Fine Woodworking

Winter 2002/2003
No. 160

Tools & Shops

ANNUAL ISSUE

Tool reviews: 6-in. jointers, 12-in. planers

Thicknessing rough lumber

An illustrated history of workbenches

Storage tips

Plumbing a shop for air

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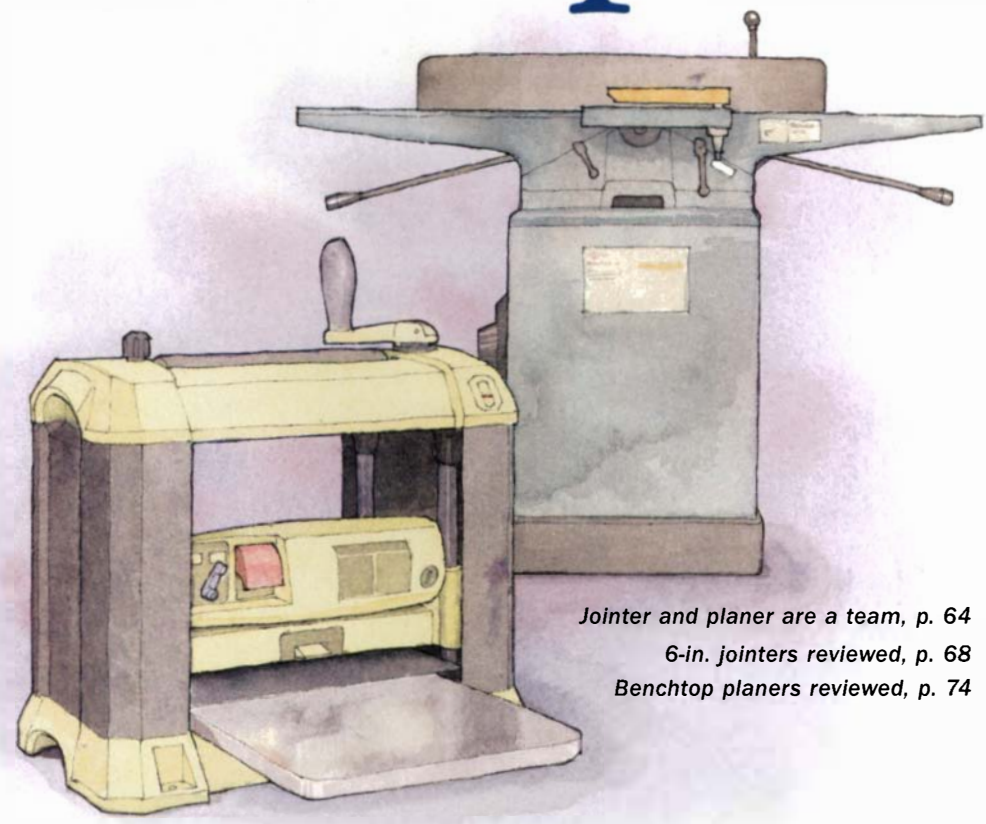

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In three decades of woodworking, Les Cizek ("Dream Shop in the Woods") has taught cabinetmaking at the country's largest community college, hosted two successful national cable television shows on craftsmanship and spent two years working with James Krenov. When he's not building unique furniture pieces for clients, Cizek and Harry Van Ornum (right in photo), his partner at Four Sisters Woodworking in Fort Bragg, Calif., offer two-week intensive sessions for experienced and beginning woodworkers. Students focus on a project or work on a range of techniques. For details visit www.foursisterswoodworking.com.

After lugging a his 500-lb. tablesaw through gardens and snow and in and out of basements, **Matthew Teague** ("Smart Shop in a One-Car Garage") feels like he's become an expert on taking down and setting up shop. But he hopes his current shop will be slightly more permanent—"at least six months," he said. But through all the moving and while working as managing editor at *Fine Woodworking*, he's still churning out furniture regularly. His most recent pieces are contemporary versions of Shaker and Arts and Crafts designs, and he is currently at work on a dining set for his future in-laws.

Roland (Rollie) Johnson ("Plumbing a Shop for Air") makes a living as a custom cabinetmaker, but you'd be hard-pressed to understand how when you learn of his other pursuits. Besides some enthusiastic vegetable farming that he shares with his wife, JoAnn, Johnson likes to tinker with other projects. He restores old cars and recently was negotiating a deal to buy and restore a small airplane. As Johnson said, lamenting his predicament, "So many toys, so little time."

Barry Reiter (Cutoffs) was trained as an environmental engineer and is semiretired from the high-temperature hazardous-waste incineration business. He was introduced to woodworking as a child while helping his father build furniture in their garage for his six brothers and sisters. He and his dad still share their hobby, even though they live 950 miles apart. A past president of the Central Florida Woodworkers Guild, Reiter has worked with guilds in Texas, Colorado, Ohio, California and Pennsylvania. He holds a Master's Certificate from the Marc Adams School of Woodworking, where he also helps administer the school's scholarship program. Barry, his wife, Becky, and their two Wheaten Terriers live on 13 wooded acres outside Orlando, Fla.

Asa Christiana (Shop Design) is a senior editor. He has spent most of the last three years building his house and shop in Thomaston, Conn., and is presently engaged in the never-ending process of finishing up. He looks forward to the day when he can put away the paintbrushes and framing tools and use the furniture-making shop he has erected. His 5-year-old daughter, Lucy, after seeing so many projects begin and end, eventually requested a workbench of her own, where she creates mixed-media sculpture in a deconstructionist vein.

Graham Blackburn ("The Workbench") grew up in London where his grandfather was a cabinetmaker and his father a builder. He came to the United States in the 1960s to study composition at the Juilliard School of Music but soon moved to Woodstock, N.Y., where in addition to continuing a music career playing flute and saxophone with various musicians, including Van Morrison and Maria Muldaur, he built his own house and began designing and building custom furniture. He has written and illustrated more than a dozen books on home building and woodworking. He also runs Blackburn Books (www.blackburnbooks.com).

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Letters

We hear your safety concerns— Woodworking is not inherently dangerous, as you write in the "About your safety" warning at the end of each and every Letters department. I pose that people are inherently dangerous.

If followed, these four simple rules can prevent accidents:

1) Know the blade's cut line: mark it, if necessary.

2) Keep digits off the cut line.

3) Tuck thumbs against hand or under palm.

4) Never take your eyes off the cut.

The most important safety device in any shop is the brain. Use it.

—F. McGiveron, Madison, Wis.

I read Mike Dunbar's Rules of Thumb "Top 10 unavoidable truths of woodworking" (*FWW* #158, pp. 84-86) with interest. I have been woodworking since 1982 and agree predominantly with what Dunbar has to say about these truths. I was quite surprised, though, to see nothing mentioned about safety! I have three kids who all like being in my shop. If there is one thing that should be on the tippy-top of this list, it is shop safety. I have drummed this into their heads and anyone else who comes in to do work in the shop. It surprises me that such a gifted and accomplished craftsman like Dunbar would leave out this basic of all rules in his list.

—Richard Taub, via e-mail

While my husband is the *Fine Woodworking* reader and the master woodworker of the family, I enjoy your articles, too. It's so inspiring to see the beautiful finished works and the details. The time and discipline that go into making them happen is incredible.

But in Andy Barnum's article "Midi-lathes" (*FWW* #158, pp. 68-73), there was a photo on p. 68 that made me cringe. I think the loose drawstring pants on the girl using the lathe are an accident waiting to happen.

Many years ago when I was in art school, our sculpture and woodworking classes required us to learn how to use power tools. While I was using a turning kind of tool, it caught a loose piece of my baggy clothing; and while no permanent bodily damage was done, it gave me the scare of my life! I was lucky to just come out of it black and blue. So perhaps I am an alarmist, but seeing loose clothing and drawstring garments around power tools like that just doesn't seem like a good combination.

It might be a good reminder to everyone out there who's doing woodworking to keep the clothes close to the body and skip the string belts and accessories. We fans of your beautiful work want you to do it safely for a long time to come.

—Carol Levy, San Jose, Calif.

I am very impressed with Gordon J. Sampson's winning Methods of Work tip "Adjustable overarm blade guard with dust collection" (*FWW* #158, pp. 14-16) and intend to build it. His design makes more sense than one supported by a horizontal arm.

However, I am afraid to use such a

Fine WoodWorking .... around the country

Jan. 19-22 and 23-26: *Fine Woodworking*, in conjunction with the Williamsburg Institute, is cosponsoring two seminars at Colonial Williamsburg titled "Working Wood in the 18th Century: Surface Ornamentation." Key presenters this year include Patrick Edwards (Jan. 19-22), a furniture maker, antiques restorer and teacher who specializes in French marquetry; Silas Kopf (Jan. 23-26), a furniture designer and specialist in French marquetry; Steve Latta (both sessions), a cabinetmaker, instructor and regular contributor to *Fine Woodworking*; and Roy Underhill, an author, teacher and host of the PBS series *The Woodwright's Shop*. Also present will be Mack Headley, the master cabinetmaker at Colonial Williamsburg, and Larry Williams and Bill Clark, makers of wooden molding planes. For more information on the conference, visit www.colonialwilliamsburg.com/history/institute/0301_prog3.cfm.

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guard, any guard in fact, without a splitter, particularly when ripping. Do you or Mr. Sampson have any thoughts about this?

–David M. Fineman, Pittsburgh, Pa.

EDITOR REPLIES: Yes, include a splitter as well.

More on zebrawood—I recently veneered zebrawood with white PVA glue to birch plywood to make the top of a small box. The glue bled through the thin veneer and couldn't be removed by scraping or sanding. I had intended to use an oil finish, but experiments with samples of zebrawood-faced plywood showed that oil finishes resulted in unsightly patches where the glue was thoroughly impregnated in the veneer.

I was hesitant to use a water-based finish on this project because I suspected that the veneer might buckle when exposed to water. However, further experiments showed this suspicion to be unfounded. In the end, I used Minwax's water-based satin Polycrylic, and the glue-impregnated patches are not apparent.

–Kent Kirk, retired, U.S. Forest Products Laboratory

Plane truth—I'm writing in response to Chris Gochnour's article "Low-Angle Block Planes" (*FWW* #153, pp. 40-47). I take issue with the following statement that appears on p. 46 of the article: "This St. James Bay thumb plane was one of only three planes reviewed that could make continuous ribbons of end grain."

After sharpening the blade in my old, unmodified low-angle Stanley, I recalled this statement and put my plane to the test on hard maple end grain. Successfully creating continuous ribbons with the tool, I thought I'd push the issue and put a sharp edge on a cheap block plane I picked up at a seaside hardware store while on vacation. Not even a low-angle type, this plane—a bare-bones $22 one with no depth adjustment and a wide-open throat—was able to make continuous ribbons on both maple and mahogany end grain.

The expensive planes in the Gochnour review are wonderful tools. Having used Lie-Nielsen planes, I appreciate their quality. However, I don't think people should think that they won't get good performance in hardwood from a basic tool. A truly sharp edge and a fine cut will make up for almost all the shortcomings of an inexpensive plane.

–Scott Nelson, Flanders, N.J.

Comments and tips on sharpening—I realize that a thorough investigation like Aimé Ontario Fraser's "Sharp and Sharper" (*FWW* #157, pp. 36-41) must stop someplace, but Fraser missed two clearly superior systems.

First, concerning waterstones: While Norton stones are the best of the three types of waterstones she tested, the new generation of synthetic Japanese waterstones, such as Bester and Shapton, excel over the Norton stones in both cutting speed and wear resistance (for the same grit and finish).

Second, the horizontal wet-wheel grinder has some advantages over the Tormek system. While the Tormek wheel can be graded in texture to change the cutting speed and finish somewhat, some horizontal wet-wheel machines have reversible or interchangeable wheels of truly different grits. And because a horizontal wet wheel grinds flat, it can be

Writing an article

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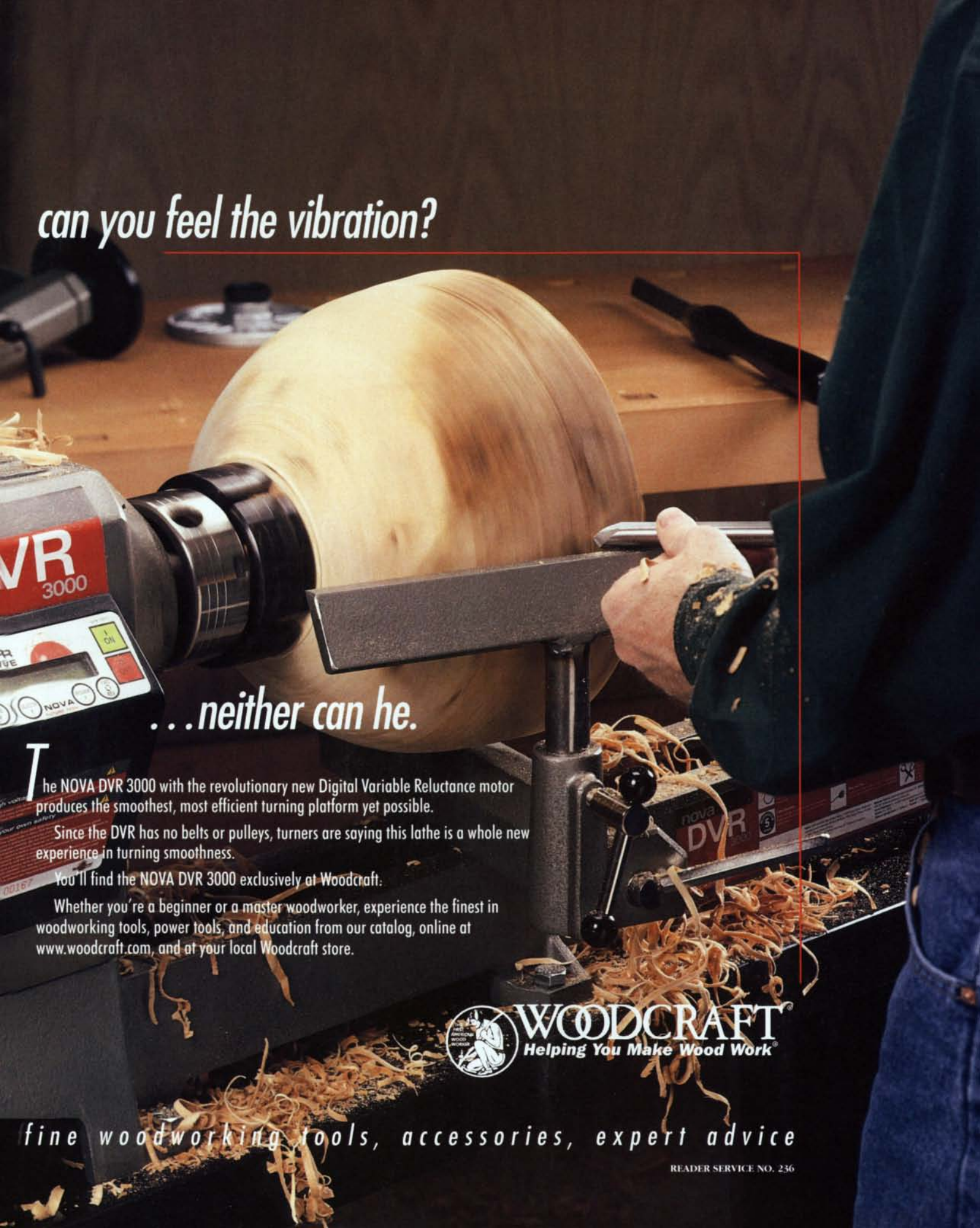

READER SERVICE NO. 236

used to flatten the back of a plane iron, eliminating the need for using a machine shop or hours of hand-lapping. The downside is that these machines do not have the variety of jigs that are available for the Tormek.

Steve Knight of Knight Toolworks has done an extensive investigation of these methods that he shares in the rec.woodworking newsgroup and at www.knight-toolworks.com.

Finally, Lee Valley/Veritas has a new horizontal dry-wheel machine that should be worth investigating, given Leonard Lee's acknowledged expertise in sharpening. However, I do not have any experience with it.

—Steve Bottorff, via e-mail

EDITOR REPLIES: We will be doing a follow-up story on the Shapton waterstones.

After reading "Sharp and Sharper," I wanted to write in with a tip. It seems that diamond paste is the hot item for super-smooth and sharp edges. The trouble is that it's expensive.

I use 3M's Perfect-It III Machine Glaze, which is less expensive than diamond paste and works at least as good, if not better. The product is used in auto-body shops to polish paint. Also, 3M has a new abrasive called Trizact; it's fantastic stuff. It comes in grits as fine as 5 microns. In the body shop we use Trizact discs in 3,000 grit to sand away imperfections in new paint. We then polish the paint effortlessly with the machine glaze.

I took Perfect-It III home and honed a chisel with the stuff on a maple block. I was blown away. Talk about a mirror finish! I then tried it on my smoothing plane. Fraser used curly maple as the test of a super-sharp blade, so I, too, used curly maple to test my plane. It left an extremely curly piece of maple glass smooth. It was the sharpest, smoothest cut I have ever gotten from anything.

I now use the stuff for sharpening everything. I go up to 1,200 grit with sandpaper and from there to a maple block with a liberal amount of the glaze to get a laser-sharp edge. You can purchase 3M's Perfect-It III Machine Glaze at any auto-body supply store.

—John Shortell, via e-mail

A more practical way to stay warm— I had to laugh when I read the tool review "Woodworker's mat helps heat cold feet"

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, executive editor

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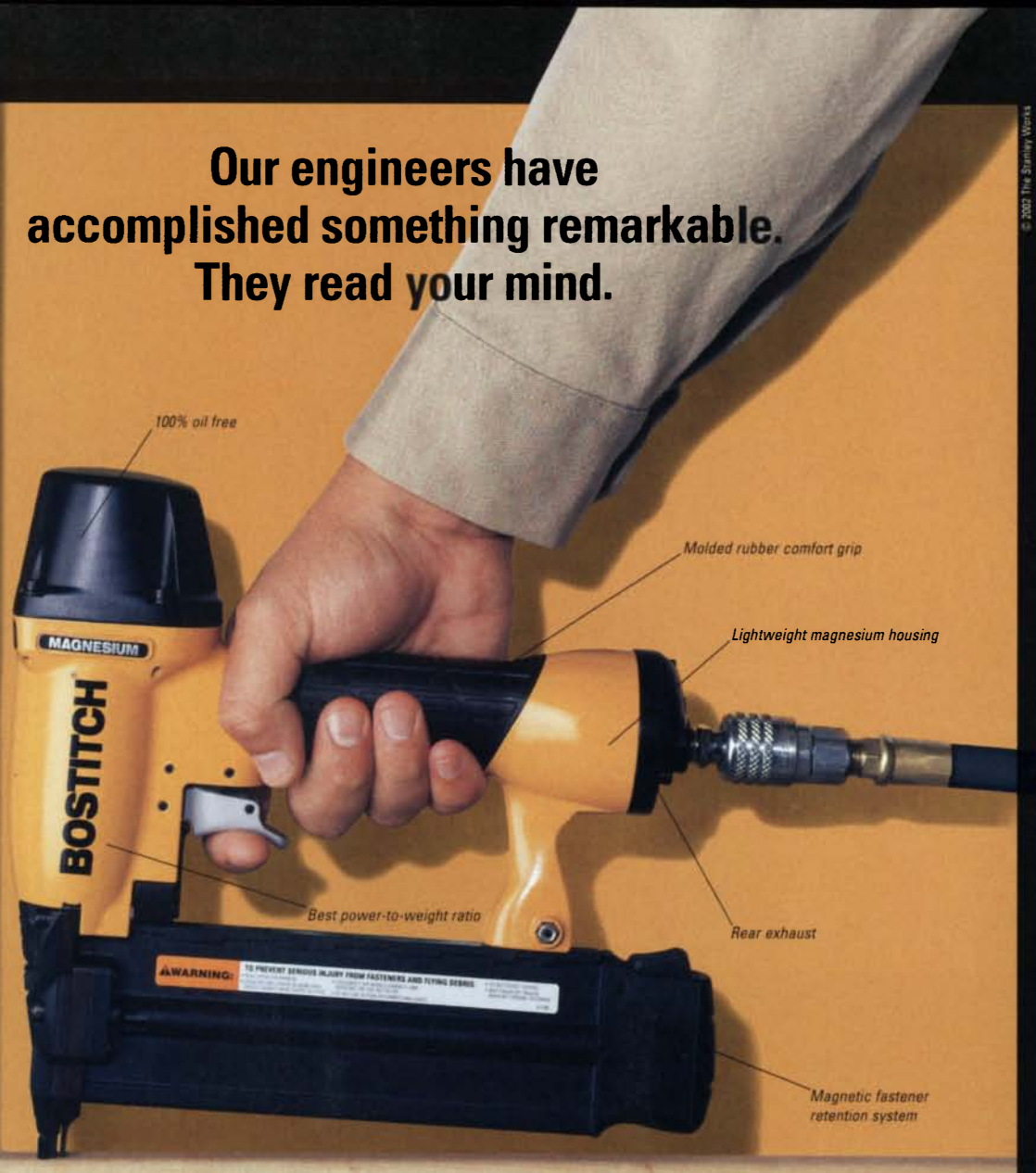

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Power-to-Weight Ratio	**80**	63	69	60	72	49

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(*FWW* #157, p. 32). Here in Vermont, where the temperatures can go 15° to 20° below zero in the winter, we came up with a device that allows you to walk anywhere in the shop and even outside, and keep your feet warm. It's called insulated boots. Try them—you will like them.

—Alex Ribak, Shelburne, Vt.

All souped up—Brian Boggs' article "Soup Up Your Spokeshave" (*FWW* #158, pp. 45-49) surfaced a long-simmering complaint I have with manufacturers that do not flatten and polish the backs of chisels and plane irons, or flatten the soles of handplanes. Also, manufacturers do not always sharpen chisels and irons.

Sharpening skills, as attested to in numerous articles in *FWW*, are not quickly or easily acquired, and the cost of the sharpening materials can easily exceed the cost of a plane or a set of chisels. Surely, manufacturers could perform these tasks for significantly less effort and cost. I suspect many aspiring woodworkers have become frustrated or intimidated by the cost and effort required to properly prepare chisels and planes and, as a result, never experience the pleasure of working with them.

With regard to spokeshaves, manufacturers have raised the burden placed on users to upgrade performance to new heights. About three years ago, I purchased one of the spokeshaves Boggs discussed in his article. After spending a couple of hours trying to flatten the blade and cap iron, I gave up and have not used it since. As received, about the only thing it is good for is elevating blood pressure and generating expletives. The shave is totally useless as a tool. To upgrade the tool, Boggs suggests replacing the stock blade with a heftier blade made from better steel, widening the throat to accommodate the new blade and fabricating a new cap iron from ¼-in.-thick brass plate (available from www.onlinemetals.com). In addition, the bed that supports the blade should be flattened by filling the indentations with epoxy, the bottom of the tool should be ground flat and the edges polished to prevent damaging the wood. I find this incredulous given that neither the descriptions in the woodworking catalogs nor the information accompanying the tools suggest that any of Boggs' recommendations will improve performance.

I would like to offer some helpful advice to the makers of such faux tools: Consider promoting them as irritating gifts in order to capitalize on schadenfreude. This is the German noun with no English equivalent that Martha Stewart is helping to popularize. It means the malicious enjoyment derived from the misfortune or discomfort of others. Most everyone knows someone who would provide them an opportunity to experience schadenfreude and would happily give such an individual a brand spanking new spokeshave for Christmas.

Seriously, I enjoyed Boggs' article and have decided to upgrade my lowly shave per his suggestions.

—James F. Durham, Raleigh, N.C.

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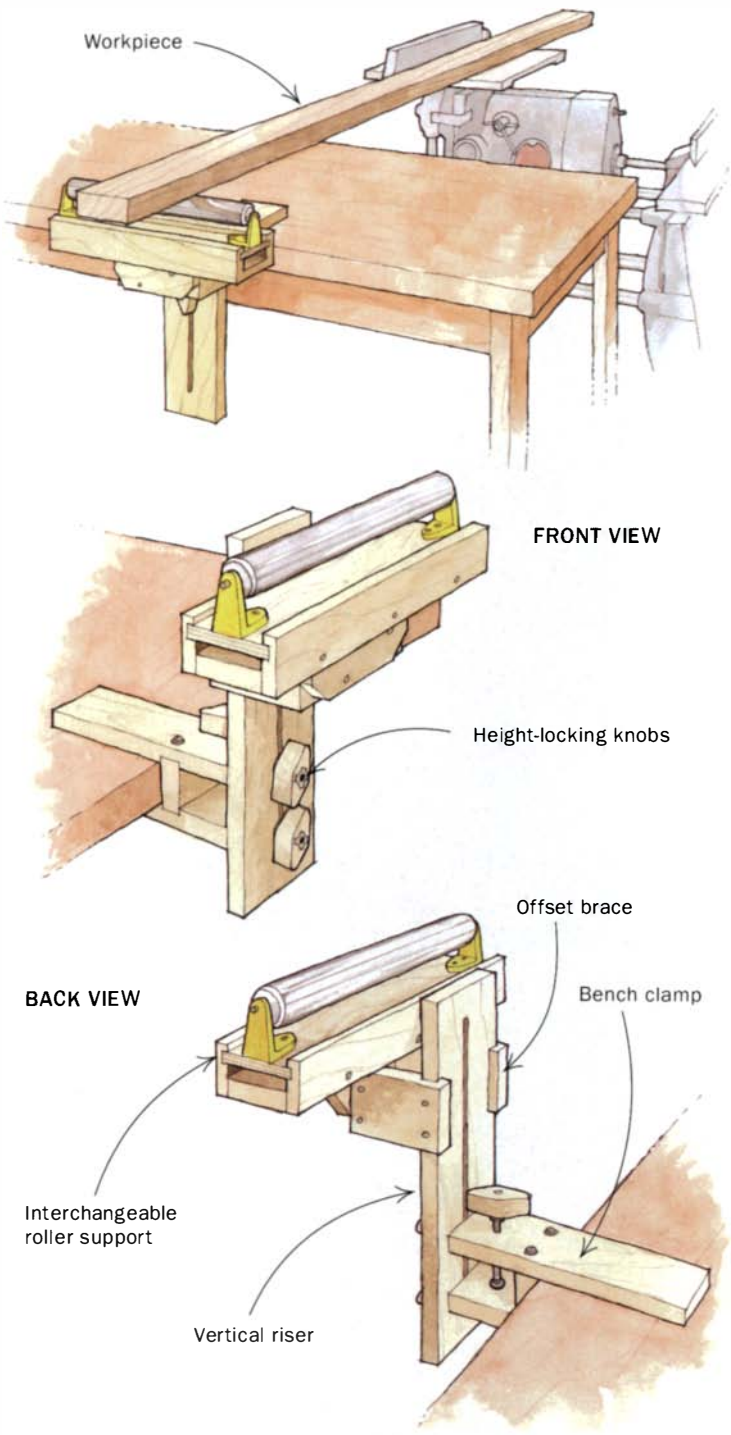
READER SERVICE NO. 153

Methods of Work

EDITED AND DRAWN BY JIM RICHEY

Bench-mounted roller support



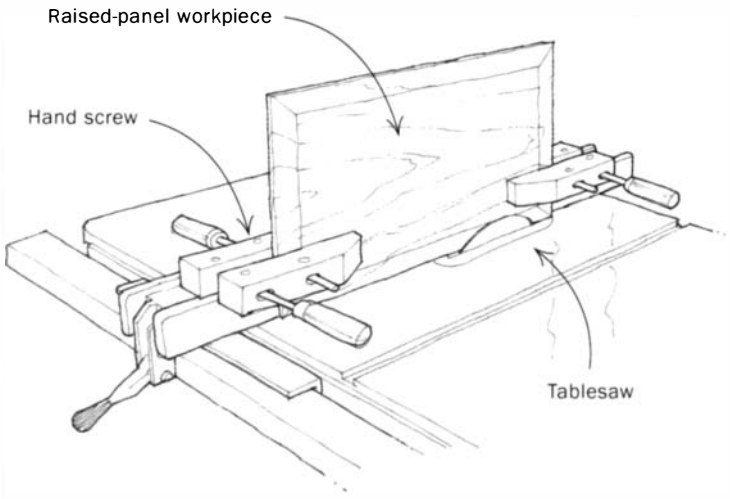
My Shopsmith multitool is the cornerstone of my small shop. One disadvantage of the machine, however, is that the small tabletop requires some sort of stock support on the outboard side when ripping. In my current shop, I have a workbench on the outboard side of the Shopsmith, so I came up with this roller support that mounts directly to the workbench—a design that could be adapted easily to other similar situations.

The support consists of three main parts: a bench clamp, a vertical riser and an interchangeable roller support. I made all of the parts from either hard maple or birch plywood.

The bench clamp needs to be strong to withstand the forces applied when clamping it to the edge of your workbench. I recommend holding the clamp parts together with long carriage bolts that will withstand the clamping stress. The vertical riser provides the up-and-down adjustment (about 9 in. on mine). The top portion of the riser has a slotted brace to hold the roller support. The brace is offset on the back edge, which allows the riser to be adjusted lower than would otherwise be the case.

I mounted the roller support to a piece of ½-in.-thick stock so that it would slide in and out of the vertical riser. That way I can interchange the rolling-pin type of support with one made of those nondirectional ball-bearing guides that are sold in many woodworking catalogs. *—Neil Bough, Elkhart, Ind.*

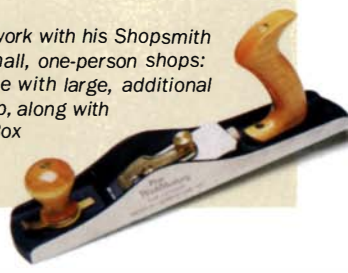
Safer raised panels on the tablesaw



To cut raised panels on the tablesaw, after setting up the blade and fence, I lower the blade and count the rotations. I place the panel against the fence over the blade insert and tighten a wooden hand screw at each end. The bodies of the hand screws become the

A reward for the best tip

Neil Bough, a graphic artist from Elkhart, Ind., designed a bench-mounted roller support to work with his Shopsmith machine in a small, crowded workspace. His device solves a universal problem found in small, one-person shops: How to support large, unwieldy stock without a helper and without overwhelming the space with large, additional outfeed tables. Besides being sturdy, this work support is easy to adjust. Send us your best tip, along with any photos or sketches (we'll redraw them) to Methods of Work, Fine Woodworking, *P.O. Box 5506, Newtown, CT 06470-5506.*

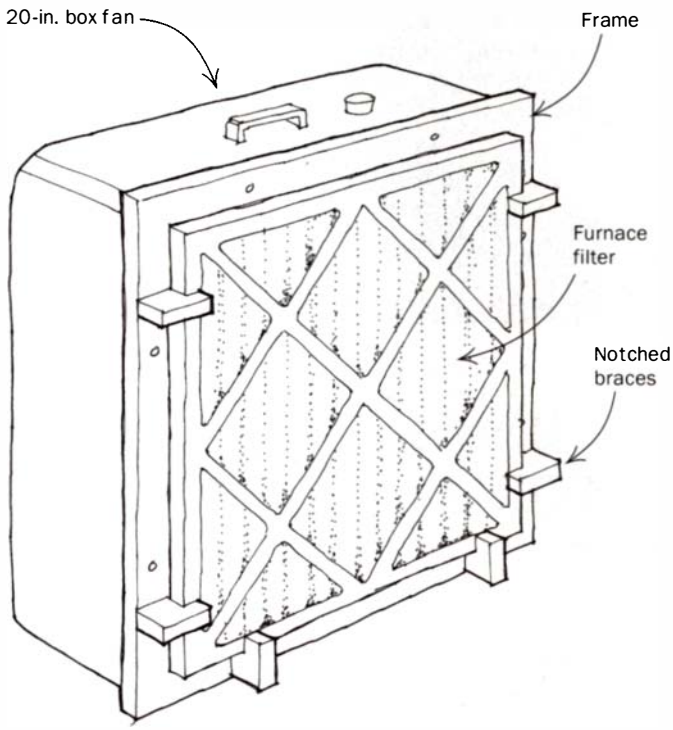


guides along the top of the fence. I retract the panel, then raise the blade to the desired position. With the saw running, the panel safely glides through with no burns or blade gouges.

—Richard DiSammartino, Lower Guynedd, Pa.

Quick tip: When thickness-planing a glued-up panel, I sometimes lose track of the amount of material removed from each side and fear cutting into the biscuits. My solution is to cut a tiny nick in each end of the panel with the plate joiner using the same setting that was used for the glue-up and from the same side of the boards. The small nicks let me see the position of the biscuits as I feed the stock into the planer. *—Richard Andersen, Victoria, B.C., Canada*

Inexpensive air cleaner



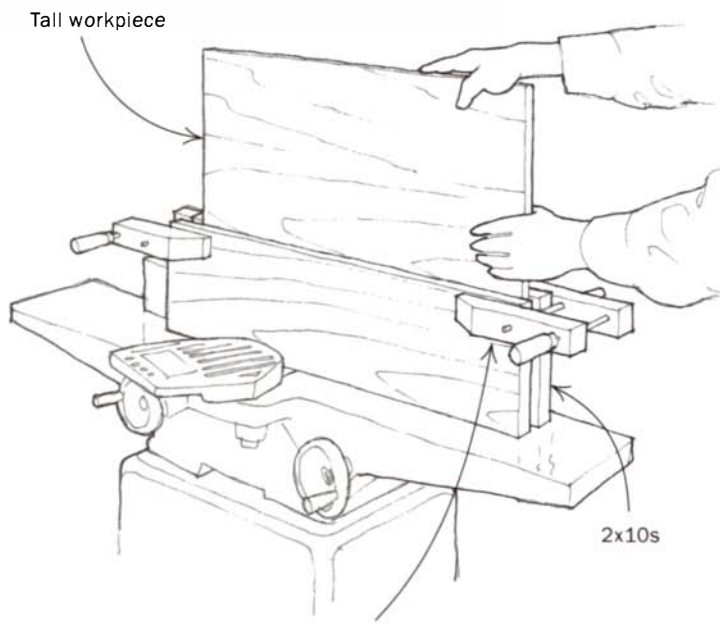
Here is a surprisingly effective air cleaner for the shop that costs less than $30 to make. The system uses a 20-in. box fan with the rear grille removed and a 20-in. by 20-in. 3M Filtrete furnace filter behind the fan. Make a wooden frame with six notched braces to hold the filter, and attach the frame to the fan with self-tapping screws threaded into the original rear-grille screw holes. The filter is disposable. *—Marshall D. Brodsky, Denver, Colo.*

Quick tip: The blade from a metal hamburger spatula is extremely flexible, so it makes a great scraper. Just file out the rivets that hold it to the handle, then file and burnish the edges.

—Jeff Van Dine, Gold Bar, Wash.

Jointing large panels

When I needed to square up the edges of a 20-in.-square tabletop, I knew from experience that I would have trouble running it through my jointer. Without going to all the effort of adding a tall fence to the jointer, it is difficult to keep a tall workpiece from tipping and ruining the cut on the edge. Here is the solution I came up with, and it worked perfectly.



Add clamps at a height that will clear the fence.

I cut two 2x10s a few inches longer than my workpiece and sandwiched the workpiece between the two boards with clamps. I kept the clamps high enough to avoid interference with the jointer fence, and then ran the sandwiched edge through the jointer. The extra width added stability to the tall workpiece. I was able to joint perfectly smooth edges without tipping or wavering.

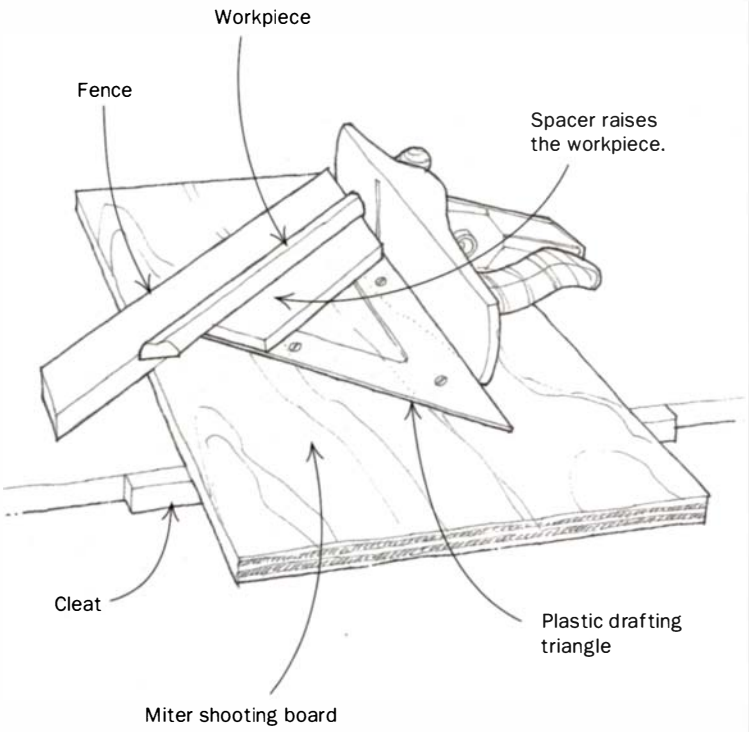
—James A. Johnson, Brunswick, Ohio

Quick tip: If you use your rasps with two hands as I do, add a handle to the tang and wrap some duct tape around the other end. It will save your fingers. The tape can be removed quickly if you need the full length of the tool. *—Drew Langsner, Marshall, N.C.*

Miter shooting board

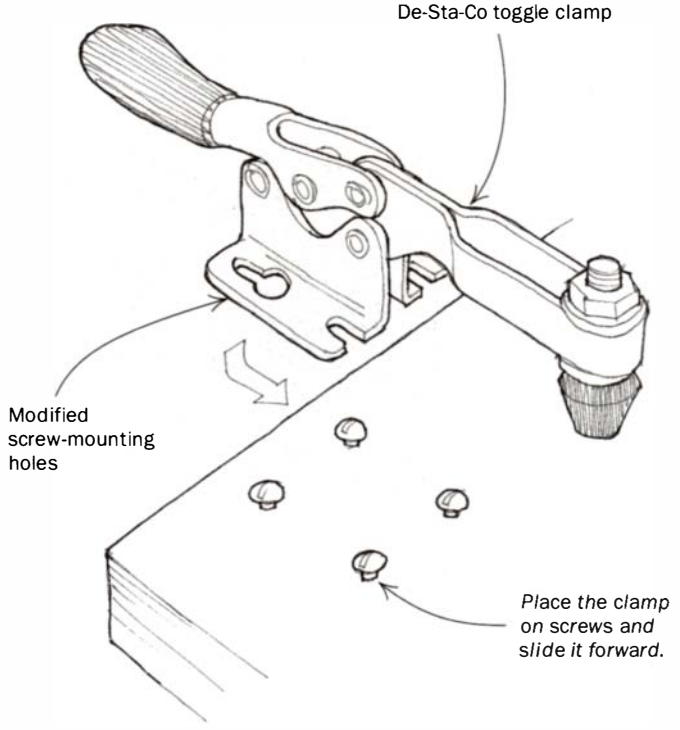
The ease of assembly and the accuracy of my miter shooting board (see p. 24) lie in the use of a plastic 45° drafting triangle as part of its construction. This triangle is extremely accurate and is available for a few dollars at any store that sells drafting supplies. Screw the triangle to a base of ¾-in.-thick plywood, keeping the screws well back from the edge to avoid interference with the workpiece. For the fence, cut a 45° miter on one end of a straight length of wood about 2 in. to 3 in. wide and screw it to the plywood base so that one edge butts against an edge of the plastic triangle. Attach a cleat to the underside of the plywood base to serve as a bench hook. You also will need to make one or more spacers to raise the workpiece so that it comes in contact with the plane iron.

Just about any bench or block plane will work with this jig if the iron is kept sharp and is set to take a fine cut. When you're pushing the plane with one hand, heavier planes seem to work better than lighter ones. Apply paste wax to the surface of the plywood



base and along the edge of the plastic triangle to help the plane glide more easily. —*Gary Westmoreland, Apple Valley, Calif.*

Movable toggle clamps



With a slight modification in the mounting holes, you can move your De-Sta-Co toggle clamps instantly from one jig to another. Make the front holes into slots by opening them up with a hacksaw and file. Then extend the rear holes by boring a second hole in front of the existing hole and filing out the waste between the two holes. The size of the second hole should be larger so that a screw head will pass through it.

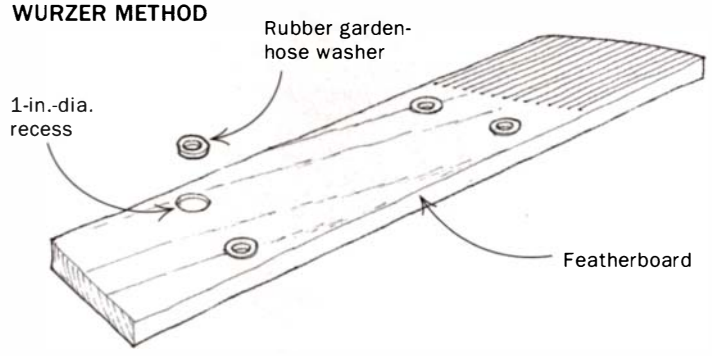
—*Vincent A. Lavarenne, Bruney, France*

Quick tip: When it comes time to replace the power cord on a portable power tool, I buy a 10-ft. or 25-ft. extension cord of the proper gauge, clip off the female end and then install the cord on the tool. This solution is cheap and easy, and it reduces the need for an extension cord when using the tool.

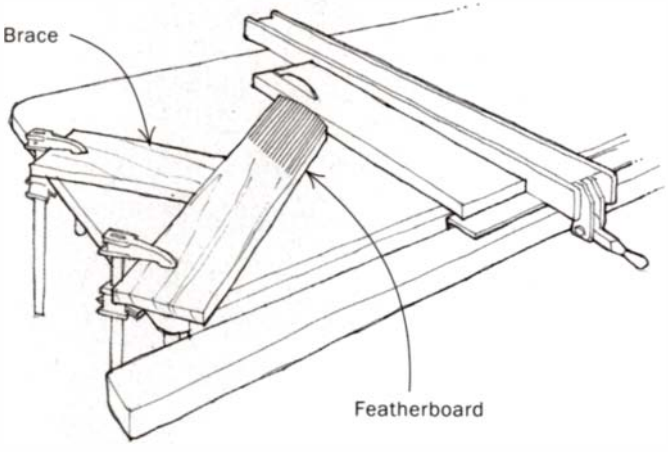
—*Gary Engel, Sturtevant, Wis.*

Two ways to prevent slipping featherboards

WURZER METHOD



BRENING METHOD



Make your featherboard as usual. Then, on the bottom of the board, drill four 1-in.-dia. recesses about 3/32 in. deep with a Forstner bit. The recesses will provide a perfect friction fit to flat rubber garden-hose washers. When you clamp the featherboard to the saw table, the washers will keep it from slipping.

—*Peter J. Wurzer, McKinney, Texas*

Clamp a second board behind and at a right angle to the featherboard to act as a brace. This keeps the featherboard from pivoting on its clamp point and thereby releasing pressure on the workpiece being held in place. —*Richard Brening, Bellevue, Wash.*

Wedges for clamping edgings

A few wedges are all you need to clamp solid edging to plywood while the glue cures. After applying the edging with glue, simply

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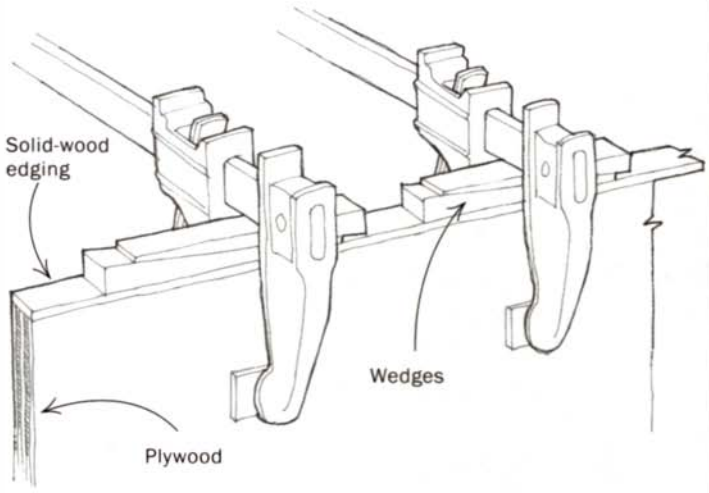
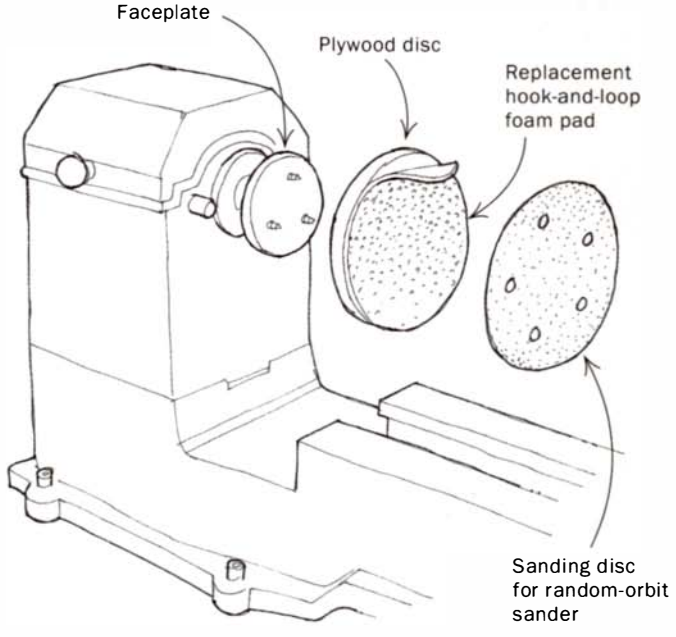


place a few adjustable clamps along the front edge of the workpiece. It's a good idea to use scraps as clamping blocks to avoid marring the surface. Then tap a pair of wedges under each clamp bar to apply pressure to the edging. *—Ted Asousa, Broomall, Pa.*

Quick tip: To cut melamine without chipping, lower the tablesaw blade so that it will barely cut through the melamine layer (1/32 in.). Then feed the sheet backward through the saw, from the back of the tablesaw to the front. This will score the melamine layer without chipping it. Raise the blade to the full cut position and feed the material through the saw the standard way, with the scored side facedown. *—Saeid Karimzad, San Jose, Calif.*

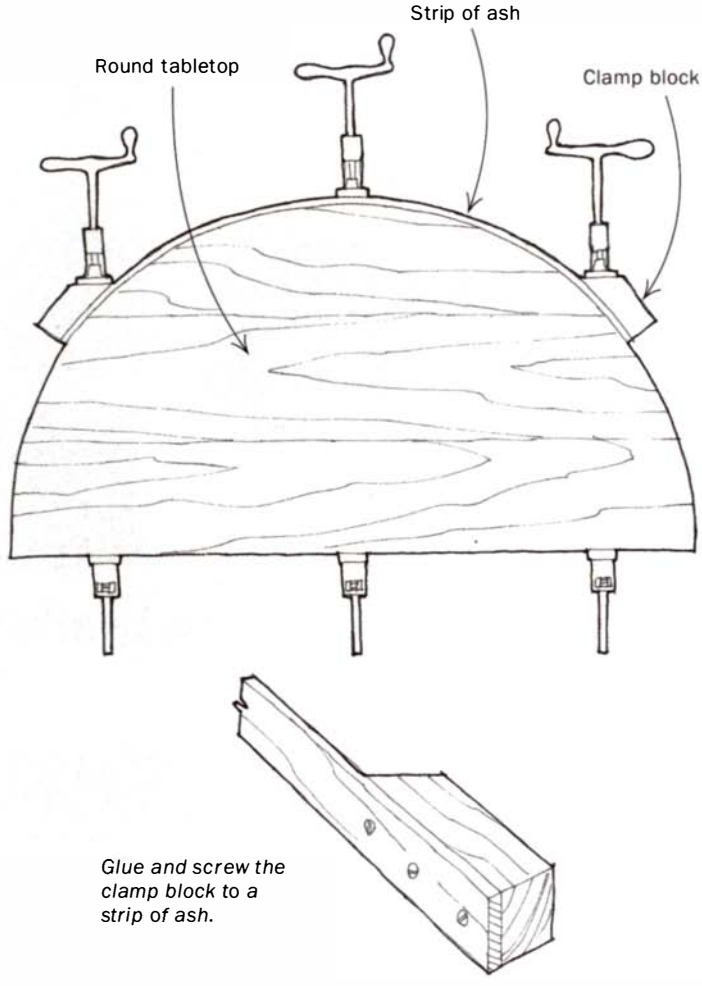
Disc sander for the lathe



When I needed a disc sander to clean up the parting point on turned objects, I hit on this inexpensive, simple and convenient solution. I first turned a 4-in.-dia. disc of ¾-in.-thick plywood with the blank mounted on a faceplate. To this I centered and attached a replacement hook-and-loop foam pad from the same manufacturer as my random-orbit sander. I now have a lathe-powered sanding disc that uses the same supply and grit selection as my random-orbit sander. Changing grits is as easy as peeling off a used sandpaper disc and sticking on another one.

—Owen Lowe, Newberg, Ore.

Clamping round tabletops



When I am making repairs on or restoring antique furniture, I sometimes need to reglue a round tabletop that has come apart. This is tough to do because the bar clamps slip on the round side of the table and can damage the edge. Here's my solution: Cut a 5/16-in.-thick strip of a springy wood, such as ash. Screw and glue a clamp block on each end of the strip. The length of the strip and the angle on the end of each glue block will vary depending on the size of the table being reglued. A 3-ft.-long strip will work for most tabletops.

Clamp the center of the strip on the center of the tabletop. Then bend the strip on either side of the center and set the remaining clamps. If needed, multiple clamp blocks can be placed on the strip to ensure enough pressure across the glue joint.

—Dave Jackson, Aurora, Colo.

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BY ASA CHRISTIANA

New construction, new opportunities

A couple of years ago my family and I relocated, and I was forced to leave behind the 100-year-old garage I had converted to a workshop. While I hated to give up that quaint backyard structure—with its large carriage doors and big, old cast-iron woodstove throwing off heat and eating up scraps in the winter—we were going to build our next house, so I would have the opportunity to custom-tailor a garage for woodworking.

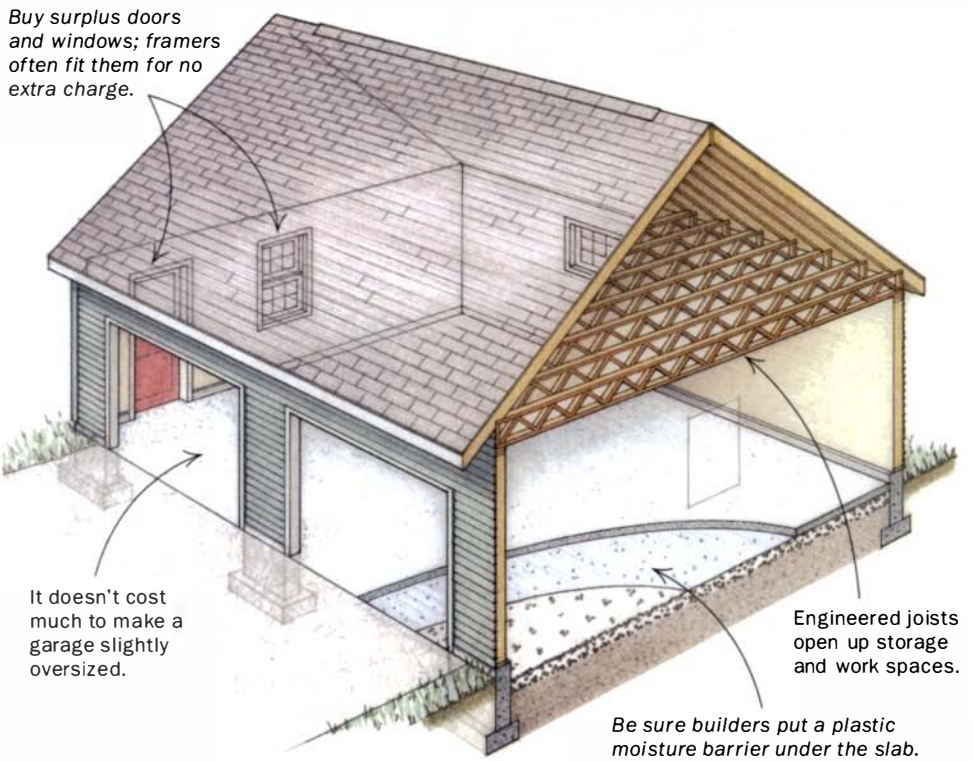
I've read a lot of articles about building the ultimate shop. But many of us are on tight budgets, do our woodworking part-time and live in houses we may have to resell to people who just want to keep their cars out of the rain. The fact is that most of us will never have a huge shop with separate machine, bench and finishing rooms; with wood floors throughout; with a flood of natural light; and with no heat-leaking garage doors. However, if you happen to be building a house and a garage, or just the garage, there are a number of ways to adapt the building to shop use—without spending much more money and without ruling out its later use as a garage.

Construction considerations

Life is about compromises and budgets: There were some things that were worth the extra money and others I just had to let go. First, I convinced my wife that I needed a detached garage. Attached buildings are cheaper, as they share some foundation and at least one wall with the house,

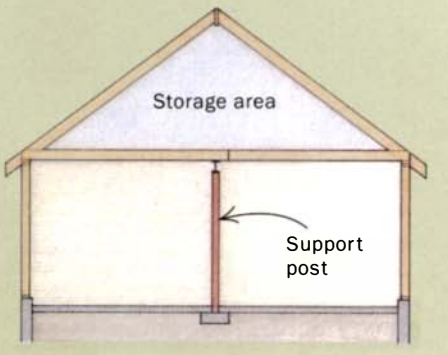
CHANGES ARE CHEAPER UP FRONT

When building a detached garage, there are quite a few low-cost changes you can make to adapt it for use as a shop—without precluding its use as a garage by future owners.

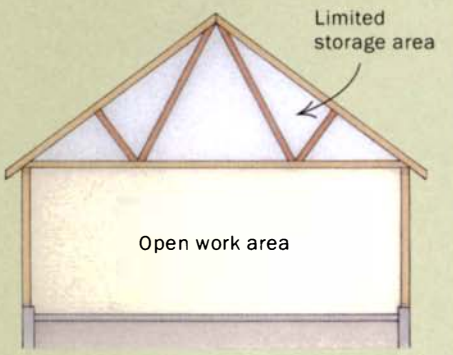


FRAMING A GARAGE FOR SHOP USE

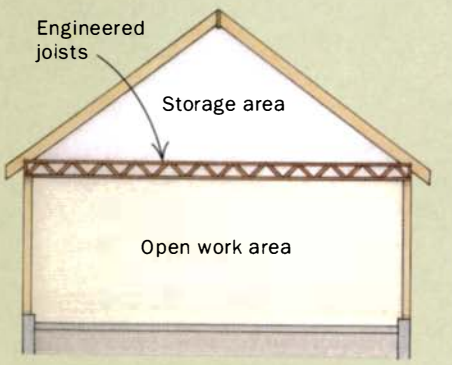
For no added cost, standard framing methods were traded for a recent building innovation, which created a structure better suited for use as a woodworking shop.



TRADITIONAL FRAMING
Joists cannot span the entire garage. Support post obstructs the shop space.



ROOF TRUSSES
Trusses create unobstructed shop space but obstruct the storage area.



ENGINEERED JOISTS
These leave both an unobstructed shop area and a usable storage area upstairs.

Drawings: Vince Babak

Other shop considerations. *For starters, Christiana opted for a detached garage, to insulate the house from dust and noise. Also, for weathering the New England winters, he opted for insulated garage doors, insulated the walls and ceiling and added a direct-vent propane heater.*

and can tie in to the same heating system if needed. But dust and noise migrate into the main house from attached shops, and that was a convenient deal-breaker for my wife. For $100 from our local architect, we bought a stock plan for a slightly oversized (24 ft. deep by 26 ft. wide) garage.

The building has a concrete floor and two garage doors. While we plan to be in the house for the next 30 years, both garage doors would be important to the resale value. A shopwide raised-wood floor would be impractical for the same reason.

To minimize the infiltration of moisture through the slab, I insisted that the builders lay down a sheet of poly (an increasingly common practice) before pouring the concrete, and I spread a few coats of leftover lacquer and polyurethane on the finished floor. By the way, to prevent slipping, I mixed into one of the coats a gritty additive I found at The Home Depot.

Engineered joists solved a space problem—Perhaps the most important thing I did was to choose a friendly, competent general contractor, who communicated and traded ideas throughout the process. And the best tip he gave me was engineered joists.

These long, strong beams span the entire 24-ft. structure front to back without requiring any support posts midway, leaving unobstructed spaces above and below. Best of all, the engineered joists cost me no more than the roof trusses specified in the original plans.

The 12-in.-tall beams had a few other benefits. Their I-beam cross section made it easy to stuff R-30 insulation between them without using staples. Also, their 3-in. width made them easier to find when screwing drywall to the ceiling (I didn't need to snap chalklines).

Toss in an extra door and window—A typical garage plan includes a couple of windows and garage doors. But our framer was willing to rough in an entry door and an extra window for no extra charge. I bought a surplus casement window and a steel door for $100, and gained some natural light and a more practical entrance.

The framer also was more than willing to replace the staircase planned for accessing the attic with a simple opening for pull-down stairs. The heavy-duty pull-down unit cost me $125 and some elbow grease, but it keeps the heat downstairs and frees up valuable floor space.

Win some, lose some

The biggest-ticket add-on was the 25,000-btu propane heater that I purchased and had installed for about $1,300. I just didn't want to wrestle with a woodstove anymore or work in the freezing cold bundled up like the Michelin Man. This sealed-burner unit, which does not allow wood dust to reach the heating element, is much safer and can keep the shop at a steady 50°F or 55°F when I'm not there, enough to keep condensation off my tools and machines. It was money well spent. I am much more inclined to go out to the shop at any hour, in any weather.

I couldn't afford to build my electrical system or dust collection into the floor (for no stray wires or hoses lying about), but I paid the electrician about $600 extra to wire the garage for power. That bought me a 60-amp subpanel, extra outlets around the walls and ceiling and one outlet wired for 220 volts.

Of course, I saved money by doing as much of the work as possible. I installed insulation, an upstairs subfloor, plywood on the walls (making it easier to hang things), trim and light fixtures.

Building a shop from scratch offered me some unexpected opportunities and benefits. I'm more than satisfied with it. It's comfortable, clean, well-powered and well-lit. In winter I can scurry across the snowy yard into a warm workspace, and in summer I can open the garage doors and let the dust out and the sunshine in.

In my world, anyway, dream shops can include compromises. □

Pull-down stairs instead of a staircase. *The stairs close off the heated downstairs space and don't eat up valuable floor space.*

Photos: Michael Pekovich

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Tools & Materials

New Zealand lathe has unusual motor

Smooth operator. *The unique motor of the Nova DVR 3000 doesn't need belts and pulleys, and that helps the lathe run smoothly. The version shown here features the optional bed extension.*

Teknatool International, the New Zealand maker of lathes and chucks, recently has come out with an updated version of its popular Nova lathe. The Nova DVR 3000 has several special features, among them a digital variable reluctance motor and electronic speed control.

Unlike motors on conventionally designed lathes, the motor on the DVR 3000 is built around the headstock spindle. Effectively, then, the shaft of the motor and the spindle are one and the same. That means the DVR 3000 is free of belts and pulleys. As a result, the lathe runs pleasantly smooth, whether you're turning a large bowl at a slow speed or a thin spindle at a high speed. A cast-iron bed also helps keep vibration under control.

The motor, rated at 1¾ hp, runs on standard 110-volt current. Speed ranges from 250 rpm to 3,500 rpm, in 10-rpm increments. A broad range like that often spells low torque at the lowest speeds, but the DVR 3000 claimed full torque at all speeds. I detected a small amount of power loss at the lowest speed, but for the most part the motor provided more than enough power.

A display panel built into the headstock proved convenient. The LCD panel includes an on-off switch, speed change, forward-reverse, and controls to program the ramp-up speed (rate of start) as well as the starting speeds.

Like earlier Novas, the headstock on this version swivels. So by adding an optional outrigger unit, the bowl-turning capacity can be increased from 16 in. over the bed to 29 in. outboard.

The spindle has 1¼-in. by 8-tpi threads with a #2 Morse taper, the same size used on larger machines. Surprisingly, the lathe does not come with a handwheel, which often is standard on lathes, even on many midi-lathes. A 6-in. aluminum faceplate is standard and should be adequate for most work. The headstock also has an indexing pin with 24 divisions, which is useful for reeding and fluting.

Both the tool rest and the base slid smoothly and locked nicely, although the locking handle could be longer. It would also benefit from a knob on the end.

The tailstock also was a smooth slider that locked securely. The tailstock spindle has a #2 Morse taper, with 3¼ in. of travel, typical for a lathe this size. The standard live center is not as good as the company's aftermarket version.

The optional bed extension increases the distance between centers from 24 in. to 45 in. The extension lined up perfectly, with the tailstock sliding effortlessly over the entire length of the bed. The optional steel stand is sturdy, although the mounting holes in the stand I looked at needed filing to line up with the holes in the lathe.

The lathe performed well, with no real problems. There were, however, a few annoyances. For example, the ramp-up speed was slow, even when adjusted to its fastest setting. Bowl turners looking for full speed in an instant might become impatient.

In the end, though, the DVR 3000 proved to be a well-built, well-thought-out machine that was a pleasure to use. Anyone looking for a lathe in the upper midprice range should give this $1,700 machine a good look. The DVR 3000 is distributed by Woodcraft (800-225-1153; www.woodcraft.com).

—Andy Barnum

Control panel adds convenience. *All of the motor functions are operated by touch control from the LCD panel.*

Photos, except where noted: Tom Begnal

Sanding block conforms to profiles

Lock in the profile. *Establish the profile (above), use an Allen wrench to secure it, then attach sandpaper.*

To sand a curved profile effectively, it's important for the sandpaper to conform closely to the shape of the curve. The Vario Sander, sold by Klingspor, helps you do just that.

At the heart of the Vario is a stack of thin credit-card-sized plastic plates, supported on edge in the body of the sander. When the edge is pressed against a curved surface, the individual plates shift to mimic the shape of the curve. You can produce the same effect by pushing your finger into the edge of a deck of cards.

Once a profile has been established, it takes just a quick turn of an Allen wrench to lock the plates in place. Once locked, the sander accepts 3½-in. by 4-in. sheets of hook-and-loop sandpaper. When you're finished with one profile, just loosen the plates and you're ready to replicate another profile.

The Vario Sander did a great job sanding coves and roundovers from ⅛ in. dia. and up. It felt reasonably comfortable in my hand. And it took less than a minute to reset the tool for a new radius.

However, if a profile includes any right angles, say, for example, a smallish stepped bead, the tool is somewhat less effective. That's because the sandpaper, even when the grit is 220, isn't flexible enough to bend around a tight radius. So inside corners don't get fully sanded, while outside corners can get rounded too much.

All in all, though, I suspect anyone who sands a lot of profiled surfaces will rate the Vario Sander as a keeper. It sells for about $30. For more information, contact Klingspor (800-645-5555; www.klingspor.com).

—Tom Begnal

Woodworking trade shows

In early August, the katydids began their all-night rhythmic refrain here in southern New England, an audible advisory from nature that summer days were becoming both shorter and fewer. For me, however, it was just as surely a reminder that two big late-summer woodworking shows were about to get started—the National Hardware Show in Chicago and the International Woodworking Fair (IWF) in Atlanta.

Within days, I was in Chicago, enjoying a traffic-free train ride from O'Hare airport to downtown, where the show was held for three days at McCormack Place, on Lake Michigan. Not much more than a week later, I was relishing a pulled-pork barbecue sandwich and a cold lemonade at Fat Matt's Rib Shack in Atlanta, a wonderful place to get fortified for four days of hard walking at the World Congress Center.

As usual, the two shows offered plenty for anyone with a woodworking bent. And, once again, I am pleased to report there was no shortage of new and improved woodworking products. Here's a summary of my many notes:

Delta updates its air cleaner

To help collect the fine airborne dust that blows around the shop, Delta introduced model 50-875, an air cleaner with some useful bells and whistles. By teaming a pleated inner filter with an electrostatic outer filter, the air cleaner becomes 91% efficient down to 1 micron, according to Delta. Power is provided by a remote-control ⅛-hp motor that moves air through the filter at three speeds: 1,300 cu. ft. per minute (cfm), 850 cfm and 650 cfm.

Other features include a means to determine when the filter needs cleaning and a time-delay switch that allows the cleaner to run and shut itself off after you leave the shop. The air cleaner sells for about $250. For more information, contact Delta (800-438-2486; www.deltamachinery.com).

A pair of router combination kits from DeWalt

The folks from DeWalt showed a new line of routers that includes two combination kits. Each kit has three main components: a motor, a fixed base and a plunge base. The motor fits both bases, and it takes just seconds to switch the motor from one to another. Effectively then, you end up with two routers for considerably less than you'd pay for two fully dedicated versions.

The motors represent the main differences between the two kits. Model DW616PK features a single-speed (25,500 rpm), 11-amp, 1¾-hp motor. It sells for about $200. Model DW618PK has a variable-speed (8,000 rpm to 24,000 rpm), soft-start, 12-amp, 2¼-hp motor. It costs

Photo, this page (bottom right): Courtesy of DeWalt

Sauer and Steiner No. 7 smoothing plane

Made one at a time. *The No. 7 smoothing plane, individually hand-crafted by a pair of Canadian plane makers, is an effective cutter.*

Konrad Sauer and Joe Steiner, operators of Sauer and Steiner Toolworks in Ontario, Canada, are making hand-crafted infill planes in the tradition of legendary toolmaker Stewart Spiers. These truly handmade planes are produced with a modest investment in equipment but demand great skill and attention to detail.

I tested a No. 7 smoothing plane with a 45° bed angle and a 9-in. sole. The 5⁄32-in.-thick by 2¼-in.-wide blade, made in England by Ray Iles, uses M2 high-speed steel, a durable alloy hardened to Rc 61. This stout blade helps minimize vibration and chatter. It is secured firmly to the plane bed by a bronze, screw-tensioned lever cap. The sole is hand-lapped and has a narrow throat suitable for fine shavings and minimal grain tearout.

Infilled with cocobolo, a dense wood that adds heft and vibration-dampening qualities, the plane's only shortcomings were a blade and chipbreaker that required a little extra work beyond the standard honing. The blade is adjusted with light hammer taps (there's no adjustment mechanism); once I set the blade, it stayed put. Subtle microadjustments are made by slightly tightening or loosening the lever-cap screw.

To give the plane a workout, I used it for 90 minutes, without any rehoning, to remove various planer and saw marks from a cherry bed frame with moderately figured wood. All of the surfaces cleaned up nicely. Then, after a touch-up honing, the plane handled the curly grain headboard just fine, with only a few areas needing some light scraping.

At $850, this is an expensive tool. It planes as well as any smoother I've used. Admittedly, a few other planes on the market cut as well at half the price. But this one has an especially solid feel that's hard to define yet easy to appreciate. And, of course, it looks beautiful. For additional information, call (905) 272-2939.

—Chris Gochnour

Trade shows (continued)

about $250. For more specifics, contact DeWalt (800-433-9258; www.dewalt.com).

Furniture from straw?

Dow Chemical has developed a fiberboard product that's made from wheat-straw fibers rather that wood fibers. Called Woodstalk, the fibers are bonded together using a water-resistant polyurethane resin, a product that doesn't contain formaldehyde. Dow claims it releases significantly less volatile organic compounds (VOCs) than most composite panels.

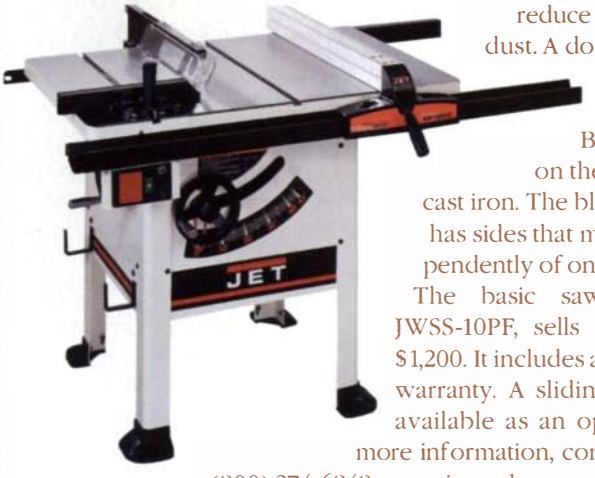
The process helps the environment in another way. In the past, wheat fields had to be burned after harvest to remove all of the stalks. Now, with the stalks being collected, not burned, the air ends up cleaner, and farmers get some additional cash.

According to Dow, Woodstalk has other advantages. A smooth surface takes paint and other topcoatings well. It weighs 15% to 20% less than most fiberboards, yet it's just as sturdy. It also machines easier and reduces tool wear. And it costs about the same as any high-quality medium-density fiberboard (MDF) or particleboard. It's available at Lowe's, The Home Depot and Menard stores. For additional details, visit www.dow-bioproducts.com.

The Supersaw from Jet

At first glace, except for the color, Jet's new 14-amp, 115-volt, 1¾-hp, 10-in. Supersaw bears a striking resemblance to the DeWalt DW746, a saw that's been around for several years. But a closer look shows a few differences.

A wider stance adds stability. The base is enclosed to help reduce noise and dust. A door in back provides access. Both wings on the table are cast iron. The blade guard has sides that move independently of one another. The basic saw, model JWSS-10PF, sells for about $1,200. It includes a two-year warranty. A sliding table is available as an option. For more information, contact Jet at (800) 274-6848; www.jettools.com.



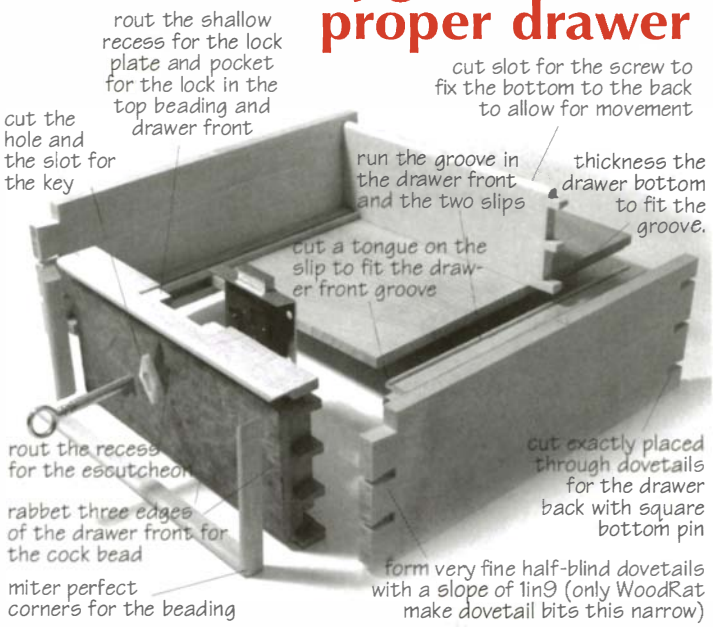
Downdraft table from General International

The General International line of woodworking machines now includes a downdraft table, model 10-700 M1. With a ⅓-hp, 110-volt motor, it pulls air at a rate of 1,250 cfm through holes in the 21¼-in.-deep by 31½-in.-wide tabletop. The filter collects dust particles as small as 0.5 micron.

Dust curtains on the back and sides are removable for sanding

Photos, this page: Chris Gochnour (left); courtesy of Jet (right)

It takes more than just a dovetail jig to make a proper drawer



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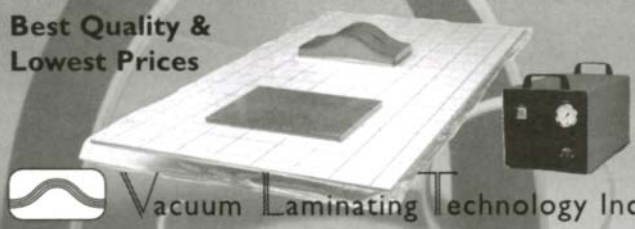

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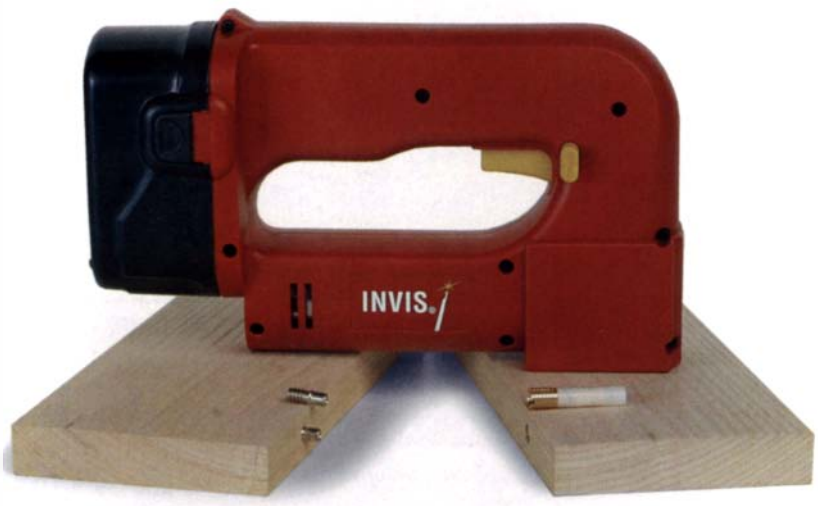
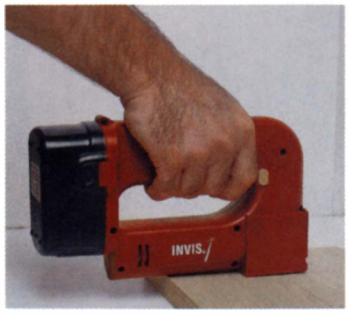


Two-part fastener. *INVIS incorporates a fastener made up of a machine screw and a threaded insert. When activated by the magnetic driver, the screw begins to spin, threading itself into the insert.*

Lamello, the Swiss tool manufacturer, has put a new twist on a hidden knockdown fastener. Remarkably, the fastener features a screw that's tightened or loosened without touching it. Called the INVIS system, its secret is a unique driver that works with special fasteners, available in 8mm dia. and 12mm dia. Position the driver near the fastener, squeeze a trigger switch and a machine screw in the fastener immediately spins.

It isn't magic that turns the screws. It's simply the principles of magnetism hard at work. Each fastener consists of a machine screw and a threaded insert that mate with each other. With the screw and the insert mounted in separate pieces of wood, the two parts join when the screw threads into the insert. The fasteners thread fully in 5 to 10 seconds.



Remote-control joinery. *Just squeeze the trigger on the magnetic driver to tighten a joint.*

An INVIS joint is prepared much the same way as a wooden dowel joint. However, the metal interface of the INVIS fasteners allows no room for error during assembly. While most woodworkers won't ever need it, the INVIS system might be ideal for anyone wanting a quick way to create fully hidden joints that can be disassembled easily. But INVIS doesn't come cheap: A starter kit costs $899, and a box of 10 fasteners is $47. For details, contact Colonial Saw (800-252-6355; www.csaw.com). *—Dennis Preston*

Andy Barnum is a wood-turning teacher living in Carmel, N.Y.; Tom Begnal is an associate editor; Chris Gochnour builds furniture in Murray, Utah; Dennis Preston is a woodworker and engineer in Brookfield, Conn.

Trade shows (continued)

large workpieces. The table sells for about $630. Contact General at (514) 326-1161; www.general.ca.

Laguna workbenches

Classic European-style workbenches are now available from Laguna Tools in five designs, all made from red beech. Lengths vary from 5 ft. to 8 ft. Contact Laguna at (800) 234-1976 or visit www.lagunatools.com.

A robust plunge router from Milwaukee

Milwaukee unveiled a new 15-amp, 3½-hp, variable-speed (10,000 rpm to 22,000 rpm), soft-start plunge router, model 5625-20. In addition to a microadjustment knob, it includes a very functional linear height-adjustment system. A heavy-duty lever was convenient to use and appeared to hold the motor securely in place. If installed in a router table and a hole is drilled in the tabletop, you can use a supplied T-handle adjustment wrench to raise or lower the bit height from above the table.

The new router will set you back about $340. For more information, contact Milwaukee (800-729-3878; www.milwaukeetools.com).

Makita's brighter jigsaw

Makita now offers a jigsaw with a built-in light-emitting diode (LED) to help you see where you're going. Model 4341FCT also has a blade-changing system that's especially quick and easy. A 6.3-amp, variable-speed motor allows from 800 to 2,800 strokes per minute. Four different stroke settings are available: one straight and three orbital. Electronic speed control helps maintain the selected blade speed. More information is available from Makita (800-462-5482; www.makitatools.com).

Sawstop introduces tablesaw

A couple of years ago, a company named Sawstop introduced a product that stops a spinning tablesaw blade the instant it contacts a wayward finger or any other body part. Based on tests using a hot dog as a finger substitute, the wiener ends up with little more than a shallow scratch.

Sawstop had hoped to license the product to the various tablesaw manufacturers. However, to date, none had gotten on board.

Convinced they have a viable product, Sawstop has begun manufacturing tablesaws. And, of course, they include the finger-saving feature. A cabinet saw and a smaller contractor's saw are expected in the spring of 2003. The cabinet saw will retail for $2,500.

For more information, contact Sawstop (503-638-6201; www.sawstop.com). *—T.B.*

Photos, this page: Kathleen Williams (top left); courtesy of Makita (right)

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READER SERVICE NO. 167

Smart Shop in a One-Car Garage

Space-saving solutions for a small work area

BY MATTHEW TEAGUE

Tales of bad shops are a woodworker's war stories. After living in five houses in seven years, I have plenty of them to tell: ladders under closeted trapdoors that descended into windowless basements, ceilings that were only an inch taller than I am when I stand barefoot, abandoned radiators, wasp nests, snow, water—good Lord, the water—and a hole in the middle of one shop floor (about 2 ft. in diameter and 2 ft. deep) just behind the infeed side of my tablesaw. Oh, yes, I could tell you some stories. But that's not my point. My point is that when I moved into a rented house with a one-car garage—9 ft. wide and 18 ft. long—most of my coworkers wondered how I would fit a shop into such a tight space. But after the shops I've endured, I felt like I'd finally arrived.

I spent a lot of time planning to condense workspaces and to make sure that machines work efficiently with one another, and I found quick and simple solutions for storage. I think I've turned the 160-sq.-ft. garage into a smoothly running shop; it's just the kind of place where I want to spend a Saturday or unwind after a day at the office. What's more, when I move, the shop can go with me; everything simply lifts off the walls or rolls out the doors.

A garage transformed

A few months ago, the garage my shop was to be housed in had bare stud walls and one electrical outlet, stored a motorcycle and was littered with enough garden tools to dig a new sea. Luckily, my roommate, who owns the house, was amenable to revamping the space, provided that I pitch in with some of the work. He wanted insulated walls, electricity and wide barn doors on the front—or at least as wide as possible on a 9-ft. run of wall. Renovating the garage would be a hefty task, and I had to do it fast. I had promised my future in-laws a dining set, and if they had to wait much longer, I feared they would take their daughter back.

While I desperately needed a good workspace, I had to remember that I only rent the house. I didn't want my shelving and workstations to be built in. I wanted to be able to lift them off the walls and move them out when I find and buy Connecticut's affordable house. And I didn't want to sink a fortune into cabinets—it's a workshop, after all, and what comes out of the shop is far more important than what goes in. I needed a shop that was well thought out and engineered for a smooth workflow, but not one that was overbuilt. I forgot about all of the garbage that littered the little garage, and started planning on a clean sheet of paper.

Mapping out the territory

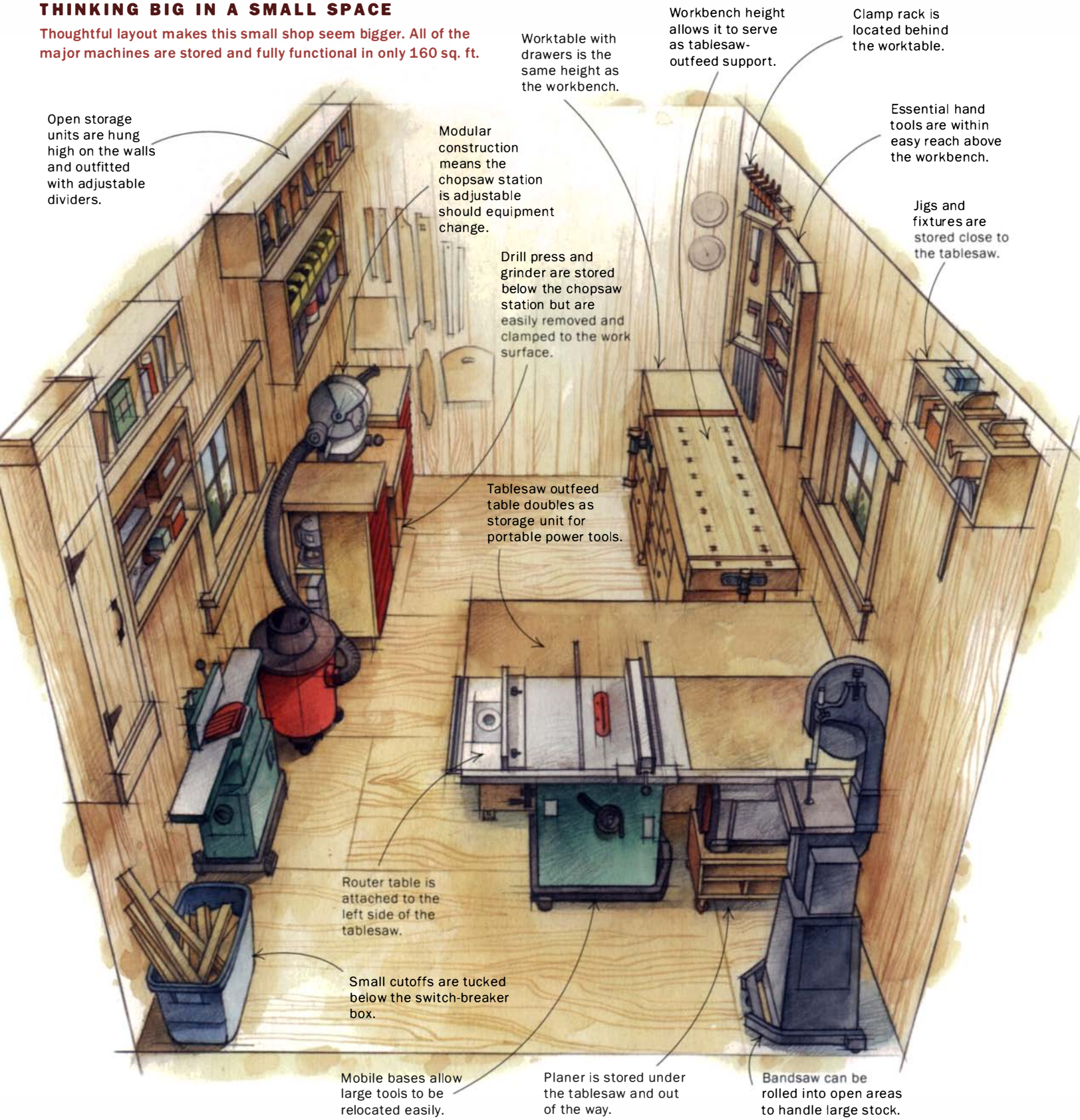
Fitting the major machines—tablesaw, jointer, planer, bandsaw, router table, drill press and chopsaw—into a room designed to hold a car (a tiny 1920s Model A, at that) is about as difficult as it sounds. I started on graph paper with paper cutouts of all of my tools. Everything had to be drawn to scale because half a foot in such a tight spot could make or break the shop. As in most shops, large stationary tools are key, but they also demand the most space, so the tablesaw seemed a good place to start.

As soon as I put pencil to paper, I saw that I was going to have to forgo my wide 52-in. Biesemeyer fence—there simply wasn't room. I downgraded to a shorter fence by changing out the rails, which at this point only meant lopping off the end of my tablesaw

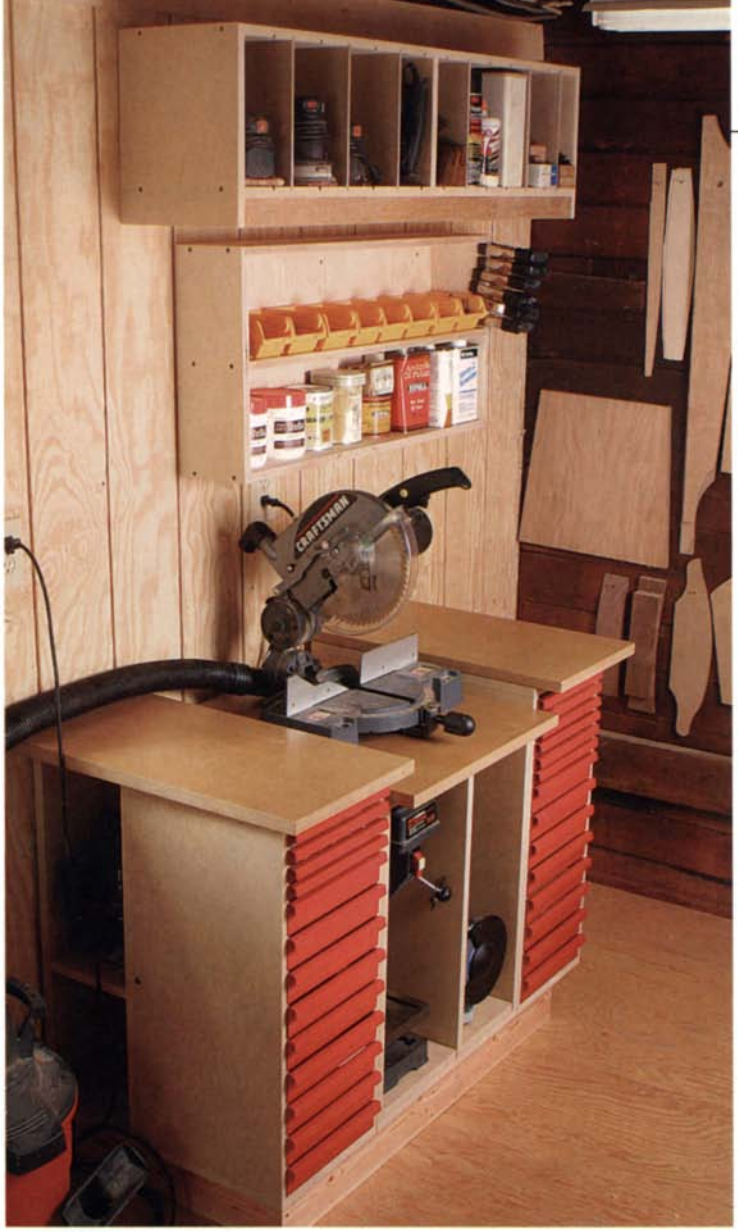
Photos: Michael Pekovich

THINKING BIG IN A SMALL SPACE

Thoughtful layout makes this small shop seem bigger. All of the major machines are stored and fully functional in only 160 sq. ft.



Drawings: Brian Jensen



A well-thought-out corner of the shop. *The chopsaw station not only provides good outfeed support for the saw, but it also stores the grinder and the drill press and houses two banks of drawers.*

MULTIPURPOSE CHOPSAW STATION

Drawers are like clamps—you can never have enough. *Metal drawers slide in sawkerfs in the carcase. Hardware and fasteners are stored in watchmaker's cases. Drawers for cutting tools are padded.*

A portable workstation. *The drill press and grinder are both stored below the chopsaw but are easily removed and clamped to the work surface.*

cutout with scissors. I soon saw that large tools had to be mobile; if I left open floor space, any tool could be pulled out easily and put to use. There still were a few wrinkles—like where my router table would go and how I could consolidate my grinder, chopsaw and drill press into one smooth-running workstation—but after a little thinking and shopping around, I solved those problems, too.

I also kept an eye on the horizontal arrangement of tools and workstations, making sure that the outfeed from certain tools—like my tablesaw and jointer—wouldn't be hindered by workbenches or tabletops. After a few more hours of moving around the cutouts and positioning the major machines, I started thinking about storage space and drawing quick sketches of the outfeed situation. In the end, I came up with an arrangement that housed the major tools in just about 80 sq. ft—about half the square footage of the entire space. It was time to run electricity and build the walls.

After cleaning the garage of all its old tools and odds and ends, my roommate and I hired an electrician pal to wire the space. We positioned all of the outlets 44 in. up from the floor—just above bench height—and ran them every 4 ft. We also dropped in four 220-volt outlets conveniently located to reach the beefier machines.

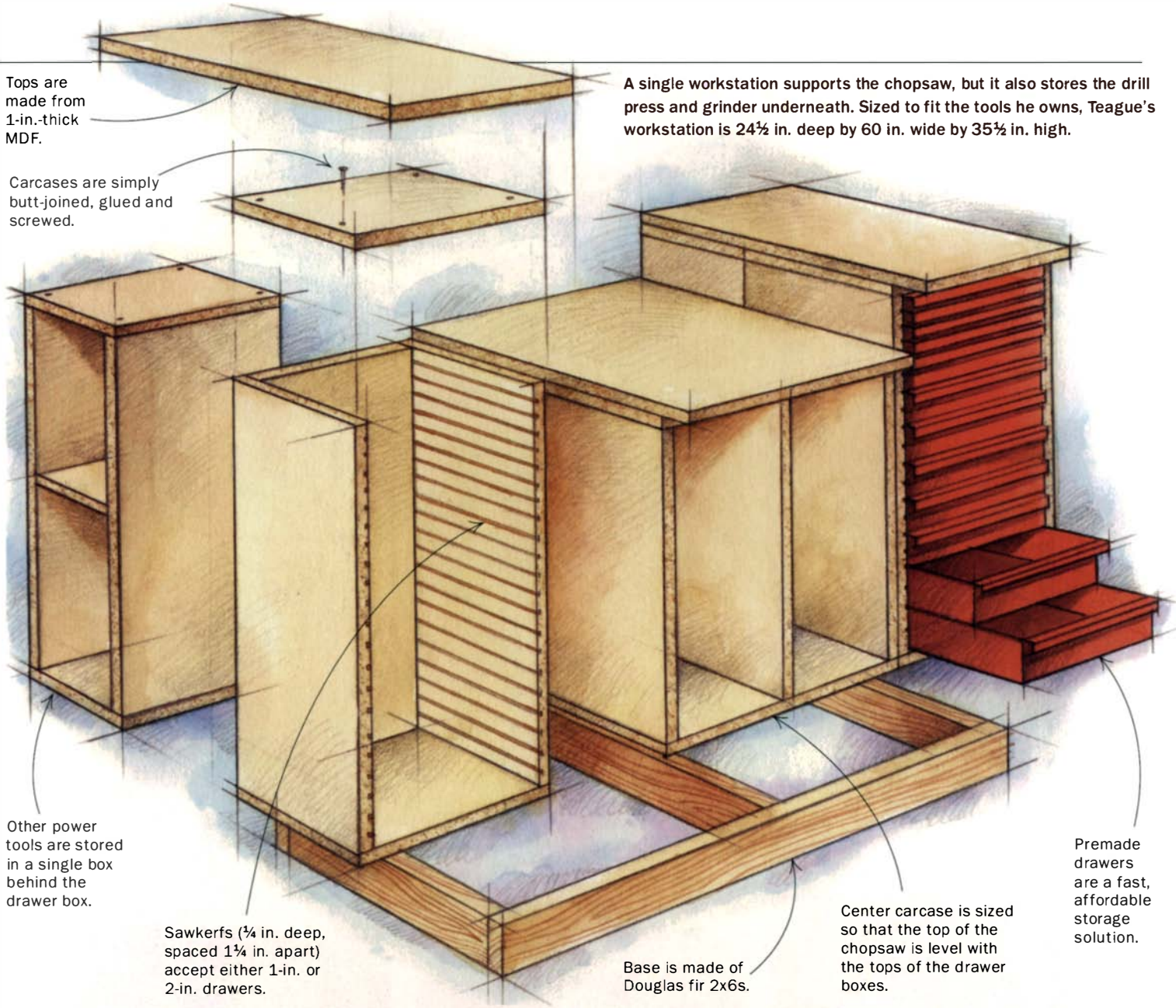
We insulated the walls and hung T-111 siding, which is stronger than drywall and does a better job of holding tool cabinets. The light color of the siding opened up the space, and the rough wood surfaces gave the shop a warm, inviting feel. We then built and hung the barn doors, which took only a weekend to accomplish.

The existing wood floor in the garage would have been nice on the feet, but it was too old and uneven to allow my heavy mobile tools to move easily. We laid down plywood flooring over the existing wood floor and covered it with a few coats of water-based polyurethane.

I have to admit I was shocked that everything worked just as it had on paper. Now I was ready to roll in the machines.

Large tools rest on mobile bases

My tablesaw sits approximately 4 ft. inside the barn doors, leaving enough space on the left side of the saw for my jointer to



A single workstation supports the chopsaw, but it also stores the drill press and grinder underneath. Sized to fit the tools he owns, Teague's workstation is 24½ in. deep by 60 in. wide by 35½ in. high.

Workstation assembles easily

Set the boxes in place. *The main carcase is centered on the base and screwed into place.*

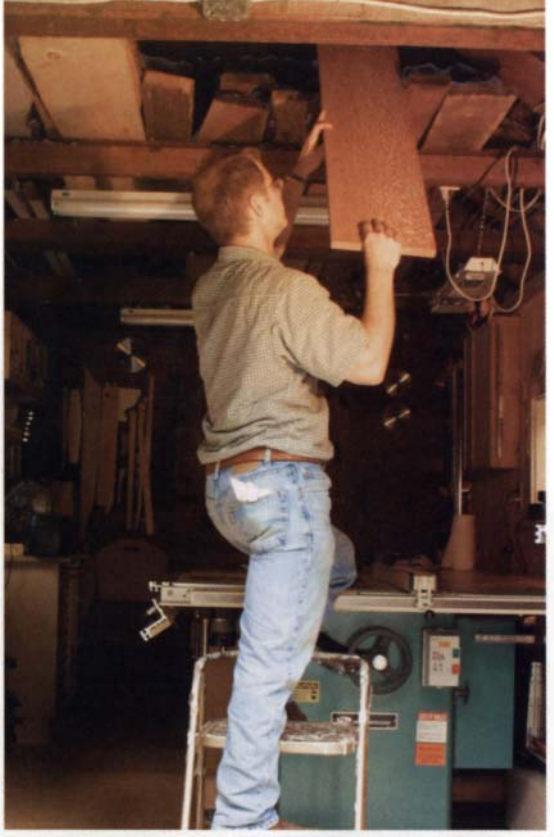
Keep the carcases flush and secure. *Clamps hold the drawer box in place while it is screwed to both the base and the center carcase.*

Exploit every inch. *Storage boxes are set behind the drawer boxes and screwed in place.*

Use a thick top. *The 1-in.-thick MDF is coated with a few washcoats of shellac and will stand up to heavy work.*

stand against the opposite wall. And because I put the jointer on a mobile base, I can move it around if I need to joint especially long boards. My small lunchbox planer, which always has worked wonderfully for me, was relegated to the cubbyhole below the right-hand side of my tablesaw. It saves floor space, but because the planer is light and kept on a shopmade mobile base, its usefulness is not limited.

One big hiccup always had been my router table. It made sense to save space by housing the router table in the tablesaw, but most models mount on the right side of the saw—a setup I'd never been happy with. And with the right side of the saw against the wall, where it clearly had to go, I couldn't stand in front of the fence when routing—doing otherwise always had seemed unsafe. Still, a stand-alone router table was going to take up more room than I had to spare. Browsing through catalogs and the Internet, I found what is the only left-mounted router table that I know of; it's made by Bench Dog (800-786-8902; www.benchdog.com). Although my choice meant losing 3 in. between the tablesaw and the jointer, I still had plenty of working space. Plus, I was able to get rid of my free-standing router table altogether.



A place for everything. *Space above the rafters is used for storing—and even drying—lumber.*

The left-mounted router table works great now, but because my tablesaw table is larger than average—even for a cabinet saw—I had to redrill a few holes in the top of the tablesaw and install spacer blocks to make the router table fit. But the afternoon's work has proven well worth it. Not only does the table save space, but it also works better than any free-standing router table I've ever had. I dropped in a router lift (*FWW* #155, pp. 56-61) to make it even more user friendly. Now I can change router bits topside with a quick-action wrench, saving both time and hassle.

As planned, the bandsaw rolled into the front corner of my shop, just behind the tablesaw. It is close enough to the doors that I am able to roll it out and use the open doorway as outfeed space as needed. But this is only in a pinch. For most of my woodworking—chairs, small tables and chests of drawers—the bandsaw has plenty of room just where it is.

This arrangement took care of the major stationary tools, and I still had two long walls for the chopsaw station and the workbench. I ended up designing and building a modular chopsaw station that houses not only my chopsaw but also my drill press and grinder. It holds a bank of ready-made drawers and leaves a few cubbyholes in back to store routers and such.

Using the tablesaw's outfeed table as storage for power tools gives me plenty of open floor space, while exposed rafters work

HAVE WHEELS, WILL TRAVEL

Buy a mobile base. *Storing the bandsaw and jointer on mobile bases allows Teague to pull them out into the open when he has to handle especially long stock.*

Or make one yourself. *Teague's planer base is nothing more than an MDF box with locking casters screwed to the bottom, and it includes shelves as well.*

well as lumber racks. Once the major machines were in place, the rest of the shop almost designed itself.

Condensed work areas

One key to working in a small shop is to condense your workspaces for both economy and ease. I wound up building units out of medium-density fiberboard (MDF) to handle tablesaw outfeed, as well as my chopsaw, grinder and drill press.

While I would have loved a nice, long tablesaw-outfeed table that could handle large sheet goods, there was hardly room. When working with plywood or MDF, I cut the sheets to rough size with a circular saw in my driveway, then trim them at the tablesaw. Ninety-nine percent of the time, the 2-ft.-wide outfeed table provides all of the support I need for the tablesaw. And if I'm cutting large sheet goods, the workbench is positioned to serve as outfeed support. But I had to get more out of the outfeed table than just outfeed support—I needed a place to store handheld power tools and to serve as another work surface for assembly and other tasks.

The outfeed table is a heavy setup, but I needed the heft to make it sturdy. I assembled the table with knockdown fasteners so that the whole workstation could be disassembled for easy transport when I move. I installed a 1-in.-thick MDF top and covered it with a few coats of shellac—not only does the shellac provide a moisture barrier, but it also makes the MDF less prone to scratches. Four 4-in. lag bolts serve as levelers, making it easy to bring the outfeed table flush to the tablesaw.

It would have been nice to have a sliding compound-miter saw, a floor-standing drill press and a permanent grinding station that was always ready to go, but working in a small shop meant I had to accept some sacrifices. And because I was working on a budget, I couldn't upgrade all of my tools—not to mention that my tools had always worked well for me.

After a bit of head scratching, I devised a way to combine my chopsaw, drill press and grinder into one workstation that takes up only a small footprint and works smoothly. I didn't work out all of the dimensions ahead of time; I just built it box by box, sized to fit each tool. Almost accidentally, it worked out better than I'd hoped. Because it's built as a modular unit, the workstation is extremely flexible. Should I replace any of my current tools, I simply can change out one of the units and replace it with a new and correctly proportioned carcase.

Well-organized storage

The bank of drawers on my chopsaw station provides more than 30 sq. ft. of storage space. I ordered premade metal drawers (around $4 apiece) from Lee Valley (800-267-8735; www.leevalley.com). Installation was simple. All I had to do was build a box and run sawkerfs every 1¼ in.; the 1-in. and 2-in.-deep drawers slide into place and can be rearranged however I like. The drawer-box carcase became the basis around which I built my chopsaw stand.

One of the best parts of working for this magazine is that I get to visit the best workshops in the world, and the good ideas I see are

ONE TABLE, MANY USES

The outfeed table not only provides support for the tablesaw, but it also stores power tools and other materials. The shop vacuum can be used for dust collection at the tablesaw. The 1-in.-thick MDF top also serves as a sturdy work surface for assembly. Lag bolts in the base make it easy to level the table.

Condense workspaces. *A router table that mounts on the left side of the tablesaw saves valuable floor space and still leaves plenty of room for moving around.*

Making it work. *A well-planned space—even if it's small—allows plenty of room for building furniture. Here, Teague works on a set of cherry dining chairs.*

abundant. While visiting Tony O'Malley, a woodworker in Emmaus, Pa., I was struck by the efficiency and cleverness of his storage space. He had built storage units all around the top of his shop wall similar to the MDF units I had installed above my bandsaw, jointer and chopsaw station.

I built them using an ultralight MDF rather than the weightier MDF of my outfeed table—the weight helps in that situation, but it isn't necessary on the wall. The light stuff is also much more pleasant to use. As O'Malley did on his shelves, I ran dadoes in the top and bottom to make the storage units adjustable and adaptable: By rearranging the ¼-in.-thick dividers, I can design separate cubbyholes for each tool.

Above both the chopsaw station and jointer, I screwed simple plywood shelves to the wall. The shelves hold screws, router and drill bits and help keep everything organized. Staying organized is key to working in any shop—I hate floundering around a sloppy space trying to locate a bit or a tool. And for space reasons, organization is even more important in a small shop. I used watchmaker's cases from Lee Valley to hold screws and other hardware (see the top right photo on p. 46). With just a glance, I can find what I'm looking for.

Watch it on the web

For a shop tour and more storage ideas, go to www.finewoodworking.com.

Where MDF falls short

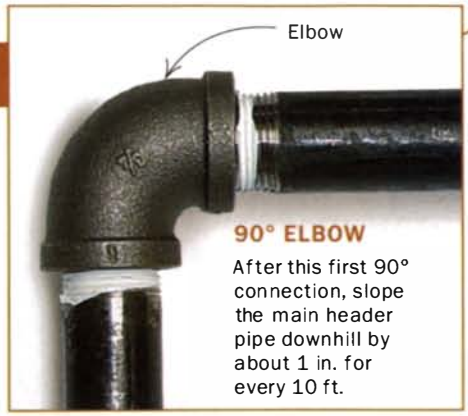
I was bent on using quick methods and economical materials, but when it came to my workbench, it was hard to accept compromise. I recently inherited an old workbench top from a friend, who had inherited it from another friend, who'd been given the bench by a boatbuilding pal many years ago. It is exactly the kind of workbench that makes you want to be a woodworker—an end vise, a front vise, a tail vise and a heavy maple top scarred with history. I built a maple base for it and installed the same drawer boxes I'd used on an earlier bench. I don't think I could sleep at night if I stored my favorite chisels and planes in an MDF box above the bench. Instead, I made a simple cherry wall unit with two box doors. I picked my favorite and most necessary hand tools and outfitted the box with custom tool holders. It was quick work, but the unit serves all of my needs.

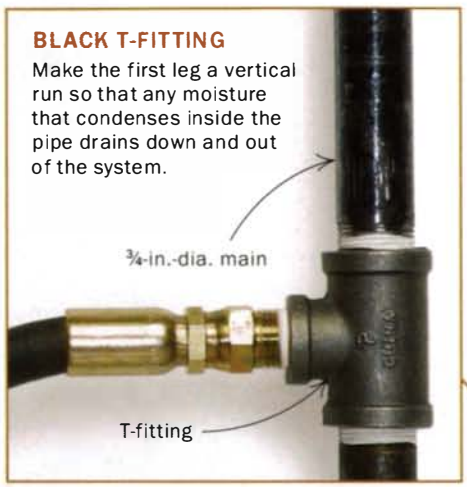
Though the garage required a fair amount of renovation, the shop came together quickly and works better than I ever would have imagined. A good workshop should be simple and sensible but designed with an eye toward efficiency. A sensible shop makes you work better and smarter. The best part is that when I move, the shop can be disassembled to move with me. □

Matthew Teague is managing editor.

NAME THAT FITTING

When you shop for plumbing supplies, have in hand a sketch of the system you're building and a parts list of every length of pipe and fitting required. Knowing the right names for fittings ensures that you'll get what you need.





Plumbing a Shop for Air

A simple system puts access to air where you need it and ends the hassle of tangled hoses

BY ROLAND JOHNSON

I've used compressed air in my shop for more than 20 years. Originally, I bought a compressor for a spray gun and an air-powered sander, but over the years I've added brad and finish nailers, a vacuum-bag veneer press, vacuum clamps, drills and routers. Compressed air, like electricity, is a wonderful source of power.

But many compressed-air systems are inadequate. A good one will supply an ample volume of air at a consistent pressure, free of moisture and particulate matter. With the right design, even a small compressed-air system can be effective, efficient and clean. The diameter and length of the pipe that you use affect the pressure and volume of air it will deliver. You need larger diameters for longer runs to avoid drastic pressure drops in the system. Compressor manufacturers are a great planning resource and offer free charts and tables that you can use to size a system for your shop.

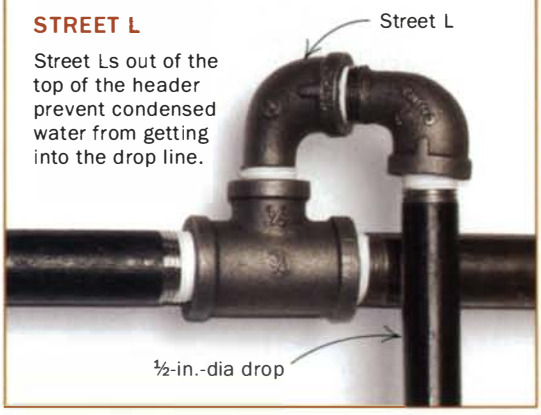
Iron pipe works best

A number of different kinds of pipe will work well to distribute compressed air inside a

Photos, except where noted: Kathleen Williams

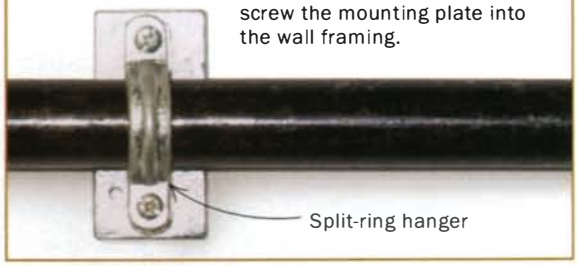
STREET L

Street Ls out of the top of the header prevent condensed water from getting into the drop line.



SPLIT-RING PIPE HANGER

The split-ring hanger is fairly easy to assemble and take apart. For a strong connection, screw the mounting plate into the wall framing.



UNION

Unions minimize the hassle of adding or removing parts to a system.

shop. Copper pipe is relatively inexpensive, but its main drawback is that it requires a plumber's talent for sweating joints, and you need a torch to do that. In new construction this may be less of a hazard, but in older shops, sawdust settled into hidden crevices can be a real danger. I would never use rigid PVC because a sharp blow from the edge of a board could cause it to rupture and send shrapnel flying.

I chose black iron pipe (¾ in. dia. for the main header pipe and ½ in. dia. for the relatively short drops) because it's the most durable and offers the most flexibility for any future changes to my system. You can buy precut and threaded lengths of pipe and all the necessary fittings at most hardware and home stores. I bor-

UNFILTERED AIR

Unfiltered air is usually fine to use with blow guns and tire-inflation chucks.

FILTERED AIR

Use the filtered line where you need it most for pneumatic tools and spray finishing guns. Filtered air will extend the life of these tools.

Spray gun

Filtered air: You don't need it for everything

At least one drop line off the main header pipe ought to be equipped with a filter and regulator. I use a Sharpe (800-742-7731) model 606A air-control unit that has a reusable filter and a water drain. Expensive desiccant driers can extract remaining moisture and oil droplets from the compressed air, but unless you're setting up a regulation spray booth, the driers are overkill.

Photos, this page and facing page (of air-powered tools): Erika Marks

rowed a pipe threader and bought bulk lengths of pipe. That way I could cut the pipe to the exact lengths I needed, and I saved money to boot. Adding a few strategically placed threaded couplers or T-fittings to the system makes an iron-pipe system easy to modify or add on to as needs dictate.

The system design is simple

A continuous-loop system, in which the pipe returns all the way back to the first drop line, is the best for keeping the pressure and volume consistent. But such a system would have required a lot more pipe than I had wanted to invest in, so I chose a system that dead ends, and it's been plenty adequate for my needs. Whichever design you choose, you can control moisture and particulate matter fairly easily.

Water runs downhill, so you can get rid of most of it by sloping the main header pipe away from the compressor, using gravity to your advantage. Install ball valves at the end of each vertical drop line off the main header for drainage, and use a filter where needed to eliminate any remaining moisture and particulate matter. A good maintenance practice of opening the ball valves daily and regularly draining the compressor tank will go a long way toward keeping the system dry and clean.

Start with a ball valve attached to the compressor tank that can instantly shut off the airflow from the tank to the system, and use a flexible hose (rubber, metal-clad or clear plastic) to connect the compressor to the first vertical length of pipe. The hose must be at least as large in diameter as the air outlet of the compressor. The flexible hose eliminates the transmission of vibrations that can cause undue noise and that could otherwise ultimately damage the piping system. Connect the flexible hose to the pipe with a T-fitting. From the T, one pipe extends up to meet the header that supplies air to all of the drops, and a second pipe extends down to another ball valve that is used to drain moisture from the system. Locate the main header pipe as close to the ceiling as possible.

Install T-fittings in the header wherever you need a drop line to bring the air down from the header to where it will be easy to access with a quick-connect hose coupler. To minimize moisture getting into the drop lines, come out of the top of the T-fitting in the header by using two street Ls that create a 180° turn. Add another T-fitting in the drop to tap the air at a convenient height off the floor where you need it, and install a ball valve in that horizontal air supply so that you can shut off the air to that service without disrupting airflow to the rest of the system.

Add filter/regulators where you need them

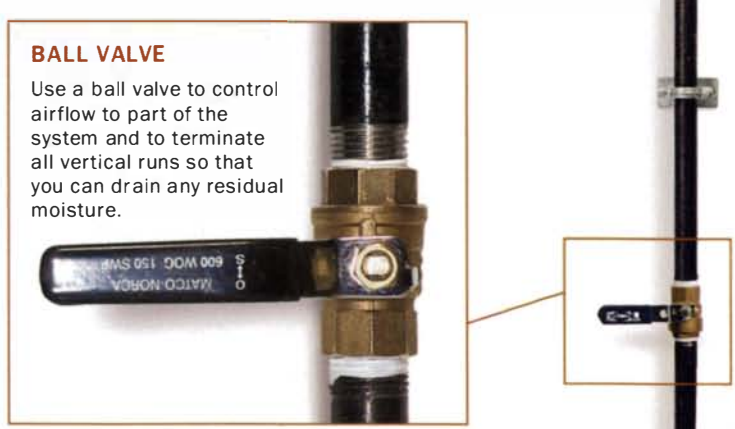
For most shops, a relatively inexpensive combination filter and regulator is all you need for clean, dry air. I use a unit that has a reusable filter and a water drain (facing page).

You also can add an oiler to a dedicated air drop line if you use that line to run only tools that need to be oiled regularly, but I would advise against it. For one thing, it would be easy to contaminate a hose or a spray gun accidentally if it were inadvertently hooked up to this line. Also, for most tools that need oil, it's enough to add a few drops directly into each tool as you use it. □

Roland Johnson builds cabinets, restores old cars and tinkers with his tractor on a farm in central Minnesota.

BALL VALVE

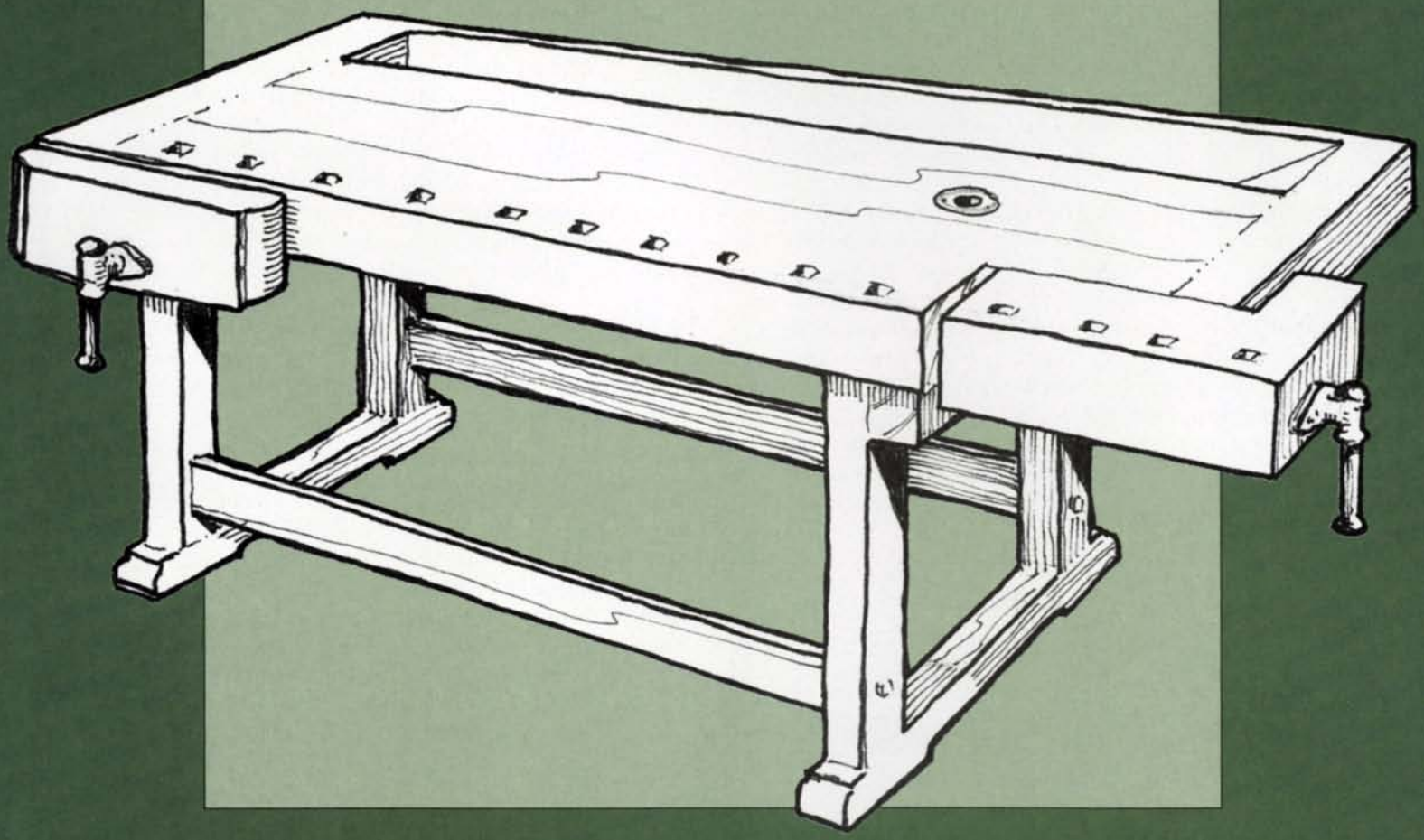
Use a ball valve to control airflow to part of the system and to terminate all vertical runs so that you can drain any residual moisture.



The Workbench

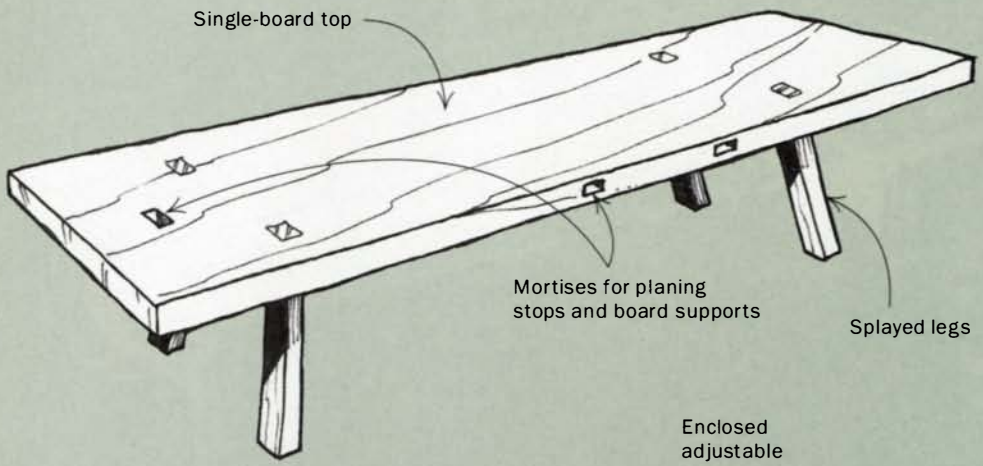
An illustrated guide to an essential woodworking tool

BY GRAHAM BLACKBURN



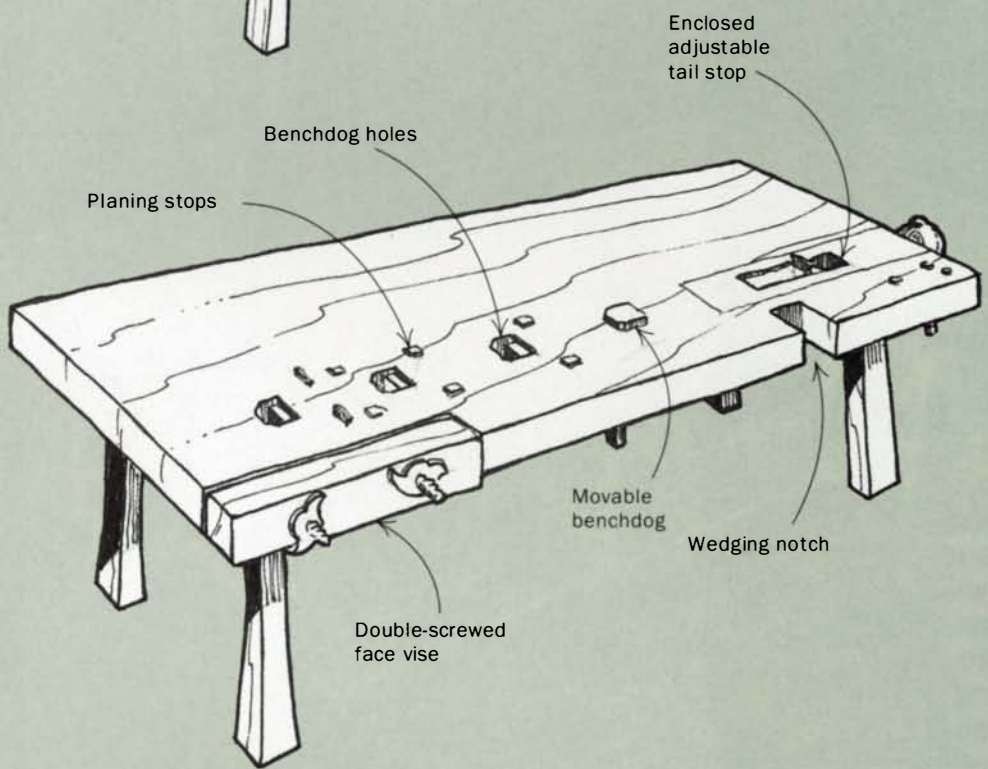
In some parts of the world, woodworkers use the floor as their work surface. In Japan, it's a narrow beam. But in the West, woodworkers traditionally have used a substantial workbench. In fact, before tablesaws and routers became for most woodworkers their right and left hands, the workbench was the most important tool of the craft. While it may no longer be the first tool a woodworker encounters in the shop, the workbench nevertheless remains at the heart of woodworking. A closer appreciation of its uses and strengths can do much to improve your woodworking experience, so here's a look at the development of the workbench, its major variations and the many practical fixtures associated with its use.

Great moments in workbench history



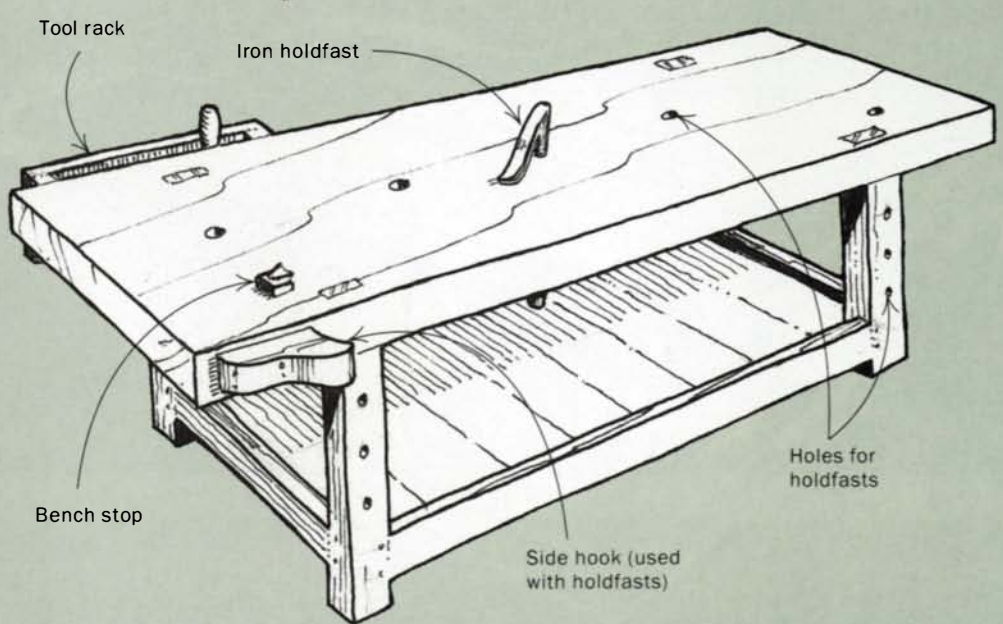
ROMAN BENCH

The prime purpose of the workbench is to facilitate the flattening and smoothing of stock, typically by planing. So it is no surprise that some of the earliest benches were used by the Romans 2,000 years ago, because it was the Romans who first made use of the metal-bodied plane. The Roman bench was little more than a long board supported by splayed legs and fitted with stops to prevent a board from being pushed off the bench during planing. This bench remained popular for more than four centuries after the demise of the Roman Empire and in some areas persists even today. The drawing is based on a photograph of a bench found in Saalburg, Germany, 250 B.C.



16TH-CENTURY BENCH

After the Middle Ages, with the development of more sophisticated forms of furniture, benches grew larger and began to feature additional holding devices. By the 17th century, vises had become common in Northern Europe. German and Scandinavian benches, in particular, were fitted with vises very similar to the large wooden tail and face vises that were common on British benches until the introduction of metal vises. The drawing is based on one by Loffelholz, 1505.



18TH-CENTURY FRENCH BENCH

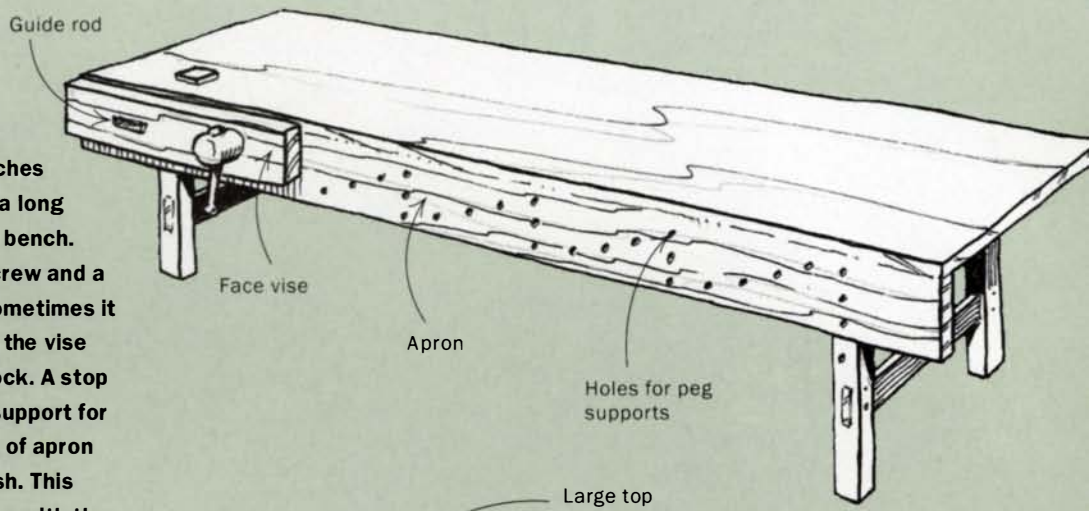
One of the more distinctive varieties, the commonly used French bench was basically a heavy table that featured a tool rack, bench stops, side hooks and holdfasts to secure the work; vises were a rarity.

Drawings: Graham Blackburn

Workbench history (continued)

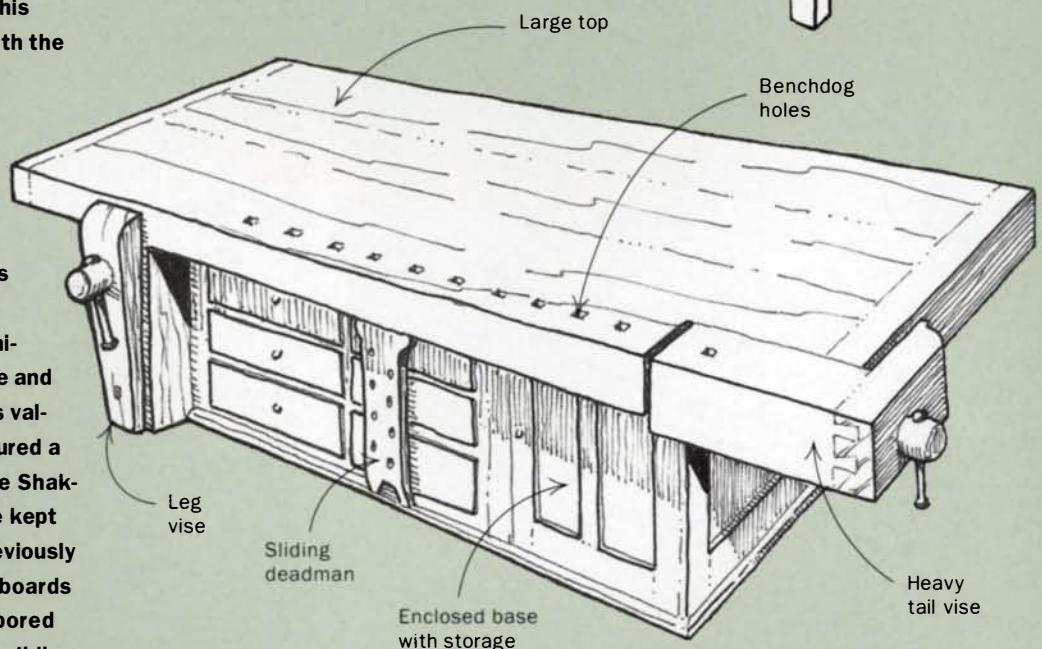
18TH-CENTURY BRITISH BENCH

In contrast to French benches and to most other European types, British benches from the 18th century relied heavily on a long face vise installed at the left end of the bench. This long vise frequently had a single screw and a guide rod to help keep it parallel, but sometimes it possessed two screws arranged so that the vise face could be angled for nonparallel stock. A stop and a holdfast also were common, but support for long boards held in the vise, in the form of apron pegs or a deadman, was distinctly British. This British-style bench emigrated to America with the early Colonists.



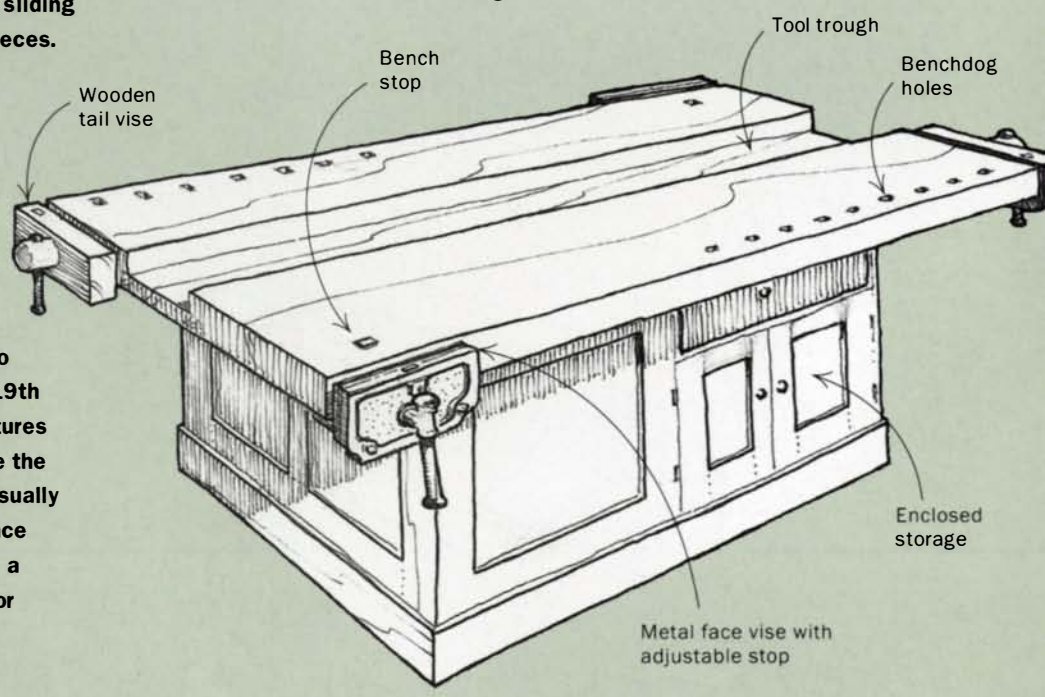
SHAKER BENCH

Among the first distinctly American benches were those built by the Shakers, a religious sect famous for its simple but well-built furniture. Shaker benches typically were massive and without tool trays, and because the Shakers valued order and neatness, their benches featured a base that was fully enclosed for storage. The Shakers also were fond of leg vises that could be kept parallel, unlike the garterless face vises previously common on workbenches. Because the cupboards and drawers in the base made the use of a bored apron impossible, the Shakers often used a sliding deadman to provide support for long workpieces.



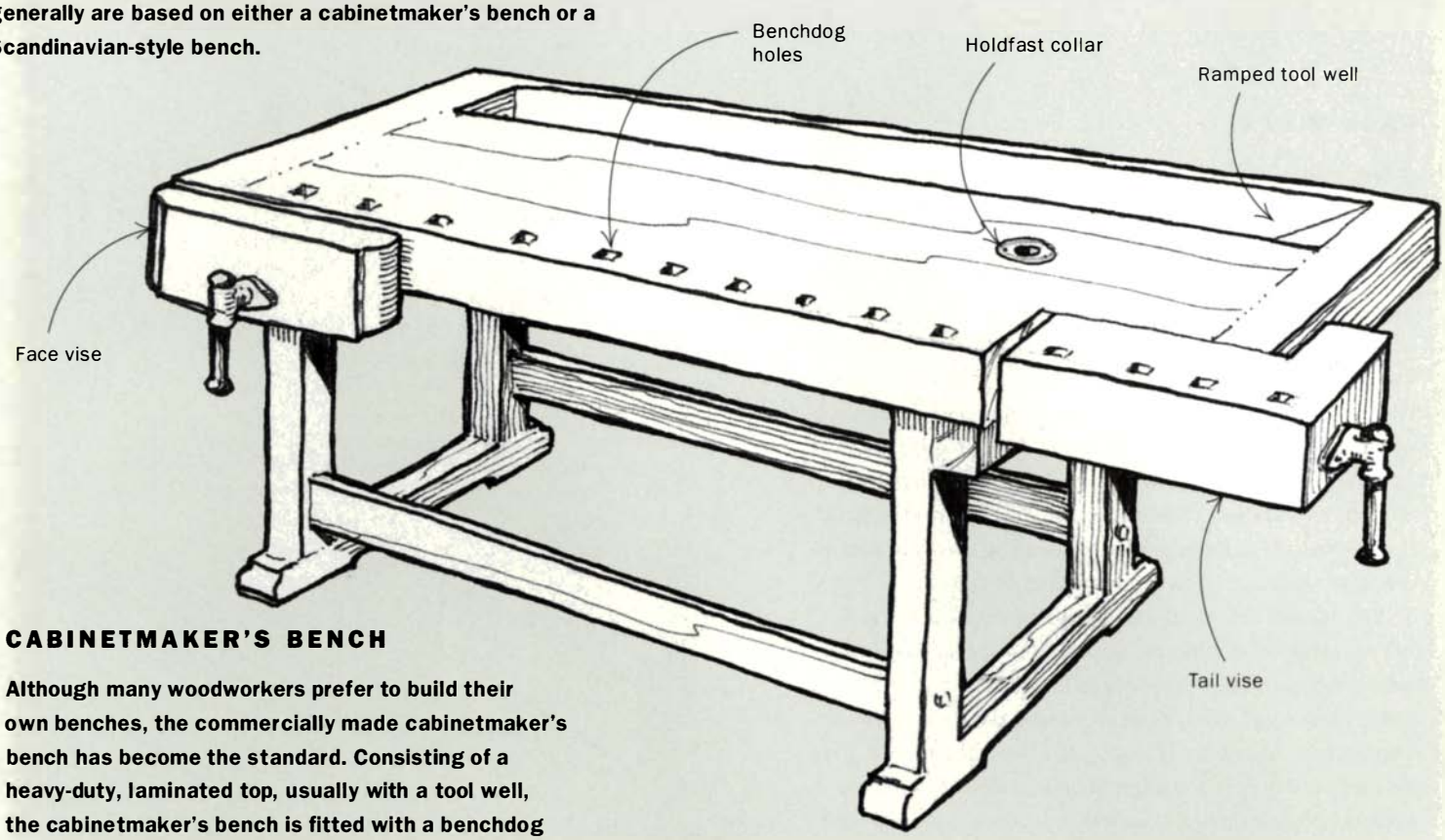
19TH-CENTURY SCHOOL BENCH

The workbenches we use today owe much to the school bench that was common in the 19th and early 20th centuries. The essential features of this bench, whether single or double (like the one illustrated), are a large work surface, usually with a trough or a tool well, both end and face vises (increasingly of the metal variety) and a system of benchdog holes in the top used for clamping workpleces.



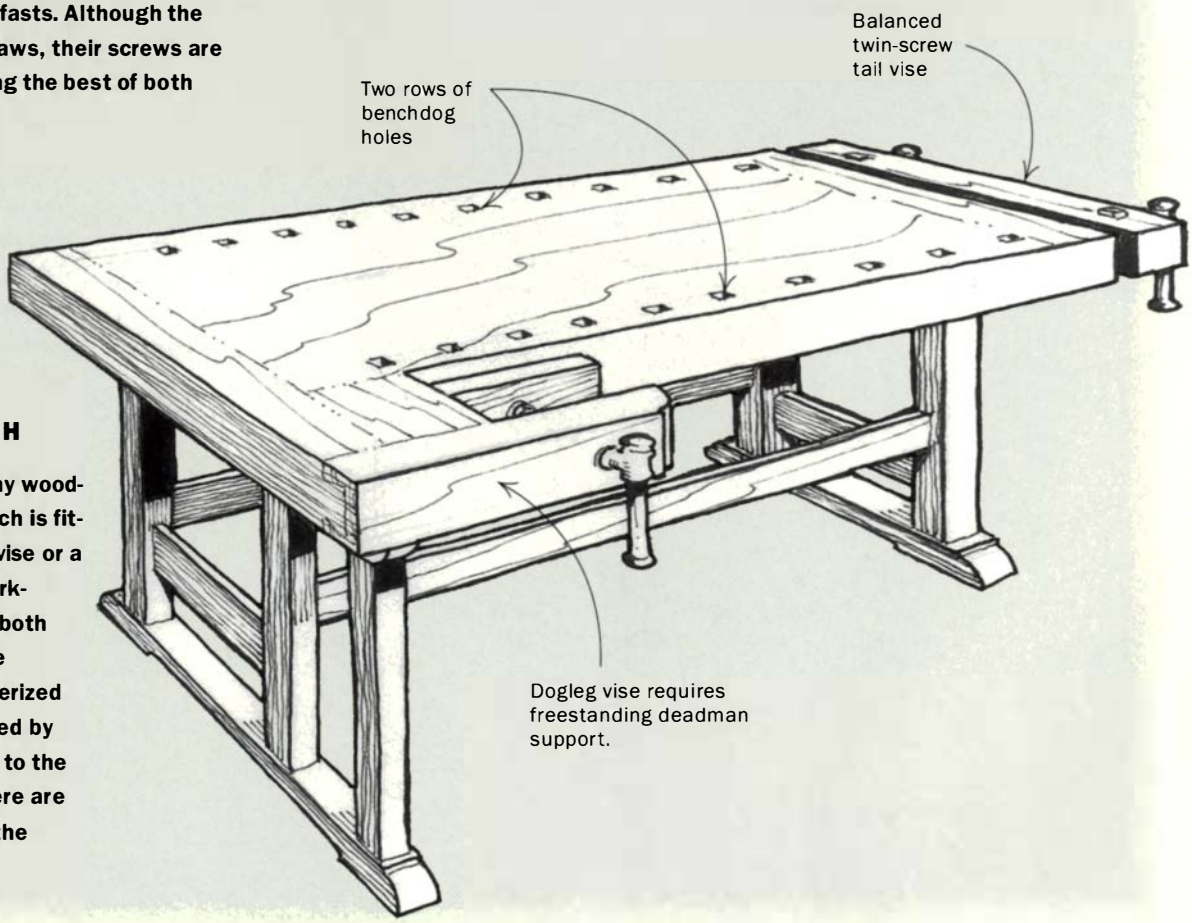
CONTEMPORARY BENCHES

Though there are countless variations, today's workbenches generally are based on either a cabinetmaker's bench or a Scandinavian-style bench.



CABINETMAKER'S BENCH

Although many woodworkers prefer to build their own benches, the commercially made cabinetmaker's bench has become the standard. Consisting of a heavy-duty, laminated top, usually with a tool well, the cabinetmaker's bench is fitted with a benchdog system and a provision for holdfasts. Although the vises may have heavy wooden jaws, their screws are invariably metal, thus combining the best of both old and new.



SCANDINAVIAN BENCH

A bench style popular with many woodworkers, the Scandinavian bench is fitted with either a standard tail vise or a balanced vise that can hold workpieces between benchdogs on both edges of the top, as shown. The Scandinavian bench is characterized by a dogleg face vise, considered by those who use it to be superior to the standard face vise because there are no screws to get in the way of the workpiece.

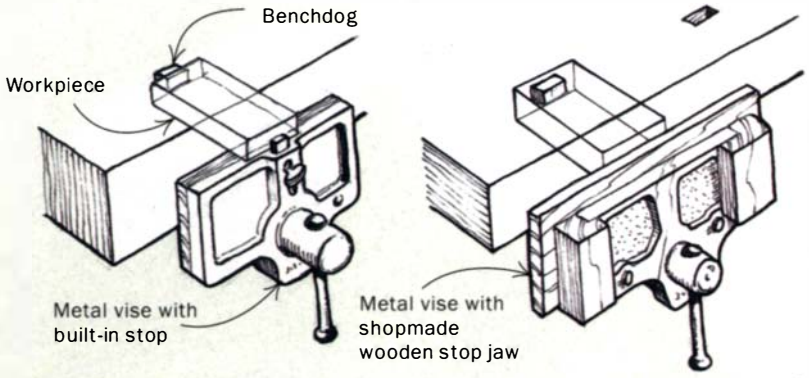
Vises

Most contemporary benches are fitted with vises. While there are many varieties, certain things remain true for all vises. If the workpiece is to be held securely without being damaged, the jaws should be wooden or wood lined, clean, aligned and parallel.

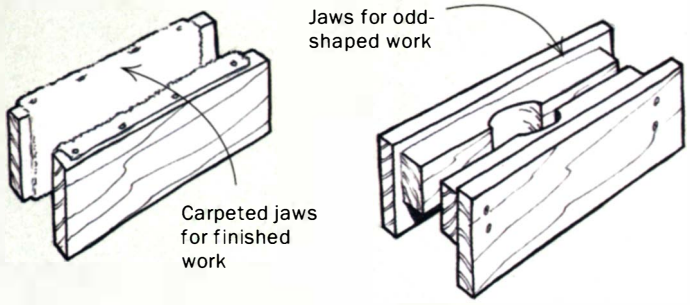
FACE VISES

A face vise is used for holding workpieces during planing. It works best if the inside faces of the jaws are flush with the front of the bench and if the tops of both jaws are flush with the surface of the bench. Although there will be occasions when you want to secure odd shapes (which can be done easily with purpose-made auxiliary jaws), the jaws should close perfectly parallel to each other so that they will hold even a thin sheet of paper firmly. Metal vises may need to be reset on the bench to meet these conditions, and they also may need to have their wood facings replaced. Wooden-jaw vises can be made flush more easily. But before altering the jaws, examine the way your particular vise works and how it is attached to the bench.

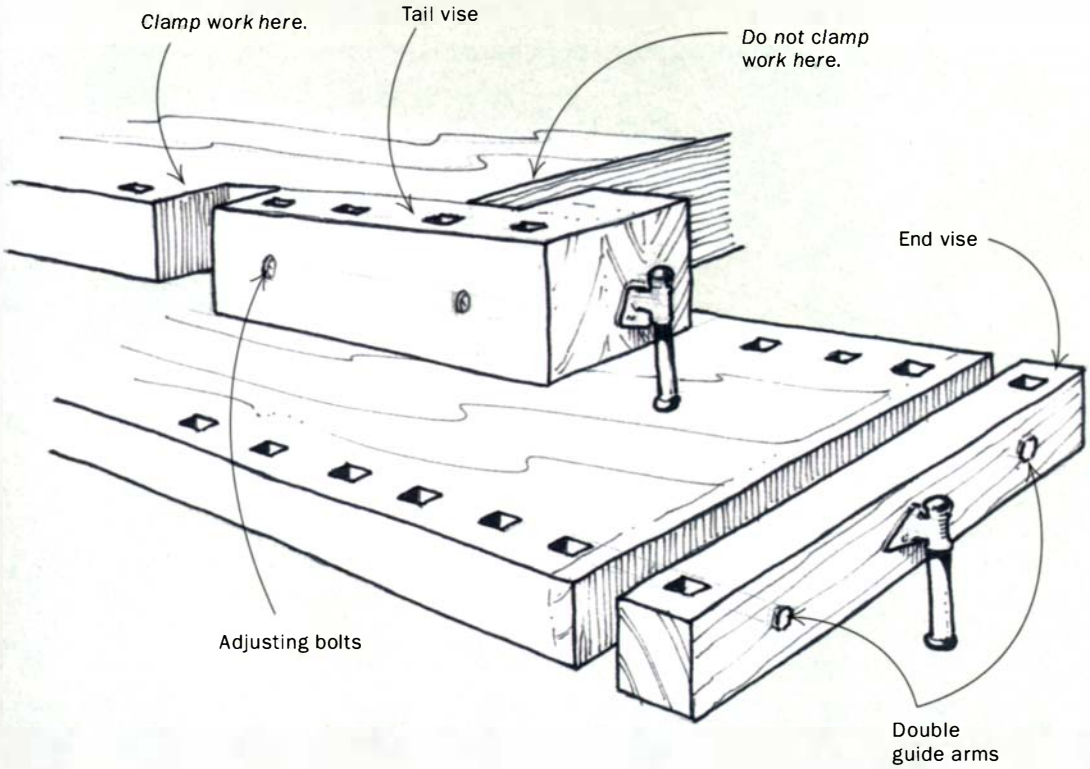
Pay special attention to making sure the guide arms run smoothly with minimal play. Older wooden vises may need their guide arms resecured to the jaws and their guide blocks adjusted. Wooden screws depend on well-fitting garters and properly positioned threaded blocks. Providing they are properly aligned, newer vises with metal screws and guide arms have fewer problems and may need nothing more than occasional cleaning and lubrication.



Some metal vises have built-in adjustable stops that can be used to clamp work between a benchdog and a stop in the benchtop. Vises that don't have adjustable stops can be fitted with a wooden stop jaw that will perform the same function or that can be custom-cut to hold other shapes.



You may want to make various auxiliary jaws, such as carpeted jaws to hold finished work or jaws to hold round and odd-shaped pieces.

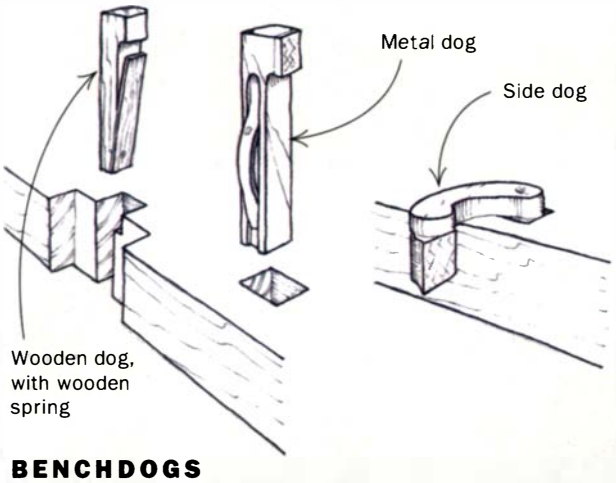


TAIL VISES

A tail vise holds a workpiece at the front of the bench. Newer tail vises that ride on a steel plate fixed to the bench can be adjusted so that the top and front of the vise remain flush with the top and front of the bench. Older tail vises ride on rails attached beneath the benchtop. Neither kind is designed to hold anything by the tail of the vise; doing so might misalign the vise. However, double-screwed end vises or end vises with a single screw and widely spaced guide arms can hold work against the end of the bench and, if they are as wide as the bench, can be fitted with benchdogs. A tail vise also can be used to clamp workpieces between a benchdog fixed in the benchtop and a dog fixed in the vise itself.

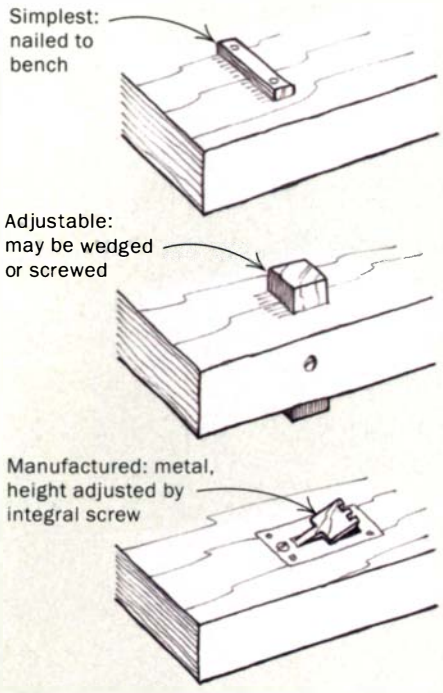
Bench accessories

A bench with vises, even when everything is in top condition and perfectly adjusted, is still only half the asset it might be—unless it's furnished with a variety of devices, such as benchdogs, holdfasts and bench hooks



BENCHDOGS

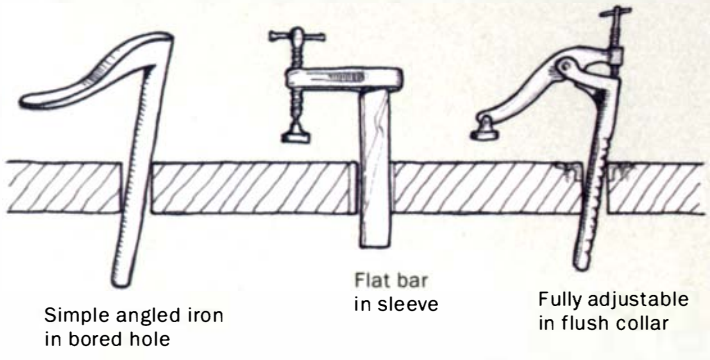
Metal dogs may last longer and fit better, but wooden dogs are easier to make and pose less of a threat to both tools and finished work surfaces. Side dogs also can be extremely useful for holding stock against the front apron.



BENCH STOPS

A bench stop is designed to prevent the workpiece from being pushed off the bench. In its simplest form, it may be a small piece of scrap clamped or tacked anywhere on the bench. An integral stop, whether a simple wooden stop held in place and at the right height by friction, wedge or a simple screw, or one of the variously designed factory-made metal stops, is more convenient and often functions as the last stop in a line of benchdogs.

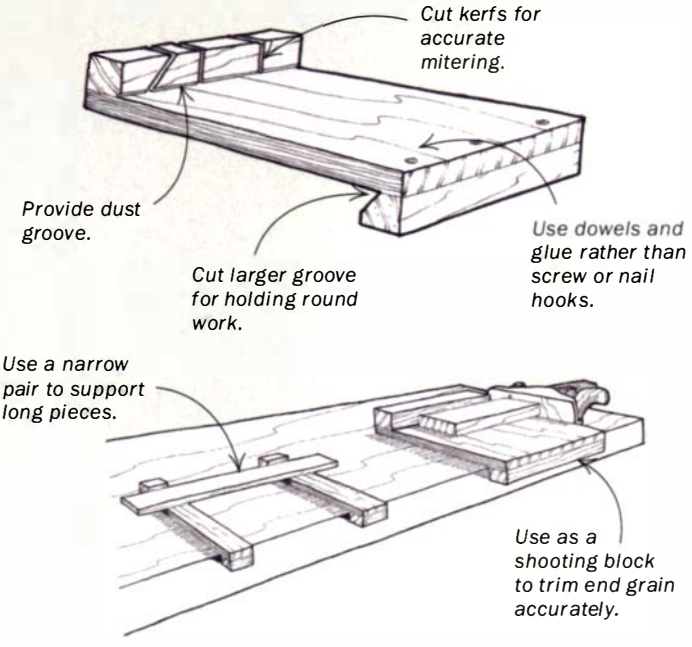
HOLDFASTS



A holdfast remains one of the most versatile pieces of equipment you can own. There are various modern forms available, but the simplest L-shaped iron bar inserted in any conveniently bored hole in the benchtop is efficient. Simply knock the top of the holdfast to secure the workpiece, and hit the back of the holdfast to release the workpiece. A holdfast's two main advantages are its ability to hold odd-shaped, flat and rectangular pieces, and the fact that it can be positioned anywhere on the bench. Don't agonize over where to bore the first hole—you inevitably will need to bore another hole somewhere else. A particularly useful place is near a vise so that the vise and holdfast can be used together in a variety of ways. Older benches typically were bored in various places along the length.

BENCH HOOKS

The most common device for securing small workpieces to the bench is the bench hook. This can be made in a variety of ways and may function as a simple sawing support, a sawing guide when kerfed exactly at 90°, 45° or any other simple or compound angle, or as a convenient end-grain shooting block.



Low-Cost Shop Floor

Plywood laid over 2x4 sleepers makes a concrete floor easier on your body and tools

BY SCOTT GIBSON

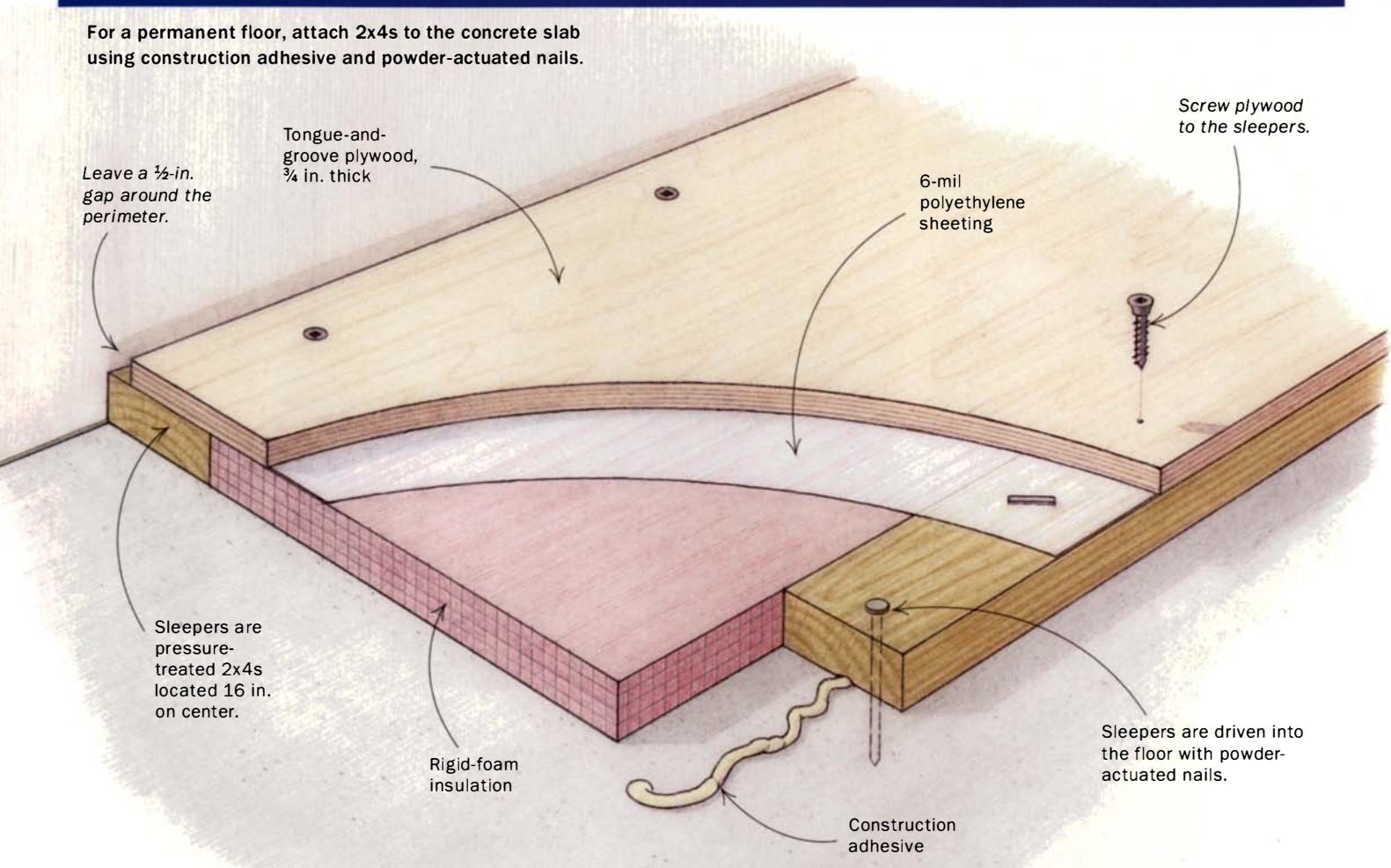
Many a shop is a converted two-car garage built on a concrete slab. I'll say this much for concrete: It's easy to sweep clean. It's also unforgiving. By mid-afternoon, feet hurt. By evening, a dull ache creeps up the back. Tools can be damaged if they're dropped on concrete. And in cold climates, concrete can be a heat sink.

One solution is to install a wood floor directly over the concrete. A wood surface is easier on your feet as well as any tools that roll off the bench. There are other advantages. Electric cable can be routed beneath the floor to power equipment located away from walls. Stationary tools, workbenches and other fixtures can be screwed down easily. If there is enough headroom, a wood floor can be raised enough to locate dust-collection ducts below. And the cost of material for covering a concrete floor with wood is minimal—about $1.60 per square foot.

Photos: Tim Sams

PLYWOOD FLOOR OVER CONCRETE SLAB

For a permanent floor, attach 2x4s to the concrete slab using construction adhesive and powder-actuated nails.



However, if a wood floor is going to drop the ceiling height to less than 8 ft., I'd think twice about adding one. But a floor consisting of 2x4 sleepers and ¾-in.-thick plywood is only 2¼ in. thick.

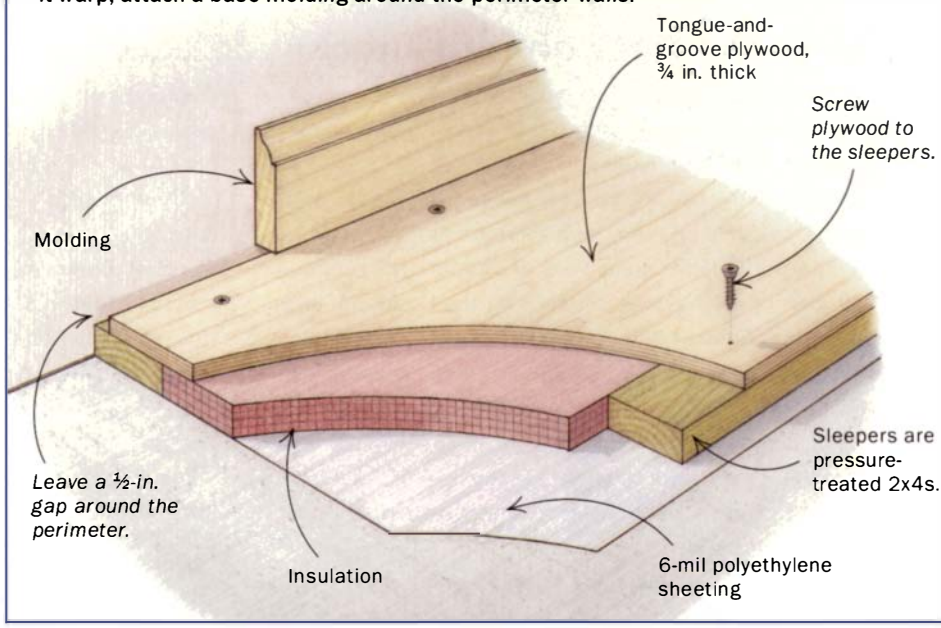
Lay out the sleepers first

Because the sleepers will be in direct contact with concrete (for a permanent floor), they should be pressure-treated material rated for ground contact. Concrete can absorb water like a sponge, and untreated wood not only decays, but it also invites carpenter ants and termites.

Don't forget to wear eye and lung protection when cutting pressure-treated wood and to wear gloves when handling it (splinters are nasty). Even though damp concrete won't degrade pressure-treated material for a very long time, really serious water problems should be cured before the new floor goes down. In a basement shop, that may mean cutting a trench at the perimeter of the room and installing a sub-

TEMPORARY FLOOR

For a removable floor, leave out the adhesive and fasteners, and place the polyethylene sheeting directly on the concrete. To keep the floor from lifting should it warp, attach a base molding around the perimeter walls.



Drawings: Vince Babak

GLUE AND NAIL THE SLEEPERS

Construction adhesive and nails provide added holding power. *Lay a bead of glue under each sleeper, then nail it to the concrete using a powder-actuated driver.*

surface drain system and sump pump. Better to do that now.

Sleepers are laid flat, not on edge, over the concrete. They should be spaced 16 in. on center so that the long edges of the plywood always fall on solid wood (see the drawings on p. 61). An easy way to get the layout right is to snap chalklines on the concrete to mark the edge of each 2x4. Snap the first line 14¾ in. from the wall, then add 16 in. to each successive line. Sleepers will span minor gaps and voids in the concrete, but serious dips should be filled before installing the floor. Be sure to use a cold chisel to knock off any obstructions that would prevent the sleepers from lying flat.

Once all of the sleepers have been cut to size, place them on or near the layout lines. Then, starting at one end of the room, pick up a sleeper and lay a fat bead of construction adhesive on the floor where the center of the sleeper will fall. Press the sleeper into place. Adhesive alone should hold down the 2x4s, but I recommend using powder-actuated nails, which will ensure that the wood is secure. Powder-actuated nails are inexpensive, and you can find them at a

Concrete: The floor of hard knocks

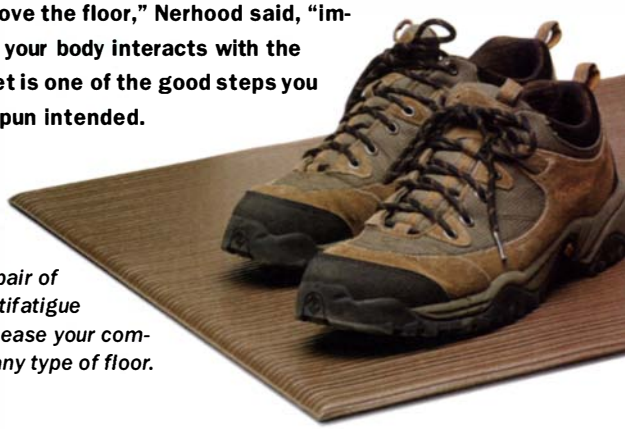
Industrial ergonomists—specialists who look for ways to make the workplace more user-friendly—would rather see you work on almost any surface other than plain concrete.

"Concrete floors are a very hard, very dense material. As a result, if you have to stand on them for any length of time, most likely you're going to experience some level of discomfort," said Rob Nerhood, director of consultative services for the NC Ergonomics Resource Center in Raleigh, N.C.

Dan MacLeod, a consultant in ergonomics in Milford, Pa., said standing on hard surfaces can result in a variety of ailments, including fatigue, stress on the spinal column and heel spurs. "The latter is more or less a type of tendinitis of the heel," he said, "the symptoms for which are sore heels, particularly in the morning when you first get out of bed."

Adding a floor of 2x4 sleepers and plywood over a concrete slab does provide some relief. But consider also using antifatigue mats. Nerhood said the goal is to provide a material that can be compressed, even slightly, as a buffer between a worker's feet and a hard floor.

Don't overlook your work shoes, either. Insoles can wear out long before the outside of a shoe shows much wear and tear. "If you can't improve the floor," Nerhood said, "improving where your body interacts with the floor at the feet is one of the good steps you can take." No pun intended.



The cure for sore feet. *A comfortable pair of shoes and antifatigue mats will increase your comfort level on any type of floor.*

local hardware store. Don't, however, skip the adhesive and rely on powder-actuated fasteners alone. Over time, the floor can wiggle loose. Because the adhesive starts to dry quickly, glue down one sleeper at a time. Remember to leave a ½-in. gap between the walls and perimeter sleepers. In a cold climate, a layer of rigid-foam insulation cut to fit snugly between the 2x4s helps keep out the chill.

Follow with plastic sheeting and plywood

Once the 2x4s have been anchored to the floor, they should be covered with a layer of 6-mil polyethylene sheeting. The sheeting prevents moisture from migrating up through the floor and protects the plywood from damp air. Overlap any seams by 6 in. and tape them with housewrap tape. If the floor is not to be permanent, omit the adhesive and fasteners and allow the sleepers to float on the concrete. Lay the polyethylene directly over the concrete first, then lay the sleepers on top of the polyethylene (see the bottom drawing on p. 61).

Plywood is next. My first choice would be ¾-in.-thick tongue-and-groove, exterior-grade plywood, but you also can use oriented-strand board (OSB), which is less expensive. Arrange the sheets so that the seams are staggered. That is, start in one corner with a half sheet. On the next course, start with a full sheet. That way, the seams will be staggered 4 ft. apart. The plywood can be nailed to the sleepers, but screws allow you to remove and replace damaged plywood sheets easily. Fasten the plywood every 16 in. with either steel wood screws or drywall screws.

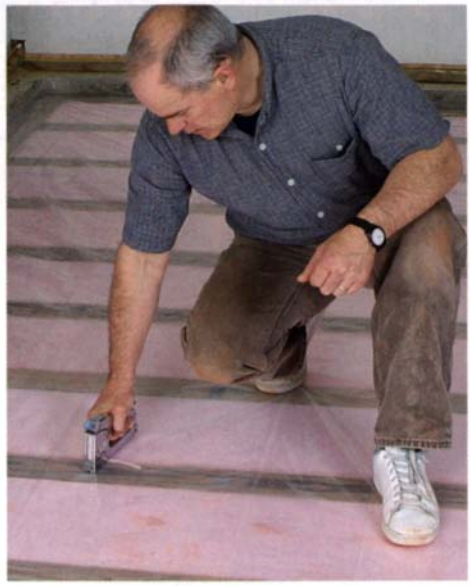
Although plywood is more dimensionally stable than solid wood, it's not a good idea to run the edge of the sheets right up to the wall. Leave a gap of ½ in. all the way around to give the plywood a little breathing room. You can cover the gap with a piece of baseboard or shoe molding.

Finishing the floor is a matter of personal preference. A coat or two of paint or clear finish will help protect the plywood from the inevitable coffee or paint spill. But for a shop, that may be more trouble than it's worth. Your feet, knees, ankles and back—as well as your edge tools—will be just as happy with an unfinished floor. □

Scott Gibson, a contributing editor to Fine Homebuilding, *lives in Maine.*

INSULATION, VAPOR BARRIER, THEN PLYWOOD

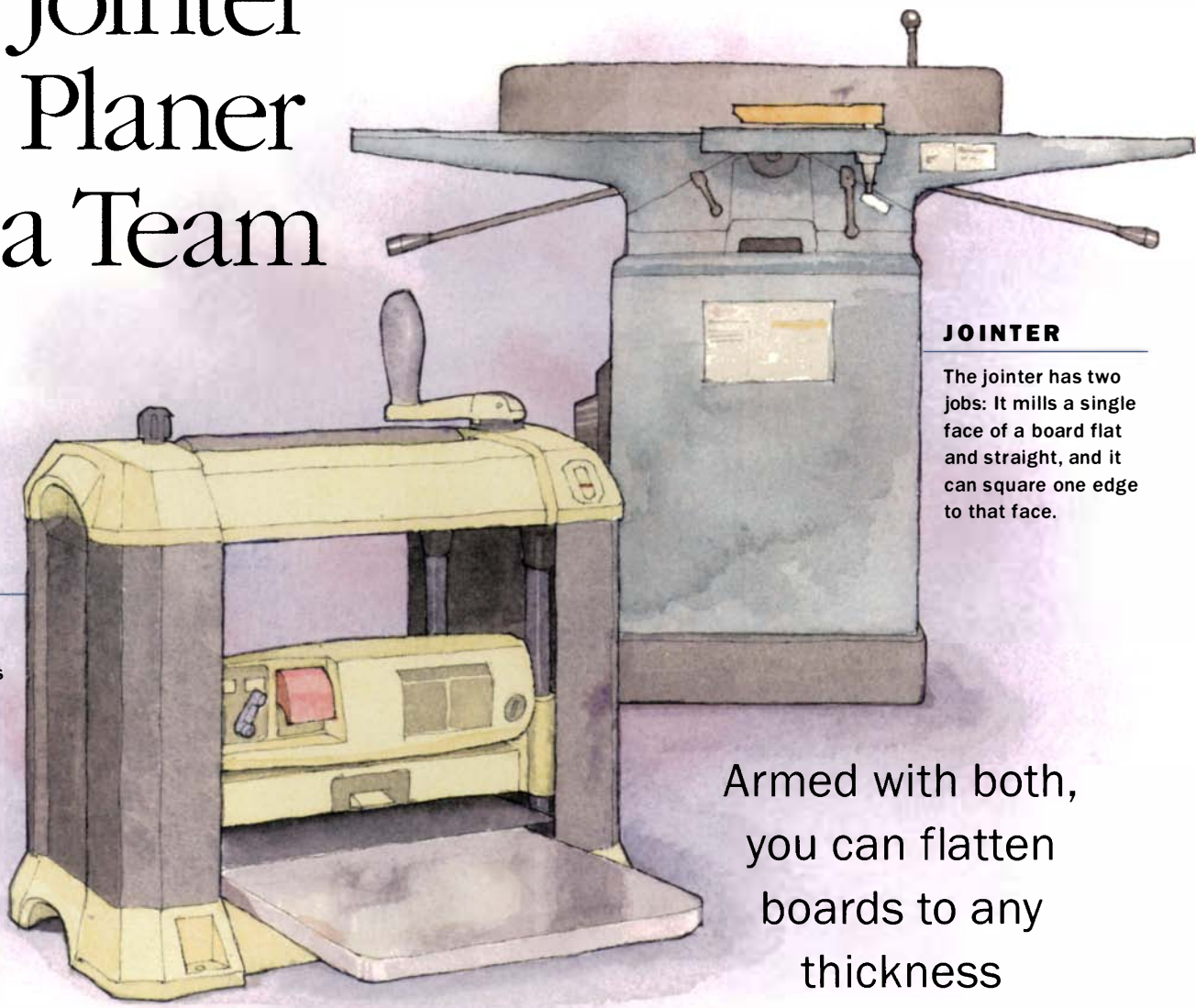
Insulation to keep your toes warm. *In colder climates, place rigid insulation between the rows of sleepers.*



Sheeting provides a vapor barrier. *Spread 6-mil. polyethylene sheeting across the top of the sleepers and insulation. Cover the whole space, and if you need more than one sheet, overlap seams by 6 in.*

Get the first piece right. *Take your time placing the first plywood sheet because all of the other pieces will follow its course. Be sure to leave a ½-in. gap at the walls around the perimeter to give the plywood some room to expand.*

The Jointer and Planer Are a Team



JOINTER

The jointer has two jobs: It mills a single face of a board flat and straight, and it can square one edge to that face.

PLANER

The planer is better described as a stock thicknesser. Its job is to plane one face parallel to another.

Armed with both, you can flatten boards to any thickness

BY GARY ROGOWSKI

My beginning students often ask me, "Which machine should I buy first, a planer or a jointer?" The answer is both. That's one reason why this *Tools & Shops* issue contains reviews of each machine. With a jointer alone, you can't get boards of consistent thickness. And with only a planer, you'll get consistent thickness, but your boards still can come out twisted or bowed.

Perhaps because of these machines' confusing names, many woodworkers don't grasp the separate functions they serve. The European names for these tools—planer (for jointer) and thicknesser (for planer)—are more accurate. The jointer planes a level surface, and the planer simply creates uniform thickness. Because of its American name, some woodworkers think the jointer is only for milling the edges of boards before glue-up.

Together, the two machines form the gateway to serious woodworking, allowing you to mill your own lumber to custom thicknesses instead of being stuck with the surfaced hardwoods available at the local home center. They also allow you to work with rough lumber, which is much less expensive than S2S (surfaced two sides) or S4S stock. Add a bandsaw or tablesaw, and you have the ability to dimension lumber to any width, thickness and length.

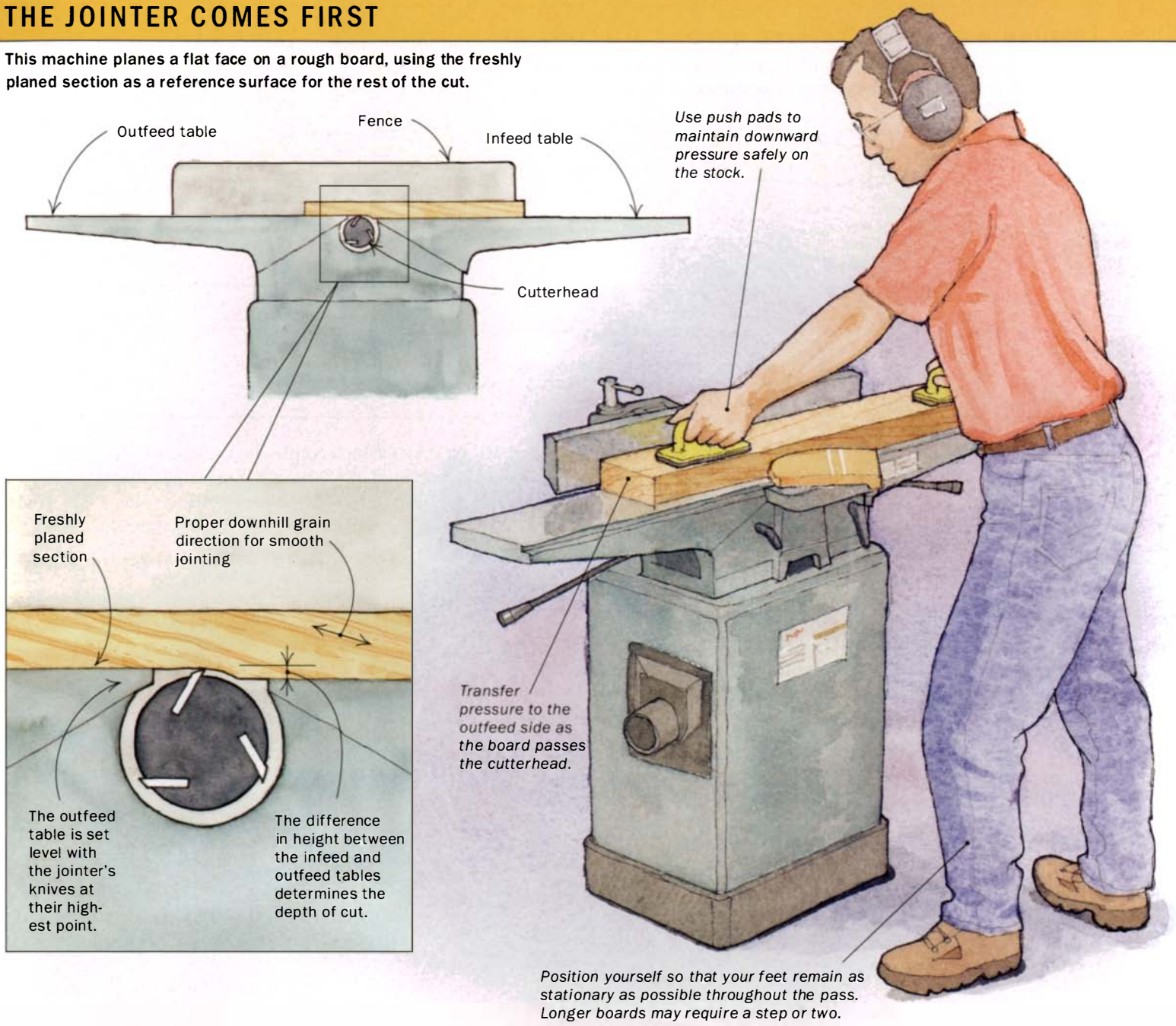
Thicknessing starts on the jointer

A jointer works like a handplane turned upside down, with its reference surfaces in line with its cutter knives. Use this tool for flattening one face of a board. If you flip over the board and joint the other side, there is no guarantee the faces will be parallel. On the jointer, each face is cut without referencing the other.

Start by roughing stock to size—Before jointing the first face, get your material roughed out to length and width. If a long or wide board is badly cupped or bowed, running it over a jointer until it's flat will waste a lot of wood. You also can rough out around board

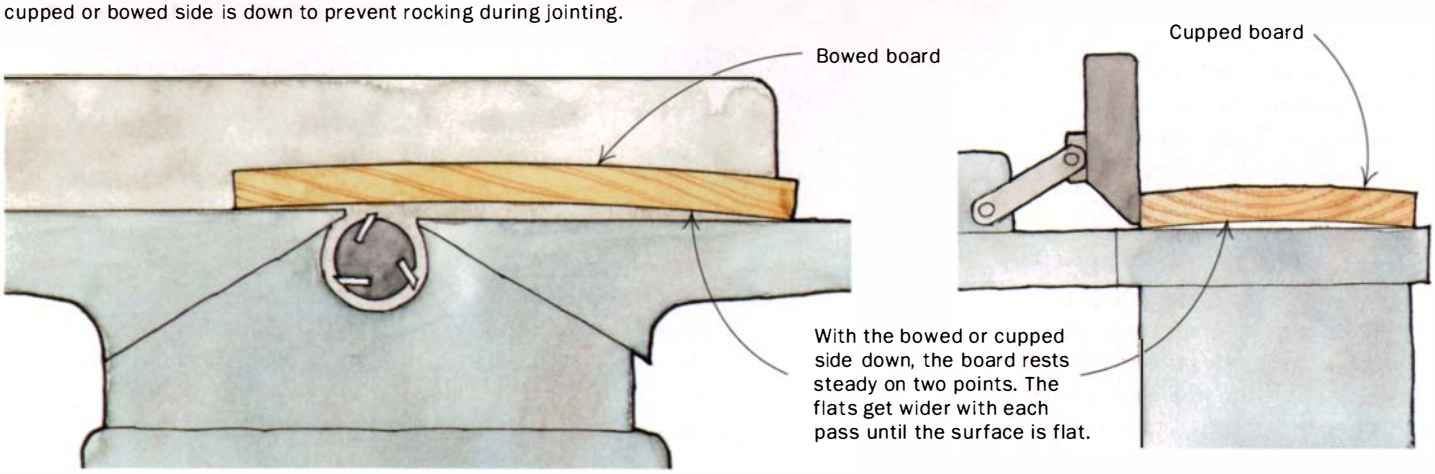
THE JOINTER COMES FIRST

This machine planes a flat face on a rough board, using the freshly planed section as a reference surface for the rest of the cut.



WHICH FACE TO JOINT?

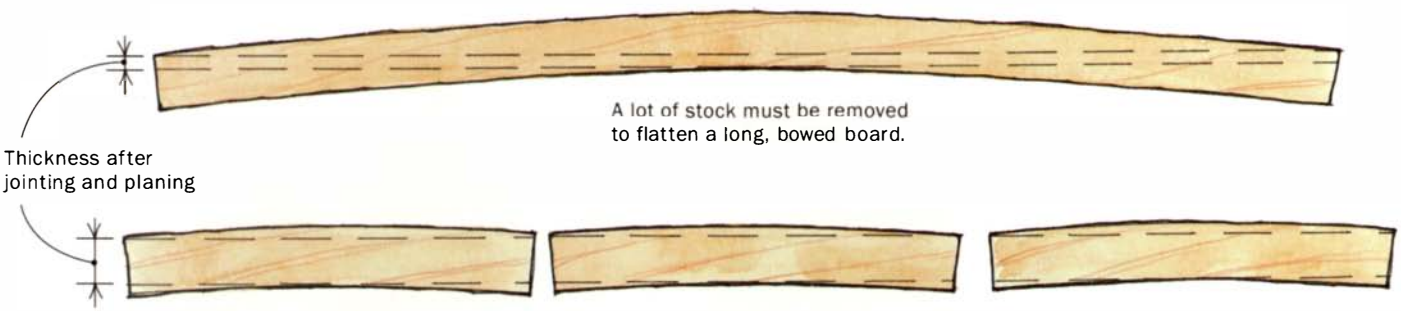
Chances are the lumber you are milling will not be flat. Orient the board so that the cupped or bowed side is down to prevent rocking during jointing.



Drawings: Jim Richey

ROUGH-CUT STOCK TO SIZE BEFORE MILLING

If you need smaller pieces from a long, bowed board, cutting the board to rough length first will result in thicker stock. The same goes for width.



You can reduce the waste by cutting a board into smaller lengths or widths before surfacing.

defects such as knots, sapwood or checks. Use a chopsaw or handsaw to rough the stock to length, removing any checked or cracked areas on the ends. Next, rough your stock to width. This can be done in a variety of ways. If the board is badly crooked, you may need to snap a chalkline on it and bandsaw to the line. Otherwise, run one edge over the jointer or handplane the edge to level it out. Now you can rip the board to rough width.

I highly recommend a bandsaw for ripping rough lumber. It wastes less wood and is much safer because there is no danger of kickback.

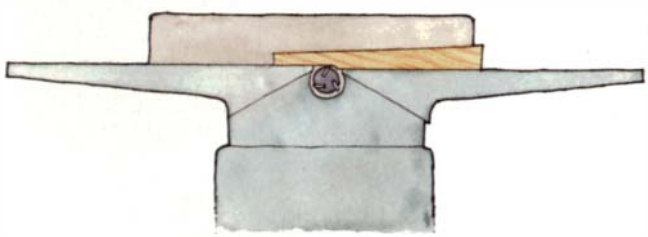
Put the cupped or bowed side facedown—It's highly unusual to find perfectly flat stock. That's because wood at a retail lumberyard gets uneven exposure to the air. Here's what to look for: cupping across the width, bowing along the length, and twist or wind in a board's thickness. First, check to see whether the board is cupped across its faces. Use a straightedge or check with your one good eye. It will be easier to run the cupped side down on the jointer table because the board will reference off its two outer edges and not rock. Take off small amounts of wood with each pass until you cut across the entire face and length of the board. Use push sticks or pads to hold the board firmly and safely on the jointer table. Mark the unjointed face with an X.

Twisted wood is deceiving. Use winding sticks to check your lumber or hold a board flat on the jointer table and see if it rocks when you push down on a corner. Mark the high corners of one face. On the jointer, start with all of your hand pressure on the leading high corner. As you continue the cut, transfer the pressure to the opposite high corner, trying to prevent rocking to one side or the other. Make multiple passes until the board is flat.

For any of these cuts, check the grain direction of the board before passing it over the jointer. And always keep your feed rate slow, use push pads for protection and to dampen vibration, and take shallow cuts.

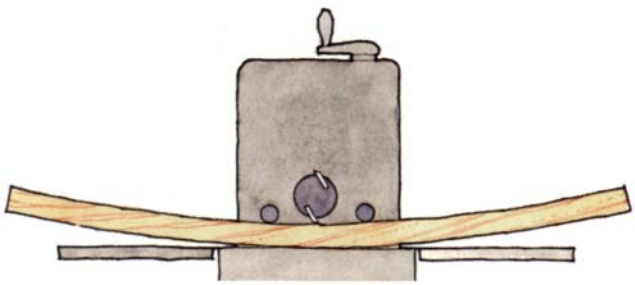
WHY ONE MACHINE IS NOT ENOUGH

Jointers and planers are great at doing the jobs they were designed for, but you can get into trouble by asking them to do too much.



FLAT BUT NOT PARALLEL

If you use a jointer first to plane one side and then the other, you may end up with flat sides but an uneven thickness.



PARALLEL BUT NOT FLAT

If you use a planer to flatten the first face of a bowed or cupped board, it simply will follow the curve.

The planer comes next

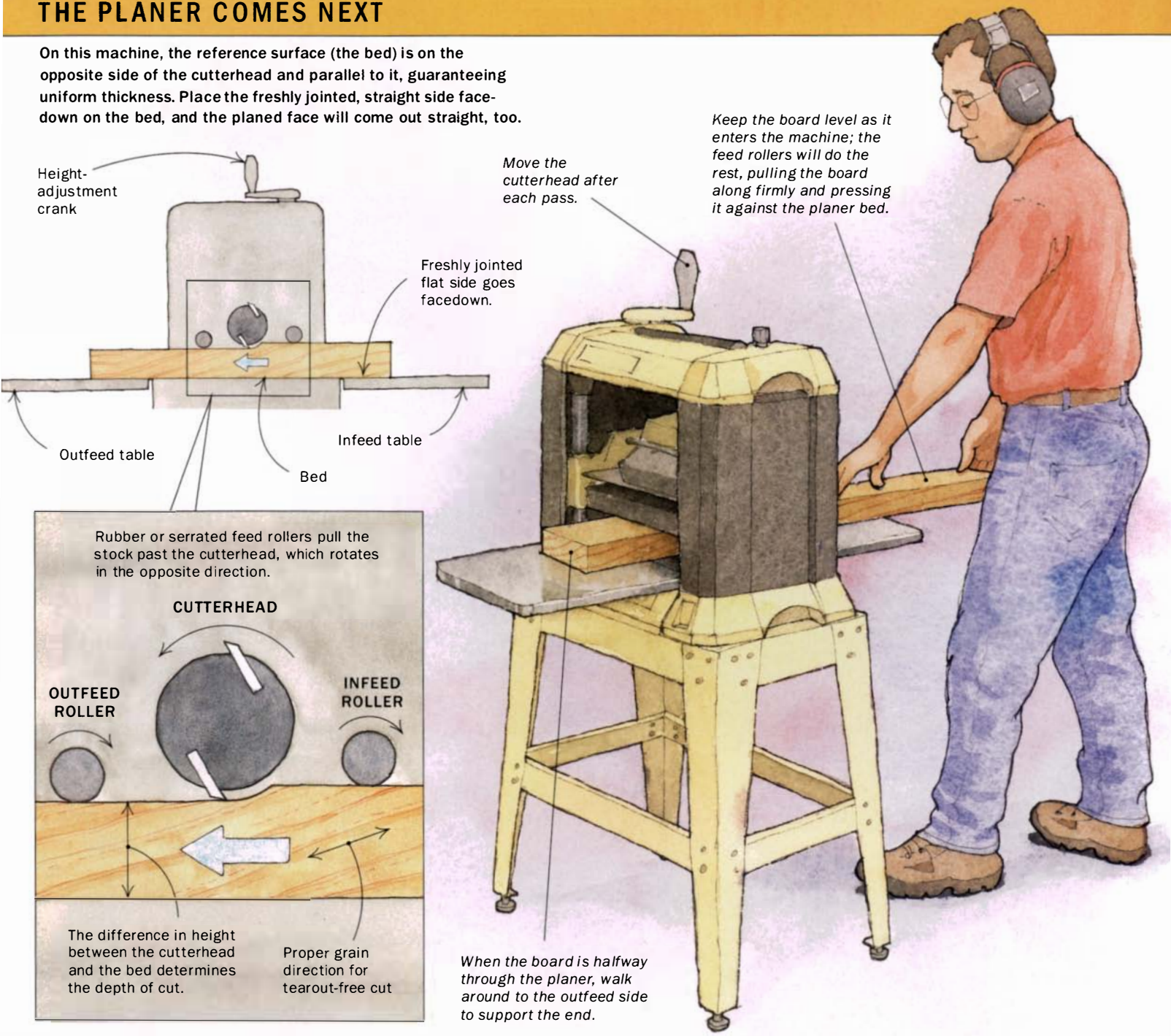
The impatient woodworkers among you may think, let's skip all this bother on the jointer and go straight to the planer. Sorry, it won't work. The planer will take whatever bowed or twisted surface you give it and make a cut parallel to that face. The reference surface on a planer is the bed; the knives are above the stock. So if the board is bowed when it goes in, it will be bowed when it comes out. If it's cupped, the planer's feed rollers may flatten the board slightly, but when it comes out it will pop back to being cupped.

You must use the jointer first to flatten one face. Then run this straight, flat side facedown in the planer to create a parallel, flat face on the other side of the board.

Arrange all of your boards for grain direction before starting the planer; remember, you're cutting on top of the board now. Make the first pass a light cut. If possible, feed the boards continuously one after the other, end to end, which eliminates the planer's ten-

THE PLANER COMES NEXT

On this machine, the reference surface (the bed) is on the opposite side of the cutterhead and parallel to it, guaranteeing uniform thickness. Place the freshly jointed, straight side face-down on the bed, and the planed face will come out straight, too.



dency to snipe at the beginning and end of a board. Plane all of the boards down to thickness, leaving them a hair oversize to allow for removing the milling marks. These marks are not a decorative effect.

If you get tearout on a face no matter how you feed the board, dampen a rag and lightly wet down the surface of the wood before planing. This will help soften the fibers and tone down most of the tearout. Also, wax your planer tables.

Last, mill the stock to width and length

After your faces are flat and parallel, work on the edges. Check that your jointer fence is set square to the table just beyond the cutterhead on the outfeed table. This is where your hand pressure should concentrate once the cut is established. Check for crook along each board's edge, and run the crooked edge down to the jointer table. Mark the squared edge and face after cutting.

Rip the last edge to width on the tablesaw or bandsaw. If the cut is rough, you'll want to leave a little extra for one final pass on the jointer. Last, cut the ends to length. Crosscut one end square on all of your boards, using your crosscut sled or miter gauge on the tablesaw. Then clamp on a stop to index the remaining cuts. □

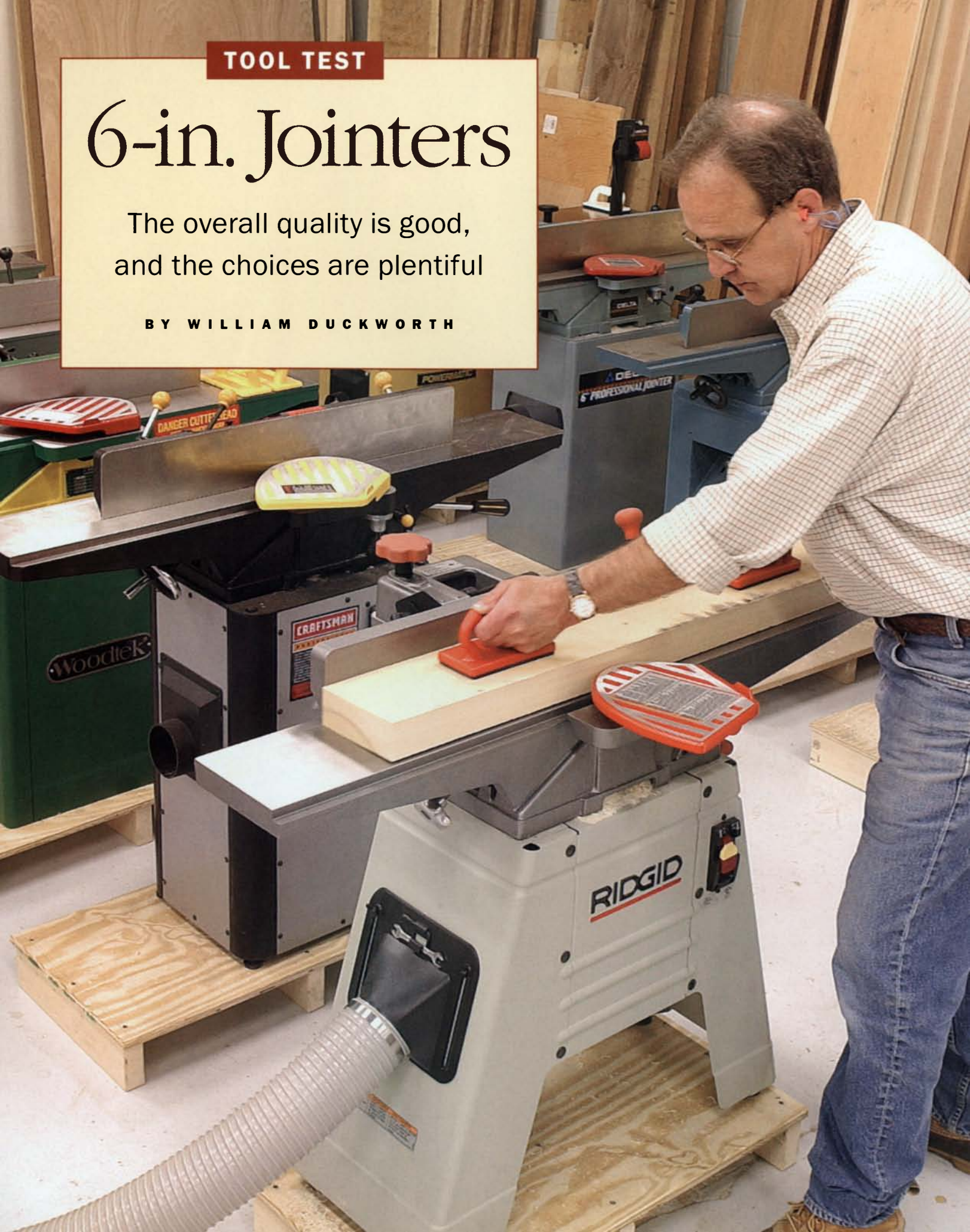
Gary Rogowski is a contributing editor. He runs the Northwest Woodworking Studio, a school in Portland, Ore., and is the author of The Complete Illustrated Guide to Joinery *(The Taunton Press, 2001).*

TOOL TEST

6-in. Jointers

The overall quality is good, and the choices are plentiful

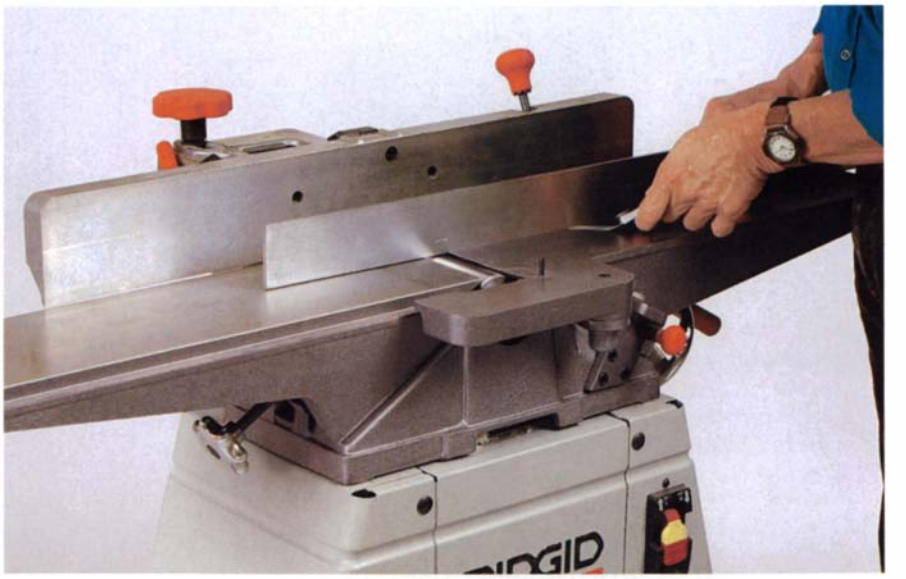
BY WILLIAM DUCKWORTH



Of all the kinds of electrically powered equipment made for processing wood, the jointer is perhaps the most misunderstood and underutilized machine. Saws rip and crosscut wood, and planers bring it down to the right thickness, but I've met plenty of woodworkers who don't own a jointer. "Why would I need one, and what does it do?" they sometimes ask. The answers to those questions are even simpler than this most basic of machines. If you're serious about building furniture or cabinets—and even if the end product is full of curves—you need to start with lumber that has at least one straight edge and one flat face. That's what jointers do. They also square up and clean up lumber edges that are rough or fuzzy from being cut on the tablesaw, and cut rabbets, too.

When buying a jointer, bigger is better in terms of the size of the knives and the length of the table beds. You can successfully joint a board that is about twice as long as the bed of the machine. The scope of lumber lengths that you can process with a 4-in. machine is limited because the beds are so short. Eight-inch (and larger) machines are great, but the price skyrockets with any machine bigger than a 6-in. version. In general, a 6-in. machine is a good starter size. Most of the 11 machines I looked at sell for less than $500, with one costing as little as $300.

Among the machines I examined, eight were made in Taiwan; three others were made in the People's Republic of China. The only significant differences between these machines can be found in the fence designs and the mechanisms by which you raise and lower the infeed and outfeed tables. All of the machines required some assembly and cleanup. The metal surfaces come coated with a rust-preventive goop that comes off easily with liberal applications of kerosene or lubricating and penetrating oil, such as WD-40.



Are they flat? *Shop manager John White checked the grinding job on infeed and outfeed tables with a straightedge and feeler gauges and used a machinist's level to measure the diagonal twist. Most of the measurements fell well within accepted tolerances.*

Tables should be flat

With a jointer, you want infeed and outfeed tables that are both flat and coplanar to one another, meaning that the tables run parallel from one end of the machine to the other. How flat should a join-

BRIDGEWOOD BW-6R

(800) 235-2100; www.wilkemach.com

Price: $399

Table width: 7¼ in.

Table length: 45¾ in.

Weight: 205 lbs.

Motor: 1 hp

The Bridgewood came with a good step-by-step instruction manual, complete with decent photos of the actual machine that was delivered, which was not the case with all of the machines I reviewed. The grinding on the tables was extremely flat, but the fence was not as flat.

DELTA 37-195

(800) 438-2486; www.deltawoodworking.com

Price: $509

Table width: 7½ in.

Table length: 46¼ in.

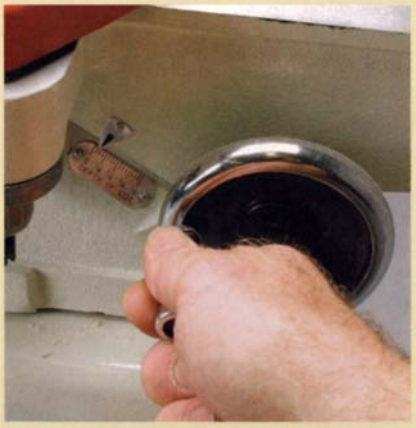
Weight: 220 lbs.

Motor: 1 hp

The switch mounted above the table is more convenient and safer than having to bend over and reach down to turn it on and off. The rack-and-pinion fence was a joy to use, though the one on this machine came from the factory marred by a nib on the toothed column. The nib limited the travel of the fence halfway in both directions, so I had to take it apart and file down the nib to make the fence work properly.

Photos, except where noted: William Duckworth; facing page: Scott Phillips

ADJUSTING THE TABLE HEIGHT



Wheels or levers. *Most brands use either a wheel or a lever to raise and lower the tables. Wheels on all of the machines, except the Jet, are mounted on the sides, under the tables.*

The Powermatic lever is unique. *It offers the ability to make both coarse and fine adjustments on the infeed table by pushing the lever up and down or by twisting its handle.*

ter table be? One dealer told me that the company's quality-control engineers allow gaps in the ground table surfaces up to six-thousandths of an inch (which is slightly more than the thickness of the cover of this magazine) in the length and three-thousandths of an inch in the width.

Fine Woodworking shop manager John White took precise measurements, using a 3-ft. Starrett machinist's straightedge and feeler gauges to check the grinding on all of the table surfaces: end to end, side to side and diagonally across each of the tables. All but one of the machines tested positively within the length tolerances listed above, and most width measurements were up to snuff. Also, the measurements to check parallelism between tables were within those accepted tolerances.

The Powermatic had an infeed table that was in fairly good shape and an outfeed table that was way out of whack. Because the box and the Styrofoam packing inside were broken when I unpacked that machine, I suspected that it was damaged during shipping. As a double-check, I went to a woodworking-supply store and measured the Powermatic floor model on display. The grinding job on that machine was well within manufacturing tolerances. Bottom line—are the tables on these jointers flat? They're not perfect, but they are flat enough to do the job they're supposed to do.

Table adjustments are made via levers or handwheels

To function properly, the surface of the outfeed table needs to be flush with the top arc of the knife cut and perfectly parallel to the full width of the knife cut, as well as the surface of the infeed table. An outfeed table set too high will result in jointed edges that are tapered and crowned; a table set too low will result in chatter during the cut and some ugly snipe on the tail end of the board. Usually, you can make any necessary adjustments in the alignment of

GENERAL INTERNATIONAL 80-1X0L M1

(819) 472-1161; www.general.ca Price: $519

Table width: 7¼ in.

Table length: 55⅛ in. (with two extensions)

Weight: 218 lbs.

Motor: 1 hp

With the instructions for assembly and setup covering less than a page, the owner's manual for the General was written under the assumption that the buyer is mechanically adept (as most woodworkers are). The two table extensions (included) add 9½ in. to the overall table length, and the tapered base with a wide footprint makes this machine more stable than most.

GRIZZLY G1182ZX

(800) 523-4777; www.grizzlyindustrial.com Price: $475

Table width: 7¼ in.

Table length: 46⅞ in.

Weight: 226 lbs.

Motor: 1 hp

The Grizzly machine is the only one reviewed that features a magnetic switch, a device more often found only on industrial-level equipment. The switch is mounted high for better access. The ground surface of the tables was well within accepted tolerances. I had to adjust the factory settings on the knives to get them parallel to the tables. After that, this machine made smooth, fine cuts.

JET JJ-6CSX

(800) 274-6848; www.jettools.com Price: $499

Table width: 7¼ in.

Table length: 45¾ in.

Weight: 214 lbs.

Motor: 1 hp

The Jet machine came with the best instruction manual of the bunch—well written, organized and photographed, and printed on coated paper for clearer images. The adjustment wheels are mounted on the front of the machine, rather than on the sides, under the tables. The outfeed table on this machine had a 0.007-in. twist from one end to the other, more than on most of the other machines. The Jet was the only brand that came with a small can of touch-up paint.

POWERMATIC 54A

(800) 274-6848; www.jettools.com Price: $749

Table width: 7¼ in.

Table length: 66⅝ in.

Weight: 304 lbs.

Motor: 1 hp

The extralong table is the dominant feature of this machine, making it possible to straighten and flatten boards that are 3 ft. to 4 ft. longer than what you can mill with the other machines in this survey. That extra length also translates to extra weight—this machine is one-third heavier than the others—and a heavier machine is a more stable machine.

the knives to the outfeed table by raising or lowering the knives with the jack screws found in the cutterheads of all of these machines, except the Reliant.

You adjust the height of tables by raising or lowering them on dovetailed ways, or tracks, that have been milled into the cast bed of the machine. Once you have the tables where they belong, the gib screws fasten the tables tightly to the jointer bed and are secured with a locknut. You can tweak the settings of the tables on the bed by adding very thin, soft metal shims (see "Jointer Tune-up" by John White in *FWW* #142, pp. 38-43). Brass and aluminum both work as shims in the dovetailed ways, but you should not have to do this to a new machine.

Some, but not all, of the dealers offer the consumer a choice in the table-adjustment mechanisms: You can use either a wheel or a lever to raise and lower tables. Opposing camps within the woodworking community will argue the merits of either with great passion. Those who prefer the wheel swear by its superior incremental accuracy. I prefer the levers: They're quick and easy to use, and I find them plenty accurate when making small adjustments. The wheels and levers on these machines all worked fine. The lever system on the Powermatic jointer is notably more sophisticated from an engineering standpoint because it offers the ability to make both coarse and fine adjustments.

One weak link I found in the three mainland-Chinese machines—Delta, Sears and Yorkcraft—was that the threads of the locknuts that secure the outfeed tables to the bed of the machine were either stripped or bound too tightly, making it difficult to adjust the height of the outfeed tables. Badly threaded screws can be

RELIANT DD39C

(800) 877-7899; www.woodworkerswarehouse.com Price: $299

Table width: 7¼ in.

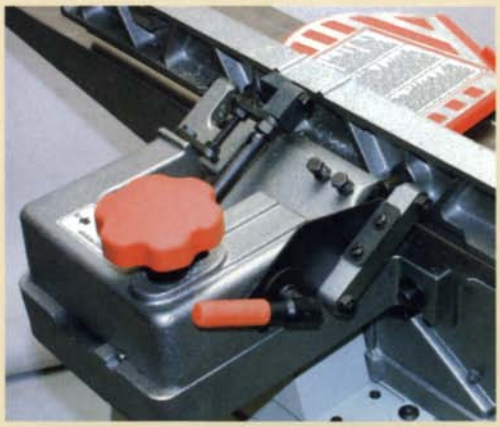
Table length: 45¾ in.

Weight: 189 lbs.

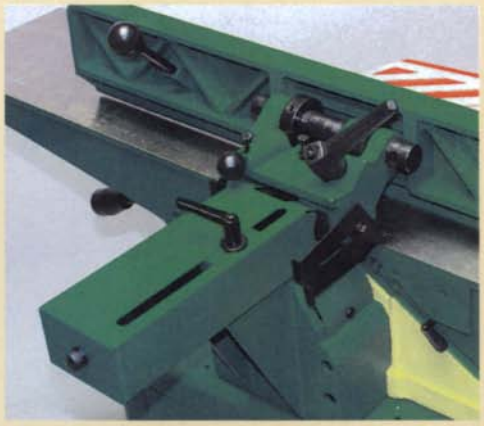
Motor: 1 hp

The Reliant is the least expensive of all of the jointers surveyed. But it is the only machine that does not have jack screws in the cutterhead, which makes knife adjustments more cumbersome. After fiddling with the factory setting of the knives to the outfeed table, I got consistently clean and accurate cuts with this machine.

FOUR DIFFERENT FENCE DESIGNS



A cast-iron fence with dual pivot points. *This sturdy design can be found on the Bridgewood, General, Grizzly, Jet, Powermatic and Ridgid jointers. The fence is easy to move in and out, and you can adjust the positive stops for different angles.*



Woodtek fence is different. *The design of the fence on the Woodtek jointer is unique to that machine. It is a sort of sliding T-shaped setup, and it works reasonably well as long as you use both hands to move it.*

This one's not easy to use. *On both the Sears and Reliant jointers, the dovetail casting on which the fence pivots does not provide for smooth adjustments and is difficult to raise and lower.*

replaced or repaired with a tap and die (but you don't want to have to perform a machinist's duty on a new piece of equipment).

Fence design is a significant purchase factor

When you're faced with choosing which of these machines to buy, the fence design (other than the price) is the only significant variant that is likely to make or break a purchase decision. All of the fence designs have positive stops for 90°- and 45°-bevel settings, and with most of them you can tilt the fence in either direction. This perplexes me. I've used the bevel setting on my own jointer many times, but only with the fence set at an oblique angle to the cutterhead, tilting away from the knives. I cannot fathom, for safety reasons, why anyone would ever set a jointer fence to an acute angle, tilting toward the cutterhead. Trying to hold a workpiece tight to the fence, with your fingers out of view and close to the knives, seems to me an accident waiting to happen.

Among these 11 machines, you can choose from four different fence designs (see the photos above). A heavy cast-iron fence with dual pivot points is easy to adjust. Because of its beefy construction, it likely will hold up well with repeated use. A couple of fences pivot on a dovetailed casting, but they are difficult to raise and lower. The sliding T-shaped fence on the Woodtek jointer

RIDGID JP0610

(800) 474-3443; www.ridgidwoodworking.com Price: $449

Table width: 7¼ in.

Table length: 45¾ in.

Weight: 210 lbs.

Motor: 1 hp

The Emerson Electric Co., maker of Ridgid woodworking machines, consistently goes one step further toward making the whole package more user-friendly. Here are some examples: organized parts trays, an adjustable dust chute that slides out of the way, a magnifying glass on the depth-of-cut gauge and soft, rubberized coatings on all handles and levers. The tapered base with a wide footprint makes this machine more stable, but the partially open base also means that it's a little noisier than machines with enclosed motors.

SEARS 21706

(800) 407-4567; www.sears.com Price: $400

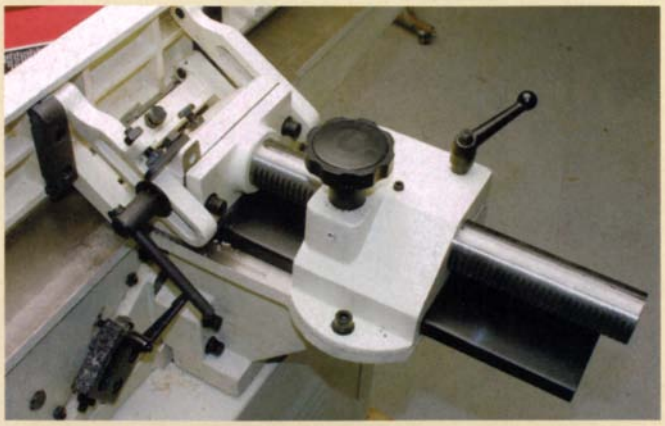
Table width: 7½ in.

Table length: 46¼ in.

Weight: 210 lbs.

Motor: 1 hp

The Sears manual, illustrated clearly with drawings, is a good step-by-step introduction to assembling and using the machine. I had to ream out most of the five dozen or so holes in the base panels to make them line up with the threaded holes in the legs. The table surfaces were ground notably flat, and the sharp knives left a surface that felt smooth as glass. This machine features a handy little storage shelf on the infeed side of the base for the push blocks. Adjusting the fence was a less-than-smooth operation.



User-friendly rack-and-pinion design. *The rack-and-pinion fence found on the Delta and Yorkcraft jointers works very well. Adjustments are quick and easy to make, and you can move the fence in and out with one hand if you happen to be holding a workpiece in the other.*

works reasonably well as long as you have the use of both hands to move it. Among all of the fences, though, the rack-and-pinion type is my favorite. Adjustments are quick and easy to make, and you can move the fence in and out with one hand.

Which one should you buy?

The good news is that the overall quality of these machines was respectable. They were ruggedly built, for the most part, within acceptable tolerances for working wood.

But like it or not, the market forces controlling this global economy have limited your choices. Not so long ago, you could still buy a Delta jointer made in Mississippi, a Powermatic made in Tennessee or a General made in Quebec—not so anymore, at least with 6-in. jointers. All of these machines were made either in Taiwan or the People's Republic of China. However, I'm convinced that the manufacturers in Asia have improved the quality of their products over what they were making 10 years ago. It's worth noting that several of the brand-name dealers represented here have inspectors at the manufacturing facilities who oversee quality control.

If money were no object, and I wanted to buy a 6-in. jointer, I'd be drawn toward the Powermatic. The fit and finish of the machine were impressive, and the bed—fully 20 in. longer than those on most of these machines—allows you to joint longer boards. Granted, I found some real problems with the tables on the first one I looked at, but I'm convinced that most of those problems were caused by shipping damages and were not the fault of the manufacturer. Lesson learned: If a machine shows up at your shop door with obvious damage to the container, refuse it or call the dealer for advice on how to solve the problem.

Among those machines in the midrange of prices, I liked the Ridgid. The numerous small improvements the manufacturer has made to detail this machine as more user-friendly—from the rubberized handles for a better grip to the magnifying glass for a better view of the depth-of-cut scale—add up to a well-appointed and well-built tool.

If I were buying a machine on a tightly limited budget, I'd go for the Yorkcraft, the bargain brand sold by Wilke. It's about $70 less expensive than Wilke's Bridgewood jointer, it has a larger fence that would make edge-jointing wide boards or glued-up panels an easier task, and I love that rack-and-pinion design. □

William Duckworth is an associate editor.

WOODTEK 924-028

(800) 645-9292; www.woodworker.com Price: $429

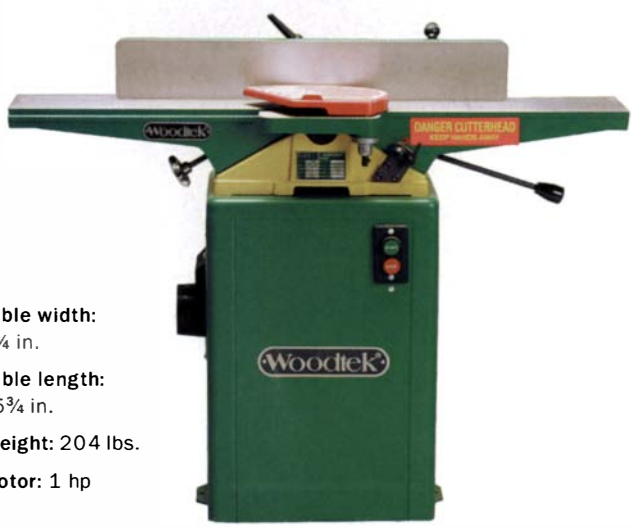


Table width: 7¼ in.
Table length: 45¾ in.
Weight: 204 lbs.
Motor: 1 hp

This machine was easy to put together, but the photos in the instruction manual were of a different model with an open stand. The fence on this machine is different from all of the others: It consists of a hexagonal bar held captive in pillow blocks with two Allen screws and a threaded handle. The gib screws were adjusted well at the factory, making it easy to raise and lower both the infeed and outfeed tables.

YORKCRAFT YC-6J

(800) 235-2100; www.wilkemach.com Price: $329

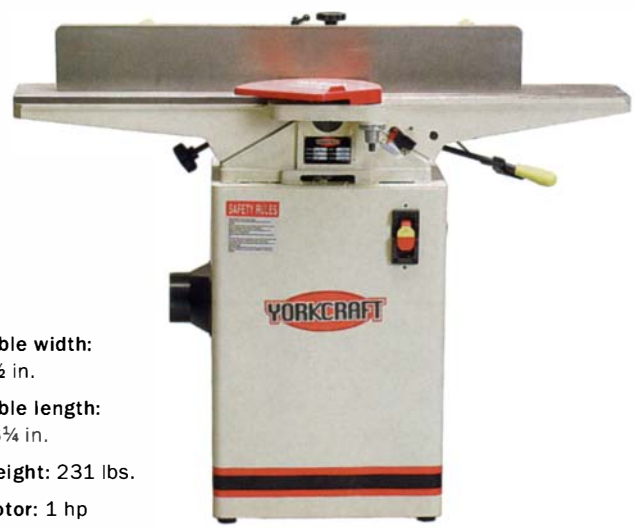


Table width: 7½ in.
Table length: 46¼ in.
Weight: 231 lbs.
Motor: 1 hp

Except for the switch location, the Yorkcraft is essentially the same machine as the Delta, including the rack-and-pinion fence that was a breeze to adjust. The table surfaces were fairly flat, and the factory settings that align the knives to the outfeed table were very good.

TOOL TEST

Benchtop Planers

For small shops, these machines offer good value and performance

BY LON SCHLEINING

When benchtop thickness planers were introduced in the early 1980s, many woodworkers viewed them with suspicion, certain that such a compact, portable, low-cost machine offered little more than a collection of assembled parts destined for early retirement. Over the years, however, these lightweights have more than managed to prove their value.

Granted, portable thickness planers aren't industrial-strength cast-iron machines. They're not intended to run all day or hog off ¼ in. of stock in a single pass. But for occasional use, as in a home shop or even a small commercial shop, a portable thickness planer can provide years of service. Plus, it produces remarkably smooth surfaces that few cast-iron machines can match.

A portable thickness planer has other advantages. Compared with bigger planers, it's a lot friendlier on the budget. And because it's relatively light, a portable planer can be picked up and stored out of the way when it's not in use.

Today's portable thickness planers vary in price from under $300 to nearly $500. That's a pretty wide range. In an effort to learn whether the price differences reflect

the quality and features of the machines, I recently put nine of them through a hands-on test: Central Machinery 6469-5VGA (sold by Harbor Freight), Delta 22-580, DeWalt DW733, Geetech CT-345 (sold by Sunhill), Grizzly G8794, Jet JWP-12DX, Makita 2012NB, Pro-Tech CS6005 and Ridgid TP1300LS (sold by The Home Depot).

Portable thickness planers are not complex tools

As machines go, the portable thickness planer is relatively simple. Driven by a universal motor, the cutterhead spins a pair of long knives at some 8,000 rpm to 10,000 rpm, depending on the model. The cutterhead, which is located above the board to be planed, is attached to an adjustable carriage. To adjust the depth of cut, the carriage and cutterhead are moved up or down simply by turning a crank.

As a board travels though the planer, it is supported by a series of three surfaces—an infeed table, a bed and an outfeed table. The Central Machinery planer includes a pair of rollers in the bed, a feature commonly found only on larger planers.

When the cutterhead is lowered to make a planing cut, a pair of spring-loaded, rubber-coated feed rollers (one in front of the cutterhead and one behind) moves up and down along with the cutterhead and contact the top face of the board as it enters and exits the machine. Powered by the motor, the rollers slowly rotate to feed the board through the machine while holding it firmly against the bed.

Tables must be aligned to ensure smooth cuts

It's important for the infeed and outfeed tables to be flush with the bed. If the infeed table is too low or the outfeed table too high, a board is likely to be hung up as it journeys through the planer. Table alignment also can affect the amount of snipe that shows up on the ends of the board.

All of these machines made it easy to adjust the infeed and outfeed tables up and down. It was just a matter of fiddling with a few bolts and nuts.

I used a long straightedge to check all of the tables for alignment. Except for the Geetech and the Central Machinery, all were dead-on. In just a few minutes, I had both of the Geetech tables perfectly flush. But the Central Machinery planer took some extra work. I not only had to adjust the infeed and outfeed tables but also the two bed rollers.

Central Machinery 6469-5VGA

Had the most snipe. Made the most noise. Manual had lots of poorly translated text. Was a chore to adjust the tables and bed rollers. Excellent carriage parallelism. Lightweight and compact. Company offers free shipping. Inexpensive.

TELEPHONE NUMBER	(800) 444-3353
AVERAGE STREET PRICE	$290
MAXIMUM PLANING THICKNESS, WIDTH	6 in., 12 in.
WEIGHT (NET)	63 lbs.
SPEED (NO LOAD)	8,000 rpm
KNIVES REVERSIBLE	No
EXTRA SET OF KNIVES INCLUDED	No
KNIVES CAN BE SHARPENED	Yes
PRICE FOR NEW SET OF KNIVES	$19
DUST-COLLECTION HOOD	Not available

Convenient controls are a plus

After looking at the table alignment, I tried all of the important controls to see how easy they were to use.

Crank—Each of these portable planers uses a crank to raise and lower the cutterhead. All of the cranks worked fine, but I especially liked the feel and action of the crank on the Ridgid planer. Its large handwheel moved smoothly, and I was able to raise or lower it a couple of inches without much effort.

Cutterhead lock—Most of the machines offer a cutterhead lock, a mechanism designed to eliminate snipe—or at least re-

Table alignment is critical. *The planers make it fairly easy to adjust the height of the infeed and outfeed tables so that they can be made flush with the bed.*

Photos: Tom Begnal

Delta 22-580

Expensive. Heaviest of the lot. Excellent carriage parallelism. Smallest amount of snipe (tie). One of the least noisy. Best dust collection. Has slotted knives and two cutting speeds.

TELEPHONE NUMBER	(800) 438-2486
AVERAGE STREET PRICE	$430
MAXIMUM PLANING THICKNESS, WIDTH	6½ in., 13 in.
WEIGHT (NET)	97 lbs.
SPEED (NO LOAD)	10,000 rpm
KNIVES REVERSIBLE	Yes
EXTRA SET OF KNIVES INCLUDED	No
KNIVES CAN BE SHARPENED	Yes
PRICE FOR NEW SET OF KNIVES	$39
DUST-COLLECTION HOOD	Optional ($30)

DeWalt DW733

Cutterhead lock was a bit stiff. Smallest amount of snipe (tie). Excellent carriage parallelism. Moderately priced.

TELEPHONE NUMBER	(800) 433-9258
AVERAGE STREET PRICE	$350
MAXIMUM PLANING THICKNESS, WIDTH	6 in., 12½ in.
WEIGHT (NET)	80 lbs.
SPEED (NO LOAD)	10,000 rpm
KNIVES REVERSIBLE	No
EXTRA SET OF KNIVES INCLUDED	Yes
KNIVES CAN BE SHARPENED	Yes (up to five times)
PRICE FOR NEW SET OF KNIVES	$39
DUST-COLLECTION HOOD	Included

duce it—by anchoring the cutterhead to the planer frame. Snipe, by the way, is the tendency for a thickness planer to dig slightly deeper during the first and last few inches of a cut.

The Delta and Ridgid planers use a lever to lock the cutterhead, a system I liked a lot. The levers engaged quickly and easily and offered a solid feel.

The cutterheads on the Jet and Pro-Tech machines are locked by turning two spring-loaded handles. But I thought the system was cumbersome because each of the handles had to be unlocked and then relocked every time the thickness setting needed to be changed.

To engage the cutterhead lock on the DeWalt model, you push down on a rod that extends across the top of the carriage. It was a bit stiff, though, so after using it all day my hand felt sore.

Cutting-depth scale—All of the machines had some sort of cutting-depth scale to indicate the thickness of a board. Once adjusted, each of the scales provided accurate readouts. I especially liked the scale on the Delta planer because its position made it easier for me to read the numbers.

Depth-of-cut gauge—Several of the machines include a depth-of-cut gauge. Although these gauges vary in design somewhat, all of them allowed me to determine quickly how much material would be removed by the next cut. I particularly liked the gauge on the Makita. To use it you simply lower the cutterhead until a steel pin gets pushed up. The amount the pin gets pushed represents the cutting depth. It couldn't be easier.

I also liked the "blade zero" gauge featured on the Delta planer. It has a spring-loaded preset gauge that snaps into position at the point the knives are going to just touch the board. From there you use the crank to lower the cutterhead to the desired depth of cut.

Preset thickness stop—Some of the machines have a gauge that lets you quickly preset the final planing cut to one of the commonly used thicknesses. For example, if you want to plane a board to ¾ in. thick, set the gauge to the preset ¾-in. mark. Once the board has been planed to ¾ in. thick, the preset stop will not allow the cutterhead to be lowered any farther.

The Delta and Makita planers don't use preset stops. Instead, they have stops that can be raised or lowered to establish a range of thicknesses.

How well do these planers work?

Once I familiarized myself with the machines, it was time to run them and make some chips. I wanted to test how accurately and smoothly the planers cut. I also measured the noise level of the machines, checked to see how easy it was to change knives and gauged the effectiveness of the dust collection.

To put the machines through their paces, I gathered a number of red-oak test boards, each one measuring 13/16 in. thick by 10 in. wide by 36 in. long. The oak was kiln-dried and presurfaced on both sides of the board at the lumberyard.

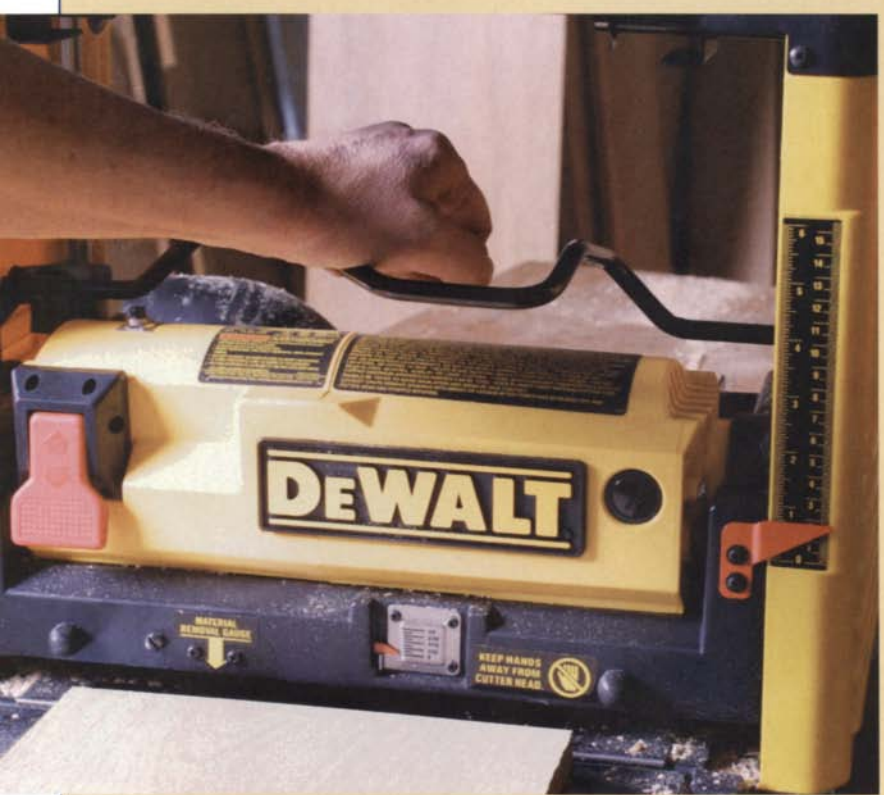
Planing accuracy—The first test was to determine whether the cutterhead was parallel to the bed table. If those parts aren't parallel, the top and bottom faces of the board won't be parallel, which means the

Geetech CT-345

Had worst score on carriage-parallelism test, but results were acceptable. Cutterhead lock was cumbersome. Smallest amount of snipe (tie). Changing knives was fast and easy. Inexpensive.

TELEPHONE NUMBER	(800) 929-4321
AVERAGE STREET PRICE	$290
MAXIMUM PLANING THICKNESS, WIDTH	6 in., 12½ in.
WEIGHT (NET)	70 lbs.
SPEED (NO LOAD)	8,000 rpm
KNIVES REVERSIBLE	Yes
EXTRA SET OF KNIVES INCLUDED	No
KNIVES CAN BE SHARPENED	Yes
PRICE FOR NEW SET OF KNIVES	$29
DUST-COLLECTION HOOD	Optional ($22)

SMART FEATURES IMPROVE PERFORMANCE



Cutterhead lock helps reduce snipe. *In general, the planers with cutterhead locks produce less snipe than those without the mechanism.*

Gauge shows depth of cut. *Some of the planers feature a gadget that quickly lets you see how much stock the next cut is going to remove.*

Preset thickness stop. *A few of the machines include a thickness stop. Once set, the cutterhead automatically stops when the stock has reached the preset thickness.*

Grizzly G8794

Had more snipe than all but one machine. No cutterhead lock. Very good carriage parallelism. One of the least noisy. Inexpensive. Free stand.

TELEPHONE NUMBER	(800) 523-4777
AVERAGE STREET PRICE	$290 (includes stand)
MAXIMUM PLANING THICKNESS, WIDTH	6 in., 12½ in.
WEIGHT (NET)	75 lbs.
SPEED (NO LOAD)	8,540 rpm
KNIVES REVERSIBLE	Yes
EXTRA SET OF KNIVES INCLUDED	No
KNIVES CAN BE SHARPENED	No
PRICE FOR NEW SET OF KNIVES	$35
DUST-COLLECTION HOOD	Optional ($30)

board ends up with a slight edge-to-edge taper when viewed from the end.

After making several passes with the test board, enough to make sure the machine was warmed up and working properly, I used a dial caliper to measure the 10-in.-wide board in several places along each edge. The numbers in the chart on p. 81 represent, on average, how much one edge differed in thickness from the opposite edge. The lower the number, the closer the cutterhead was to parallel. All of the machines did pretty well in this test, with the numbers ranging from less than 0.001 in. to 0.007 in.

I also checked each test board for snipe after it had been planed. Sniped areas cause problems in most furniture construction because they create parts of different thicknesses. And it's almost impossible to achieve flush surfaces between mating parts that have different thicknesses. In most cases, though, snipe is not a problem if it measures no more than a few thousandths of an inch. Such a small amount of snipe can usually be handplaned or sanded out quickly.

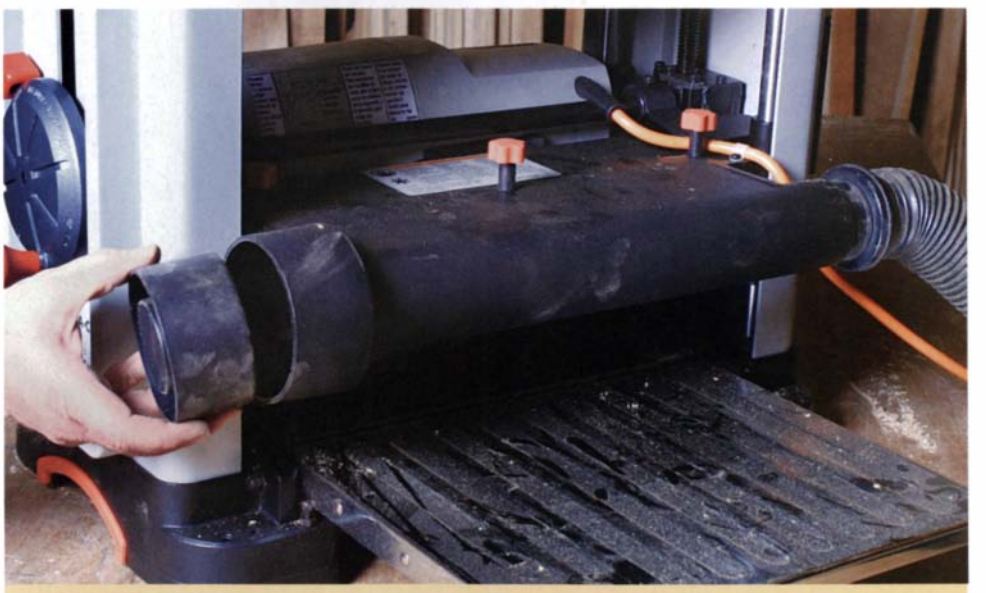
To test for snipe, I planed between 1/32 in. and 1/64 in. during each pass, a typical cut. After each pass, I turned over the board to maintain the same orientation of the leading and trailing ends and ran it through the planer again. That made it easier to detect snipe, because any amount I measured with the dial calipers was equivalent to adding the snipe on the top side to the snipe on the bottom side. The results can be found in the chart on p. 81.

One last point regarding snipe: For as long as I've been woodworking, snipe has been a fact of life. Though some of these machines reduce snipe to nearly zero, none of them eliminates it. Rather than waste time trying to create a snipeless cut, I take another approach. Any board destined for the planer is rough-cut a few inches longer than needed. Then, after planing, I simply cut off the sniped ends. Granted, at the end of the day I use a bit more material. But all of the boards end up with zero snipe.

Surface smoothness—Portable thickness planers, as a group, are regarded as machines that create wonderfully smooth surfaces. After looking closely at this delegation, the reputation is well earned. All of the machines produced amazingly smooth surfaces. The planer cuts were nearly imperceptible, needing only some slight sanding or scraping to achieve a perfect surface.

Noise—Portable thickness planers are inherently noisy, so ear protection is always a must. Still, all else being equal, I prefer to use relatively quiet planers.

To measure noise levels among this collection, I used a decibel meter mounted on a tripod, taking care to place the meter the same distance from each machine, with the position of the meter representing the location of my ears when I run a planer (see the chart on p. 81 for the final results).



Dust-collection hood helps gather chips. *DeWalt and Ridgid provide a hood with their machines. Central Machinery doesn't offer one. The other manufacturers make the hood available as an accessory.*

The Grizzly and Ridgid machines did well in this category.

Knives—As with any cutting tool, planer knives eventually wear to the point that they no longer cut smoothly, or they get badly nicked. When that happens, you'll need to provide the machine with fresh, sharp, cutting edges.

Some portable planers have single-edge knives that are sent out to be sharpened when they become dull.

Other manufacturers use reversible knives, which have a cutting edge on both sides. When one edge dulls, turn around the knife to expose a new, sharp edge. Although the manufacturers say some reversible knives can be sharpened, typically you just toss them after the second edge has dulled. I prefer reversible knives because their affordability eliminates the hassle of getting them sharpened.

The Delta and Geetech planers use steel pins to help position the knives on the cutterheads, a nice little feature. Elongated holes in the knives allow them to be moved laterally on the pins as they're mounted to the cutterhead. If the knives get nicked, the resulting ridge in the board often can be eliminated simply by shifting one of the knives over a little.

When it's time to change knives, any planer that makes the job easier has my vote. So I wanted to see how tough it is to change the knives on these machines. To get a sense of this, I kept track of how long it took to get the job done, carefully following the knife-changing directions in the owner's manual. Check the chart on p. 81 to find the results.

Dust collection—Thickness planers spit out chips by the bushel. Absent a dust collector, those chips not only pile up quickly on the shop floor, but they also can eventually clog up a planer to the point that boards don't run through the machine as smoothly. I think dust collection is more than a convenience. It's a necessity.

DeWalt and Ridgid are the only manufacturers that include a dust-collection hood with their machines; the others, except for Central Machinery, make the hood available as an accessory.

I hooked up each machine with a hood to my 1,200-cu.-ft.-per-minute (cfm) dust collector. Two machines were not tested: Central Machinery doesn't offer a hood, and the

Jet JWP-12DX

New knives and optional dust-collection hood are the most expensive. Two separate cutterhead-locking handles slowed the locking process. Minimal snipe. Moderately priced.

TELEPHONE NUMBER	(800) 274-6848
AVERAGE STREET PRICE	$350
MAXIMUM PLANING THICKNESS, WIDTH	6 in., 12½ in.
WEIGHT (NET)	69 lbs.
SPEED (NO LOAD)	8,000 rpm
KNIVES REVERSIBLE	Yes
EXTRA SET OF KNIVES INCLUDED	No
KNIVES CAN BE SHARPENED	Yes
PRICE FOR NEW SET OF KNIVES	$50
DUST-COLLECTION HOOD	Optional ($40)

Makita 2012NB

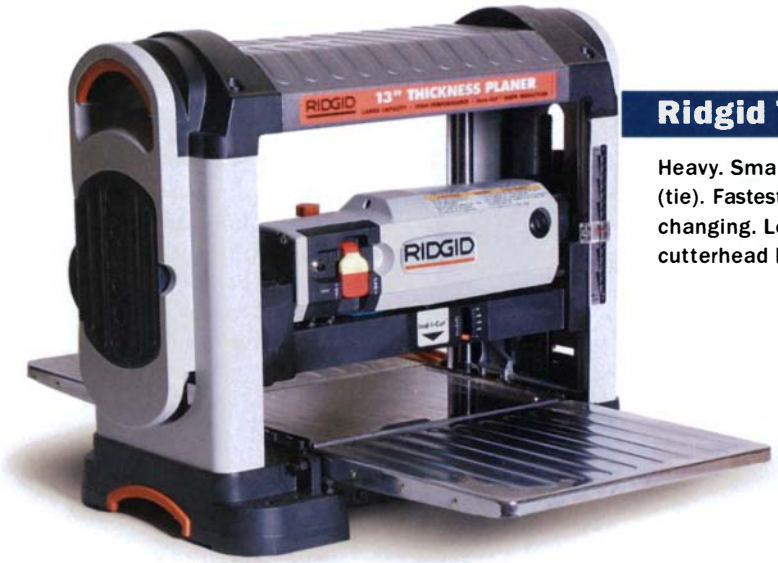
Had more snipe than most other planers. Odd-sized (3-in.-dia.) dust port. Expensive. Very good carriage parallelism. Light-weight. Compact. Changing knives was faster and easier than on most others in the test.

TELEPHONE NUMBER	(800) 462-5482
AVERAGE STREET PRICE	$480
MAXIMUM PLANING THICKNESS, WIDTH	6⅜₂ in., 12 in.
WEIGHT (NET)	61 lbs.
SPEED (NO LOAD)	8,500 rpm
KNIVES REVERSIBLE	Yes
EXTRA SET OF KNIVES INCLUDED	No
KNIVES CAN BE SHARPENED	No
PRICE FOR NEW SET OF KNIVES	$39
DUST-COLLECTION HOOD	Optional ($25)

Pro-Tech CS6005

A long cutterhead-locking lever took a lot of effort to engage. Tied for longest time to change knives. Minimal snipe. Very good carriage parallelism. Moderately priced.

TELEPHONE NUMBER	(800) 888-6603
AVERAGE STREET PRICE	$330
MAXIMUM PLANING THICKNESS, WIDTH	6 in., 13 in.
WEIGHT (NET)	74 lbs.
SPEED (NO LOAD)	9,900 rpm
KNIVES REVERSIBLE	Yes
EXTRA SET OF KNIVES INCLUDED	Yes
KNIVES CAN BE SHARPENED	Yes
PRICE FOR NEW SET OF KNIVES	$30
DUST-COLLECTION HOOD	Optional ($20)



Ridgid TP1300LS

Heavy. Smallest amount of snipe (tie). Fastest and easiest knife changing. Least noisy. Easy-to-use cutterhead lock. Moderately priced.

TELEPHONE NUMBER	(800) 474-3443
AVERAGE STREET PRICE	$397 (includes stand)
MAXIMUM PLANING THICKNESS, WIDTH	6 in., 13 in.
WEIGHT (NET)	84 lbs.
SPEED (NO LOAD)	9,500 rpm
KNIVES REVERSIBLE	Yes
EXTRA SET OF KNIVES INCLUDED	Yes
KNIVES CAN BE SHARPENED	No
PRICE FOR NEW SET OF KNIVES	$30
DUST-COLLECTION HOOD	Included

To create a better overall picture of the planers in this review, Schleining included several hands-on measurements, such as checks of snipe and blade-changing time. The chart at right has the results.

Snooping for snipe. *Snipe was measured with a dial indicator.*

Changing knives shouldn't be a chore. *Depending on the machine, the job can take anywhere from five to 25 minutes.*

Grizzly dust-collection hood wasn't available at the time of the test, but it is now.

Although all of the planers did an acceptable job collecting dust, the Delta machine won the test hands-down. After planing a board, I was hard-pressed to find even a thimbleful of chips around the machine.

In search of a favorite

The planers in this group fall into three general price ranges: low cost, midrange cost and high cost. For anyone with a tight budget, the Central Machinery, Geetech and Grizzly machines all retail for under $300. The midrange machines, which include the DeWalt, Jet, Pro-Tech and Ridgid, cost between $300 and $400. At the high end are the Delta and Makita planers, which both sell for more than $400.

HOW THE PLANERS PERFORMED

BRAND	AVERAGE SNIPE PER SIDE	OUT OF PARALLEL	NOISE (LOAD)	TIME NEEDED TO CHANGE KNIVES
CENTRAL MACHINERY 6469-5VGA	0.0075 in.	Less than 0.001 in.	105 dB	25 minutes
DELTA 22-580	Less than 0.001 in.	Less than 0.001 in.	95 dB	17 minutes
DEWALT DW733	Less than 0.001 in.	Less than 0.001 in.	98 dB	17 minutes
GEETECH CT-345	Less than 0.001 in.	0.007 in.	98 dB	12 minutes
GRIZZLY G8794	0.0055 in.	0.002 in.	95 dB	18 minutes
JET JWP-12DX	0.0025 in.	0.006 in.	101 dB	20 minutes
MAKITA 2012NB	0.0035 in.	0.002 in.	99 dB	15 minutes
PRO-TECH CS6005	0.0020 in.	0.002 in.	98 dB	25 minutes
RIDGID TP1300LS	Less than 0.001 in.	0.004 in.	94 dB	5 minutes

Each one of these nine machines produced impressively smooth surfaces on the test boards. So when it came to the all-important category of surface smoothness, I gave all of them the same grade: excellent.

Among the low-cost planers, the Grizzly and the GeeTech got high marks in some other categories. The GeeTech had the least amount of snipe. Plus, its slotted knives can be changed quickly. The Grizzly was one of the quietest machines.

Among the midrange-cost machines, I liked the DeWalt and Ridgid a lot. The Ridgid comes with a stand. Also, the DeWalt and Ridgid planers include an extra set of knives and a dust-collection hood. Both hoods have a full 4-in.-dia. outlet, ideal for most dust collectors, and a smaller outlet that fits most shop-vacuum hoses. On both machines the cutterhead locks reduced snipe to nearly zero.

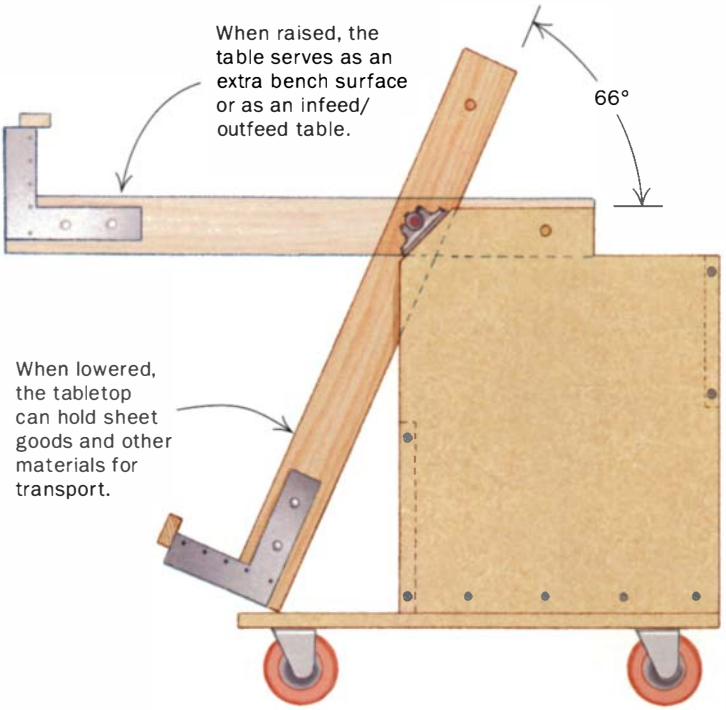
Watch it on the web
For tips on buying a planer, go to www.finewoodworking.com.

It took only five minutes to change the knives on the Ridgid planer—best of the bunch. And it was the least noisy machine in all price ranges.

The high-cost category, as you might expect, offers more benefits and features than the lower-cost models. The Delta planer had the most effective dust collection of any machine I tested. Its repeating thickness feature worked flawlessly to within a couple thousandths of an inch. Also, it's the only portable thickness planer to offer two feed speeds, although I couldn't detect any appreciable difference in surface quality between fast and slow feed rates.

The Makita is the lightest and most compact of the lot, features especially important for someone who moves the planer frequently. It has a simple, effective depth gauge. The knife-holding system made changing knives a pleasure. My only gripes were that the dust hood is 3 in. dia. instead of the standard 4 in. dia., and that there was more than average snipe. The Makita, although the most expensive of the planers tested, is the one I would most want in my shop. □

Lon Schleining (www.woodbender.com) is a contributing editor and author of Treasure Chests: The Legacy of Extraordinary Boxes (*The Taunton Press, 2001).*



Tilt-Top Shop Cart

Move large, unwieldy stock without breaking your back

BY FRED SOTCHER

The first time I manhandled a sheet of 1-in.-thick medium-density fiberboard (MDF) onto my tablesaw, I realized that I needed something to assist with this backbreaking task. So I set out to design a materials-handling cart. But I wanted more than just a plywood mover. My wish list required this shop aid to do the following tasks:

1. Assist with feeding large boards and sheet goods onto the tablesaw
2. Transport sheet goods and other materials from my truck to the shop
3. Double as an additional bench surface when needed
4. Act as a tablesaw infeed/outfeed table
5. Store conveniently out of the way

It's safe to say that the cart I created meets all of those requirements. The tilting top makes it easy to load and feed sheet goods onto the tablesaw. Heavy-duty casters allow me to wheel it around the shop easily. And it also works as an independent bench or as an outfeed table extension to my tablesaw.

I wanted a top that remained flat yet was light in weight, so I chose torsion-box construction. The interior is made up of 3-in.-wide pine strips stapled and glued into 5-in. squares. The box then is framed with a thicker hardwood and the two sides are covered with Masonite. Pressure laminate is applied over the Masonite on the top. Two ⅛-in. by 12-in. by 12-in. metal angles (Simpson 1212L), with one leg cut off each at 7 in., support the shelf, which is constructed of hardwood.

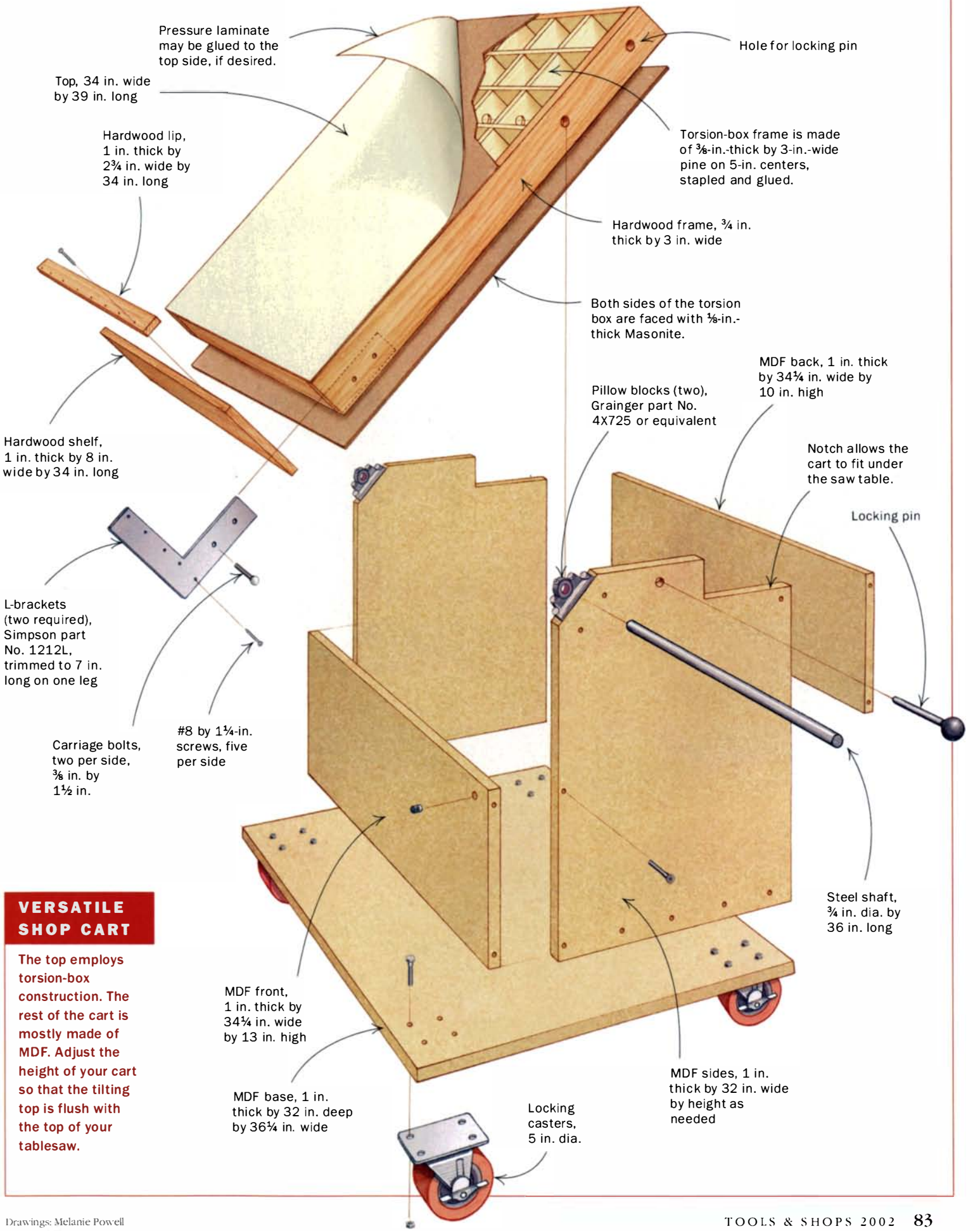
The base of the cart is built using 1-in.-thick MDF and connected with ¼-20 knockdown fasteners. (You could probably get by with ¾-in.-thick MDF.) A ¾-in.-dia. shaft extends through the table and terminates in pillow blocks at both ends, forming the pivot point for the table. With the pivot point near the center of gravity of the sheet goods, you can pivot several hundred pounds of material with little effort. At the opposite end of the table, a ⅜-in.-dia. locking pin is used to lock the top in the horizontal position.

I made the cart the same height as my tablesaw. When I'm not using it to feed stock, it fits behind the saw, where it acts as an outfeed table extension. □

Fred Sotcher is a retired electrical engineer and an avid woodworker who lives in San Jose, California.

The L-shaped tilting top holds several sheets of plywood. *A pin locks the tabletop in the horizontal position. Large locking casters can handle bumps in the concrete without stalling. Pillow blocks make for a smooth pivoting action.*

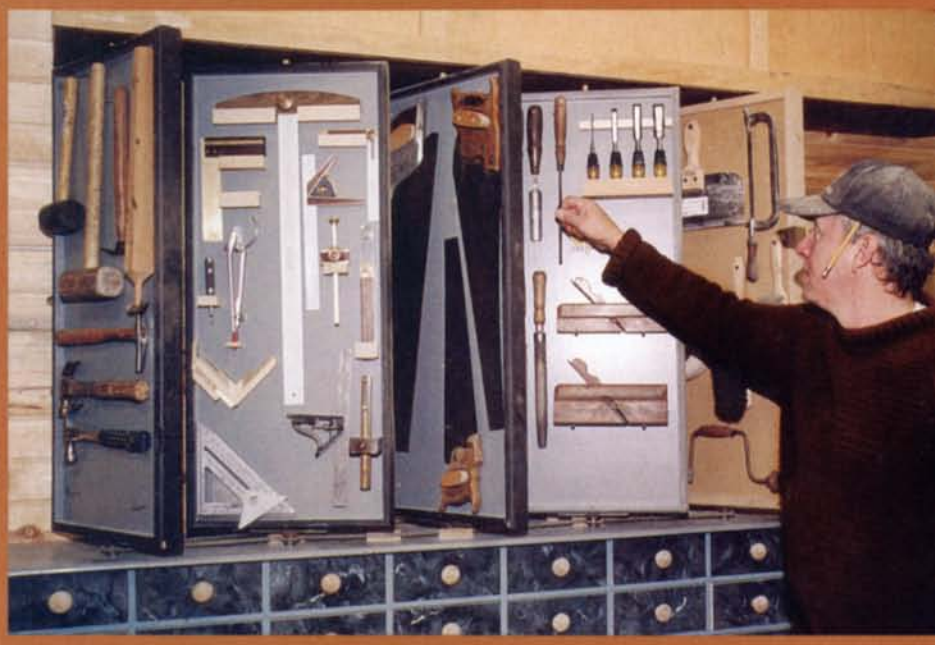
Photos: Anatole Burkin



VERSATILE SHOP CART

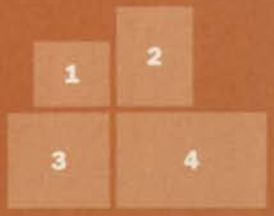
The top employs torsion-box construction. The rest of the cart is mostly made of MDF. Adjust the height of your cart so that the tilting top is flush with the top of your tablesaw.

Drawings: Melanie Powell



Four Ways to Get Organized

Plain, fancy, simple or clever—there's a storage concept to fit your needs



1 ELEGANT CABINETS

2 MOVABLE TOOL RACKS

3 USING WASTED SPACE

4 REVOLVING TOOL RACK

Woodworkers who are passionate about their craft spend a lot of time in their shops, perhaps more than in any other room of their homes. It's no surprise, then, that many woodworkers go out of their way to set up a comfortable, organized, even elegant workspace. You can tell from the way these craftsmen have set up their shops that they take great pride in their work. Following are snapshots from four shops scattered coast to coast that show the creativity of their owners. We hope they inspire you to make your shop a better place to work.

Photo, this page (bottom right): Leroy Trujillo

Elegant Cabinets

If fine cabinetry is good enough for the kitchen, why not the workshop, too?

BY DAVE PADGET

T-slotted panels, common in retail displays, are used inside the cabinets. *Custom-made tool holders fit into the slots. The backs of the doors are fitted with Peg-Board.*

Tool storage chests and cabinets are an ancient and respected art form worthy of our best efforts. Besides their obvious usefulness, well-designed toolboxes allow craftsmen to test and demonstrate their skills. I can't help but think that these works also provide their makers with great satisfaction and enjoyment.

I know that shops are usually works in progress, constantly evolving to meet new requirements. Therefore, when designing my present shop, I tried to make things adjustable, convertible or adaptable to mitigate the scarring of the shop that inevitably results from perpetual changes. However, I still wanted the workbench and tool cabinets to be permanent fixtures and placed them along a wall, freeing up the center of the shop for my tablesaw.

The 10-in.-deep by 144-in.-wide by 45-in.-high tool cabinet over the workbench is, without a doubt, the focal point of the shop. It features six maple raised frame-and-panel doors with walnut splined corners. The case is topped with a high crown cornice with two maple crown moldings accented with black walnut trim. The fluted pilasters separating the three sections of the cabinet have corbels at the top supporting the cornice. A small pullout shelf at the bottom of each pilaster keeps my coffee cup off the workbench. One of the pilasters houses a 4-in. dust-collection duct.

Inside the cabinet my tools are hung on T-slotted panels (commonly seen in retail displays). These panels are for mounting fixtures and require a metal bracket that slips into the slot. They are

Solid-wood cabinets dress up the shop. *Padget loves spending time in his shop, and he's made it as elegant as the rest of his home.*

Photos, except where noted: Anatole Burkin

durable, stable and easily adapted to a variety of needs. The panels and the metal brackets can be ordered from commercial retail merchandising distributors such as Too Home (800-878-6021).

A workbench often is called upon to handle tasks other than woodworking. Tools such as lawnmowers and chainsaws aren't kind to a maple benchtop. That's why I covered 5 ft. of my 12-ft.-long bench with a stainless-steel cap.

The woodworking section of my bench is laminated maple with a maple face and end vises with walnut handles and walnut benchdogs. There is also a bench slave on the right leg to support long material while in the face vise. The bench features raised frame-and-panel ends and fluted pilaster legs. A maple storage cabinet under the work surface houses drawers with black walnut sides dovetailed to maple faces and sliding maple tills with walnut splined corners. The bench also is equipped with 110-volt and 220-volt power, high-pressure air and a vacuum.

Elsewhere in the shop I have two rolling storage units (one vertical, one horizontal) for sheet goods. These units have heavy-duty hinges on one side attached to the wall or adjoining cabinet. Two 3-in. heavy-duty casters on the other end support the outward end off the floor and allow the unit to be swung or rolled out from the wall for easy access to the contents. It can be pushed back against the wall and out of the way. One of the rolling units can be made from a 12-ft. 2x10 and one 4x8 sheet of plywood. I mounted the vertical unit on the side of the clamp storage closet. The horizontal unit is mounted to a wall shelf support. All of the shelving in my shop is attached to the walls rather than standing on the floor (saving precious floor space) and is totally adjustable.

Swiveling vertical storage unit. *One edge is fastened to the wall with heavy hinges, and casters underneath allow the unit to pivot for easy access.*

The pursuit of shop storage perfection will go on and on because it is as individualized as each woodworker. The important thing is to engage in and enjoy the creative process. □

Dave Padget works wood in Olympia, Wash.

Movable Tool Racks

Wall-hung, solid-wood racks are not only adaptable but also cover cinder blocks

BY CARL SWENSSON

I work in a cinder-block basement shop and, needless to say, the walls are not pretty. I've partly solved this problem and answered the question of how to store most of my hand tools by building simple tool racks out of clear pine. The racks lend a warm touch to an otherwise visually cold working environment.

The racks are hung on French cleats, which allow me to move a whole set of tools to where I'm working in the shop.

It's easy to reconfigure a tool rack. *Just pull out the nails and start over.*

I went a little overboard by gluing up blocking to the front of the cleats (and to the front of the lower spacer blocks as well) to create breadboard ends. The blocking extends a hair beyond the face of the rack and produces a shadow line, which lends a finished look.

This simple tool-rack design is practical for many reasons. First, I know where every tool is at a glance. Because the most-used tools are so easily and conveniently stored, I'm less apt to let them pile up and clutter my bench when working.

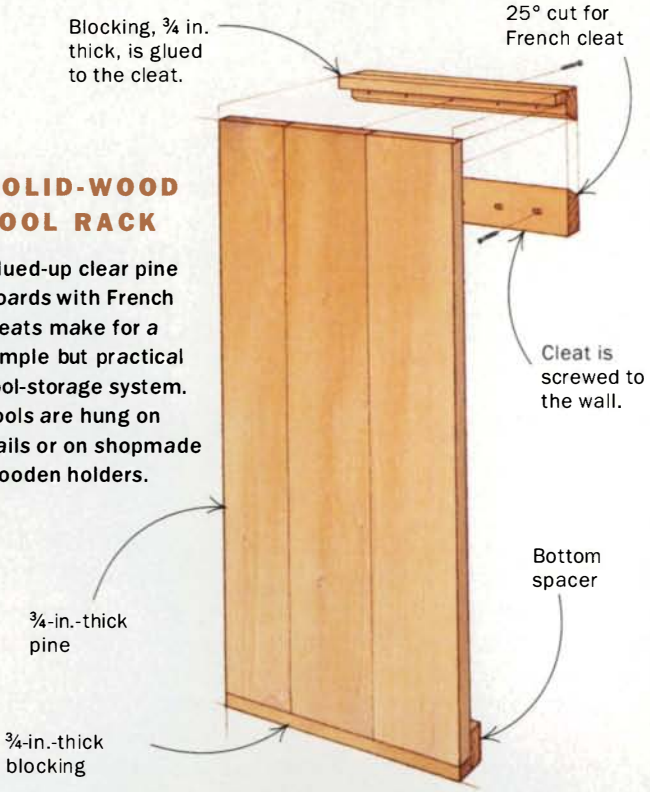
To add or subtract tools from the racks, all I need is a claw hammer and a fistful of nails. Although you can hang a lot of tools just by a nail alone, I did make a number of wooden holders for things like chisels and hammers. Most of these holders are simple blocks of wood with notched holes that allow a tool to be slipped into the holder without having to raise it very far and bump into other tools placed above. If you design your holders so that tools must be lifted up and out, you have to leave room above, which wastes space.

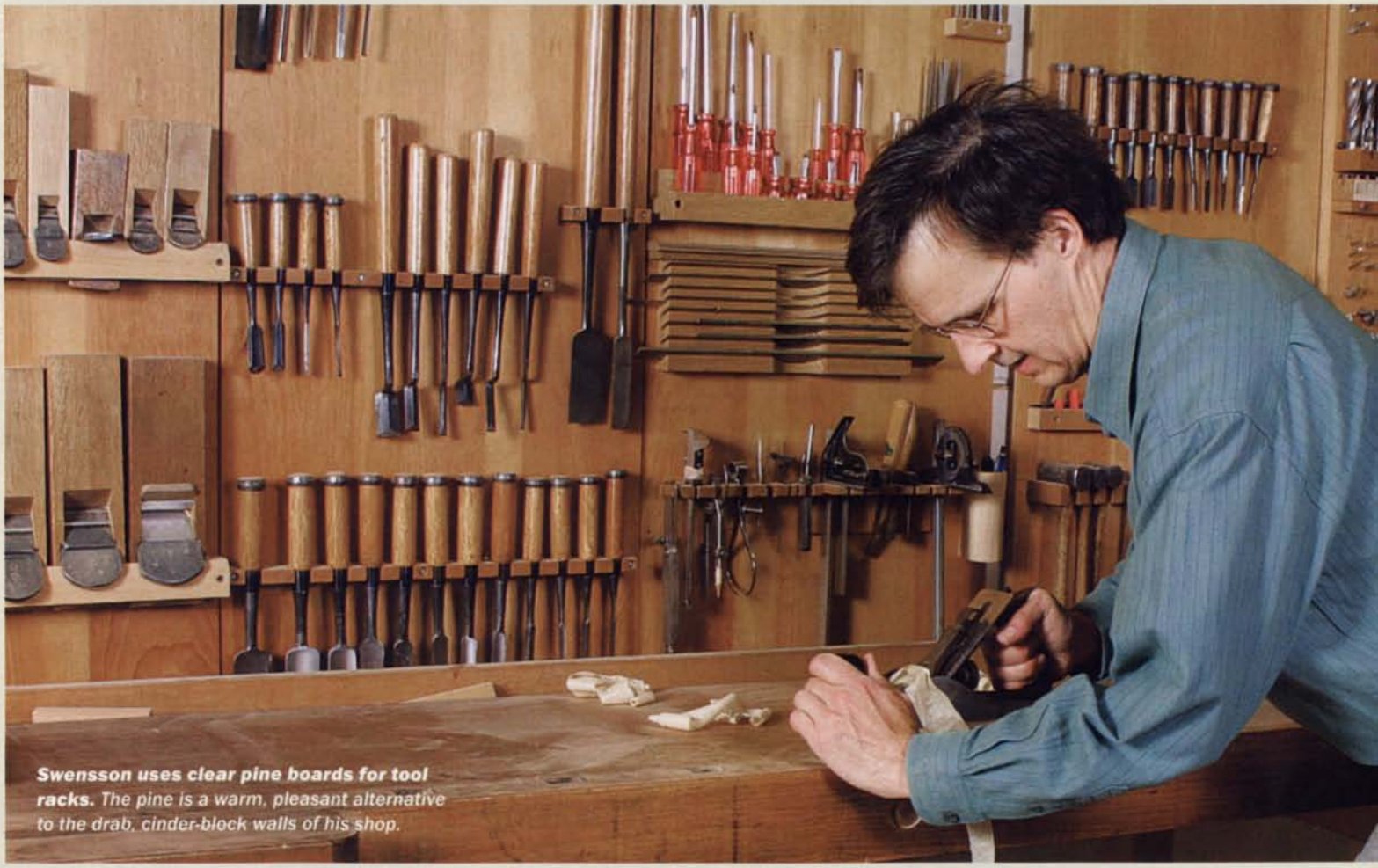
Last, I've noticed that when my customers visit my shop, they enjoy seeing this orderly display of tools. It gives them a sense of what is needed to create a piece of furniture. □

Carl Swensson designs furniture and teaches woodworking in Baltimore, Md.

SOLID-WOOD TOOL RACK

Glued-up clear pine boards with French cleats make for a simple but practical tool-storage system. Tools are hung on nails or on shopmade wooden holders.





Swensson uses clear pine boards for tool racks. *The pine is a warm, pleasant alternative to the drab, cinder-block walls of his shop.*

Using Wasted Space

Get the most out of your shop and use underutilized spaces

BY FRED SOTCHER

Overhead cabinets reside above the tablesaw. *Sotcher likes glass-door panels (left in photo) because they make it a lot easier to locate tools. And he says he has not broken one pane in 10 years.*

A well-designed storage system makes it easy to find tools and hardware, allows for flexibility as needs change and makes the best use of limited space. It also should be low in cost, look good and show off the more attractive tools. I have a variety of storage systems in my basement shop that meet these requirements.

I've never seen storage cabinets that hang out over part of the tablesaw. But that's exactly what I built. My cabinets fill the wasted space to the right and rear of the blade and store jigs for the saw. Doors on both ends let in enough light for me to find things easily. The cabinets are set far enough out of the way that I never run into a problem when cutting tenons or other tall parts.

You hardly ever see glass-faced cabinets in workshops, but I built some anyway. In the 10 years since, I have yet to break one pane of glass. I did mount them rather high, at about the same level you would install kitchen cabinets. I can spot what I need from halfway across the room.

If you have a set of stairs leading into your shop, build shelves or pullout drawers to fit under the treads. You'd be surprised at how much stuff can be put away in this awkward space.

There are a lot of small items that need to be stored in the average workshop, including screws, hinges, template rings for routers and replacement parts. Instead of tossing them in drawers or on shelves where they will get mixed up, I use jars, plastic storage bins and what are known as stock boxes, cardboard storage bins that you can buy from industrial suppliers such as Grainger (check your Yellow Pages) and MSC (800-645-7270).

I like to have my hand and power tools within easy reach. For them, I built angled (set at 15°) display racks. I screwed French cleats to the faces of the racks to hang specially designed tool holders. Heavy tools have dedicated holders. This system allows me to reconfigure the racks as needed. □

Fred Sotcher is a retired electrical engineer who works wood in San Jose, Calif.

Adjustable wood storage rack. *The rack is converted from horizontal storage to vertical storage by simply removing the cross pieces.*

Angled tool racks are placed above the bench. *Individual tool holders are attached to the rack with French cleats.*

Revolving Tool Rack

New spin on storage maximizes wall space

BY JOE JOHNS

Five-panel tool rack revolves. *Johns' tool rack provides about 40 sq. ft. of storage while taking up only 15 sq. ft. of wall space.*

Whether your shop is large or small, and your tool collection miserly or princely, it is satisfying to figure out storage solutions that are efficient, adaptable and inexpensive. Now, I don't have anything against Peg-Board, but frankly, Peg-Board is boring. I like to show off my creativity in the shop as well as in my woodworking. That's why I designed a swiveling tool rack.

My tool rack makes highly efficient use of wall space. It takes up only about 15 sq. ft. but returns 40 sq. ft. of storage (both sides of the panels are usable). The panels don't bump into each other because they're all linked via sprockets by a length of chain.

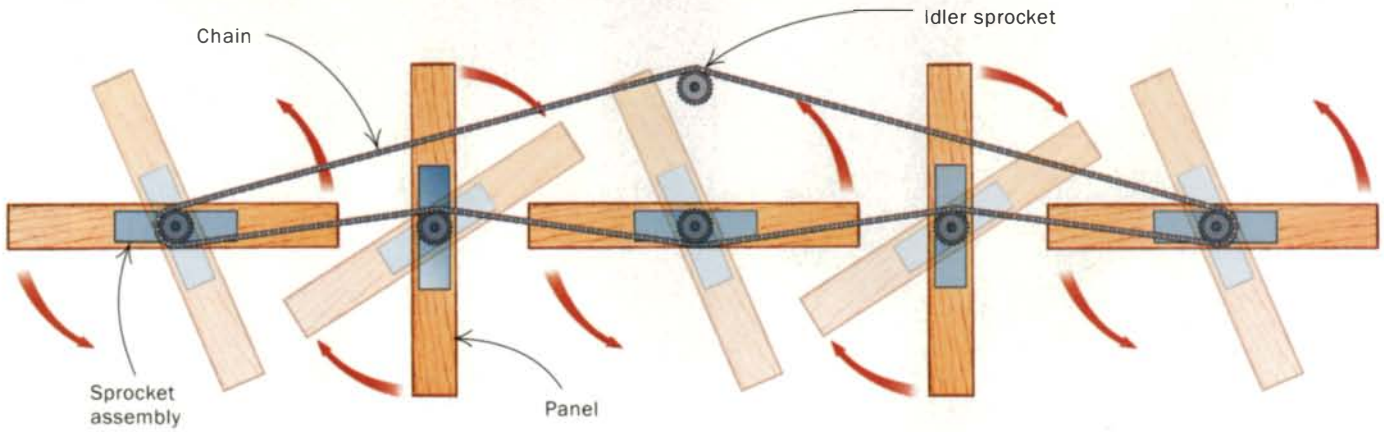
The construction of the panels couldn't be simpler. They consist of ½-in.-thick medium-density overlay (MDO, which is fir plywood covered with paper), surrounded by a 2-in.-thick frame of medium-density fiberboard (MDF). Each panel is centered on a metal pin attached to a sprocket connected to a length of chain. A second pin is attached to the top of each panel frame. I fitted my panels between upper and lower cabinets (the pins on the frames fit into matching holes in the cabinets). But to simplify things, you could fit the panels between a pair of L-shaped plywood support brackets bolted to the wall. Be sure to use lag bolts and tap into the studs. For tool holders, I drilled holes in the panels to accept lengths of wooden dowels and steel rods. It's easiest to do this with the tools arranged on a panel laid flat.

For more details on the construction of my tool rack, visit my web site: www.blackfoot.net/~woodwork/revolve.htm. □

Joe Johns lives in Ronan, Mont., where he specializes in furniture design, antique repair and refinishing, and custom cabinetry.

BIRD'S-EYE VIEW OF THE TOOL RACK

With a revolving tool rack, both sides of each panel can be put to use. And with so many tools out in the open, it's a lot easier and faster to find what you are looking for.



Photo, this page: Leroy Trujillo

Hammers and Mallets

Woodworking's original blunt instrument has evolved into a wide range of specialized tools

BY MARIO RODRIGUEZ

Fine woodworking is usually characterized by the careful cutting and fitting of joints that then slide together with only hand pressure. However, sometimes a little coercion is the most efficient response to a stubborn joint. In my shop I employ a variety of hammers and mallets to help me in a multitude of tasks: interior demolition and disassembly of existing work, dry-fitting of carcases, built-in installations and adjustment of tools such as the blades on molding planes. My favorite hammers and mallets are laid out here, along with explanations of what I use them for. □

Mario Rodriguez is a contributing editor.

16-OZ. STRAIGHT-CLAW HAMMER ▶
This hammer is great for heavy work in the shop: assembling large-scale dovetails, driving lag bolts before wrenching them and setting the pronged drive center for a lathe into a blank. The head and handle are one piece, making this hammer a favorite among the pros because of its indestructible nature. At 21 years, this is my oldest hammer.

◀ 20-OZ. STRAIGHT-CLAW HAMMER
I use this heavy bruiser for construction and installation. The weight and length of this hammer are sufficient to drive an 8d common nail in two blows. The straight claw is useful for chipping stuff out of corners as well as for prying things apart. I prefer a fiberglass handle for a tight and permanent fit with the head; the rubber sheath gives a nonslip grip.

12-OZ. BALL-PEIN HAMMER ▶
A small-scale, machine-shop staple comes in handy in my woodshop. There is always some bit of metal needing to be coaxed into place or straightened out. This hammer also does more mundane duty, such as tamping down paint-can lids.

12-OZ. CURVED-CLAW HAMMER ▶
For light assembly, this hammer's compact size reduces the chance of causing inadvertent damage. The red-oak handle feels good, but I have had to tighten it with oak shims a couple of times. The curved claw gives good leverage for pulling out nails without destroying the work.

◀ JAPANESE HAMMER
This hammer is useful for setting the irons in Japanese planes, and for woodworking in tight corners. The head is of cast steel with a handle fitted through the eye and held tightly with wedges.

◀ CROSS-PEIN HAMMERS ▶
Also known as a Warrington hammer, this style is considered a versatile shop hammer, as evidenced by the wide range of sizes it comes in. I use the 3½-oz. hammer (right) for delicate tasks such as nailing brads in picture frames, while the 12-oz. size (left) does universal duty. The tapered pein—the end of the head opposite the main striking head—can be used for starting small nails with less chance of hitting your fingers.

◀ 6-OZ. TACK HAMMER
When I picked up this hammer almost 20 years ago at a five-and-dime store, I replaced the original, flimsy lauan handle with a hickory one. Now I love the feel of this tool. It is perfect for restoration work such as setting small, solid-wood patches and inlays. I also use it for setting wedges into joints and for adjusting blades and cutters on my antique planes.

◀ LAMINATED MALLET
The head on this mallet comprises 1/16-in.-thick layers of laminated beech, making it stronger, heavier and less prone to splitting than a solid-wood mallet. The face of this mallet is designed to strike the work at a more efficient angle than a square-headed mallet would.

◀ LIGNUM VITAE CARVER'S MALLET
I use this when cutting mortises and carving. Unlike the square mallet, the round shape of this tool allows me to pick it up without having to orient its face to the work. I bought this mallet for $2 because of its crooked handle, but I wouldn't part with it for $20.

◀ DEADBLOW HAMMER
This rubber mallet features a hollow head filled with lead shot that delivers a solid blow without damaging the work. It doesn't have much visual or tactile appeal, but it's good for assembling large carcases.

◀ 2-LB. MASON'S LUMP HAMMER
I use this brute for light demolition work such as removing interior trim and woodwork. It also provides just the right force for assembling the undercarriage of my Windsor chairs. I replaced the original handle with one made of hickory.

◀ BRASS-HEADED MALLET
This mallet definitely punches above its weight. I use this compact tool mostly for carving because its ergonomic shape reduces fatigue. An added bonus of its small size is that it takes up less space in a tool bag.

Photos: Kathleen Williams

Dream Shop in the Woods

Built specifically for woodworking, this shop meets the needs of two busy furniture makers

BY LES CIZEK

The first impression people get when they enter our shop is that it looks more like a gallery than a shop. With artwork, large workspaces, whimsical design details and shining, clean floors, our shop is not like the cozy dens that many woodworkers use. It is, however, an efficient and comfortable place to work. As full-time custom furniture makers, my business partner Harry Van Ornum and I use every square foot of our shop, called Four Sisters Woodworking (inspired by a quirky Victorian photograph).

We've designed the space to be large, open and light-filled because that's the kind of environment we like to work in. Our shop is also the culmination of lessons learned from the poorly made shops we've worked in over the years.

Harry and I have more than 40 years of woodworking experience between us. We started our partnership in 1995 in a leased space in downtown Fort Bragg, Calif. We ran that shop for five years, renting bench space to four other woodworkers. It got to be a very busy place, and Harry and I found we were doing a lot of things other than making furniture. We decided to sell the place and build a perfect shop just for the two of us, leaving the landlord hassle behind.

This new shop is a unique and functional workspace (see the floor plan below). It comes very close to fulfilling our vision of the perfect shop.

Learning from our old shops

Years ago, I had my first shop in Florida in a corner of a storage building that was used primarily to shelter a boat. The space was cramped and dirty and left little room to work. Next came a garage with an awning that enabled me to move my work outside on good days. Harry also had some very poor shop spaces, the most notable being an unheated space in Minnesota.

The common denominator of all those shops seemed to be that none of them were designed for, or dedicated to, woodworking. We made buildings into woodworking shops rather than designed a shop just for woodworking.

Our ideal shop would have plenty of natural light, easy access for large pieces of lumber and sheet goods to be brought in, appropriate wiring for three-phase and single-phase machines, and finally, a comfortable floor.

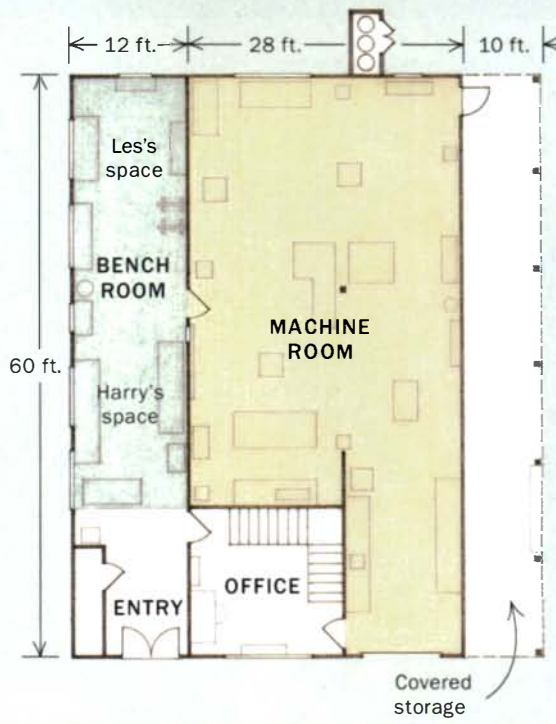
As Harry and I sat down to plan our new shop, we knew we

SEPARATE ROOMS FOR BENCH WORK AND MACHINE WORK

Because the furniture makers spend 80% of their time in the bench room, they relegated machine and bench work to separate rooms, giving each partner a quieter place for hand-tool work.

BENCH ROOM

Bench room for two. *With high ceilings and lots of light, the bench room is a comfortable place for handwork and finishing.*



MACHINE ROOM

Efficient layout. *Machines are arranged so that wood progresses in logical order from the lumber rack through all of the workstations.*

Photos: Tim Sams; drawings: Vince Babak

Harry's bench space

Harry Van Ornum's furniture requires a lot of handwork, and he does most of his work at his bench. He keeps frequently used tools nearby, such as clamps, squares and planes. He admits that he has more planes than he uses, but as a collector as well as a user, he sees them as functional art.

Cutting tools in line. *On his other bench (across from the planes), Van Ornum keeps his chisels and carving gouges within easy reach.*

wanted to build a woodworking space from the ground up.

The building blends with the site

Harry and his wife, Scotty Lyons, own a forested five-acre site about a mile from downtown Fort Bragg, and we decided to build there. We sited the shop to appear as if it were emerging from the woods. Warm and inviting, the building fits naturally into the surrounding redwood forest.

The exterior is typical of Mendocino County barns. The footprint is 60 ft. by 50 ft., which includes a 10-ft. by 60-ft. unenclosed extension on the south side. Harry's wife has a weaving studio in the upstairs portion of the shop, which is about 650 sq. ft. The basic shell of the building was erected by a contractor who specializes in agricultural and warehouse construction. Harry and I installed the windows and finished the interior, including building the second floor and all of the walls. Harry is also a general contractor, and his skills and knowledge made this work go smoothly.

The unenclosed storage area runs the full length of the building. Eventually, we'd like to enclose this area, but for now it's where we keep rough lumber as well as our panel saw for cutting large sheet materials.

Les's bench space

Cizek's fiery-faced tool cabinet in the background is typical of his finishing style, which frequently incorporates bright colors. His work area has the requisite shaping tools and a workbench.

The shop's exterior is redwood board and batten, and the roof is steel painted dark green. Sixteen skylights pierce the roof and produce a strong, diffuse light through the interior.

Separating bench and machine rooms

One major influence on our shop's design was the shop at the College of the Redwoods, which we both attended. The shop boasts separate bench and machine rooms. The advantage of this setup is that noise and dust are confined to the machine room, leaving the bench room as a quiet retreat for more intense work. The wall between these rooms has a layer of insulation and sound channel to help keep things quiet. While one of us is working stock in the machine room, the other can be cutting dovetails or drawing in the bench room. Neither disturbs the other.

A temple for tools. *Cizek decided that his prized, and much-used, custom Japanese spokeshaves needed to have their own home.*

Keeping those small parts organized. *Cizek made a library card catalog-style chest for screws, hardware and other items.*

The 12-ft. by 60-ft. bench room occupies the north side of the building. It is lit by six skylights, five north-facing windows and three metal halide lamps. Because we spend most of our time in the bench room, we tried to make it comfortable with lots of colors, painted wood floors and framed prints on the walls. We have found that being surrounded by color and art influences the creative process in each of us.

Likewise, the number of windows adds to the pleasing atmosphere. Whimsically shaped, recycled windows let in light between the rooms and break the expanse of large, white wall.

The machine room is accessed through a 3½-ft.-wide, two-way swinging door. The floor is a

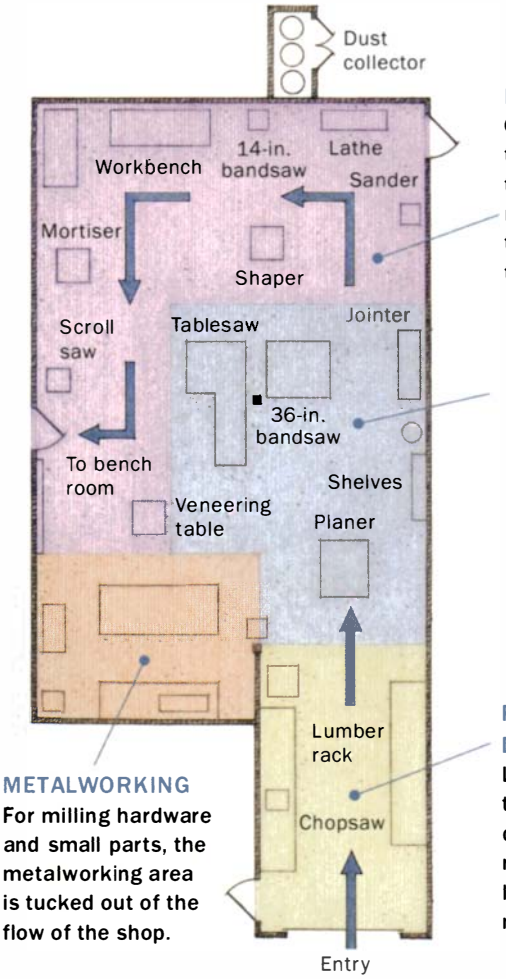
The machine room

Rough lumber enters here. *The lumber rack is close to the chopsaw. The jointer and planer are stationed just beyond.*

Dust collection for large machines. *The 36-in. bandsaw and sliding tablesaw are grouped together so that they can share a duct for efficient dust collection.*

WORKSHOP ZONES

Each operation has a zone within the shop at Four Sisters Woodworking. Lumber enters through the large garage-style door and then makes its way through milling, shaping and eventually to the bench room for handwork and finishing.



FINAL SHAPING
On a path toward the bench room, the shaping machines line the edges of the room.

MILLING
Machines are grouped together for easy transition between tasks.

ROUGH DIMENSIONING
Lumber enters through a wide door, is stored on a rack and is cut to length when needed.

METALWORKING
For milling hardware and small parts, the metalworking area is tucked out of the flow of the shop.

concrete slab painted with a durable epoxy paint. We left plenty of room around each machine to make the movement of stock easier. The machine room is lit by a combination of fluorescent lights and 10 skylights. With the skylights, we don't have to turn on the fluorescents until the evening.

Here on the north coast of California, summertime highs reach only the 60s and winters can be cold and damp. So we installed radiant heat under the floor in the bench room and placed forced-air propane heaters in the machine room.

How the shop works

In the machine room, we designed our shop around the flow of rough lumber to finished furniture. On the right side of the shop through a large garage door, we unload our lumber to the storage rack. We currently have a small lumber-storage rack where we keep a collection of furniture-grade wood (we keep a large cache in a barn at Harry's house). From there, we can take the lumber directly to the planer for milling. The jointer and large bandsaw are beyond the planer for further dimensioning. Next to the bandsaw, we have a sliding tablesaw for sheet goods and other uses. On the perimeter, we've located the shaping tools, such as a lathe, shaper and sanding machines, because they are used primarily with smaller pieces and don't require the room needed for manipulating large lumber. But we've left plenty of space between machines so that we can move around easily.

Harry and I do a lot of veneering, so we set up the bandsaw, jointer and veneering table for this process. We placed the jointer next to the large bandsaw because while we're cutting veneers, we often like to joint a face in order to get a clean cut.

We also have a metalworking area where we mill custom parts and hardware. We tucked this part of the shop into a corner of the machine room so that metal filings are kept away from lumber.

Our central dust-collection system is a three-phase, 7½-hp unit. We routed the ducting to each machine. The dust collector is outside the shop on the east side so as to keep the noise away.

Each of our bench spaces reflects our personal interests. I use a wide variety of finishes, including aniline dyes, so my tool cabinet has a fiery red face. I also have a cabinet full of my most-used finishing supplies and I am able to get to what I need easily. In addition, I have the hand tools that I require, but not much more. I do have a special set of Japanese spokeshaves that were custom made. To honor them as well as their maker, I built a small wall-hung pagoda that houses them.

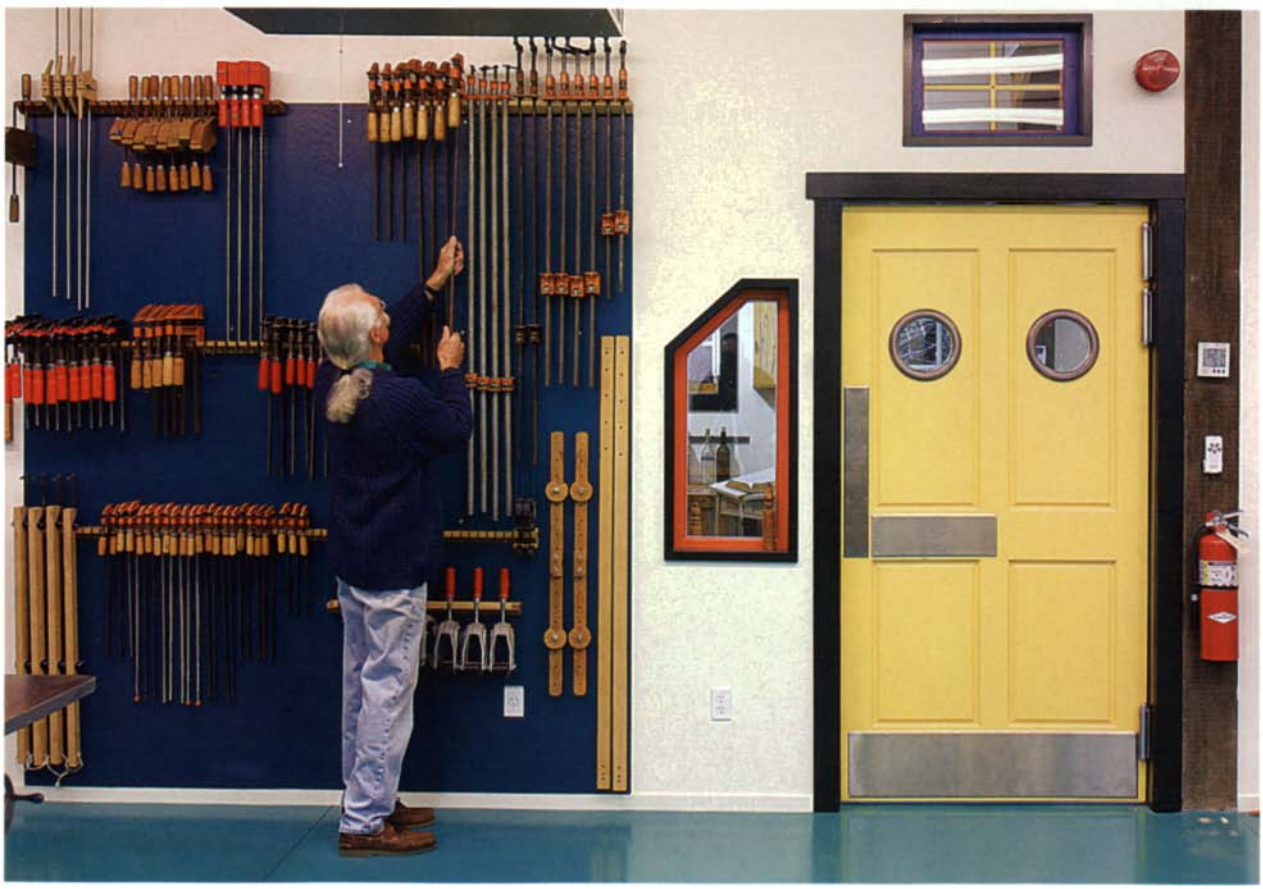
While one of us is working stock in the machine room, the other can be cutting dovetails or drawing in the bench room. Neither disturbs the other.

Harry is a collector and user of old tools, so around his bench he has a variety of classic, old planes. He also is an accomplished carver; therefore, his gouges and chisels are laid out in a line for easy access.

In addition to the natural and artificial light overhead, we installed spotlights at our work areas. We do all of our finishing at our benches. Because we use mostly rub-on finishes, we have no need for a spray booth, and the bench room is adequate for this work.

For the most part, this shop fulfills our dreams. While we wouldn't say that it has changed our furniture, a pleasant shop does make it easier to create quality work. In fact, we believe that our design of a large, open and light-filled space reflects the philosophy of our shop motto: *Sat cito, si sat bene* (Soon enough, if done well). If we were to start over, the only thing we'd change, believe it or not, is to make the shop larger. □

Les Cizek builds custom furniture in Fort Bragg, Calif. His wife, Norma Watkins, assisted with the article.



A colorful clamp rack. *The colors throughout the shop brighten the environment. The clamp rack also provides a reliable spot for storing essential tools. Portholes in the swinging door help avoid head-on collisions.*

Current Work

Current Work provides design inspiration by showcasing the work of our readers. For more details and an entry form, visit our web site at www.finewoodworking.com. Send photos and entry forms to Current Work, *Fine Woodworking*, 63 S. Main St., Newtown, CT 06470.

Merrall III MacNeille Marlboro, Vt.

MacNeille, who apprenticed under Karl Holtey for several months last year, made both of these shoulder planes (1¼ in. wide by 8 in. long by 2¾ in. high) at Marlboro College in Vermont. The American-rosewood and steel-sided skew plane is based on the Spiers-pattern shoulder plane. The ebony and cartridge brass plane is based on a stags-horn shoulder plane by George Miller. MacNeille cut the dovetails by hand with a hacksaw and file, and made extensive use of a drill-press cross vise and end mill for flattening and dimensioning. Each plane took 150 hours to complete. Both are finished with Watco oil and wax. Photo by Kathleen Williams

David Jeske Oregon City, Ore.

"I enjoy the quiet side of woodworking and wanted to create some marking tools that are functional yet a delight to use," Jeske said. This marking set is made from cocobolo, brass and tool steel. The knife is 6 in. long, and the gauge is 4 in. wide by 7 in. long by 2 in. high. Both tools are finished with an oil and varnish mixture and wax.

Roger Fowler
New Westminster, B.C., Canada

Fowler built this toolbox (7 in. deep by 38 in. wide by 16 in. tall) about 10 years ago when he was living in England. It is constructed out of mahogany scavenged from the renovation of a 400-year-old English pub. Fowler's toolbox is constantly evolving as he tries to improve it or to create a spot for a new tool. It is detailed with boxwood inlay and brass hardware, half of which is handmade. The toolbox is finished with French polish and wax.

Russ Filbeck San Diego, Calif.

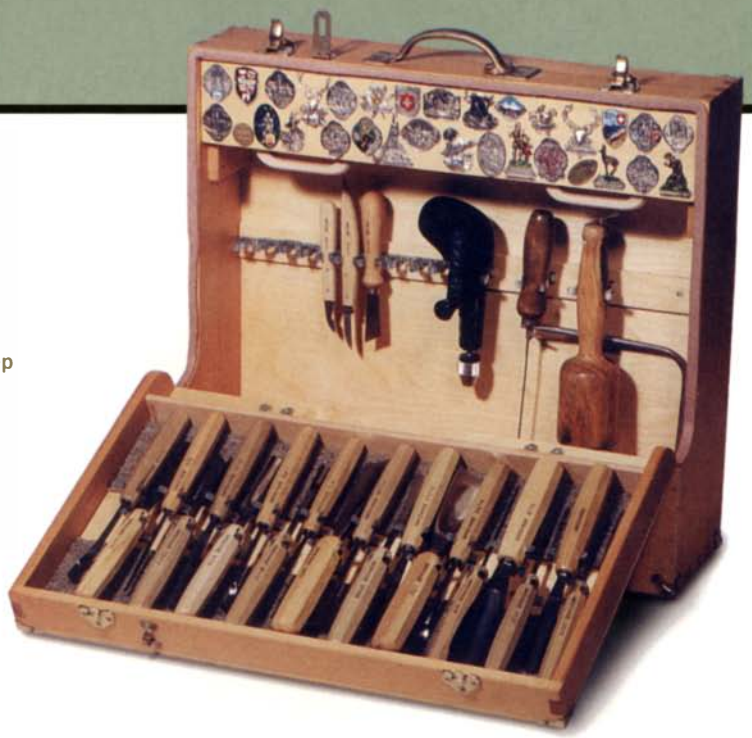
Filbeck, an instructor at Palomar College and an avid chair maker, crafted these three spokeshaves (each 1¾ in. wide by 11 in. long by 1 in. high) in an effort to make a high-performance tool. The cocobolo spokeshave on the left is a traditional design, while the curly maple one in the middle has the handles positioned lower, in line with the blade—an idea he got after seeing Brian Boggs' spokeshave. Filbeck modified that design with the boxwood spokeshave on the right by placing the handles in front. "Having the handles in front and in line with the cutting edge really improves the usefulness of the tool," he said. All three spokeshaves have an oil finish. Photo by Erika Marks

Cornelius Aten North Wiltshire, P.E.I., Canada

As a recently retired dairy farmer, Aten now has more time to pursue his childhood passion: woodworking. This walnut and cherry toolbox (10 in. deep by 24 in. wide by 20 in. tall) is just one of the many projects completed since his retirement. The coopered top is formed with 18 pieces, each cut at 10°, with a corresponding sunburst at each end. When the walnut and cherry laminated handle is in the upright position, the tails of the handle engage the small knobs of the two drawers on each end to prevent the drawers from sliding out. Aten lined the drawers and the top compartment with red velvet and now uses the box in his dining room to store fine cutlery. It is finished with Danish oil and wax.

Lark J. King Woodbury, Minn.

"A few years back, knowing that my current bench was fading and inadequate, I began thinking about bench design, function, materials and details of construction," said King. Turning to Scott Landis' *The Workbench Book* (The Taunton Press, 1998) for inspiration, King found everything he needed to design and build his own workbench. Taking 110 hours to construct, this workbench (32 in. deep by 93 in. long by 35 in. tall) is made from hard maple and padauk and weighs 350 lbs. The tail-vise assembly that King installed on his bench is one of the 95 extra assemblies produced by Atlas Machinery Supply Ltd. for the bench featured in Landis' book. The bench has a tung-oil finish.



Gordon Meinecke Thornhill, Ont., Canada

"One of the pleasures of wood carving is having a good and safe place for the tools," Meinecke said. Constructed out of pine and birch-veneer plywood, this carrying case (6½ in. deep by 19½ in. wide by 22 in. tall) features a built-in drawer, a metal strip of clips to accommodate extra tools and a felt-lined fold-down tray to protect and securely stow the tools. The drawer front is decorated with Swiss, Austrian and German *stocknaegel*—pins fastened by hikers to their walking sticks to show where they have been. The case has a clear lacquer finish.

John E. Stair Jr. Wilmington, N.C.

Based on the original, which is housed at Hancock Shaker Village in Pittsfield, Mass., and appears in Scott Landis' *The Workbench Book* (The Taunton Press, 1998), this mammoth Shaker workbench measures 37½ in. deep by 148 in. long by 34½ in. tall. Stair made the base from pine, using mortise-and-tenon joinery with walnut pins to secure the tenons. The top is constructed of three different woods: maple in the front, oak in the middle and poplar in the back. The tail vise is made of maple, while the leg vise and board jack are made of cherry. This bench took Stair a year to complete. The base is painted, and the top has a shellac finish.

Robert M. Soule West Haven, Conn.

After a 40-year career as a cabinetmaker, Soule keeps busy in his retirement years by restoring antique planes for himself and his friends. He has made many wooden planes, but this miter plane (2¾ in. wide by 11 in. long by 2¾ in. high) was his first attempt at a metal one. Taking approximately 80 hours to complete, it is made from cocobolo, brass and steel. The brass sides dovetailed to the steel sole were filed by hand, and the plane features a removable lever cap to facilitate easy maintenance. It has a tung-oil finish.

Wayne A. Anderson
Elk River, Minn.

A love of old tools combined with metalworking experience developed into a planemaking passion for Anderson, a mechanical designer for the defense industry. Hand-shaped and fitted without the use of machine tools, the smoother (1⅞ in. wide by 8 in. long by 6½ in. high) is made from walnut burl, bronze, brass and steel, while the infill smoother (1½ in. wide by 5½ in. long by 4½ in. high) is constructed of ebony with ivory inlay, bronze and steel. The smoother (left) is finished with tung oil and wax, and the infill smoother (above) is finished with wax.

Howard Reiche Falmouth, Maine

Working out of a cobbled-up tool carrier for years, Reiche finally decided to take the time and make an ornate one. "My son soon ended up with the first one, and one of my grandsons with the second. Finally, I was allowed to keep and use the third tool carrier," he said. Made from curly and bird's-eye maple, mahogany and cherry, each is a different size. But they all have a high handle that minimizes stooping. Each of the carriers is decorated with string, band and figure inlay, and all have a satin-urethane and wax finish. Photo by Jeffrey Stevenson

John Lehnus San Francisco, Calif.

This spokeshave (1 in. wide by 8 in. long by ¾ in. high) was born out of frustration. "Inspired by Mike Dunbar, I use spokeshaves constantly," said Lehnus, "but restoring original 19th-century ones to functionality was becoming too time-consuming, so I tried my hand at making my own from scratch." Carved from tiger maple, it has a wedged blade cut from a pair of old carbon-steel hedge clippers, annealed, forged and shaped with a MAAP torch and a variety of metal files. The finish is a combination of linseed oil, beeswax and carnauba.

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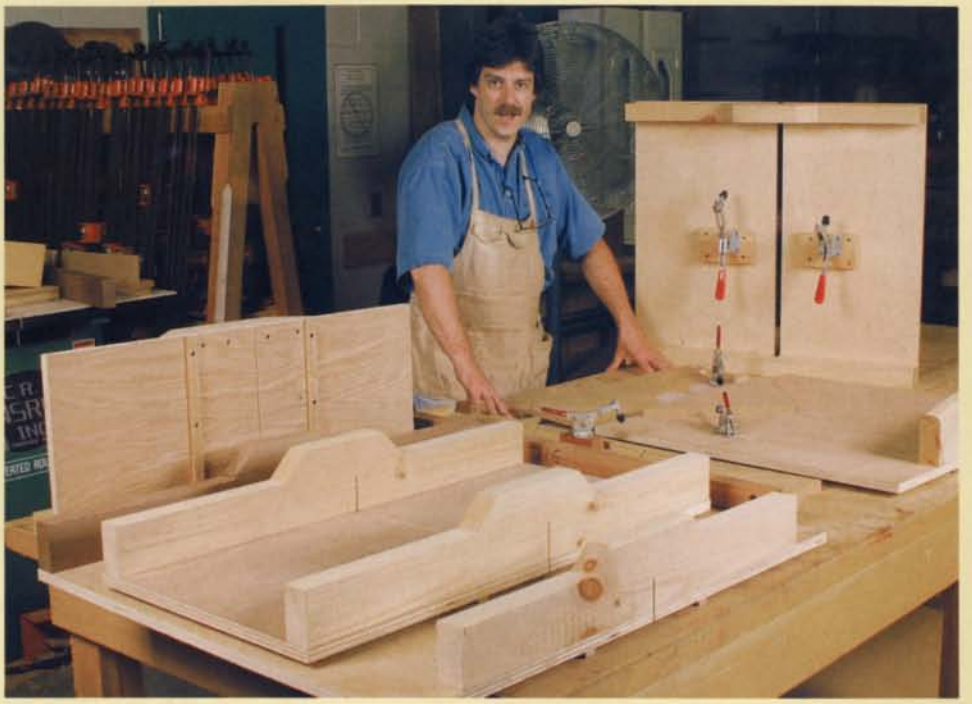
Tablesaw carriage jigs

A versatile family yielding speed, accuracy and safety

BY STEVE LATTA



A carriage jig makes crosscutting on the tablesaw easier and safer, allowing you to machine components consistently and accurately. But many of the jigs sold in catalogs are grossly overpriced and sometimes inadequate. I made a family of carriage jigs that meets the majority of my needs without taking too many of my hard-earned dollars (see the photos at right).

The jigs, made of plywood or medium-density fiberboard (MDF), offer numerous benefits. Two runners secured to the bottom allow each jig to carry and guide the stock in a controlled manner along a predetermined path of cut. The kerf in the jig becomes a fixed point for aligning a cut. And because the stock is off the tablesaw, it can be secured to the jig so that fingers are kept away from the blade.

The crosscut jig

This is the most basic of the four carriage jigs and will be the one you use most often. The other jigs simply are variations of the crosscut jig.

The body of the jig is ¾-in.-thick MDF or birch plywood about 22 in. by 30 in. For larger jigs like this one, I think plywood works a little better and lasts longer. Be sure to pick a flat piece without defects.

For the runners, use a hardwood like cherry or maple, preferably with straight grain to keep the runners from warping. Mill them slightly oversized and let them sit for at least a day before dimensioning them to fit the slots in your tablesaw. Put a small notch on each side of the runners where they mount to the underside of the body. The notches make it easy to trim the runners with a rabbet plane if they are too tight for the miter slots. Countersink holes about every 6 in. for the screws that will secure the runners to the body.

Mount the runners to the body—Lay the runners in the slots of the tablesaw. Place a light bead of glue down the runners, then lay the body of the jig over the runners, referencing off the tablesaw fence. Draw a pencil line from each center

CROSSCUT JIG

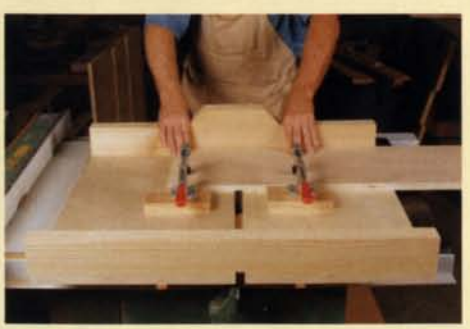
An auxiliary fence extends the reach of this workhorse. The hinged stop block allows Latta to flip the stop out of the way when making the first cut to square a board.

LARGE-PANEL JIG

With 30 in. between fences, this jig is used to square up panels and case sides.

MITER JIG

As long as the miter fence corner nearest the sawblade is a perfect 90°, and you cut adjoining workpieces on opposite sides of the fence, you are guaranteed a 90° miter joint.



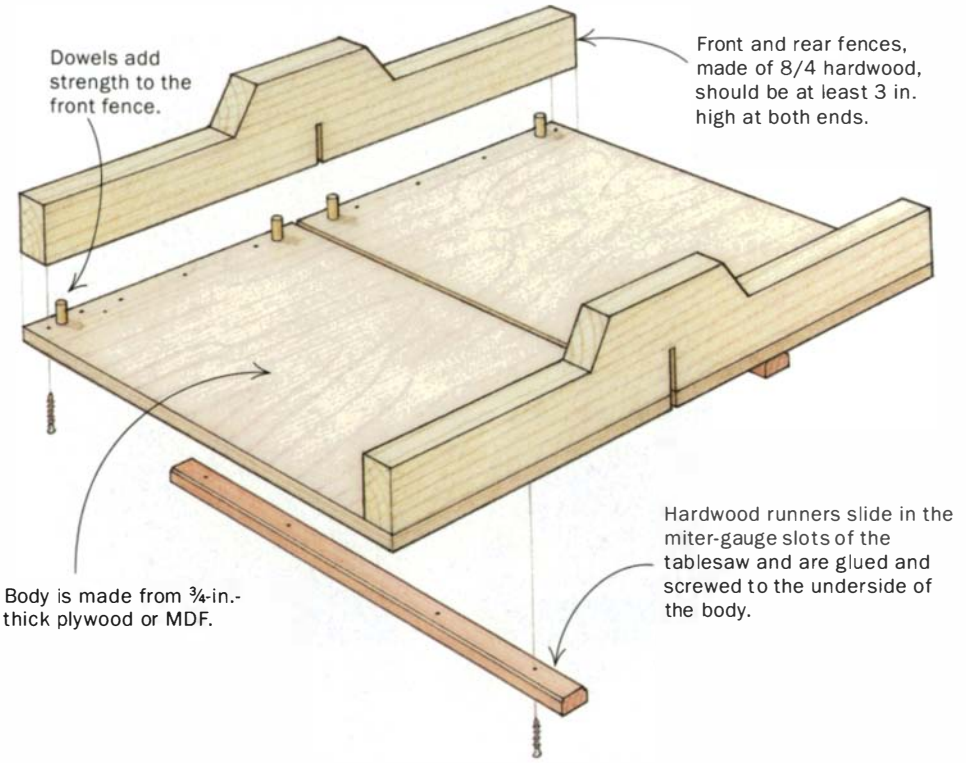
DADO JIG

With the workpiece secured by two De-Sta-Co clamps, the operator's hands are kept well clear of the blade.

Photos: Mark Schofield

A BASIC CROSSCUT JIG

Tailor the size of the jig to fit the work you do. The crucial features are a front fence perpendicular to the line of cut and runners that slide easily without play.



of the front of the runners to each center of the rear of the runners. Tack a few brads to hold the runners in place temporarily.

Slowly slide the jig off the front of the saw until the first set of screw holes is visible from the bottom. Screw each runner to the body of the jig. Repeat this procedure on the back of the saw. Slide the jig forward and backward until all screws are in.

At this point, the carriage should slide easily without play. If the jig sticks, use a rabbet plane to trim the shiny spots of the runners until the carriage slides easily. Less is more here: If the humidity is high, leave the jig running a little stiffly; it will work fine in drier conditions.

Attach the fences to the body—The crosscut jig has two fences that keep the two halves of the jig connected. The front fence (nearest the operator) also serves as a reference edge for the workpiece, so it must align perfectly.

Make the fences out of straight-grained 8/4 stock. Cut the pieces to rough size, then let them settle for a day or so before final dimensioning. I make the fences at least 3 in. high (and taller at the center). When machining the raised center section, leave enough stock on both sides of the kerf so that your fingers will stay clear of the blade as it exits the jig.

Glue and screw the rear fence along the back edge of the body. The rear fence does not need to be perfectly square because nothing is referenced off it. Raise the blade to full height, run it through the rear fence and cut just about all of the way to the other side of the plywood.

Along the bottom front edge of the body, drill and countersink a series of screw holes to secure the front fence. At one end, drill three holes close together but slightly offset. At the opposite edge, secure the fence to the body with a single screw. Using an architect's large plastic drafting triangle, adjust the fence so that it is square to the blade. Screw down the opposite corner through one of the three holes and

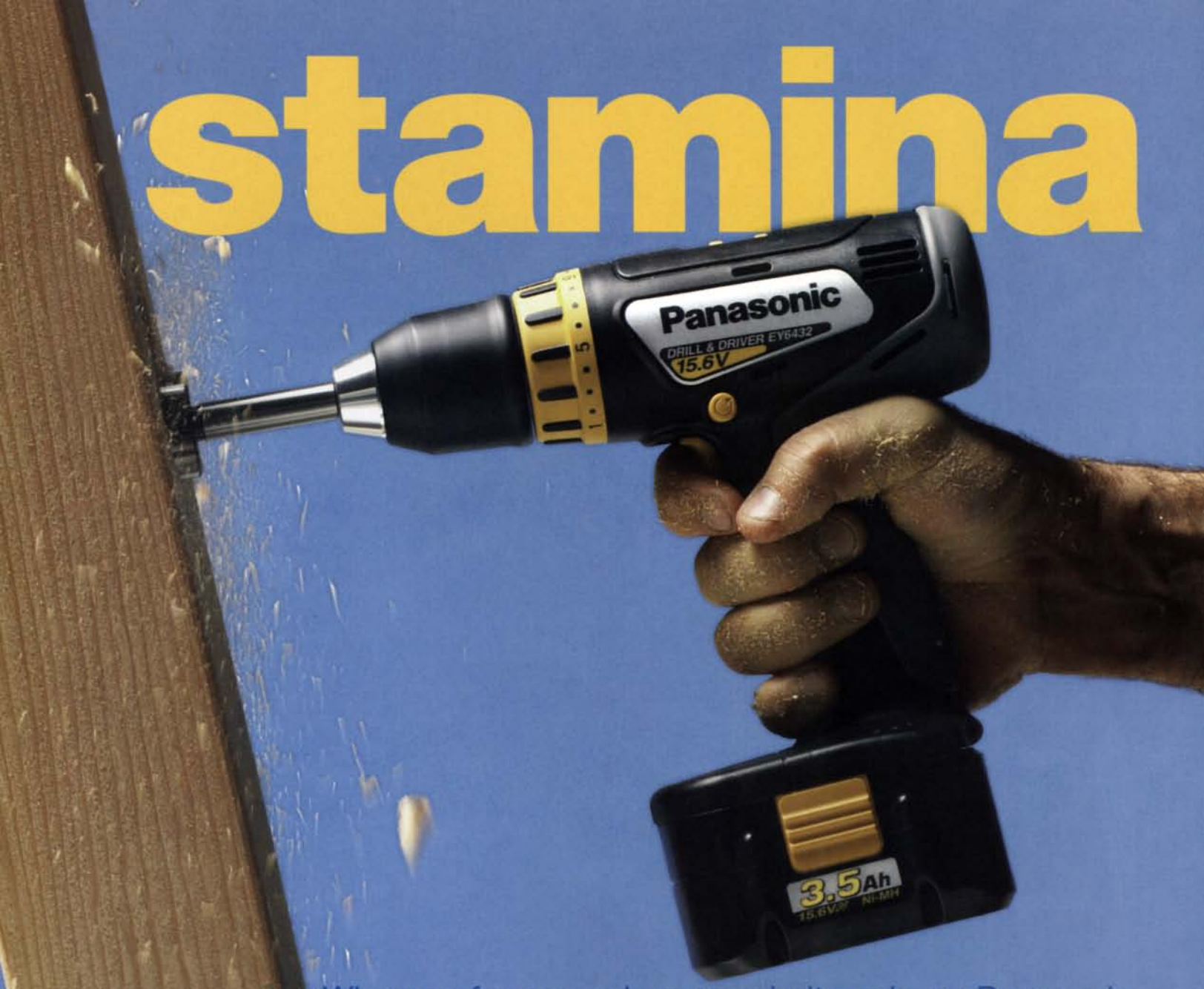
MILL AND ATTACH THE RUNNERS

Tight but recessed. *The runners are slightly shallower than the miter-gauge slots but the same width. The notches make fine-tuning easier (far right).*

The runners are first glued and tacked to the body of the jig. *Then screws are driven in to reinforce the connection.*

Fine-tune the fit. *If necessary, plane the runners so that the jig slides easily in the miter-gauge slots.*

stamina



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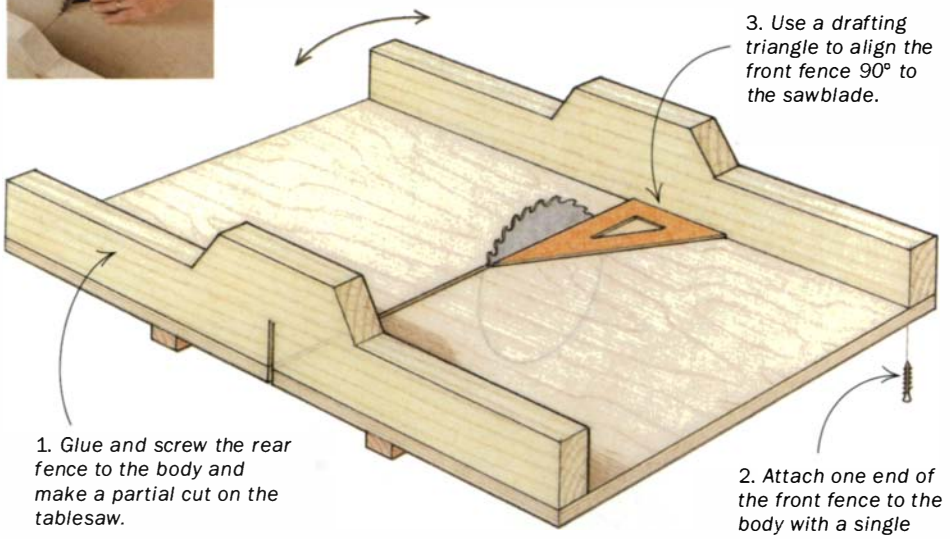
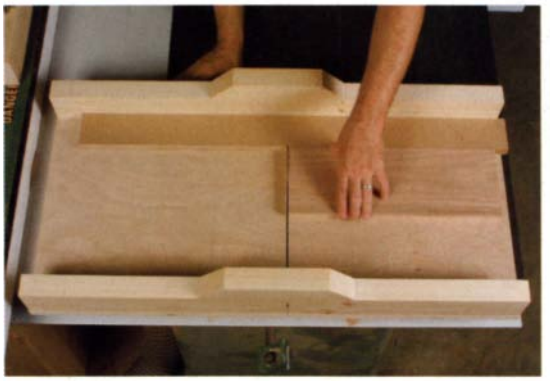
ALIGN AND ATTACH THE FENCES

Align the front fence. *Because the workpiece registers against the front fence (nearest the operator), it is critical that it be perpendicular to the sawblade. Make trial cuts and adjust the front fence until the location is perfect.*





Make a sample cut. *To preserve the front fence until it is aligned properly, use a backer board with perfectly parallel sides when making the sample cuts.*

Cut once, measure once. *Check your sample cut for squareness. If necessary, adjust the front fence slightly.*

A strong but replaceable fence. *Attach the jig to the fence with screws. Then bore holes for dowels and apply glue to the fence portion only. The dowels add strength without prohibiting easy replacement of the fence.*

make a trial cut to see if the fence is cutting at 90°. If it's not, adjust the fence and resecure it using one of the other three holes.

The reason for offsetting the three holes is that it lessens the chance of splitting the fence if all three holes have to be used. Once it is aligned properly, screw down the fence along its entire length. To add a little reinforcement to the screws, insert a ⅜-in.-dia. dowel through the bottom at the ends of the fence and about an inch from both sides of the kerf.

Adding an auxiliary fence for regular use is a good idea. The new kerf not only reduces tearout and blade distortion as the blade exits the stock, but it also provides a solid point of reference. A long auxiliary fence allows you to cut stock that is beyond the capacity of the jig's fences (see the top right photo on p. 104).

The rest of the family

The following three jigs are made in the same manner as the basic crosscut jig, and you'll find them just as useful.

Large-panel jig—This jig is actually a crosscut carriage jig, but it's bigger for cutting case sides and squaring panels. It's made the same way, but the fences are 30 in. apart.

Dado jig—The advantage of this jig is that there is no guesswork as to the dado's location. By mounting auxiliary fences to the front fence and tacking auxiliary surfaces made out of ¼-in.- or ⅜-in.-thick plywood to the body, the jig can be set and reset to different dado widths.

Miter jig—Make a carriage with a short rear fence and attach a piece of plywood cut into the shape of a large right triangle. The perpendicular faces of the triangle must be exactly 90° to each other, but as long as you cut the two parts of each joint on opposite sides of the triangle, it doesn't really matter if the perpendicular faces are exactly 135° to the saw kerf. The miters will still work out. Mounting extended fences with pivoting stop blocks allows me to mill several frames in a short time.

When storing the jigs, hang them up or lay them flat. Their continued accuracy depends on how you handle them. Although they might not be as fancy as the catalog versions, they'll last for years. □

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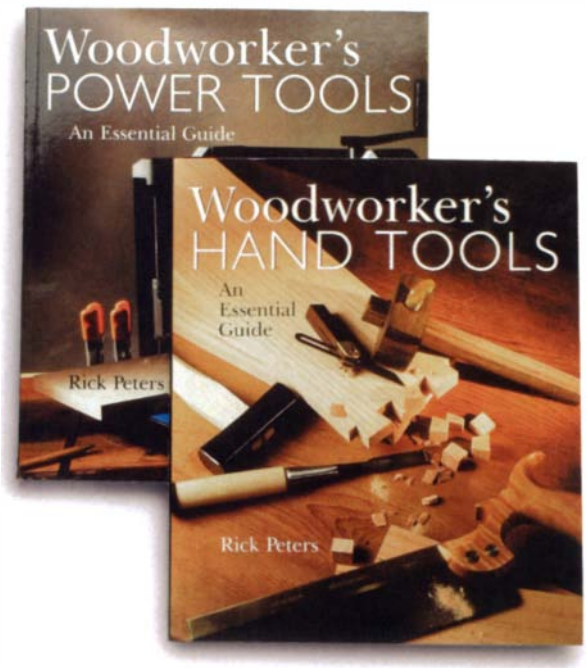
Reviews

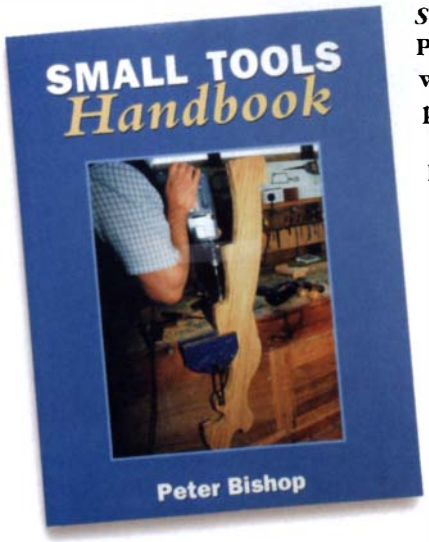


***Woodworker's Power Tools, An Essential Guide* and *Woodworker's Hand Tools, An Essential Guide* by Rick Peters. Sterling Publishing, www.sterlingpub.com; 2002, 2001. $24.95 each paperback; 192 pp.**

Concise writing and informative photos and drawings are the keys to successful how-to books. Rick Peters has fulfilled those requirements with *Woodworker's Power Tools* and *Woodworker's Hand Tools*. Whether you are interested in choosing and using corded tools, benchtop or stationary machinery, marking tools, handplanes, chisels or other tools, these two books cover the gamut.

Like most woodworking books, these are aimed at the beginner and intermediate hobbyist. Peters is an experienced woodworker, and that comes through in his books. He does not shy away from making a few brand recommendations along the way, and his choices are sound. But the inexperienced woodworker might come away thinking that these recommendations are written in stone. The fact is, because of intense competition today in the world of power and non-powered tools, there are a number of good brand choices available.

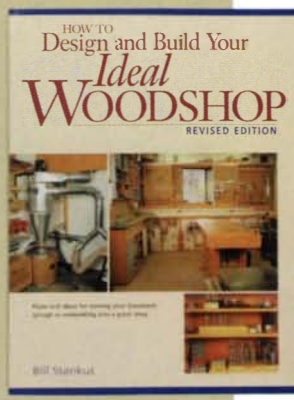
Peters is at his best when he presents bite-size pieces of advice, which are packed into each chapter. These include tips on how to prevent overtightening the collet on a router; the best way to cut plywood with a circular saw; and using electrolysis to remove the rust from an old hand tool. The cover images notwithstanding, both books are nicely photographed. The images are well chosen and serve to inform the reader. All in all, I would recommend these books to woodworkers seeking to expand their basic knowledge of power and hand tools. *—Anatole Burkin, executive editor*



***Small Tools Handbook* by Peter Bishop. Crowood Press, distributed by Trafalgar Square Books, www.trafalgarsquarebooks.com; 2000. $35 paperback; 176 pp.**

Peter Bishop's lifetime in woodworking is evident in this guide to almost every hand tool and small power tool that a woodworker could need. Besides a brief description of each tool, he annotates each one with one to five hammer symbols based on how much use the tool is likely to get. Thus, while a smoothing plane gets five hammers, the compass plane merits one hammer. American readers are going to find the metric measurements difficult to grasp. And I think the book would have been more visually engaging if there were photos of some of the tools in use instead of only still shots. The price seems a little steep, but anyone getting started in woodworking and wanting guidance on building a tool set should consider this book. *—Mark Schofield, associate editor*

***How to Design and Build Your Ideal Woodshop* by Bill Stankus. Popular Woodworking Books, www.popularwoodworking.com; 2001. $27.99 paperback; 128 pp.**



I've organized and worked in five different woodshops over the years, and now I'm in the process of building the sixth, so the title of this book by Bill Stankus piqued my interest. Whether you're starting from scratch or simply looking to improve an existing workspace, this book is jam-packed with good, useful information about everything from layout to dust collection, electrical wiring, lighting, storage and safety concerns. Photographs and illustrations document scores of solutions to the myriad choices you face when designing a woodshop.

Stankus, a veteran woodworker, teacher and author, wisely advises the reader that there is no one ideal shop, that each space can be customized for comfort and efficiency for the individual woodworker and the type of work being performed. He encourages the mindset of looking at the task of organizing a woodshop as a work in progress rather than fussing over obsessive perfectionism. *—William Duckworth, associate editor*

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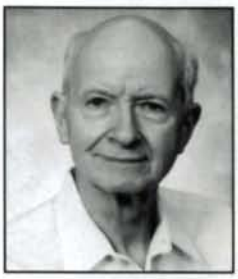

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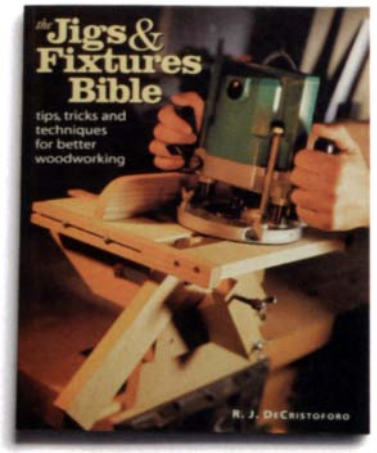
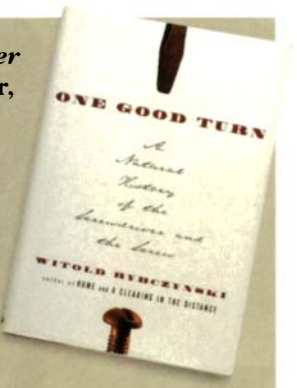


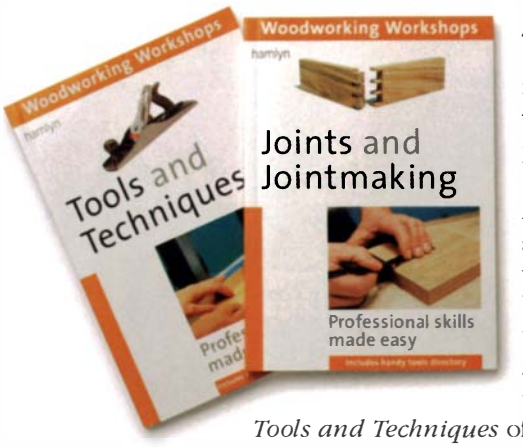
***The Jigs & Fixtures Bible* by R.J. DeChristoforo. Popular Woodworking Books, www.popularwoodworking.com; 2001. $24.99 paperback; 128 pp.**

The subtitle to this book by the late "Cris" DeChristoforo, "Tips, tricks and techniques for better woodworking," describes this book very well. Edited by the author's son, the book comprises articles that appeared in *Popular Woodworking* magazine between 1995 and 2000, along with tricks of the trade sent in by readers. Subjects include an overview of 10 tools that deserve a place in your shop, as well as numerous jigs to get the most out of each machine. Some of the jigs err on the side of stretching a tool to do something it wasn't designed for, but it would be the rare woodworker who didn't pick up several tips from this book. *—M.S.*



***One Good Turn: A Natural History of the Screwdriver and the Screw* by Witold Rybczynski. Simon and Schuster, www.simonsays.com; 2000. $22 hardcover; 173 pp.**

This book started as an assignment given to the author by *The New York Times* to write a short essay on "The Best Tool of the Millennium." Touching on the histories of almost every common tool, this book casts the lowly screw in the starring role; without it, much of modern history couldn't have happened. Inventions such as the printing press, the telescope and the sextant, which pulled society out of the Dark Ages and into the Age of Enlightenment, would not have been possible without the screw. Rybczynski follows the story all the way into the modern era, covering the battle between square-drive and Phillips-head and explaining how the latter won out in common usage. *—Asa Christiana, senior editor*



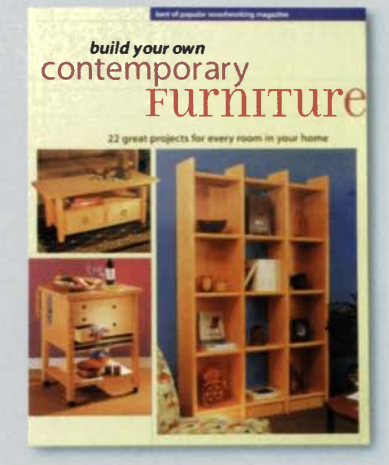
***Joints and Jointmaking* and *Tools and Techniques*, Woodworking Workshops series. Hamlyn, dist. by Sterling Publishing, www.sterlingpub.com; 2001. $9.95 each paperback; 80 pp.**

As an editor for *Fine Woodworking*, I often get asked for a book that might inspire an interest in woodworking. The problem is that quite a few basic woodworking books are overwhelming in their size and scope. This pair of books seems to solve that problem. Only 80 pages long, each of these books can be read easily in an afternoon.

Tools and Techniques offers an overview of woodworking tools and their use. The clear pictures show good-quality tools being used in the basic dimensioning of wood as well as in its final shaping. The book ends with a decent illustration and description of wood species from around the world.

Joints and Jointmaking is appropriate for either newcomers to woodworking or for advanced beginners. The book describes straightforward and traditional methods of joinery, ending with four projects to help you develop your joint-making skills.

—Tim Sams, associate editor



***Build Your Own Contemporary Furniture* by the editors of *Popular Woodworking*. Popular Woodworking Books, www.popularwoodworking.com; 2002. $24.99 paperback; 128 pp.**

This book covers 22 projects first published in *Popular Woodworking* magazine, along with an opening chapter on general construction and finishing techniques. If contemporary furniture is to your liking, you'll find a wide range of useful projects and fundamental techniques, aimed at advanced beginners and intermediate woodworkers. True beginners may be frustrated, however, because basic techniques such as edging plywood are left unexplained.

The opening section is especially valuable, presenting a no-nonsense approach to rubbing out a fine finish, and a tablesaw sled that makes both square and miter cuts and includes a clever stop system and featherboard.

The range of projects is especially wide and useful, from small boxes to tables, a closet upgrade and a rolling kitchen island. Some of these contemporary pieces have an up-to-date Asian flair, but a few others have a slightly dated look, at least to my eye. Obviously, readers can and will make small changes to suit their own tastes. Overall, this is a nicely presented book, with solid woodworking fundamentals that could be used on any project. *—A.C.*

Photos: Kathleen Williams

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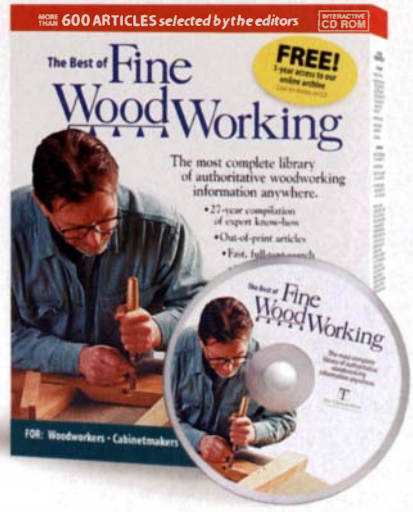

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Q&A

Safe use and disposal of chemical strippers

I do a lot of refinishing, and I'm concerned about both personal safety and the environmental impact of using and disposing of stripping chemicals. How toxic or dangerous are these chemicals? Also, are they biodegradable, and if not, how should they be disposed of properly?

—Martin Bolling, Houston, Texas

Chris Minick replies: Paint and varnish, by their very nature, are designed to protect wood from common household chemicals. Therefore, it should be no surprise that very strong and sometimes dangerous chemicals are required to remove them. Paint and varnish removers fall into three broad categories: caustic strippers, solvent-based strippers and nonflammable strippers. Each class poses different hazards to the user and to the environment.

Caustic strippers are water solutions of alkaline chemicals, such as sodium hydroxide or potassium hydroxide. These chemicals have the potential to cause severe, irreversible skin and eye damage if handled improperly; therefore, face shields and sturdy rubber gloves must be worn when you use a caustic stripper.

Solvent-based strippers contain varying amounts of toluene, acetone, methanol or other strong, toxic solvents. This type of stripper also is highly flammable and must be used in a well-ventilated area to prevent the buildup of vapors that may ignite.

Nonflammable strippers usually contain large amounts of methylene chloride, which has been identified by the Food and Drug Administration as a possible cancer-causing agent. Hence, you must take care to limit contact with the liquid and vapors by using the proper protective equipment.

Fortunately, a new class of paint and varnish removers is now available at paint and hardware stores. These paint strippers contain water and paint-removal chemicals that are nontoxic and nonflammable, and they are much safer to use than conventional refinishing chemicals. These strippers can be used indoors without the bulky protective equipment that's normally required when stripping.

Regardless of the type of stripper used for the project, proper disposal of the waste can be difficult. Spent strippers not only contain the stripping chemicals but also the residue from the stripped finish. If you have used the stripper to remove old paint, the residue also may contain hazardous amounts of lead pigment. For this and other reasons, stripping wastes are classified as hazardous and fall under the jurisdiction of the Environmental Protection Agency (EPA). Each state has its own regulations pertaining to the disposal of hazardous waste, so you must contact your state EPA (get the number from the phone book) to find out the exact disposal procedures in your area.

[Chris Minick is a consulting editor to *Fine Woodworking* on finishing subjects.]

Working with chemical strippers. *Until a few years ago, using paint and varnish strippers meant using face masks and chemical-resistant gloves, but new environmentally friendly strippers are much easier to handle.*

Dealing with pine pitch

In building Southwest furniture, I work with a lot of 5/4 and 8/4 pine. Frequently, after completing a piece of furniture, I find sap seeping through a small crack, knot or pore in the wood. It is very frustrating, and I try to stop the seepage so that the piece can be finished. I've tried filling the crack with glue and, at times, literally digging a hole in the wood and filling in with a new piece. Sometimes this works, sometimes not. Is there any product or method that can kill the sap or stop it from flowing?

—Robert O. McCartan, Tucson, Ariz.

Jon Arno replies: The high resin content in pine can cause serious, and sometimes latent, problems with many finishes. Even when the woodworker has exerted every effort in preparing the wood, resin may ooze out of the wood months or even years later and cause the finish to soften or bubble up. Although resin seepage most commonly occurs on the end grain or around knots, it can happen anywhere. The reason for this is that pine contains resin canals, which are minute cavities between the wood cells where the tree stores resin. Pitch pockets occur when the tree grows around a wound, entrapping a substantial quantity of resin.

Little can be done about pitch pockets other than to avoid them when cutting out the furniture parts. If you're stuck with a pitch pocket, you can try scraping out the resin and filling the resulting hole with wood filler. Resin seepage on flat surfaces or along the end grain can be controlled to some extent by selecting a finish that is not softened by pine turpines. Turpentine-based varnishes or ones that use paint thinner (mineral spirits) for thinning or cleanup are not usually resin resistant. Some of the modern polyurethane varnishes using mineral spirits as a vehicle will resist resin, but only those that polymerize as they cure. By and large, though, it is safer to select a finish formulated with some other vehicle.

Lacquer-based finishes do tend to hold

Photos: Michael Pekovich

back resin, but shellac is perhaps the best. Because shellac is alcohol based and dries to leave a thick, rigid film on the surface, it provides a relatively strong resin barrier. Unfortunately, shellac is not particularly durable in other respects and tends to cloud when exposed to humidity. The technique I use is to give the project a generous undercoat of shellac and switch to a more durable varnish for the topcoats. This approach works reasonably well, but I still experience an occasional problem with resin bubbles around knots.

Your problem is probably compounded by the extremely arid climate of southern Arizona. Most pine lumber is kiln-dried to approximately 12% to 15% moisture content. Although this would be dry enough for most regions of the country, it isn't for your climate. As the wood loses moisture to achieve equilibrium, it is doubtless sweating a little resin. In the future, buy your lumber several months in advance, and store it in a stickered pile. This should allow the resin time enough to come to the surface and harden into crystallized beads, which can be scraped off before the wood is put to use.

[Jon Arno is a wood technologist and consultant in Troy, Mich.]

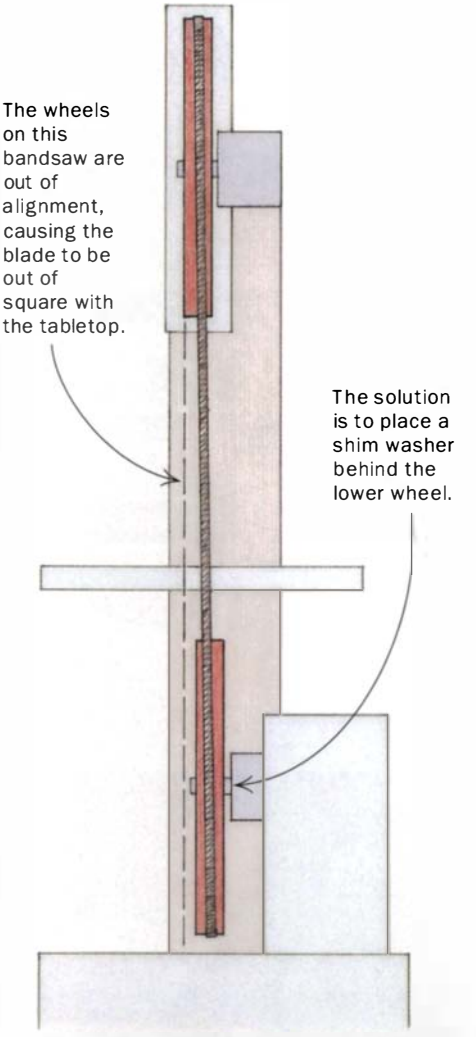
Shimming bandsaw wheels for blade alignment

My Grizzly bandsaw (14½ in., G1019Z) appears very similar to the one in the wheel-alignment photos in your "Bandsaw Tune-up" article (FWW #157, pp. 46-52). So on my saw, which was made in Taiwan, do I shim the upper or lower wheel?

—Tom Rice, Farmville, Va.

John White replies: I can't be positive without seeing your saw, but I would expect that only the bottom wheel can be adjusted. Typically, on Taiwanese saws, the nut holding on the upper wheel stops on a shoulder machined in the axle, and there is no spacer tube in the upper wheel's hub to separate the inside races of the two wheel bearings. If this is the case with your saw, the position of the upper wheel can't be adjusted with shim washers. Without a spacer tube, adding shim washers behind the upper wheel and tightening the nut against the shoulder on the axle will apply excess pressure on the wheel bearings.

ALIGNING BANDSAW WHEELS
On many bandsaws manufactured in Taiwan, only the lower wheel may be adjusted.



On the type of saw you have, wheel alignment can be adjusted by adding or removing shim washers behind the lower wheel. Usually, the wheel will be held in place by a bolt with a 13mm head and washer. It is quite likely that the bolt is a left-hand thread, so you will need to turn the bolt clockwise to remove it. If the wheel won't come off the axle after the nut has been removed, do not pry against the wheel's rim, because it can be bent easily. The only safe way to remove a solidly stuck wheel is with a wheel-pulling tool, available at auto-supply stores.

Once the wheel is off, you can add shim washers behind it to move it outward. If the wheel has factory-installed washers behind it, you can remove them to move the wheel inward. If there aren't any washers behind the lower wheel, and you need to move it backward to line up the wheels, you are stuck: The machine was built out of line, and you will need to contact the manufacturer to see if there's a fix for the problem.

Iturra Designs in Florida sells an $8 set of shim washers for the lower wheel on Jet Bandsaws; I suspect that these also will fit the Grizzly saw because all of the

Remove the lower wheel and shim it flush to the top wheel. *A wheel-pulling tool (left) makes quick work of removing a wheel that is seized in place. Once the wheel has been removed, simply shim it out (above) until it is aligned with the upper wheel.*

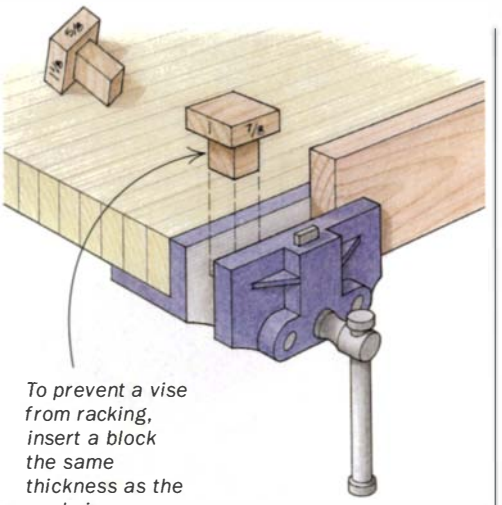
Drawings: Vince Babak

Taiwanese saws are of similar design. Iturra's phone number is (888) 722-7078. [John White is the shop manager for *Fine Woodworking* and the author of *Care and Repair of Shop Machines* (The Taunton Press, 2002).]

Keeping vise jaws parallel

I use a standard bench vise (Record), and I'm having a problem with the gripping as of late. I've used the vise for a year now, and one side closes better than the other side. Have I damaged my vise by clamping pieces unevenly? Is there a solution that could prevent this from happening and give me a better hold in my vise? —Jason Gray, Topeka, Kan.

Christian Becksvoort replies: Uneven pressure when using a vise can eventually cause damage. I have a wooden vise, and nine times out of 10, I clamp my work on the right side of the vise. Therefore, the piece being held keeps the jaws apart on the right side only, while the screw is trying to pull the entire jaw in. Because there is no resistance on the left side of the vise, the evener bars (on either side of the screw) will eventually either bend (on a metal vise) or work loose from the wooden jaw (on a wooden vise).



To prevent a vise from racking, insert a block the same thickness as the workpiece.

Years ago, I made myself a set of five T-blocks to help keep the vise jaws parallel to each other. It took less than a board foot of scrap wood and about 30 minutes of work. First, I made five top blocks, about ¾ in. thick by 3 in. wide by 3 in. long. To the middle of the 3-in. by 3-in. faces, I glued five different-sized spacer blocks: ⅞ in. by 1 in., ½ in. by 1⅛ in., ⅝ in. by 1½ in., ¾ in. by 1¾ in., 1¼ in. by 2 in. (all 2½ in. long). These blocks act as spacers for the left side of my vise, with the top blocks holding the spacer portion between the jaws. Note that I now have 10 different thicknesses of wood to use: ½ in., ⅝ in., ¾ in., ⅞ in., 1 in., 1⅛ in., 1¼ in., 1½ in., 1¾ in. and 2 in.—all 2½ in. long. Feel free to make other thicknesses for whatever dimensions you need.

If I'm planing a 1-in.-thick board, I drop the appropriate block between the jaws on the opposite side of the vise. If I then choose to clamp a ⅞-in. board, I simply open the vise, turn the block 90° and retighten. The blocks can be stored in the tool trough of the bench or on a small shelf below, or they can hang below using small screw eyes and string. [Christian Becksvoort is a contributing editor.]

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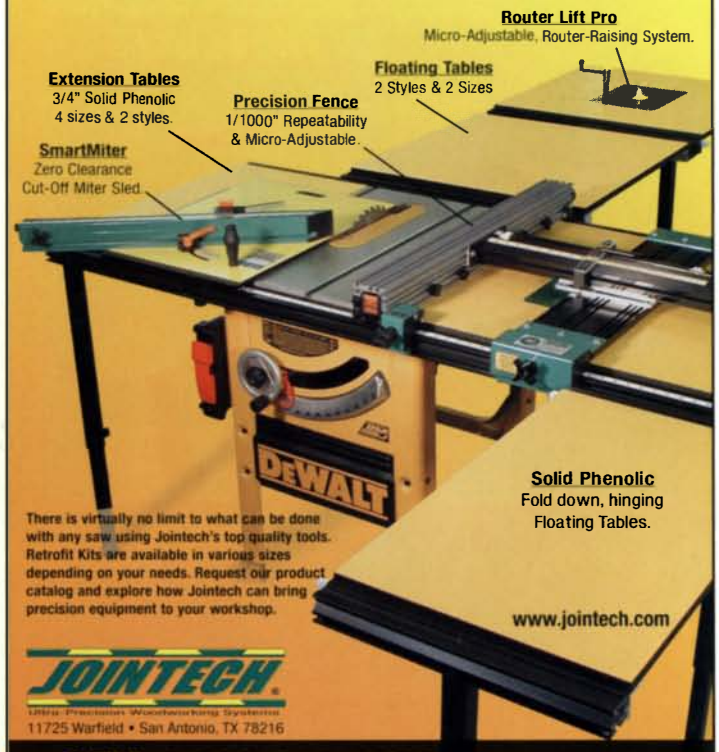

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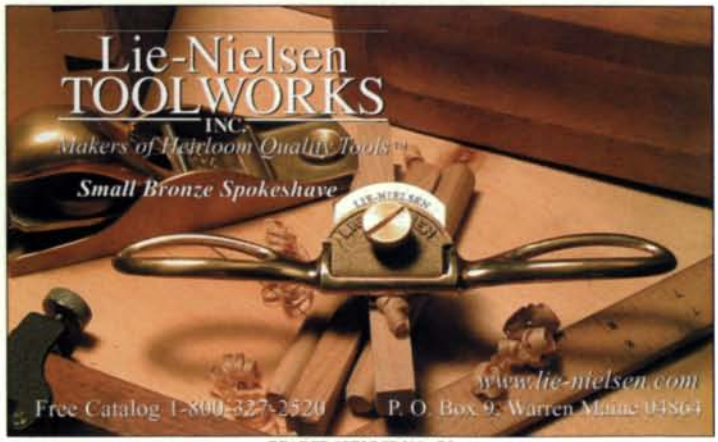

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BY BARRY REITER

Solvents:
Reduce, recycle, and dispose of them properly

A good approach to using, recycling and disposing of shop solvents is one that I learned from my father: "Use it up, wear it out, make it do or do without." In today's affluent and throw-away society, the mantra seems to be: "Buy it, get bored with it and bury it."

Perhaps it's because their main material comes directly from nature, but I am convinced that most woodworkers have more empathy for the first approach. When it comes to the use and disposal of solvents, we all have collections of jars with mysterious liquids that we aren't quite sure what to do with, but we know they shouldn't be poured down the drain.

Help is not easily available because most of the official guides, such as a Material Safety Data Sheet (MSDS), are written by professional chemists, environmental engineers and industrial hygienists, and are targeted at the commercial user of solvents. The suggestions that follow are aimed exclusively at the small noncommercial shop; larger operations are already well-covered by government regulations.

Make less solvent last longer

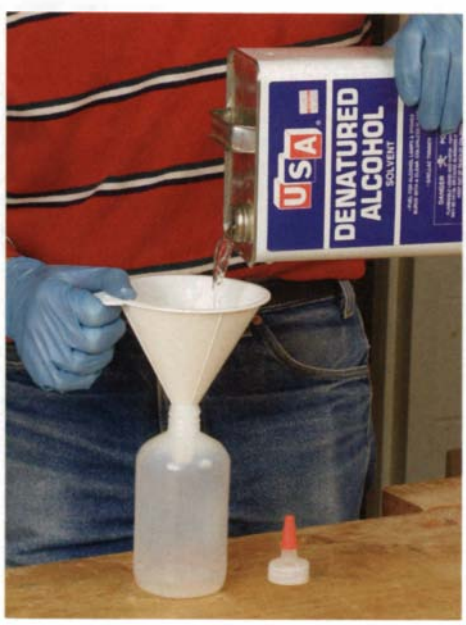
Three easy steps can minimize the amount of solvents in your shop. First, use the correct solvent for the task at hand. This area was covered in detail by Jeff Jewitt in an earlier article (*FWW* #151, pp. 86-91).

The second step is to minimize spillage. We all have tried pouring a few ounces from a gallon can and ended up with more solvent on the table or on the floor than in the desired container. The use of a plastic funnel makes the transfer of solvents into a smaller container much more efficient.

The third step is to reduce solvent evaporation by choosing the proper container. If the solvent is to be used as part of an ongoing process, such as French polishing, transfer the material into a squeeze bottle or one with a lid. Laboratory-supply companies carry modestly priced plastic containers that dispense precise amounts of liquid. But make sure your container is appropriate for the solvent to be stored.

Reuse solvents in practical ways

Whether you're cleaning a brush or a sprayer, you can reuse most solvents more than once as long as you remove the particulate material between uses.



Don't spill your alcohol. *A funnel makes it easy to pour liquid from a large container into the narrow mouth of a small one without spilling half of it on the bench.*

To clean brushes, pour some solvent into a wide-mouth container with a lid. Remember that a small amount of most solvents goes a long way. When the initial brush cleaning is complete, don't discard the solvent. Instead, cover the container and let the pigment or particulate portion settle out. The next time you clean a brush, use this solvent for the initial finish removal and then use some fresh solvent for the final cleaning.

If you're going to use the solvent for cleaning spray equipment, you can transfer it easily from the original container into the gun and spray (pump) it back into the same container when you're finished. Depending on the material being sprayed, the solvent can be used several times before there is a need to filter it. This is best done using a fine-mesh paint filter, but a coffee filter can substitute in a pinch. Even when the solvent has been saturated with dissolved pigment or particulate that's too fine to be removed with a filter, the liquid is still good for initial brush cleaning.

Three methods of disposal

No matter how efficient you are, there eventually will be solvent that requires disposal. As a home-based woodworker or hobbyist, you legally are permitted to handle solvents and solvent residuals in a manner that is quite different from the

Photos: Kelly J. Dunton

RECYCLING

Strain and retain. *After the sediment in used solvent has been allowed to settle, the liquid can be strained and reused. Let the goop at the bottom dry and then dispose of it.*

Spray and save. *The solvents used to clean a spray gun can be captured and reused.*

methods required of professional or commercial woodworkers. Most federal and state waste-disposal rules focus on the high-volume commercial operations.

The environmental threat from solvents is primarily to the groundwater. This shallow water quickly can become part of the aquifer from which many communities get their drinking water. It is amazing how fast some solvents can move through soil and become part of the aquifer. Therefore, under no circumstances should any solvent or solvent mixture be poured onto the soil. They also never should be poured onto the pavement or onto an area where runoff into a storm drain or stream could result, because you never know when that runoff might become part of someone's drinking water.

City Hall can help—The most environmentally friendly way of handling spent solvent is to collect the material in a metal can and bring it to a community hazardous-waste collection site. Many communities, as part of their waste-reduction and recycling programs, sponsor quarterly collection events where this type of material is handled correctly at no cost to participants. Call your local government to determine whether your community participates in this type of program.

Into thin air—If your community does not participate in a waste-reduction program that includes solvents, there's a simple solution. For a small amount of solvent, let the spent liquid evaporate in the original container and then discard the dry remains. In the case of larger quantities, pour the liquid into a pan or dish with a large surface area to increase the evaporation rate. Be extremely careful that the container and solvent are not accessible to children or pets, because solvents are poisonous.

Some periodicals recommend that spent solvent be poured into sawdust and allowed to evaporate that way. There are drawbacks to this disposal option: If the spent solvent mixture also contains long oils like linseed or tung oil, spontaneous combustion is a possibility.

A better way is to pour the liquid into a container of pebbles or small stones. The stones increase the surface area on which the solvent will evaporate and serve as a heat sink for any temperature rise caused by drying oils.

Can solvent go down the drain?—Another issue is the solvent that enters a drain as part of the soap-and-water cleanup. The first question is whether your sewer is on a public system or a septic system. Public sewers typically handle large volumes, so small quantities of solvents are absorbed easily without incident.

If you are on a septic system, you must remember that it is not forgiving, especially in colder weather. A septic system depends on bacterial action to degrade spent solvents (and everything else) that go into the system. The bacteria do not handle great differences in the normal input to the septic system. Small amounts of organic solvents on a regular basis from a final cleaning of brushes should not cause a problem. It is the spikes of solvent that will result in a decrease in the system's efficiency. If this is your only option, use a septic aid like Rid-X in conjunction with the disposal process. □

DISPOSAL

Evaporation. *Pouring used solvent into a container filled with small stones increases the surface area over which the liquid can evaporate.*

Dilution is the solution. *Septic systems can handle small amounts of solvent released when brushes are cleaned.*

You must be very proud.

Is this the first time you've hand-cut dovetails?

Cradle courtesy of Norm Abrams.

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One-Man Shop, One Brick at a Time

The brick mills and factories of New England were Garrett Hack's inspiration when he designed and built this workshop on his Vermont farm. The *Fine Woodworking* contributing editor used recycled bricks and roof slates, elliptical window arches, granite slabs around the foundation, hand-plastered walls and industrial light fixtures to create a shop that "looks like it has lived here a long time." Building into a hillside meant a cooler interior in the summer, fewer bricks and the ability to drive right up to the second floor, which contains an office and lumber-storage area. Starting in 1993, Hack cleaned the 9,000 recycled bricks and built the entire timber-frame structure himself, with help from a local mason. Each year he took on a major element of the project, and today the shop is nearly complete. People who wander down his dirt road, he said, "wonder what this 'old' building is doing in the middle of nowhere."

Photos: Asa Christiana (top); Michael Pekovich (bottom)