Fox D2057—and two dedicated bases—Delta 50-274 and HTC HRBS-14. All range in price from about $50 to $100. I think the

Photos, except where noted: Kelly J. Dunton

Dedicated vs. universal bases: Which is right for you?

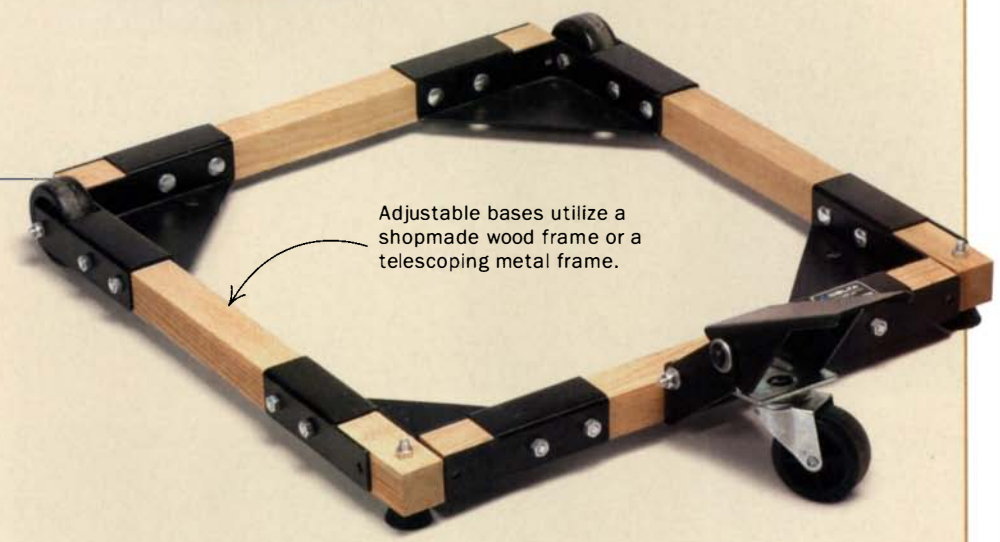
The foremost requirements for a mobile base are that it be strong and stable. It must not buckle under the weight of a machine, and it must not wobble while the machine is in use. It is an added benefit if it transports a machine with ease and if its handles and foot levers are easy to see and to use.

DEDICATED BASES

Dedicated bases are engineered to the weight and dimensions of a specific machine. However, most dedicated bases fit more than one machine. The HTC HRBS-14 (right), for example, fits a variety of 14-in. bandsaws. Often, more than one machine from a company will fit within the footprint of its dedicated base. Such is the case with the Delta 50-274 (see p. 86), which is made to fit six Delta machines.

UNIVERSAL BASES

Universal bases can fit almost any machine as long as the footprint fits within the base's adjustment range. A base that's too big usually is fairly easy to retrofit by adding a plywood bottom, cutting the base's rails shorter, and/or by drilling out extra bolt catch holes in the base's runners.



models offer a good cross section of what is available today.

Not all bases are easily assembled

The construction requirements for each brand varied a lot—from arriving almost ready-made out of the box to assembly that seemed almost as complicated as that of a pocket watch.

On first inspection, I thought the Jet universal base was well engineered. Each side has one solid rail made from flat bar stock with a single set of holes for the bolt catches. The parts snapped together in about three minutes. Assembly was nearly as easy with the Delta 50-274 and the HTC HRBS-14 dedicated bases.

The universal Delta 50-345 comes as a set of parts and metal corner assemblies. It requires the user to fit it out with wood rails; the manufacturer recommends using hardwood, such as oak or maple. I made mine out of red oak. Assembly of the Delta 50-345 was more labor-intensive than any of the other bases, but the end result was a perfect fit to the footprint of my machine.

The HTC 2000 has 108 pieces to assemble. That's a lot, but this unit proved to be worth the extra effort, as the fit was solid. The rails also allow a variety of size options.

The General 50-025 required a lot of assembly. This base arrived with 114 parts. However, assembly was straightforward once I studied the instructions and parts list provided.

The Shop Fox had the most parts—128, to be exact. Compared with other units reviewed here, parts for this base were difficult to fit, so assembly was frustrating and labor-intensive.

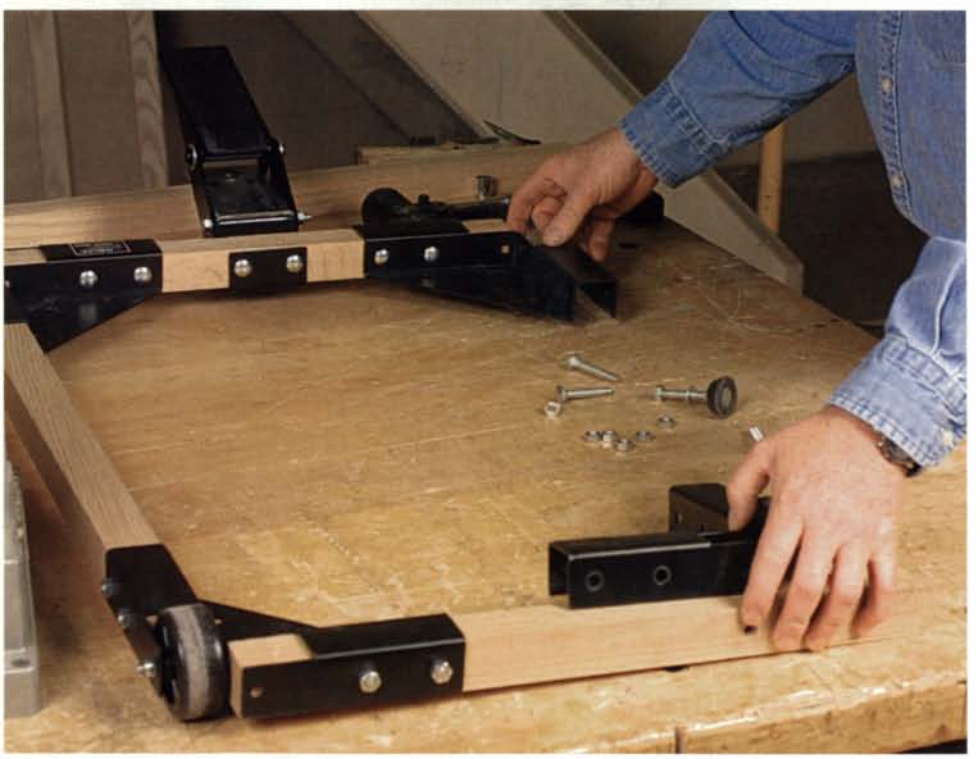
Bases should not wobble under load

The usefulness of a mobile base depends greatly on its weight-bearing capacity. I used two bandsaws to conduct this test. Each one weighs less than 250 lb. I did not include a tensile-strength trial because all of the bases are rated to bear much more weight than I intended to place on them. Still, one base did have difficulty holding firmly under the weight.

Both of the HTCs, the General, and the Shop Fox bases proved to be solid. The two Deltas, though lighter, were substantial enough to carry their loads faithfully.

I was disappointed in the performance of the Jet HMB-UMB. It is rated to hold

Nearly ready to roll. *While most universal bases required extensive assembly, the Jet HMB-UMB arrived nearly ready-made. Snap catches (inset) make adjustments easy. Simplicity, however, comes at a price—the unit flexed under load.*



Some assembly required. *The Delta 50-345 requires milling four hardwood frame members, drilling holes, and assembling nuts and bolts. Once complete, it provides a stiff platform.*

600 lb., yet the brackets that support the wheels flexed when I placed a 230-lb. bandsaw on it, and the whole unit wobbled while cutting, making it disconcerting to use.

Foot-operated locks are easy to use

The wheel-locking system may be a deciding factor in choosing a mobile base. Wheel types and axle configurations vary, and each company has a unique take on locking systems. Some bases employ hand-operated systems, while others use foot-operated systems.

Even though I don't like the inconvenience of bending down to set a brake, I did like the hand-operated system on the HTC HRBS-14, which required minimal hand pressure to work.

The Shop Fox D2057, which also employs a hand-operated locking system, was one of the most solid, unwavering bases I tested, once it was locked down. However, locking the machine on its leveler pads felt awkward and seemed to take a long time. I called the company and discovered that I was overtightening the knob. I was assured that it takes only one-half turn to get the leveler pads to engage and secure the machine to the floor. I tried it again, and it worked.

The foot-operated locking system on the General worked well. The two easy-to-find foot levers made locking and unlocking the wheels a breeze.

The HTC 2000 has foot-operated locking levers on both sides of the unit to accommodate its two front caster wheels. The locks easily engaged to secure the machine on two leveler pads and two fixed wheels.

The Jet has a foot-operated lock on both fixed back wheels and a wing-nut type of friction lock on the side of its two front caster wheels. The locks on the fixed wheels were simple and straightforward. The side friction locks, however, were difficult to use.

The locking systems on both Delta bases also worked well. With one step, the units can be locked. And with a flick of the toe, the bases are ready to roll.

Most bases rolled smoothly

Up to this point, I had conducted my tests on a level, clean floor. I decided to add realism to the mix. Taking turns with each base, I rolled the bandsaws through light sawdust and over a low-nap shop carpet.

The HTC 2000, with the narrowest and

LOCK THE WHEELS...

Shorter foot levers can work well. *In spite of its smaller size, a well-engineered foot lock, like this lever on the Jet HMB-UMB, proved more than adequate to hold a machine in place. It also was easy to kick up and release for moving.*

Easy-to-operate hand lock. *The HTC hand-locking mechanism engages a small leaf spring that secures the wheel with little effort.*

...OR LIFT THE WHEELS OFF THE FLOOR

softest wheels of the group, moved like a sports car compared with the rest of the bases. The narrow wheels worked like skinny tires in snow, cutting easily through the sawdust and over the carpet. However, the soft wheels on the HTC 2000 were susceptible to getting screws and other debris embedded in them.

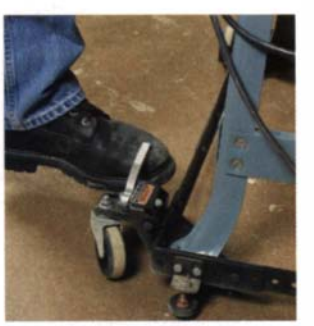
The General 50-025, both Jet units, both Delta units, and the HTC HRBS-14 all cut the mustard where mobility is concerned. Even when the threaded locking feet were up off the floor, the Shop Fox still didn't roll as easily as the rest of the bases I tested.

Considerations for uneven floors

Another issue to consider when deciding on a mobile base is the type and condition of your shop floor. Is the floor fairly level, or is it uneven? Do you keep it reasonably clean? Any mobile base can be stalled by even a small scrap of wood on the floor.

Whether a mobile base is on the move or in its locked position, it is good to be aware of the number of points of contact it has with the floor. If your floor is flat and level, a unit with four wheels will work well. But if you plan to use the base on an uneven floor, a three-wheeled base may be the better choice. Basic laws of physics tell us that three contact points give better

Foot-operated levers prevent unnecessary bending. *Both Delta models tested (50-345 shown left) have a foot-operated locking mechanism that is prominent and easy to operate.*



Footwork shouldn't be fancy. *Foot levers should be easy to locate and to use without looking. The HTC 2000 (above) and the Delta (left) have foot levers that are large and easy to operate.*

stability on an uneven floor than four points do. The unique design of the HTC HRBS-14 places the third wheel away from the main footprint of the base on a cone-style extension assembly, which counterbalances the upper body weight of the bandsaw. The design offered great stability, whether moving or parked.

The only other three-wheeled units in this test are the Delta models 50-274 and 50-345. Each Delta base uses two leveler pads to catch it when the locking wheel is disengaged. The 50-274 is engineered the same way. But the 50-345 was somewhat tippy in motion. When using this universal base with the bandsaw—a machine that tends to be top heavy—the unit tipped in an abrupt turn while I was moving it across the floor of the shop. This gave me a start, until the leveler pads touched down to keep the machine from toppling. With a little forethought, I was able to avoid this problem from then on.

Picking the best performers

As the old adage says, "You get what you pay for." Yet, when it comes to choosing a mobile machine base, you can get extra value for your money if you have a clear understanding of your needs.

If you're not interested in spending a lot of time putting together the complex gadgetry that some of these bases require, a dedicated base, such as the HTC HRBS-14 or the Delta 50-274, might be your answer.

In a hard-use setting, you can't beat either of the HTC units. The HTC HRBS-14 dedicated base is engineered to a very high standard. The same holds true for the HTC 2000 universal base. Some of HTC's mobile bases tend to be expensive, but HTC does offer a 30-day trial and a lifetime guarantee on all parts. To me, product integrity does not get any better than that. If you insist on the best and don't mind paying for it, HTC has a base waiting for you. (The company also builds custom mobile bases.) Another superstar is the General. It's massive, holds a machine firmly in place, rolls easily, locks decisively, comes with clear directions for assembly, and is a great value. □

Cliff Colley teaches woodworking at a high school in Plymouth, Mass.

MOBILE-BASE SPECIFICATIONS

MODEL	STREET PRICE	EASE OF ASSEMBLY/ NUMBER OF PARTS	WEIGHT RATING
DELTA 50-274 800-223-7278 www.deltamachinery.com	$100	Easy/ four parts	300 lb.
DELTA 50-345	$65	Difficult/ 66 parts	300 lb. (using hardwood)
GENERAL 50-025 514-326-1161 www.general.ca	$49	Difficult/ 114 parts	500 lb.
HTC 2000 800-624-2027	$59	Very difficult/ 108 parts	400 lb.
HTC HRBS-14	$99	Average/ 25 parts	475 lb.
JET HMB-UMB 800-274-6848 www.wmhtoolgroup.com	$69	Easy/ eight parts	600 lb.
SHOP FOX D2057 800-225-1153 www.woodcraft.com	$66	Most difficult/ 128 parts	700 lb.

DELTA
MODEL 50-274

DELTA
MODEL 50-345

GENERAL
MODEL 50-025

DEDICATED OR UNIVERSAL	NUMBER OF WHEELS	LOCKING MECHANISM	MOBILITY	STABILITY	COMMENTS
Dedicated	Three	Single foot-operated lever and leveler pad	Very good	Good	Strong for its size; stable, in spite of caster wheel tilting machine in rolling mode
Universal	Three	Single foot-operated lever and leveler pad	Good	Good	Arrives in kit form; can be made to suit machine footprint; stable when parked; tippy while moving
Universal	Four	Two foot-operated levers and leveler pads	Very good	Very good	Probably the best mobile base in its price range
Universal	Four	Two foot-operated levers and leveler pads	Excellent	Very good	One of the top performers; HTC offers 30-day trial and lifetime guarantee on all parts
Dedicated	Three	One foot-operated lever and two hand-screw locks	Excellent	Excellent	Three-wheel "nose-cone" design aids in stability; a top performer, even on an uneven floor
Universal	Four	Two foot-operated levers and two friction locks	Average	Poor	Flexed under load; did not provide a solid platform for the bandsaw; suitable only for the lightest of shop machines
Universal	Four	Two hand-screw locks that adjust leveler pads independently	Average	Very good	Not intuitive to lock and unlock; a stout unit that provided a stable platform for a machine in the locked position

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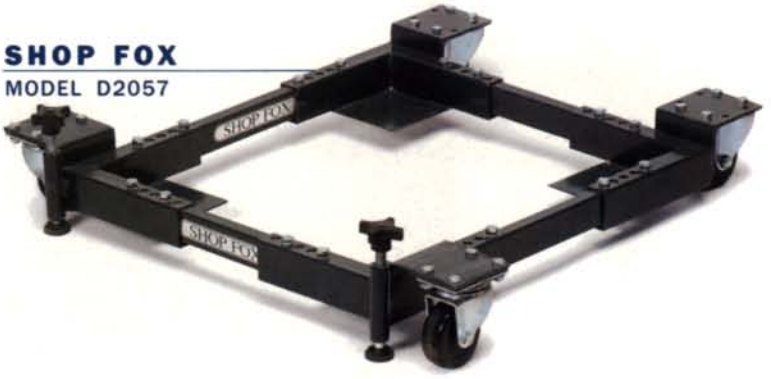

Photos, this page and facing page: Karen Wales

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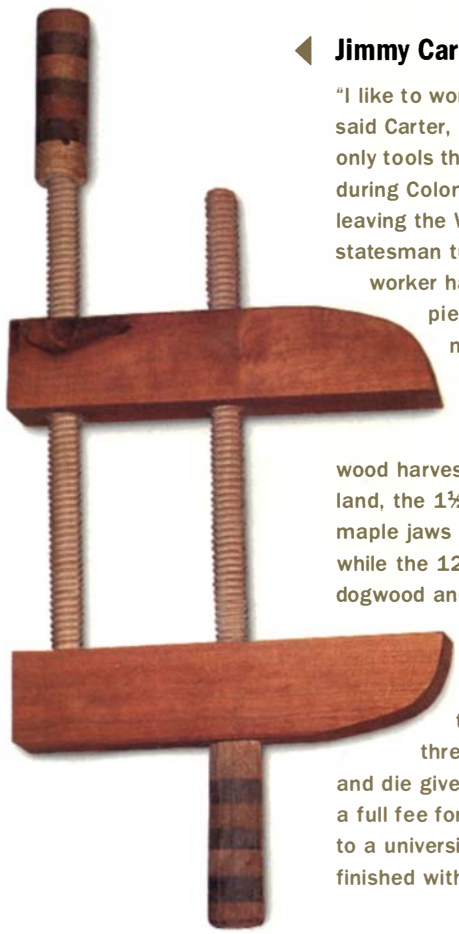
Wayne Anderson Elk River, Minn.

"I'm a tool collector," said Anderson, "and as a collector, I have a keen appreciation for hand tools." He has turned this appreciation into a hobby and builds handplanes using no machine tools. Two of Anderson's latest designs are this low-angle chariot-style block plane (1¾ in. wide by 5 in. long by 1½ in. high) and this skewed miter plane (2¼ in. wide by 11 in. long by 2½ in. high). The brass block plane and the steel miter plane both have cocobolo infill and wax finishes.



Jimmy Carter Plains, Ga.

"I like to work with green wood," said Carter, "and on occasion use only tools that were available during Colonial times." Since leaving the White House, the statesman turned avid woodworker has built about 150 pieces of furniture using many of his own shop-built tools, such as this hand-screw clamp. Made of wood harvested from his family's land, the 1½-in.-square hard-maple jaws measure 7½ in. long, while the 12-in.-long alternating dogwood and black-walnut handles and dogwood threaded rods give the clamp a 6-in. throat capacity. "For threading, I used a tap and die given to me in 1984 as a full fee for making a speech to a university." The clamp is finished with oil.

Larry Cluchey Neustadt, Ont., Canada

Cluchey made this pair of marking gauges (fence is 2¼ in. dia.; beam is 7 in. long) out of maple burl with bronze wear rings and steel cutters. "Settling on a round beam," said Cluchey, "meant that I could inset a rubber O-ring in a groove in the fence to keep a minimal amount of friction on the beam and prevent the fence from freely sliding up and down." The gauges are finished with tung oil.

Steve Franklin Danvers, Mass.

Franklin made this toolbox (17 in. deep by 27½ in. wide by 17 in. high) as his first project when he was a student at North Bennet Street School. The case, drawer fronts, and door are made from one piece of Honduras mahogany, and the interior is maple. Franklin chose blind mitered dovetails for the carcase construction and half-lap and through-dovetails for the drawer joinery. He turned the desert ironwood pulls from stock given to him by his father-in-law. The toolbox is finished with shellac. Photo by Lance Patterson

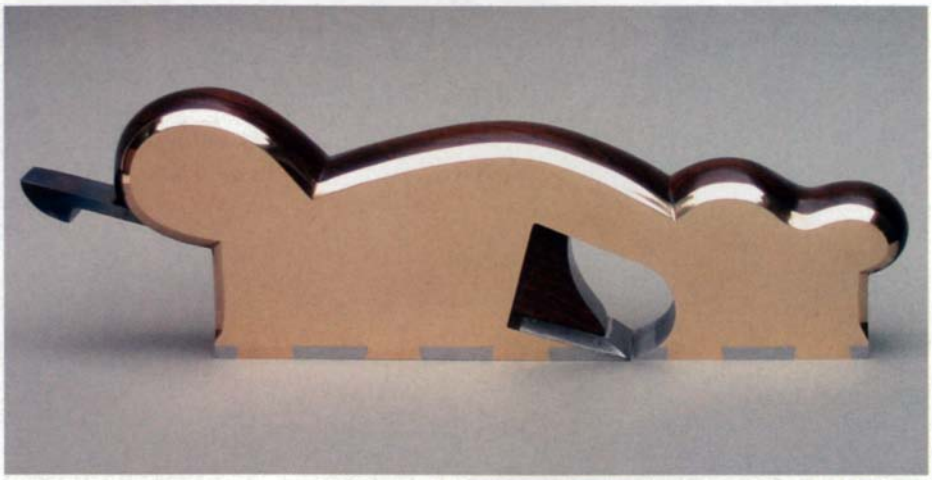
John Klink Bethlehem, Pa.

A toolmaker by trade, Klink decided to put his professional skills to the task and make some of his own tools for woodworking. The scraper plane (2 in. wide by 6 in. long by 3⅜ in. high) has a cast-iron body and a curly maple handle; the chisel plane (1½ in. wide by 5 in. long by 2 in. high) has a steel body with a padauk handle. Both planes have 1½-in.-wide A2-steel blades. Klink got the idea for the steel dual-end marking gauge (fence is 1⅜ in. square; beam is 7¼ in. long) from Jim Kingshott's *Making and Modifying Woodworking Tools* (Guild of Master Craftsman Publications, 1993) and made the body and adjuster on a CNC milling machine. The wood handles on the planes are finished with tung oil.

Dale Malayko

St. Albert, Alta., Canada

"I decided to learn how to make furniture with hand tools," said Malayko, "but first I had to build the primary tool for a furniture maker: a workbench." Under the tutelage of Tage Frid and Frank Klausz in *Fine Woodworking Techniques #1* and #9 and Scott Landis' *The Workbench Book* (The Taunton Press, 1987), Malayko built this bench (29 in. deep by 78 in. wide by 38 in. high) out of Canadian spruce, eastern hard maple, and African padauk. The tail and shoulder vises are made entirely of wood, with the exception of the vise screws; the vise faces are covered with burgundy leather. The bench is finished with seven coats of Danish oil.

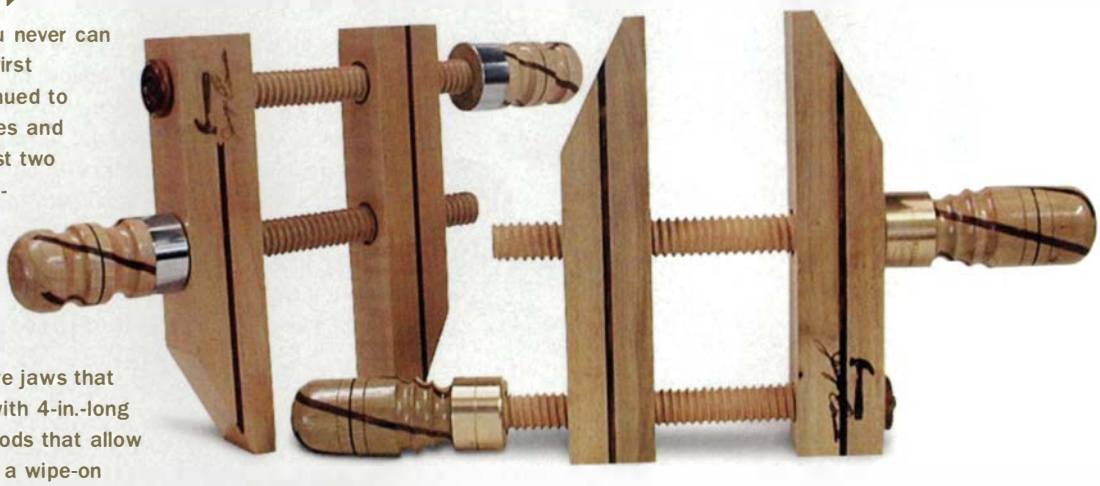


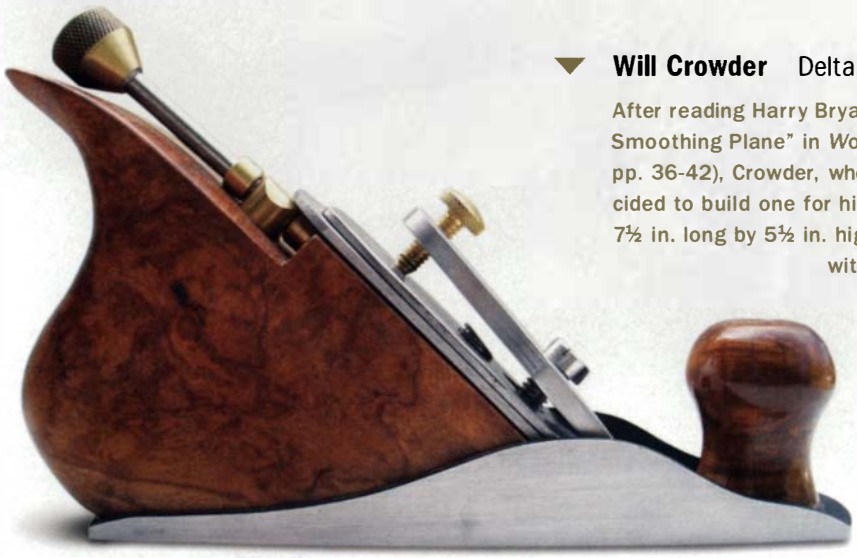
Brian Buckner Tallahassee, Fla.

Buckner built this drop-nose shoulder plane (¾ in. wide by 6 in. long by 2½ in. high) based on a photo he saw in Sandor Nagyszalanczy's *The Art of Fine Tools* (The Taunton Press, 2000). The plane is constructed out of phosphor bronze and tool steel with a rosewood infill. "Unlike the original, which had a cast gunmetal shell," said Buckner, "I used dovetails to join the sides to the sole." The infill has a French-polish finish.

Jerry Ernce Broken Arrow, Okla.

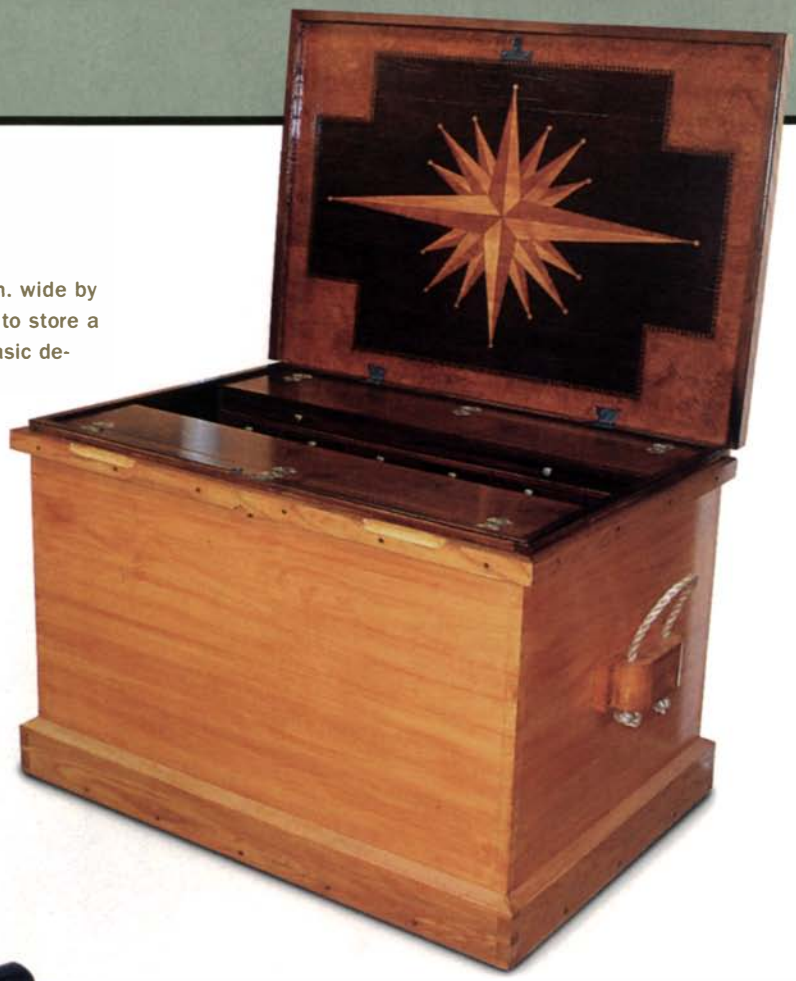
A given rule in woodworking is that you never can have enough clamps. Ernce made his first clamps out of necessity and has continued to outfit his shop with clamps of all shapes and sizes. These hand-screw clamps are just two of the many that he has made throughout the years. The clamp on the left is made of maple with padauk inlay and chrome handle ferrules; the clamp on the right is made of persimmon wood with rosewood inlay and brass handle ferrules. Both clamps have jaws that measure 1⅛ in. square by 8 in. long, with 4-in.-long handles and ¾-in.-dia. birch threaded rods that allow the jaws to open 4 in. Each clamp has a wipe-on polyurethane finish.





Will Crowder Delta, B.C., Canada

After reading Harry Bryan's article "How to Make a 7" Smoothing Plane" in *Wooden Boat* magazine (issue #147, pp. 36-42), Crowder, who has a love for handplanes, decided to build one for himself. The smoother (2 in. wide by 7½ in. long by 5½ in. high) has a cherry handle and body with a mild steel sole. Except for the brass screws and the blade, he hand-crafted all of the parts himself. So pleased with the way the first one turned out, "I decided to make seven planes in total for friends and family for Christmas gifts," said Crowder. The plane has a lacquer finish.



Michael A. Mason Hales Corners, Wis.

Mason built this cabinetmaker's chest (29 in. deep by 43 in. wide by 28 in. high) because he wanted a historically accurate way to store a part of his collection of antique woodworking tools. "The basic design of this chest is similar to the Duncan Phyfe chest," said Mason, "but I added some features, such as a second sliding till." The chest's case is made of pine, while the drawer tills are made of ribbon-striped mahogany and walnut. There are five drawers in the front till and 16 in the back; under each till and in the center are wells that can stow up to 100 molding planes. The inside of the lid is veneered with a star pattern of elm burl, maple, and mahogany. The chest has a shellac finish.

Robert M. Soule West Haven, Conn.

While flipping through an auction catalog, Soule spotted a rare three-arm plow plane that had sold recently for $21,000. As an avid collector with 60 restored and reproduction plow planes in his collection, he decided to build this handled three-arm plow plane (10½ in. wide by 10½ in. long by 6¾ in. high) to add to his collection. The plane's body is made of applewood and features an ebony wedge and arms that are tipped with ivory. Soule threaded the boxwood screw arm and applewood nut himself. The plane is finished with shellac and oil.

Joseph Petrovich Salinas, Calif.

"These screwdrivers developed out of an interest in preserving the cap-iron screws on my planes," said Petrovich. Because the screws have oversize slots that tend to get distorted with undersize blades, the one screwdriver that worked was a 19th-century piano tuner's type. Its only drawback: the 16-in. length. Made of bird's-eye maple and Gonçalo alves with annealed and ground-flat discarded files as blades, the screwdrivers measure 4⅞ in., 5 in., and 7 in. in length. The handles, which are lathe-turned, are shaped to accommodate a palm grip with flats to keep them on the bench, and are finished with tung oil, shellac, and carnauba wax.

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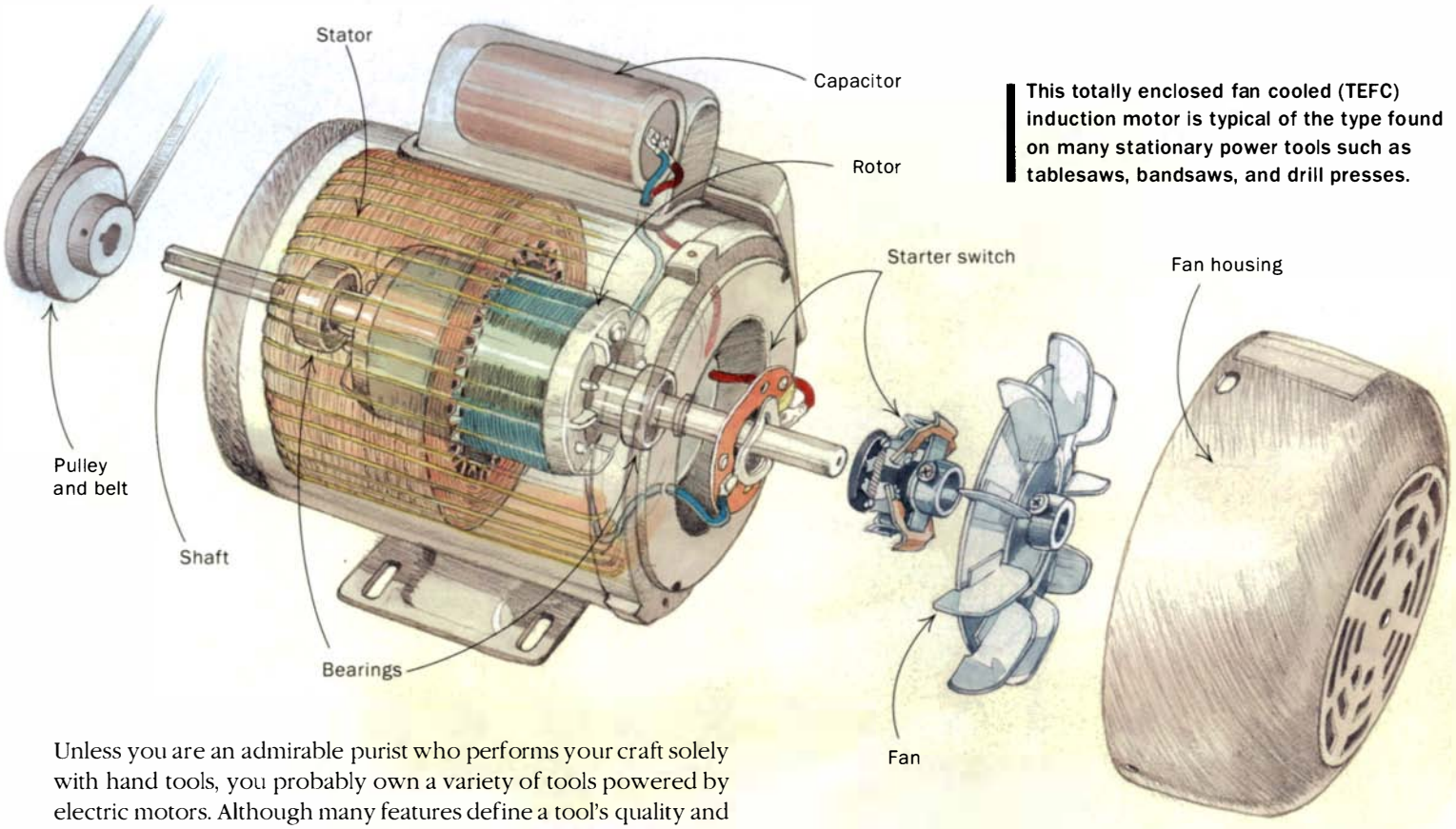
BY BARRY WIXEY

How an induction motor works



This totally enclosed fan cooled (TEFC) induction motor is typical of the type found on many stationary power tools such as tablesaws, bandsaws, and drill presses.

Unless you are an admirable purist who performs your craft solely with hand tools, you probably own a variety of tools powered by electric motors. Although many features define a tool's quality and usefulness, the motor probably is the most important and yet the most overlooked.

Induction motors usually are found on large stationary tools (handheld power tools use smaller universal motors). Often mounted outside the tool, an induction motor is easily recognizable by its large, coffee-can shape. In many cases the shaft also is visible and typically has a pulley mounted on it.

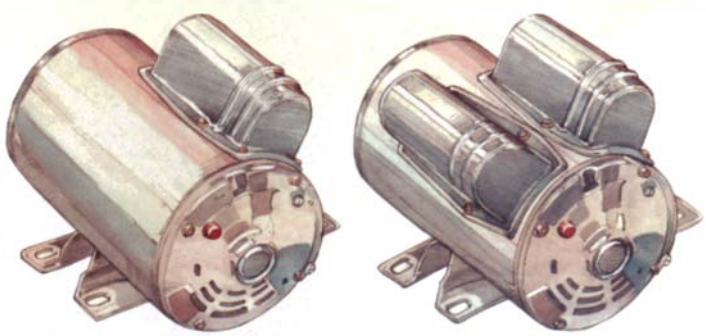
Few moving parts increases reliability

Induction motors consist of a copper wire and an iron rotor that is surrounded by a stator, itself made up of coils of copper wire. Power is fed directly to the stator only; the resulting magnetic field induces current in the rotor and makes it turn. There is no direct electrical connection to the rotor itself. The only other moving parts are the two bearings supporting the rotor and, on most single-phase motors, a starter switch. Thus, the only things on a single-phase motor that can wear out mechanically are the starting switch and the two bearings.

Bearing life is related directly to bearing speed, and because the speed of the induction motor is relatively low, bearings rarely fail unless they become contaminated with dirt. Sealed ball bearings are preferable because they are lubricated for life, keep out dust, and should last for 100,000 hours or more.

On the outside of most modern induction motors, you will see one or two cylindrical capacitors about the size of a toilet-paper tube. One capacitor indicates a capacitor-start motor, which boosts start-up torque; two capacitors indicate a capacitor-start/capacitor-run motor, with the second capacitor increasing the efficiency of the motor and making it run more smoothly.

ONE LUMP OR TWO?



Most induction motors used in woodworking machinery have one or two capacitors on their outside. One capacitor (left) helps the motor start by adding torque, while better motors include a second capacitor (right) that makes the motor run more smoothly with improved efficiency.

Slow speed is ideal for large power tools

An induction motor's speed is determined by the AC frequency of the power supplied and the way the coils of wire are wound on the stator. The most common speeds for induction motors used in

Drawings: Fred Carlson

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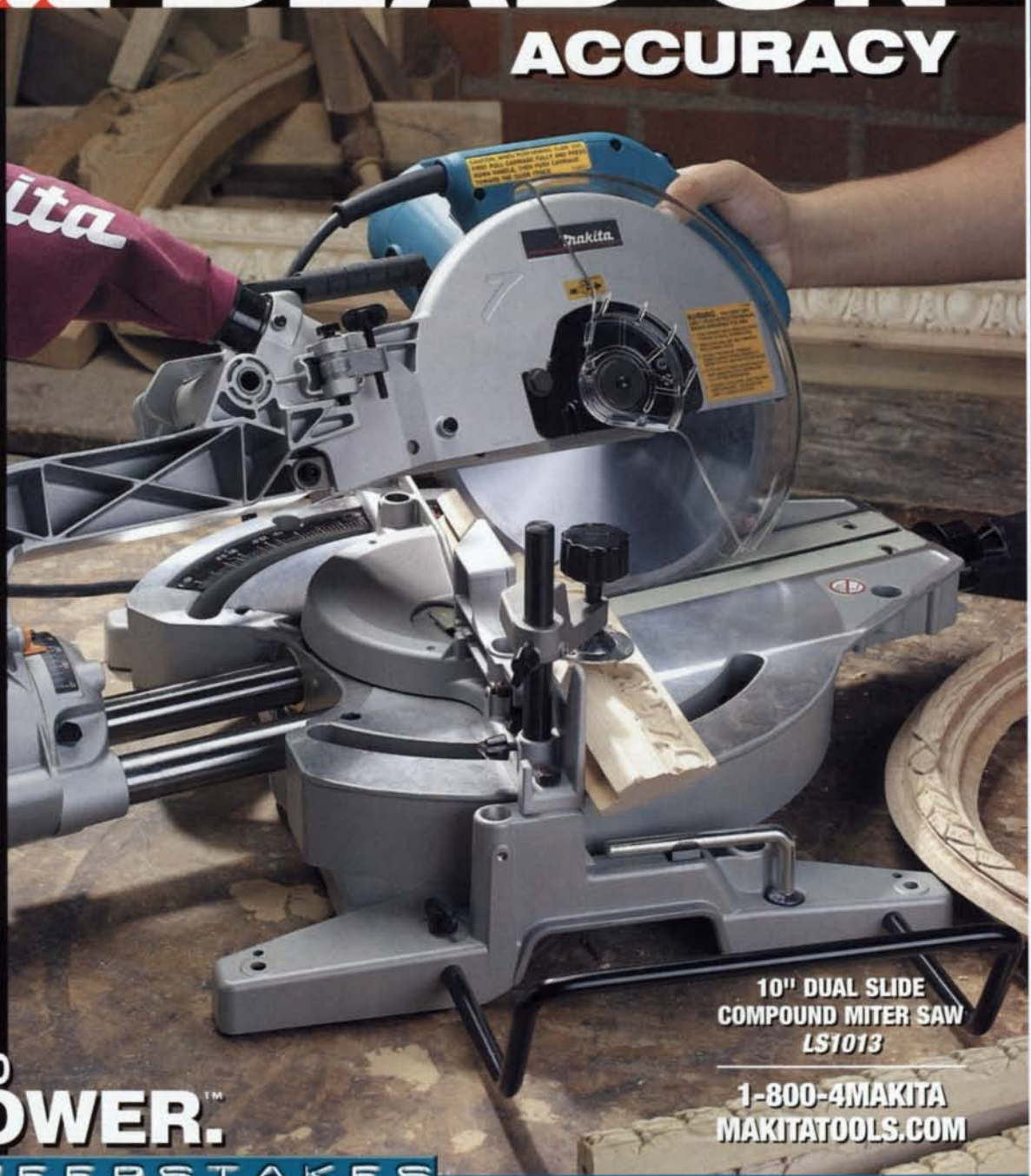

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KEEP YOUR MOTOR COOL

A thermal breaker (left) cuts the power if the core temperature of the motor becomes excessive. A circuit breaker (right), normally located next to the machine's main on/off switch, cuts off power if an excessive load is placed on the motor.

power tools are 1,725 rpm (bandsaws and drill presses) and 3,450 rpm (planers and tablesaws). These relatively low speeds, as compared with universal motors, make induction motors ideal for use in these tools. For example, a 10-in. tablesaw blade requires 5,000 rpm to cut efficiently. A 3,450-rpm motor is easily stepped up to this speed via a pair of correctly sized pulleys.

Induction-motor housings come in three main designs: open configurations that allow in dirt and moisture; drip proof, which can withstand an occasional drop of water; and totally enclosed fan cooled (TEFC), which keeps out everything. TEFC motors cost more than open and drip-proof designs, but given the generally dusty conditions in a woodshop, TEFC motors are preferable for woodworking tools.

Excessive heat kills induction motors

The single biggest cause of motor failure is heat. The harder you use your tool, the more power it draws and the more heat it creates. The amount of heat also depends on the motor's efficiency. No motor is 100% efficient. If it was, 100% of the power going into the motor would be converted into power delivered to the sawblade. If your motor is 70% efficient at a particular speed and torque output, 30% of the power going into your tool is being converted to heat. When you stall a motor, it is running at 0% efficiency: 0% power out and 100% heat generation.

This heat can increase to the point that the varnish insulation on the copper wire can burn off, cause the wires to short out against themselves, and even melt the copper, destroying the motor.

Two types of breakers prevent overheating—Many modern induction motors have a thermal breaker located on the motor itself. The breaker cuts the power if the core temperature of the motor becomes too high. In practice, repeated tripping of a thermal breaker will wear out a motor. If you do cause the breaker to trip, resist the temptation to resume business as normal as soon as the breaker can be reset. Take a break for at least 30 minutes, preferably an hour, and then reduce the severity of the cut you are making.

A better method is a circuit breaker that trips when too much power is being consumed for too long. This device, normally located near the machine's on/off switch (or part of it), should protect the motor and the windings almost forever, but only if the motor airways and windings are kept clean.

Use the proper extension cord—The voltage supplied also affects the performance of an induction motor. Other tools operating on the same circuit as the induction motor sometimes reduce the voltage available to the motor. If the motor is designed to run off standard household current of 110v to 120v and is supplied with lower voltage, the torque output will be greatly reduced, and motor overheating is possible.

If you must employ an extension cord, keep it as short as possible and of a gauge suitable for the motor's rating. For a 15-amp motor, a 25-ft. cord should be 14 ga. or preferably 12 ga., and a 50-ft. cord should be 12 ga. or, better still, 10 ga. The smaller the gauge number, the thicker the wire inside the extension cord and the greater its capacity to deliver current over longer distances.

Keep the motor clean—If the air vents are not kept clear and the inside of a motor becomes packed with sawdust, the internal cooling fans will not be able to operate efficiently. Periodically vacuum and blow out any dust that has lodged in a woodworking machine's motor. In particular, this will benefit the starter switch, which is probably the weakest link on single-phase induction motors. This switch is designed to operate only momentarily when the motor is switched on, and then to be forced outward along the shaft of the rotor by the centrifugal force of the motor. If sawdust prevents this movement, the switch will continue to receive power, and the starter windings inside the stator will burn out. □

KEEP YOUR MOTOR CLEAN

In a dusty workshop, dirt eventually can clog motors that are not totally enclosed, leading to overheating and possibly starter-switch failure. Use a shop vacuum to remove the accumulated dust.

Photos: Mark Schofield

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Rules of Thumb

BY TOM LEROY

Work at the right height to reduce pain, improve control

Woodworkers come in all different sizes, yet machine tools and manufactured benches adhere to standard heights. Some time or another, your body probably has let you know with sore joints or an aching back that some of these standard heights don't suit all tasks.

To get the best out of your shop you need to consider not only what you do to turn lumber and sheet goods into finished products but also how your body interacts with the shop environment. A mismatch between your body and a tool or bench increases the chance you'll develop pain and means you're wasting energy to get the job done.

There is not one height that is correct for all woodworking activities. Consequently, your workspace or the way you work likely will need modifications to accommodate every task in the life cycle of a woodworking project.

To determine the appropriate work heights, let's look at woodworking tasks in three categories: power tasks, finesse tasks, and precision tasks. Power tasks are those activities that primarily require the body to produce force, such as when handplaning a board flat. Finesse tasks require near equal amounts of force and control, such as when cutting dovetails or tenons. Finally, tasks in the precision category require a great deal of control and visual input, as is the case with carving a ball-and-claw foot. Each of these categories is safest for your body if performed at a different height.

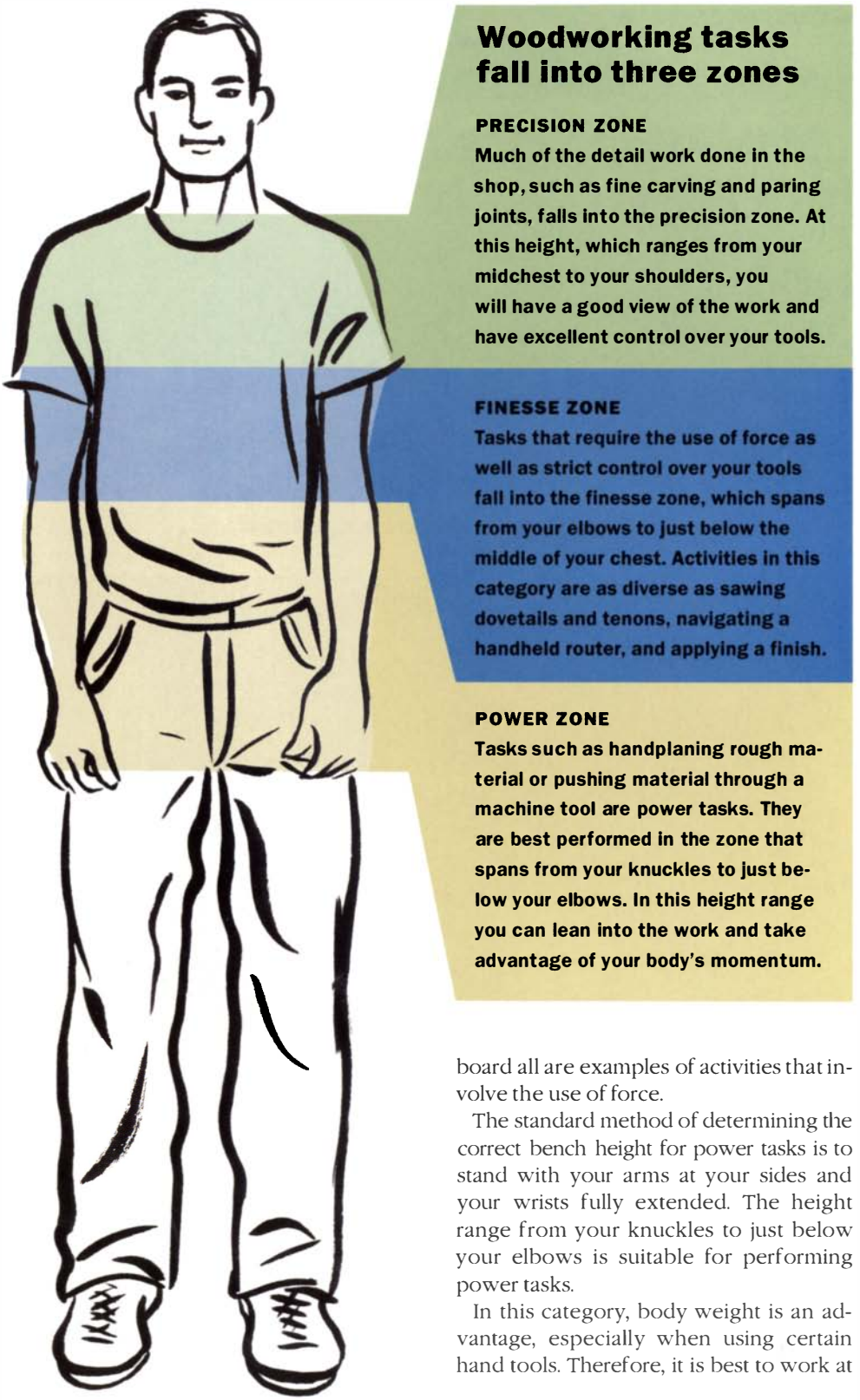
Once you've identified the proper height zone for a specific task, raise or lower worksurfaces, the workpiece, the tools, or your body to reduce discomfort.

Power tasks are best done at a low height

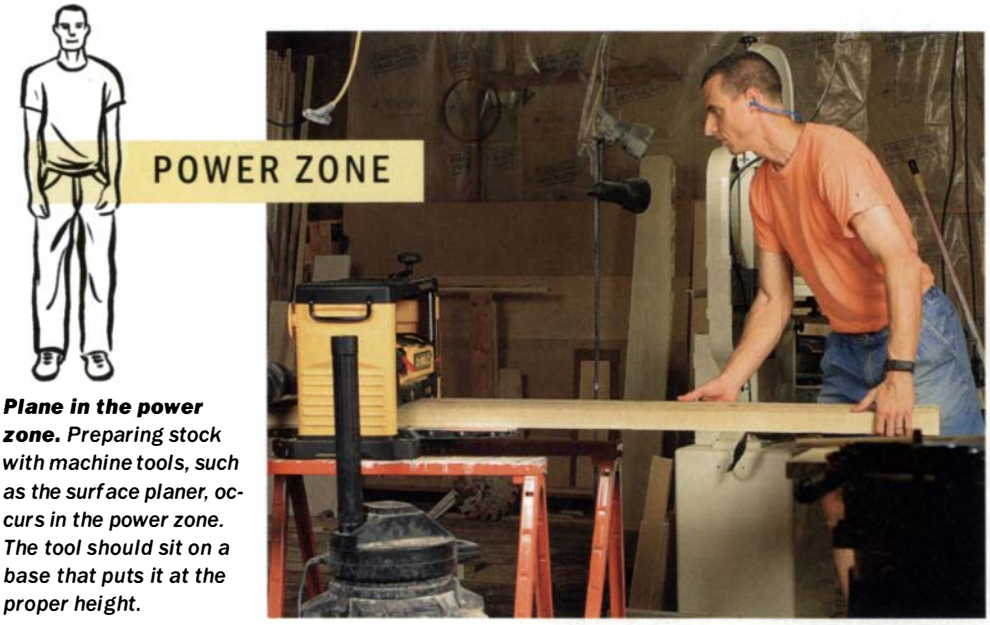
Rough stock preparation typically falls into the power category. Ripping a sheet of ¾-in.-thick medium-density fiberboard (MDF), dimensioning a rough board with a handplane, and machine-jointing a board all are examples of activities that involve the use of force.

The standard method of determining the correct bench height for power tasks is to stand with your arms at your sides and your wrists fully extended. The height range from your knuckles to just below your elbows is suitable for performing power tasks.

In this category, body weight is an advantage, especially when using certain hand tools. Therefore, it is best to work at



Drawings: Julie Johnson



Plane in the power zone. *Preparing stock with machine tools, such as the surface planer, occurs in the power zone. The tool should sit on a base that puts it at the proper height.*

a height that allows you to lean into the work. When using machine tools, less lifting is required at this low height.

Modify tools and benches to the right height—Once you determine your power zone, you may find that you need to raise the tool or the workbench to match this height; one simple solution is to make a sturdy box that shims the worksurface to a higher elevation.

For some woodworkers, lowering a worksurface may be difficult or impossible. Sinking a tool by placing it lower than the floor is one option, although difficult. It could be done in a situation where a shop is being designed and built. Shortening the tool base also is an option but may require some time and expense. Alternatively, you can build a platform to stand on that elevates you to the height of the tool. However, a platform can become a hazard when you're moving around the shop.

In either case—too low or too high—you may want to consider modifying a tool base or workbench to achieve the ideal height for power tasks.

Finesse work is done at a midrange height

Finesse tasks combine the elements of power tasks with precision tasks, relying on physical force as well as on control and visual input from the woodworker. These tasks include sawing dovetails and tenons; chopping mortises manually or with a machine; rough carving; most cuts on a bandsaw (which is why a bandsaw's table is designed higher than a tablesaw's); using a spokeshave with a shavehorse; handheld routing; and most sanding and finishing tasks. These tasks are best accomplished in the range that starts at your elbows and ends just below the middle of your chest. This position gives you a better view of the work without compromising your body's ability to produce power and control with a tool.

Raise your work or lower your work zone—One example of adapting your shop for finesse work can be seen in Pat Warner's routing bench (*FWW* #129, p. 72). His bench is 40 in. high so that he doesn't have to lean over to see his router cut into a workpiece. I have a support that sits atop my workbench that allows me to rout at the proper height (see the photo below).

Other simple solutions are achieved by properly orienting the work in your bench vise with the use of a couple of easily made jigs. This would allow you, for example, to raise the stock to be dovetailed while still fully supporting it to limit vibration. I also use a raised bench hook for some marking and shoulder-plane tasks.

Precision work takes place at the highest height

Precision work encompasses much of the detail work done in the shop. Examples include end-stage carving, paring joints, final joint-fitting, and freehand use of routers and laminate trimmers.

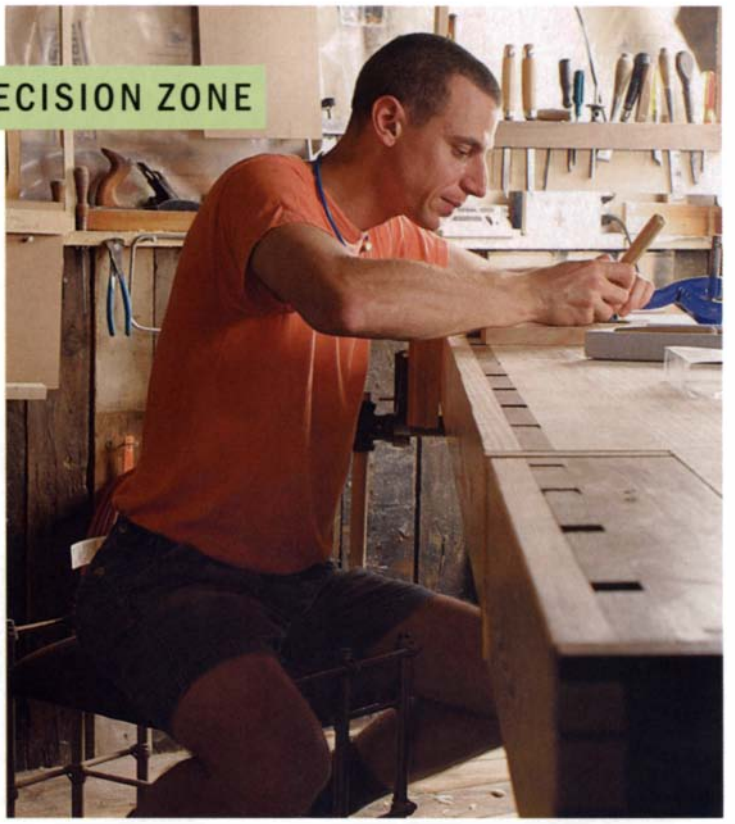
The proper position for most precision tasks is from midchest to shoulder height. This is an ideal range because these tasks require a great deal of visual input. Having the work in a close visual range is important. Additionally, proper shop lighting is critical for these tasks.

Make a jig or vise to hold work high—I've come up with several jigs in my shop that allow me to hold workpieces high above my standard workbench so that I can perform precision tasks. The goal is holding the work well, exposing it to your eyes, and not creating any awkward postures in the arms.

Wood-carvers have their own solutions. Because their work-height requirement is significantly different than normal bench

Raise your router to the finesse zone. *Handheld routing is a finesse task and should be carried out at a height just above your elbows. A raised support for your workbench is an easy solution.*

Photos: Karen Wales



Lower your body to the precision zone when you can't raise the work. *Sitting on a stool while you work will put you at the right height for detail carving at the workbench.*

height, many carvers tend to have a separate bench or vise set up for carving.

If you cannot raise the work accordingly, sit on a stool that positions you correctly at the bench. Doing so lowers your precision zone to the level of the bench. The only caveat is that a seated position limits the force you can produce with your lower body and requires your upper torso and arms to exert more effort.

Customize your shop for common work heights

It is likely that your shop has many height-deficient work areas, but you have to prioritize when it comes to solving these problems. First, address tasks that cause physical discomfort. You might recognize these as the tasks that end with the statement: "Gee, my back kills me when I do this for more than an hour." Focus next on those tasks you spend the most time on, including big jobs that require repetitive tasks. Risk of injury is a function of how bad the situation is and how long you spend doing the task. □

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3. Sales through dealers and carriers, street vendors, and courier	92,973	82,752
4. Other classes mailed through the USPS	0	0
C. Total paid and/or requested circulation	293,854	283,115
D. Free distribution by mail		
1. Outside county	4,574	6,841
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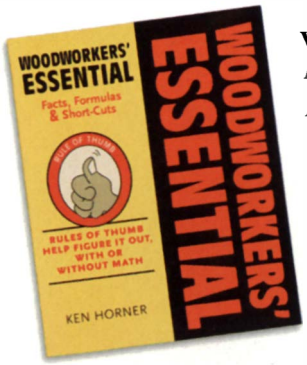
16. This statement of ownership will be printed in the Winter 2003/2004 issue of this publication. **17.** I certify that all information furnished on this form is true and complete. Signature and title: Tim Schreiner, Publisher.

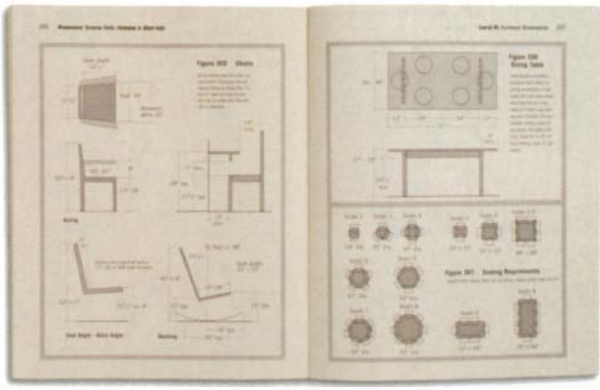
Reviews



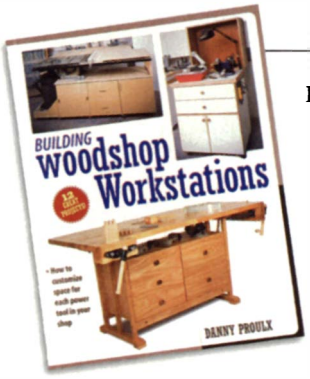
Woodworkers' Essential Facts, Formulas & Short-Cuts *by Ken Horner. Cambium Press, 800-238-7724, 2003. $24.95 paperback; 312 pp.*

This book doesn't try to draw a line between formulas and facts; it is designed to be a comprehensive reference for woodshop problem-solving. It does address many of the math problems woodworkers will encounter. A nice feature is that for all of these—scaling drawings; proportioning; calculating board feet, pulley sizes, and miter angles; even converting fractions and decimals—the author offers an alternative solution for the math-challenged, usually a graphic technique or a table. However, Ken Horner's book goes far beyond math. There are comprehensive sections on drawing and layout, covering geometric shapes and how to draw and divide them evenly. There also are valuable chapters on standard furniture dimensions, wood glues, and dust collection. The two-dimensional drawings are somewhat crude, but the information is there for the careful reader. Although it overlooks a few common woodworking problems, this is a very useful and comprehensive shop reference.

–Asa Christiana, senior editor



Beyond the math. *Horner's book not only explains formulas and drafting techniques but also ranges into valuable subjects like standard furniture dimensions.*

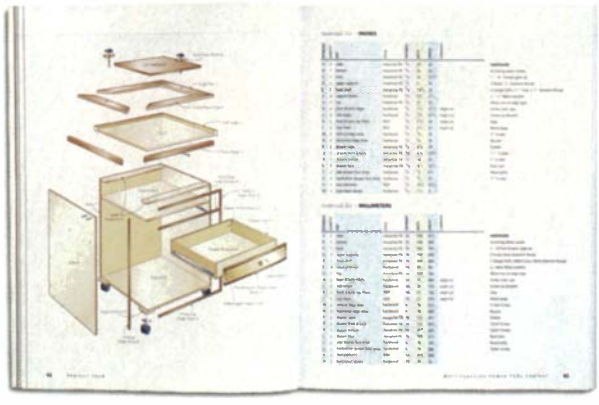


Building Woodshop Workstations *by Danny Proulx. Popular Woodworking Books, www.popularwoodworking.com, 2002. $24.99 paperback; 128 pp.*

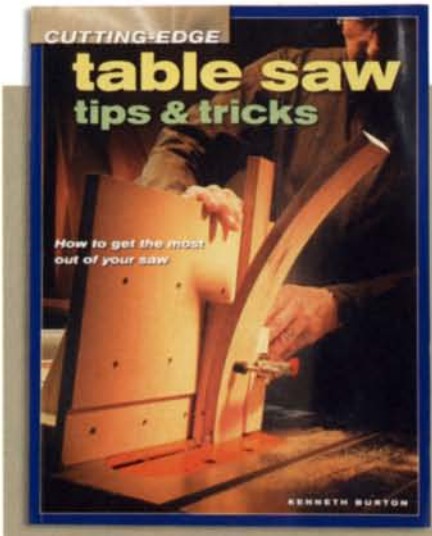
Danny Proulx, a 30-year veteran of the cabinetmaking trade, has put together a dozen examples of small-shop workstations to help readers maximize space and increase shop efficiency. Each project—such as the practical workbench, power miter-saw station, router-table cabinet, drill-press center, mobile workbench and tool cabinet—is a no-nonsense design suited to a specific purpose. Proulx provides exploded drawings (showing all of the parts and how they fit together), materials lists (including hardware), and step-by-step advice on how to construct each workstation.

Many woodworkers are capable of solving their own storage problems. But for the beginner who is putting together a new shop, this book offers solid tips and useful visuals.

–William Duckworth, associate editor



Upgrade your shop. *Proulx's book presents cabinets for most shop machines, with clear drawings and step-by-step instructions.*



Cutting-Edge Table Saw Tips & Tricks: How to get the most out of your saw *by Kenneth Burton. Popular Woodworking Books, 2003. $24.99 paperback; 128 pp.*

When a board has to be ripped or crosscut, most woodworkers go straight to the tablesaw. However, the tablesaw isn't limited to those two common cuts. With a little know-how and a few jigs, you can use the tablesaw to perform a long list of other woodworking tasks. Kenneth Burton has compiled a good many of those between the covers of this book. The author holds a bachelor's degree from the Rochester Institute of Technology's School for American Crafts and has been a professional woodworker for some 20 years.

Using a balanced mix of high-quality color photos and well-written text, Burton does a good job of getting his point across. Along with all of the tips and tricks, each chapter has plans for jigs and accessories that make a tablesaw more productive. The book's last section offers three furniture projects that rely on the author's techniques.

Advanced woodworkers probably won't find much new ground broken here. But those at the beginner or intermediate levels will uncover plenty of useful information to take to the shop. Watch out for a few out-of-sequence photos, and also two examples where a jig or push block should have been used to support the stock safely (pp. 58 and 114, respectively).

–Tom Begnal, associate editor

Photos: Asa Christiana

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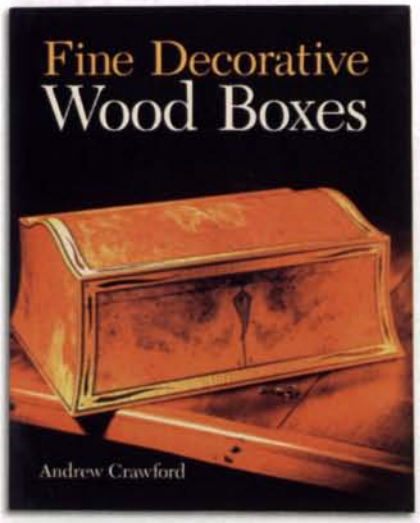

Fine Decorative Wood Boxes *by Andrew Crawford. Sterling Publishing, www.sterlingpub.com, 2003. $19.95 paperback; 144 pp.*

First published in 1998 without the word "Wood" in the title, Andrew Crawford's book remains a treasure trove of information. The book starts with an overview of the tools, techniques, and materials common to all box-making. It then describes how to build 10 boxes, each unique in look and construction. You need to be a detail-loving woodworker to copy these boxes exactly, but even if you adopt just one or two of the author's methods, the price of this book will be money well spent.

—Mark Schofield, associate editor

High-end box-making. *With clear descriptions and photos,* Fine Decorative Wood Boxes *covers many high-end box-making techniques, such as veneering, laminating, carving, and inlaying.*

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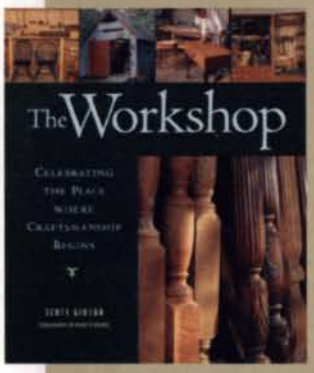
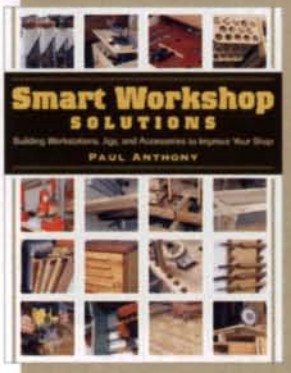
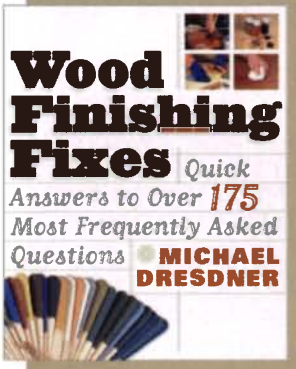


The Taunton Press is introducing a long list of woodworking books this fall and winter, covering a broad range of topics. The following are just a few highlights. For more titles and information, go to www.taunton.com.

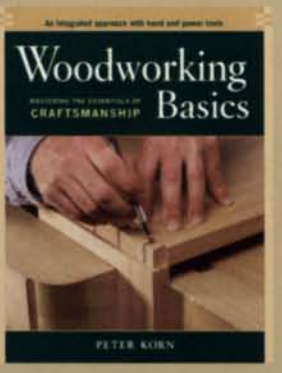
The Workshop *by Scott Gibson. $34.95 hardcover; 208 pp.*
With more than 290 color photos, this book is a guided tour of more than 30 outstanding workshops, including those of furniture makers, boatbuilders, turners, and others. You'll learn how the shops evolved and how they suit the needs of the woodworkers who own them.



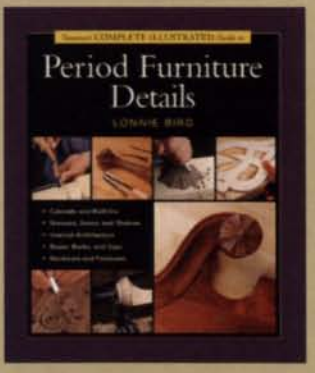
Smart Workshop Solutions *by Paul Anthony. $19.95 softcover; 176 pp.*
This book is a collection of great ideas for shop accessories, workstations, jigs, and storage solutions. Included are detailed drawings, step-by-step instructions, and photos.



Wood Finishing Fixes *by Michael Dresdner. $19.95 softcover; 144 pp.*
You'll find this book is long on solutions, not theory, covering the entire finishing process from sanding to final polish.



Woodworking Basics *by Peter Korn. $19.95 softcover; 208 pp.*
Peter Korn presents an approach to learning woodworking that has proven successful for hundreds of people who have attended his prominent school over the past 10 years. Included are two projects: a small bench and a side table with a door and drawer.



TAUNTON'S COMPLETE ILLUSTRATED GUIDES
Period Furniture Details *by Lonnie Bird. $27 softcover; 144 pp.*
Choosing & Installing Hardware *by Bob Settich. $29.95 softcover; 224 pp.*
Written by a dream team of professional woodworkers, Taunton's *Complete Illustrated Guides* help the reader find information quickly. Like earlier volumes on furniture and cabinet construction, joinery, and shaping wood, these two new guides attempt to be the most authoritative and comprehensive references available on their subjects. In the coming months, look for subsequent volumes on finishing and box-making. *—A.C.*

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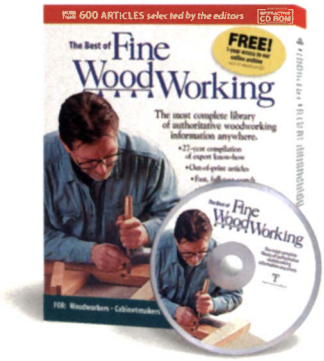

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Q&A

The scoop on Japanese chisels

What is the long-term effect of sharpening Japanese chisels? Won't the scooped-out back eventually give you a curved cutting tip as you grind the edge away? What purpose does the scooped-out back have? How does this allow you to get and hold a sharper cutting edge?

—Ben Pearce, Melbourne, Australia

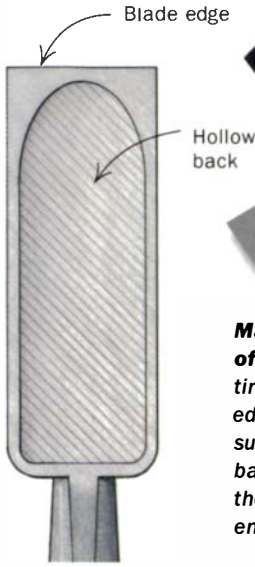
Harrelson Stanley replies: Japanese chisels are made from two separate metals. The bulk of the tool is forged from soft iron. The back, which comprises the cutting edge, is made from a plate of very hard steel that is forge-welded to the soft iron. The soft iron of the chisel supports the steel in a way that is related to the thinking behind wrapping a piece of graphite in softwood to make a pencil. As you sharpen the bevel (top) of the chisel, the soft iron falls away at a much faster rate than the lower edge of the blade, made from the much harder steel plate.

Because the cutting region of the blade is made solely from hard steel, it would take an inordinate amount of time to flatten the back of the chisel if it were solid, compared to the time it takes to sharpen the bevel edge. So the volume of hard steel in the back of the chisel is hollowed out. If your stone is flat, the hollow makes it easy to flatten the bottom of the chisel to a very high standard—as much as plus or minus 2 microns—because of this design.

[Harrelson Stanley teaches Japanese building methods in Massachusetts.]

JAPANESE CHISELS EXPLAINED

With each sharpening, the back must be flattened to prevent the hollow from creeping forward and opening the forward edge of the blade.



Maintain the shape of the hollow. *Each time you hone the edge of the chisel, be sure to flatten the back. This will retain the hollow for the entire life of the chisel.*

Problems with milk paint

Inspired by the cupboards that Mike Dunbar made a couple of years ago (FWW #151, pp. 64-71), I decided to make something similar and, as he did on one of his cupboards, I used milk paint for my finish. This was my first time using milk paint, so, like Mike, I finished the painted surface with linseed oil, which is supposed to even out the color. But my finish turned out blotchy. What did I do wrong?

—Rich Tassoni, Faraday, La.

Mike Dunbar replies: The milk paint may have been applied improperly, which is a common mistake among first-time users. Milk paint cannot be flowed onto a surface like oil or latex finishes. Being water based, milk paint is sucked into the wood, so it must be applied thinly and worked heavily with the brush. Efforts to flow on the paint will result in a blotchy surface. The paint also will build up, and look crusty. The oil topcoat will not make the paint blotchy; it will only accentuate what already exists. By the way, I no longer use boiled linseed oil. I now use untinted Danish oil.

Milk paint does not result in a flat, uniform color. While one of its features is slight differences in shading, this is so subtle that one would not describe it as being blotchy.

For more information on milk paint and painting processes using milk paint, go to www.milkpaint.com.

[Mike Dunbar is a contributing editor.]

Milk paint can't be flowed on. *Milk paint, unlike oil- or latex-based paints, must be applied in thin, well-worked coats. Some colors, like soldier blue (shown), can require up to three coats.*

Photos, except where noted: Kelly J. Dunton; this page (bottom left, middle right, bottom right): Karen Wales; drawing: Vince Babak

How to flatten wavy veneer

I am in the process of veneering some drawer fronts with mahogany crotch veneer. I plan to book-match consecutive pieces, but my veneer is not flat enough to work. How do I flatten veneer without cracking it?

—Tom Calisto, Durham, N.C.

Karen Wales replies: To flatten veneer, I use a recipe for a veneer bath (above right) that I learned from my instructors at North Bennet Street School and in an article by Tage Frid in *FWW* #42 (pp. 74-75).

For the drying process, you'll need two pieces of plywood, a stack of newspapers, and anything you have that can weight it down. All ingredients can be found at most hardware, pharmacy, and grocery stores.

Before beginning the flattening process, it is important to select and number each veneer sheet. Keeping the sheets in order is a key to having them look nice on a finished piece of furniture.

Once the veneer bath is of a smooth consistency, immerse all of the sheets, one by one, in the mixture. Then leave them all to soak (together) for around 30 minutes.

Next, lay a generous amount of newspaper on a flat piece of plywood. Begin to layer the veneer sheets with three or four pieces of newspaper between each sheet. Once the stack is complete, lay a few more sheets of newspaper on top of the pile, a piece of plywood on top of that, and then the weight. Let it dry for an hour or so.

Finally, pull off the wet newspapers, replace them with dry ones, cover, and weight the stack once again. Leave the veneer to dry overnight before using it. [Karen Wales is an assistant editor.]

Recipe for success. *These ingredients make a bath that binds weak fibers in veneer, making the veneer more flexible.*

Veneer bath

1 part flour

2 parts plastic resin glue (Weldwood)

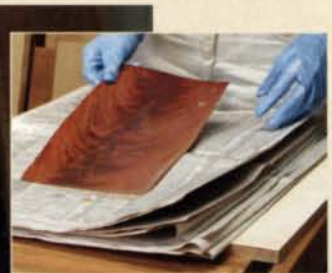
3 parts water

1½ parts glycerin

1 part isopropyl alcohol

To avoid lumps, mix the wet and dry ingredients in separate containers. Then, slowly pour the dry ingredients into the wet mixture. Stir rigorously until the consistency is smooth.

Number veneers before processing. *Veneers usually arrive in the order in which they were sliced from the log. To keep track of the sequence, number each sheet before soaking it. Then immerse each one in the bath, making sure that each veneer gets covered with the mixture. Leave all the veneers soaking together for about 30 minutes.*



Let the veneer drip and dry. *Allow the excess mixture to drip from each veneer. Then layer several sheets of newspaper between each one, to soak up excess fluid. After an hour, replace the wet paper with dry paper.*

Flatten the treated veneers. *Place the stack of veneer between two sheets of plywood. Add the weight (about 10 lb.) and leave the stack to dry overnight.*

Photos, this page (top left, top center): Karen Wales

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BY DAVID L. WISELEY

Conquering clutter

Ten steps to keeping your shop organized and free of junk

I used to spend more time looking for tools than using them. One day, as I languished in a mountain of mess, I resolved to overcome my bad habits, which had become a huge obstacle to my productivity. I devised a system that has enabled me to sort my tools and to attack, consolidate, and eliminate junk in my workshop. Today, my shop is a fun place to be; it's clean enough to be healthy and dirty enough to be happy. And when I need a tool, I can find it without having to tunnel through mountains of clutter. Here are the 10 practical methods I used to organize my shop.

1. Organize tools by groups

You don't need a special cubbyhole for every tool. Using large cardboard boxes, about 12 in. by 16 in. by 24 in., I put all related tools in the same labeled box. To store the boxes, I built shelves along the walls of my shop, about 2 ft. down from the ceiling, utilizing wasted space. Then I cut off the box tops to provide easy access to my tools.

2. Apply the Rule of 10

Every time I enter the shop, for whatever reason, I first put 10 things back where they belong. It may seem like cheating, but everything counts. For example, throwing five sockets back into the toolbox counts as five items. Add three chisels and two screwdrivers, and I'm done.

In a very messy shop, it takes only seconds to find and put away 10 things; it gets harder as the shop begins to clear out. But in the long run, applying the Rule of 10 will reduce clutter in the shop with seemingly little effort.

3. Relocate commonly used items

For a long time, I kept nails and screws in assorted bags, bottles, and coffee cans under a workbench, where they often were misplaced and too easily lost. My solution was to build a fastenings drawer into the bench where I did most of my work. Now I can quickly locate whatever type of fastener I need.

By the way, those plastic boxes that have clear tops and about a dozen little compartments inside are great at eliminating clutter in the shop.

4. Throw out junk

A new box of nails costs only $1. So I told myself, "Throw out those old nails you saved when you tore down grandma's back porch!"

It is also a good idea to lose those things that have become obsolete. Realizing that I never really was going to use that old eight-track player lying dead in the corner, I finally pitched it.

5. Untangle power-tool clutter

Corded power tools are difficult to store neatly. So I decided to forget about trying to be neat. Instead, I made some simple wooden boxes without tops and dedicated one box to each tool. After each use, I simply wad the cord and pitch the tool into its own labeled box, along with any of its little wrenches and keys.

Don't forget to make a few extra boxes for extension cords, work lights, and assorted devices. Such boxes are handy for storing chargers and attachments, too.

6. Take out the trash

My shop had only one waste container, and sometimes months would go by without my emptying it. After I added three 30-gal. waste containers to my shop, I realized how much garbage I generate. Now discards fly from my hand directly into the trash can.

Drawing: Chuck Lockhart

7. Don't save every cutoff

It's hard to toss away wood scraps. I used to make a product that created barrels of 6-in. by 6-in. oak pieces that seemed too good to discard. Then I realized that such short boards require too much time to salvage. I learned to stop over-valuing my wood scraps. Now small cutoffs go into the scrap bin or the stove. Pieces shorter than 2 ft. long get shoved into a large wooden box under my bench. Long, narrow stock is stood up on end in a barrel that I have mounted on wheels.

8. Pare down your tool collection

My shop had plenty of screwdrivers, but I could never find one when I needed it. So I laid them out on my benchtop and culled what I really needed. Then I put each screwdriver in its dedicated location and sold the rest.

I don't advocate trying to get by on the bare minimum, but rather focusing on getting rid of unneeded tools. Keepsakes from your great-uncle Chippendale can hang over the fireplace. Otherwise, they should go.

9. Label perishables

Some things last forever. I used to treat everything that way. Did you know that old shellac doesn't dry well? I do now.

Today, when I buy a product that has a shelf life, I write a discard date on the can with a laundry marker. Periodically, I go through my cans of paint and finish, eliminating the duplicates and stale items.

10. Let go of surplus

Finally, I picked up every item in my shop, from homemade jigs to exotic woods, and asked myself two questions: Had I used that item in the last five years? Did I have a definite need for it in the next six months? If the answer to both questions was no, I gave the item away. □

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READER SERVICE NO. 59

PLANE FUN

The conventional wisdom in plane making is to strive for a tool that performs flawlessly, perhaps adding just a few personal touches. Michael Flaherty takes a more whimsical approach to the craft, breathing life into an otherwise stoic art. "Wood," said Flaherty, "is a living, breathing, vibrant material that has its own life, personality, beauty, and humor." Whether it be a creature of the deep spouting shavings through its blowhole, barnyard animals, a half-size miniature replica plow plane, metal and wooden miniatures of all shapes and styles, or bench-ready full-size models, Flaherty's mirthful approach reminds us to have fun with woodworking. To see more reader-made tools, check out Current Work on pp. 88-91.

Photos: David Scherer