TAUNTON'S

Fine Woodworking

Foldout plans for a workbench

April 2003
No. 162

Affordable drill presses reviewed

Aerosol finishes that really work

Foolproof mitered boxes

Better choices in wood screws

Arts & Crafts design guide

How to install locksets

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Build a sofa table with drawers

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Fine Woodworking®

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On the Cover:
Scott Gibson's oak sofa table is rooted in the Arts and Crafts style, but the steel stretcher adds a modern twist. See p. 74
Photo: Michael Pekovich

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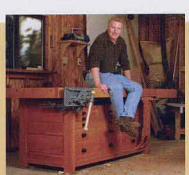
The Taunton Press
Inspiration for hands-on living™

Contributors



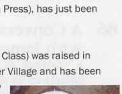
Jon Leppo ("Rock-Solid Workbench") studied painting and sculpture in Pennsylvania before moving to Albuquerque, N.M., where he began building cabinets and furniture. From there he moved to Dallas, where he worked for several woodworking shops and an art gallery and spent a couple of years in the oil business. Eventually Leppo settled in Denver, where he works as an engineer, designing everything from rocket parts to car-wash systems. Away from work he enjoys spending time with his wife and 3-year-old adopted son and trying to complete the seemingly never-ending process of remodeling their nearly 100-year-old bungalow.

Bernard Maas ("Drill-Press Review") wrote his first article for *Fine Woodworking* back in 1986 (#57). Over the years, he's contributed another dozen articles and tool reviews. His last look at the subject of drill presses was an article called "Drill Press Primer" (*FWW* #94) about how the machine works and what it's used for. Maas teaches woodworking and computer-aided design to students at Edinboro University of Pennsylvania, where he's been on staff since 1968.

Chris A. Minick ("Aerosol Finishes") brings a rare talent to our pages, interpreting the sometimes mysterious aspects of finishing with a scientist's understanding, which he explains in common-sense language. As a youngster in the 1950s, Minick worked part time for his grandfather, who was a master finisher by trade. As an adult he took a job as a chemist in the research and development sector of a large manufacturing company, where he's worked now for more than 30 years. Minick dabbles in woodworking as a hobby in his garage shop in Stillwater, Minn. He is also a consulting editor.

Almé Ontario Fraser ("A Guide to Modern Wood Screws") has been working with wood for more than 25 years. She got her start as an exchange student in New Zealand, where she worked building wooden racing sailboats. She has been teaching and writing about boatbuilding and furniture making ever since. A former editor of *Fine Woodworking*, she's written for *WoodenBoat*, *Professional Boatbuilder* and a slew of sailing magazines. These days, Fraser is the chief instructor at The Wooden Boat Workshop, a boatbuilding and woodworking school in Norwalk, Conn. Fraser's first book, *Getting Started in Woodworking: Skill Building Projects that Teach the Basics* (The Taunton Press), has just been published.

David W. Lamb (Master Class) was raised in Canterbury (N.H.) Shaker Village and has been making furniture nearby for 30 years. At 19 he apprenticed with a local cabinetmaker, Alejandro de la Cruz. Years later, de la Cruz sold Lamb his house and small woodworking shop, where Lamb has lived and worked ever since. Some time ago he added space by tacking on a 45-ft. by 50-ft. building salvaged from a local textile factory. His spacious shop has become a meeting place for the New Hampshire Furniture Masters Association, of which Lamb is a founding member. Over the years, many studio craftsmen moved to the area, including Chance Anderson (left in photo), the stoneworker who collaborated with Lamb on the table shown in Master Class. Anderson's rangy house/shop compound is an organic structure that arose over years of creative fits and starts. Like Lamb's place, it serves as an informal rally point for local craftsmen.



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HOW TO CONTACT US:

Fine Woodworking
The Taunton Press, 63 S. Main St., P.O. Box 5506, Newtown, CT 06470-5506 (203) 426-8171
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To contribute an article, give a tip, or ask a question, contact *Fine Woodworking* at the address above or:

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Letters

Corrections on combo machines— Some specifications were incorrectly listed in the article "Combination Machines" (*FWW* #161, pp. 52-59). First, it should be mentioned that Laguna sent us a Knapp Kombi 410 Profi T, which has a 16-in. planer/jointer, though we asked all manufacturers to send us machines with 12-in. planer/jointers. Due to time constraints, we decided to review the larger Kombi 410 Profi T, whose design is similar to the smaller model, the Kombi 310 Profi T. In the process, some confusion resulted.

As outfitted, the price ($15,150) published is correct for the Knapp Kombi 310; however, the correct weight is roughly 2,000 lbs., depending on options—about the same as the comparable Felder.

We also missed a few features on the Felder. Like the Knapp, it can be broken down into two smaller units—saw/shaper and planer/jointer—temporarily for transport or permanently by doing some electrical work and adding accessory parts. Also, the tilting shaper spindle is a standard feature on both the Felder and Knapp machines. Last, like the Knapp, the Felder will accept a 14-in. sawblade with the addition of a different splitter.

One other note: The correct web address for Felder is www.felderusa.com.

A doctor's concern— I just read the Tools & Materials article on antivibration gloves (*FWW* #158, pp. 28-29) and am slightly concerned. Although it's true that the gloves may indeed address the issue of nerve damage after prolonged use of vibrating equipment, that is not the only cause of this problem. Neuropathy has many causes, and one should be evaluated by a physician to be sure that the damage is, in fact, caused by the vibrating equipment and not by some other undiagnosed and potentially life-threatening disease such as diabetes.

–Sean Conroy, M.D., via e-mail

Woodworking business articles?— Generally, I would be in my woodshop building inventory for the upcoming holiday arts and crafts shows. But I ran the top of my left index finger into the bandsaw. Nasty cut, 12 stitches but no other damage, lucky me. So what better to do in this imposed off time than to visit the newsstand and pick up a copy of *Fine Woodworking*.

So far, I've enjoyed "A Life Built on Bookmarks" by Jonathan Binzen (*FWW* #158, pp. 74-75). The title should be, "How to Make a Living in a One-Man Production Shop," which also conveys very important information for the current times.

As a supplement to our meager retirement for the past seven years, my wife and I have successfully operated a shop and studio. We make hardwood items for the kitchen: everything from laminated cutting boards to freestanding butcher-block islands to spreader knives to salad forks to cheese cutters.

As investment savings dramatically shrink, Social Security becomes less and less adequate and medical costs skyrocket, more and more fixed-income people will turn their serious hobbies into endeavors that can gain back some cash.

How about running a series of how-to articles titled "Turning Your Artistic Ideas and Skilled Woodcraft into a Cash-Paying Business" based on case studies of people who are doing it? The series could explore how they research, develop and market their products. The articles would be a great service to subscribers and a large number of untapped subscribers.

–Bob Bowman, Sequim, Wash.

A reader's appreciation— I'm a subscriber to *Fine Woodworking*, and it's an excellent publication. I appreciate the fact

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.... around the country

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that you use advertisers who are somehow affiliated with the content of the magazine. When reading other woodworking magazines, I get tired of wading through what seems like volumes of propaganda on what I should use to whiten my teeth or freshen my breath.

Many of your articles have given me great insight on techniques, made me try something new that I didn't have enough confidence to try before. I actually enjoy using my hand tools now and am proud of the results I get with them.

–Jame H. Scyphers, Chelan, Wash.

Stanley combo square confusion— Steve Latta's review of combination squares (*FWW* #159, pp. 68-72) described the Stanley Tools model No. 46-123 without noting that there are two versions (with the same model number stamped on the packaging) on store shelves. His review was of a tool that was made in England. The American-made version has what looks like a stamped steel blade, not the satin-chrome blade mentioned in the article, and it's harder to read. I saw both the English- and American-made squares at a Lowe's store in October 2002.

–Ira Hertzoff, Columbus, Ohio

WILLIAM DUCKWORTH, ASSOCIATE EDITOR, REPLIES: We got in touch with the product manager at Stanley Tools for an explanation. He confirmed that the model No. 46-123 combination square currently in production is the English-made version (shown in Latta's article), which has a light gray, matte finish on the satin-chrome blade and is easier to read than the older American-made tool. Stanley switched the manufacturing to the United Kingdom two years ago, so the Lowe's store is depleting older shelf stock before replacing it with the newer model.

Heads in the clouds—Good issue (*Tools & Shops, FWW* #160). It makes me want to take a six-week vacation just to organize my (121-sq.-ft.) shop.

I am especially intrigued by one tool shown: on p. 89, Joe Johns shows off his revolving tool rack, the leftmost panel of which has several sizes of hammers. I've never seen one quite like the top right hammer. Is this a regional hammer, found only in the Big Sky Country?

Also, I have a quibble with some details of the top photo on p. 48 of the "Smart Shop in a One-Car Garage": Matthew Teague's going to need a taller ladder than shown to store his lumber above the rafters. I assume he meant "in the rafters" or perhaps "above the joists."

–Bill Houghton, Sebastopol, Calif.

EDITOR REPLIES: You are correct on both counts.

Another way to joint bowed boards— I'd like to thank Gary Rogowski for the fine article explaining the workings and differences of the jointer and planer (*FWW* #160, pp. 64-67). I have been a professional woodworker for over 20 years and also teach woodworking in the evenings. I find that many of my students have difficulty understanding the need for both machines.

I would like to offer a couple suggestions: Prior to flattening a twisted board, throw a little sawdust under the high trailing edge corner. This will prevent the board from rocking.

When jointing a bowed board, I agree you should put the bowed side face-down if the bow isn't too bad or the board is short. However, a board with a serious bow will often dive down past the cutterhead and strike the edge of the outfeed table, and the trailing end will hang down below the infeed table. As you move it forward, the center slowly rises up, giving you a surface that isn't straight. In these cases, put the bow up and keep your hand pressure in the center of the board. Make multiple passes until the flat spot reaches each end.

–Steve Childers, Wyoming, Del.

Sloping compressor plumbing—In Roland Johnson's article "Plumbing a Shop for Air" (*FWW* #160, pp. 51-53), he recommends sloping horizontal pipes away from the compressor. What's the

Writing an article

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reasoning behind the recommendation? Do you know of empirical evidence backing it up? I sloped my pipe toward the compressor to confine moisture to as little pipe as possible in the hope that it would better condense and drain.

–Donald Smith, via e-mail

ROLAND JOHNSON REPLIES: It doesn't really matter which way the pipe slopes as long as there is slope. If the system creates a lot of moisture and isn't emptied often, sloping away from the compressor will alleviate the possibility of the water filling the initial water trap to a level above the compressor T. This is not likely to happen on a well-maintained system, but not all of us are good at maintenance, and hence my suggestion to slope the system away from the compressor.

More than one way to skin a floor—

Scott Gibson's article "Low-Cost Shop Floor" (*FWW* #160, pp. 60-63) was very well done. (Here comes the but...)

One thing in the text was not correct. "...the long edges of the plywood always fall on solid wood." The photos do show the correct installation, which is installing the plywood perpendicular to the sleepers. The short edges should have the support of the wooden sleepers, since they are not T&G. The T&G on the long edges join them as a unit to span between the sleepers.

–Randy Frantz, Arroyo Grande, Calif.

Marriage vs. collaboration—

In the article "A Marriage of Wood and Plastic" (*FWW* #161, p. 26), the author did a superb job of explaining our processes in a nutshell, but the description of the work as "Syron's furniture" gave the impression of a very distinct division of labor between ourselves. It is hard to explain the complexities of a collaboration, particularly when it involves varied materials and talents. We wanted to note that the furniture of J.M. Syron and Bonnie Bishoff is designed and built by a deeply integrated team. We are both involved in designing and building the furniture and working with all the materials. While we do have our areas of expertise, it is not as cut and dried as a short article can convey.

–Bonnie Bishoff and J.M. Syron, Rockport, Mass.

Correction—The photos of the box elder bowl (*FWW* #161, pp. 5, 66) were taken by Robert Epstein.

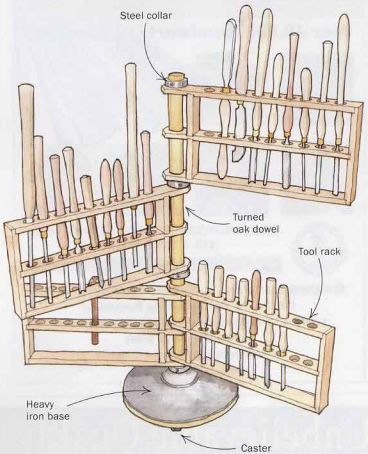
About your safety:
Working wood is inherently dangerous. Using hand or power tools improperly or ignoring standard safety practices can lead to permanent injury or even death. Don't try to perform operations you learn about here (or elsewhere) until you're certain they are safe for you. If something 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

Methods of Work

EDITED AND DRAWN BY JIM RICHEY

Lathe-tool holder



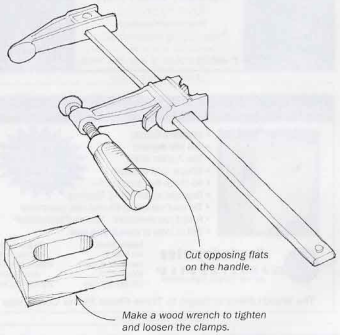
My turning gouges never seemed to be where I wanted them. I tried laying them across the bed of the lathe while I turned, but they sometimes fell off. I tried placing them on a table near the lathe, but I lost time looking for the tool I wanted to use next.

So I came up with this lathe-tool holder that has solved the problem. As you can see, the working ends of the tools are all visible when I place the stand to the side and slightly behind my work.

To make the stand, start with a heavy base (I used a recycled cast-iron stop-sign holder) and add casters to the base so that you can move it around easily. Turn a 2-in.-dia., 48-in.-long hardwood dowel (I used oak) and install it in the base. I secured the dowel with setscrews through a steel collar. Next, make three or four hardwood tool racks with holes in the frame that allow each rack to rotate on the dowel. Install steel collars fastened with Allen-head screws to position the racks on the dowel. I think you will find this holder quite useful.

—Gerald Z. Dubinski Sr., San Antonio, Texas

Tightening hand clamps



To multiply the clamping pressure of your hand clamps, use a drawknife to cut opposing flats on the handles. Then rout a slot in a piece of hardwood to make a wood wrench like the one in the sketch. With this combination you can apply tremendous clamping pressure and then easily loosen the clamps later.

—Andy Olerud, Driggs, Idaho

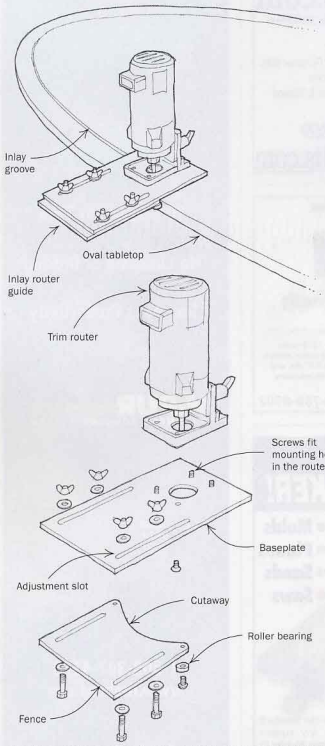
Router guide for inlaying oval tabletops

I needed an adjustable guide for routing an inlay groove around the perimeter of an oval tabletop. When I couldn't find a commercially available tool, I built a fixture that works quite well (see p. 18). It provides an even and reliable offset for my trim router as it moves along the edge of any round or oval shape.

Start with two pieces of Lexan, one for the baseplate (about 5 in. by 8 in.) and the other for the adjustable fence (about 5 in. by 5 in.). Cut two slots in the baseplate to allow for depth adjustment and drill a hole for a cutter port. Attach the baseplate to the router

A reward for the best tip

Gerald Z. Dubinski won a Lie-Nielsen handplane for the lathe-tool holder shown above. Dubinski, a lifelong resident of San Antonio, Texas, became enthused by woodworking after taking a shop class in junior high school, and at 73 years old, he's still at it. Dubinski currently serves as the executive vice president of a cancer therapy treatment center and spends his weekends in the shop. Examples of his furniture have been featured in Fine Woodworking *issues #85 and #115. 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.*

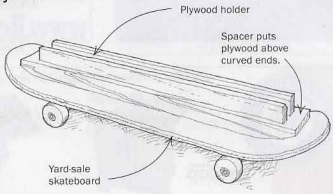


using the existing screw locations. Next, cut two adjustment slots in the fence piece to match those in the baseplate, and then cut away an arc in the end of the fence piece that will contact the workpiece. The cutaway allows the fence to follow the rounded edge of the tabletop by always pivoting on two points. Drill and tap two holes at those points of the fence for attaching rollers (I used a couple of roller bearings scavenged from old router bits). Finally, attach the fence to the baseplate with four ¼-in. bolts, washers and wing nuts.

To use this router guide, install a ⅜-in. straight bit in the trim router, adjust and lock the fence for the desired offset from the edge of the table and set the depth of the bit. You will have only one chance to cut the slot, so make a test cut in a piece of scrap to be sure everything is right. After that, set the router on the workpiece and make one slow, careful pass around the entire tabletop.

—Roy H. Hoffman, Oriental, N.C.

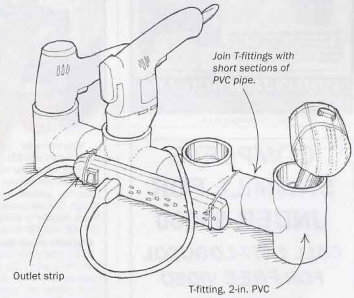
Plywood mover



I picked up a skateboard at a yard sale and took it to the shop where it was mainly used by younger guys to show off during coffee breaks. One day, when I had to move a full sheet of medium-density fiberboard (MDF), my bad back motivated me to turn the skateboard into a plywood mover. I simply added a few scraps of wood to the top of the skateboard to support the MDF sheet above the curved ends and to keep it from sliding off. After loading the device, I could transport the freight easily anywhere in the shop, jumping hoses, cords and even curbs once I got the hang of it. All I had to do was keep up with the thing once I got it moving.

—David Kalin, Kaneohe, Hawaii

Drill station



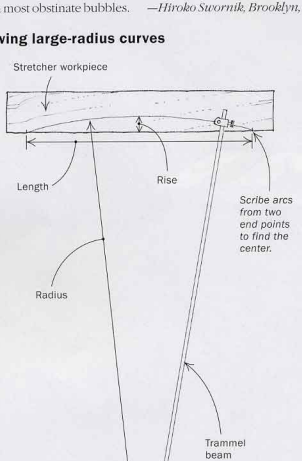
When I'm putting together a project with lots of screws and hardware, I find it convenient to have several drills on hand: one for drilling the pilot hole, one for countersinking and one for driving

the screws, for example. This drill station holds and provides power for as many as four drills. It also makes a convenient stand for recharging the batteries in cordless drills. I made the drill station from 2-in. T-fittings of PVC pipe, joined with short lengths of pipe. I also attached an outlet strip to the drill station with nylon ties.

—H. Wesley Phillips, Greer, S.C.

Quick tip: To fix stubborn veneer bubbles, hold a chisel under hot running tap water until the blade becomes hot. After drying off the chisel, use it as a small iron and apply it to the problem area. In about a minute the combination of heat and light pressure will tack down most obstinate bubbles. *—Hiroko Suwornik, Brooklyn, N.Y.*

Drawing large-radius curves



I make Mission-style furniture, which often calls for curved stretchers. Drawing these long, large-radius curves used to be a problem. Typically, I knew how long the curve needed to be and the rise at the center, but finding the correct radius and the center location to draw the curve with a compass always was strictly a trial-and-error process. I found it difficult even to estimate the correct starting length for the compass.

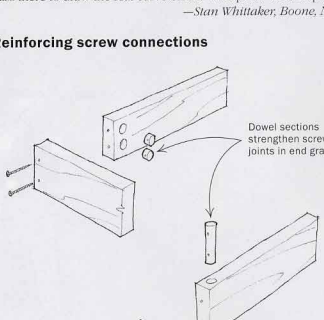
For the answer, I contacted my friend, Dr. John Harris, an assistant professor of mathematics at Furman University. Here's his solution: First, you must know the desired straight length of the curve (Length) and the rise at the center of the curve (Rise). Then you can determine the trammel-beam setting or radius of the curve by solving the formula below:

$$\text{Radius} = (\text{Length}^2/8 \times \text{Rise}) + (\text{Rise}/2).$$

In addition, you can establish the pivot location for the compass point (the center of the circle) by setting your compass to the radius length determined above. Place the compass at each end of the curve and swing two arcs over the approximate center. Where the arcs intersect is the center of the circle. Place the compass there to draw the real curve on the workpiece or a template.

—Stan Whittaker, Boone, N.C.

Reinforcing screw connections



Some time ago I had to learn the hard way that screws are inherently weak when driven into end grain. One way to get around this problem is to insert short sections of dowel at the points where the screws will be located. To conceal the dowels, you can install them from the inside surface or vertically, as shown. Or, for a decorative effect, you can make the dowels in a contrasting wood and install them from the outside.

—David L. Harvey, Mercer Island, Wash.

Quick tip: Commercial photographers often discard large pieces of seamless photographic background paper when it gets smudged or wrinkled. This paper makes an ideal cover for a workbench or a glue-up area. *—R.B. Himes, Vienna, Ohio*

Notes & Comment

The Chair, according to Sam Maloof

The Chair, a recent exhibition at the Worcester (Mass.) Center for Crafts, had one juror: Sam Maloof. The renowned chair maker, now 87, said that while he is generally uncomfortable with proclaiming, "This is bad; this is good," he took the job "for the fun of it."

Working from photographs alone, Maloof found it difficult to whittle 300 chairs down to 30, he said. Because comfort and functionality are important to him, he would have liked to sit in each one.

His jurying approach was simple: "Leave it to the heart." Usually, he responded to "pieces that looked nicely put together," he said. However, sometimes humor and whimsy hooked him. If awards had been handed out, his Best of Show would have gone to Personal Crate, a simple plank chair with its own storage box, all made from found wood by Stephen Whittlesey. "It's very whimsical but, believe it or not, the chair sat very well," Maloof said, adding, "I've been watching [Whittlesey's] work for years."

Because Maloof typically doesn't like pieces that are "way out there," he thinks he surprised some people with the show's eclectic mix.

Maloof also noted chairs by Jon Brooks (left), Jacob Cress, David Ebner, Bill Perkins, Barry R. Yavener and Edger Morey as personal favorites.

One type of furniture that didn't fare well in the jury process was reproduction work, even when it was Maloof's own chairs that were being copied. However finely crafted, these pieces didn't fit the art-furniture thrust of the show. Maloof said he wishes there had been a separate category for traditional styles.

The exhibition ran during October and November of 2002, and Maloof opened the show with a lecture and slide show of his work. Also, he donated a chair to be auctioned off for charity.

—Asa Christiana, senior editor

Art furniture that "sits well." *For The Chair, an exhibition at the Worcester (Mass.) Center for Crafts, sole juror Sam Maloof chose pieces that were artistic yet well-built and useful. The chair inside Stephen Whittlesey's Personal Crate (left) actually was comfortable, according to Maloof, who also included Jon Brooks' Narcissus (above) as part of the eclectic collection.*

Nonprofit urban lumberyard hopes others will follow

In August 2002, Protect All Life (PAL) announced that its Oakland, Calif., tree yard and lumber mill were in full operating mode. By then the nonprofit program had already diverted some 6,000 tons of wood from San Francisco Bay Area landfills. The program works because local arborists and construction companies are glad to be paid for felled trees rather than paying a landfill to dispose of them.

The PAL yard specializes in oak, acacia, redwood, cypress, cedar, pine, several burls and air-dried eucalyptus. It mills lumber, flooring and decking and makes some custom furniture.

Aside from filling a need in the Bay Area, PAL created the Tree Recycling Yard to be a national model for urban recycling yards. The nonprofit status is important—it helped the PAL program secure local and state funds for starting up and expanding its operation, said Jennie Fairchild, who is in charge of marketing and business development. To learn more about the PAL operation, call (510) 834-8257, or go to www.recycletrees.org. *—A.C.*

Saved from the scrap heap. *These thick slabs came from salvaged redwood, eucalyptus and pine logs.*

Photos, this page (clockwise from top left): Dean Powell; courtesy of PAL Foundation; Stephen Whittlesey

Ontario woodworking school is a class act

When I was asked to report on Rosewood Studio, a woodworking school that I attended, I was a bit reluctant. It's like telling everybody about a favorite out-of-the-way fishing hole: You run the risk that people will show up and see for themselves.

Rosewood, in Almonte, Ont., Canada, possesses a great combination of outstanding facilities, charming surroundings and an interested, knowledgeable and enthusiastic staff. The school has a low-key atmosphere that I found conducive to exploration and learning. Also, the U.S. dollar goes a long way in Canada.

I have taken a number of weeklong woodworking classes, but this year I carved out an extra week from my schedule as a marriage and family therapist.

I learned that Garrett Hack, one of my previous instructors, was teaching a two-week class on making furniture with hand tools at Rosewood Studio. I also found out that the school's founder, Ted Brown, had studied with James Krenov. That was enough for me.

While Brown was not formally an instructor in the class that I took, he was always around, and his presence was a big part of the experience. One example of his skill and attention to detail is that he and his staff made all of the workbenches that are used at the school. These are finely crafted, massive, European-style benches, and each student gets his or her own.

One student to a bench. *Each student at Rosewood Studio works at a heavy-duty bench made by the school's staff. The school offers classes to suit woodworkers of all skill levels.*

The town of Almonte is also part of the appeal. The main street is cobblestone and lined with small shops. The school is in a renovated mill, and the river and the railroad bridge can be seen from the workshop. A few doors down you'll find a bakery, which has sandwiches and sweets; a combination restaurant/art gallery/antique furniture shop with excellent food at great prices; and a nice pub, which serves lunch and dinner and has seating on the patio right next to the falls.

Rosewood also offers complete travel planning services, which I found helpful. Contact Rosewood Studio at (613) 256-8900; www.rosewoodstudio.com.

—Peter Lynch

Book review

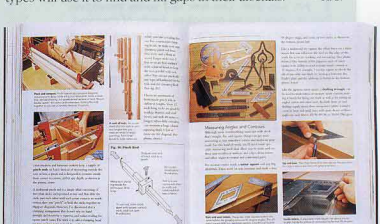
Choosing & Using Hand Tools *by Andy Rae. Lark Books, New York, 2002. $19.95 paperback; 208 pp.*

Covering every hand tool in an experienced woodworker's shop is a tall order for 208 pages, but Andy Rae pulls it off. With a rich combination of well-chosen photographs and pithy text, he presents a a complete outfit for all shop situations, covering what hand tools to choose and why, and how to get the most from each one.

He does a great job explaining time-tested tools and techniques—with excellent chapters on choosing and using traditional handplanes, saws and chisels—but he also praises and highlights many recent innovations. And he's not above including the nonwoodworking tools that woodworkers use all the time—wrenches and screwdrivers, for example.

While the book seems encyclopedic, it is not all-inclusive. As Rae says in the introduction, he leaves out tools he considers "spurious at best, and downright silly at worst." A self-confessed tool junkie, Rae does go over the top at times with obscure flea-market finds and a section on french-fit tool drawers, but he also offers "a survival kit" that includes fewer than 50 tools.

The book is a great resource for woodworkers of all levels. Savvy newcomers will use it as a buyer's guide, while seasoned types will use it to find and fill gaps in their arsenals. *—A.C.*



Photos, this page: Courtesy of Rosewood Studio (top); Rodney Diaz (bottom)

Tools & Materials

The Supersaw from Jet

Introduced last summer, this 10-in. tablesaw is Jet's answer to DeWalt's model DW746. These saws are unique in that they generally fall between contractor and cabinet saws when it comes to performance, features and price. After using the Supersaw for a few weeks, I came away convinced that it is a solid machine with lots of good features, but not without flaws. If Jet sorts out the problems, they could have a winner.

Out of the box, the assembly was straightforward and was helped greatly by clear instructions.

The clever self-leveling mechanism on the feet worked well. It took only a few moments to make the saw rock-steady on my uneven floor. When checked for flatness, the cast-iron top had a perfectly acceptable 0.006-in. dish. The two extension wings are also cast iron, a nice plus.

I used a dial indicator to determine the runout of the sawblade arbor, and the result was as good as it can get—zero. When measured to see if it was parallel to the blade, the miter slot was out by 0.005 in. over a 10-in. length, an acceptable number.

The on-off switch can be positioned anywhere along the rip-fence rail. I found this very useful because I could put it where I'm most accustomed to finding the switch.

The 1¾-hp motor had enough power for common sawing jobs. Using a new combination blade, I ripped 4/4 oak with ease. I also was able to rip a 3-ft. length of 2¼-in.-thick maple, although I had to slow the feed rate considerably and accept light to moderate burn marks.

Jet added a magnified cursor to the rip fence, but the cursor actually obscured the scale, so it turned out to be more of a hindrance than a help. Also, the splitter and antikickback-pawl assembly was flimsy; I'd suggest replacing it with a better safety mechanism.

The interior of the saw is fully enclosed, as it is on most cabinet saws, which should aid dust collection. Oddly, the dust-collection port accesses the interior through a grate at the bottom. This is seemingly to prevent a dust collector from sucking up offcuts. Though my 2-hp dust collector was spared chunks of wood, it also was spared a fair amount of dust, which readily clogged the grate. Consequently, I had to clean out the saw by hand regularly.

The miter-gauge bar has a clever adjustable mechanism for tightening the fit in the slot. However, before I started to do any adjusting, I discovered that there was already a fair amount of slop between the bar and the head. So even after maxing out

New 10-in. tablesaw. *The Supersaw from Jet is shown here with the optional sliding table.*

SIDE BY SIDE

6-in. variable-speed bench grinders

The wheels on most low-cost bench grinders mount to the motor shaft, so the wheels rotate at the same speed as the motor, typically about 3,450 rpm. That one speed is fine for general grinding tasks, but for certain jobs, such as grinding out a nick in the edge on a bench chisel, a delicate touch and slow speed are required to avoid overheating the thin edge of tool steel. If it gets too hot, the steel loses some of its hardness, and you end up with a cutting tool that won't hold an edge for long.

Early last year, both Craftsman and Delta introduced 6-in. variable-speed bench grinders. Simply by turning a dial on these

Photos, except where noted: Rodney Diaz; this page: Tom Begnal (left); courtesy of Jet (top)

the adjustment, the miter gauge still had some slop.

The Supersaw is also available with a short-stroke sliding-table option. The table is cast iron and attaches to the rip-fence rails. It glided without play and was easily adjusted to slide parallel to the blade. The sliding table, unfortunately, had some downward flex. Crosscutting small pieces wasn't a problem. However, when I tried crosscutting a 3-in.-thick by 4-in.-wide by 48-in.-long black-locust post, the table deflected enough to change the angle of cut by a few degrees.

The fence on the crosscut table also has some design flaws. Each time I changed the angle, the scale had to be recalibrated because one clamp positions both the scale and cursor. When you move the scale, you move the reference, too. Second, the hold-down was not very strong. When fully engaged, a workpiece still slid around easily.

The basic version of the Supersaw, model JWSS-10PF, has a 30-in. rip capacity and sells for about $850. Model JWSS-10SPF, also with a 30-in. rip capacity, includes the sliding table and is priced at about $1,200. Both models are available in 52-in. rip-capacity versions. For more information, contact Jet (800-274-6848; www.jettools.com).

—Strother Purdy builds custom furniture in Bridgewater, Conn.

Well-designed carving tools from Lamp

I'd just finished putting a razor edge on a 1-in. round-handle carving chisel when I became acutely aware of just how sharp the edge had been honed. The chisel rolled off the front edge of the bench, fell straight down and sliced through both my canvas shoe and sock and into my unsuspecting foot. Although in pain, I felt lucky because the chisel narrowly missed cutting a tendon. That incident has since soured my interest in round-handle chisels.

It's also one of several reasons why I like carving tools made in Germany by Lamp. The hornbeam handles are octagonal, not round, so the chisels are less likely to roll. In use, the handles felt comfortable in my hands. And the tools were nicely balanced.

The tools were ready to use right out of the box, with edges finely ground and polished. Unlike most carving-tool manufacturers, Lamp tests each tool for hardness. The steel is hard enough to hold an edge, but not so hard that it is difficult to sharpen. Then, before leaving the factory, the steel gets a thin coat of lacquer to help reduce corrosion and keep it looking new.

Lamp carving tools are available in a wide range of shapes and sizes. Each one has the blade type and width (in millimeters) stamped into both the shank and handle. Tool prices range from $20 to $60. For more information, contact Wood Carver's Supply (800-284-6229; www.woodcarversupply.com).

—Simon Watts is a furniture maker in San Francisco.

High-end carving tools. *Lamp-brand carving tools take a nice edge, cut well and won't roll off the workbench.*

machines, the speed can be adjusted anywhere from 3,450 rpm to 2,000 rpm. At 2,000 rpm, the wheel cuts slower, so it's a little easier to avoid overheating a tool. But if you aren't careful, 2,000 rpm is still fast enough to overheat a thin edge quickly.

Both grinders have 2-amp, 115-volt induction motors that mount to cast-iron bases. The tool rests are also cast iron. The spark arresters and eye shields are nearly identical. And each grinder includes a lamp that accepts a 40-watt bulb.

The Delta, made in China, comes with a pair of ¾-in.-wide, 60-grit aluminum-oxide wheels: one gray and one white. The gray wheel is intended for general grinding; the white one is for edge tools. White aluminum oxide is more friable than gray, which means the grits break away faster, allowing the wheel to cut cooler.

The Craftsman, a Taiwanese product, includes a ¾-in.-wide, 60-grit, gray aluminum-oxide wheel and a brass wire wheel. If you plan to grind cutting edges, you'll want to have a white wheel at the ready, which can be found at most hardware stores for about $20.

Low-cost grinders with speed control. *The Craftsman 21152 (shown) and Delta GR250 bench grinders allow you to vary the speed from 2,000 rpm to 3,450 rpm simply by turning a knob.*

I was unable to bog down either grinder when it was running at full speed, despite bearing abnormally hard against the wheel with a piece of 1-in. angle iron. I did manage to bog down both when run at the lowest speed setting, but only with some extra effort.

Both of these machines look to be more than adequate for general grinding and tool sharpening. The Craftsman, model No. 21152, sells for about $80, while the Delta, model No. GR250, can be had for around $72. For more information, contact Sears (800-697-3277; www.craftsman.com) or Delta (800-438-2486; www.deltamachinery.com).

—Tom Begnal is an associate editor.

Photos, this page: Simon Watts (top right); Tom Begnal (bottom)

A router dovetail jig that actually saves time

The usual knock against router dovetail jigs is that speed and convenience are illusory, and that good woodworkers can hand-cut the joints in less time than it takes to adjust the fences, the stops and the depth settings associated with a jig. This point is probably closest to the mark when it comes to machining variably spaced dovetails. Jigs for such work are notorious for their mechanical complexity. But a new jig on the market, the Akeda DC-16V, takes much of the hair-pulling out of dovetailing with a router.

The Akeda deploys its finger templates in an ingenious way. Instead of sliding along a bar and locking with a setscrew, each guide's pair of integral cogs meshes with corresponding slots in the jig's back rail. The guides can be located and locked in place with ease and precision—either the cogs engage the slots or they don't. Penciled reference marks, transferred to the back rail from embossed centerlines in the fingers, make accurate changeovers from tail guides to pin guides a snap.

On the downside, the dovetails can be spaced in increments of only ⅛ in. But, as I see it, the simplicity of this jig and the shorter set-up times that result make the spacing limitation acceptable.

Locking fingers. *The finger templates on the Akeda lock onto the jig's back rail, allowing for easy and precise adjustments.*

Dovetailing simplified. *A new jig, called the Akeda, creates snug-fitting dovetail joints in relatively short order.*

The Akeda cuts both through- and half-blind dovetails. It takes stock up to 16 in. wide. When making through-dovetails, it can accept stock from ¼ in. to 1 in. thick for the parts with tails, and ¼ in. to ¾ in. thick for the parts with pins. When making half-blind dovetails, the jig can accept stock from ¼ in. to 1 in. thick for the parts with tails, and ⅜ in. to 1 in. thick for the parts with pins.

When the dust had cleared, though, the Akeda had reliably produced dovetails that needed the barest of hand taps to send home, joints whose tails and pins typically measured within a tolerance of 0.005 in.

Using this jig requires mounting a 7⁄16-in.-dia. guide bushing on the router; mine was obviously machined well, but for those whose aren't, 0.004-in.-dia. oversize and undersize straight bits are available for fine-tuning the pin size when cutting through-dovetails (where, unlike half-blind dovetails, everything shows).

The DC-16V, supplied with guide fingers for basic through- and half-blind joints, costs $300. When bundled with an accessory kit (which includes dust-collection components, eight router bits, guide fingers to match up with the 7, 9, 11, 14 and 20 dovetail cutters, supplementary stops and guide spacers, among other things), the Akeda costs $500.

For additional information, contact Woodcraft (800-225-1153; www.woodcraft.com).

—Michael Standish is a woodworker living in West Roxbury, Mass.

Miniature moisture meter

Moisture meters come in a variety of shapes and sizes, but I've yet to see one smaller than the Moistec. Indeed, it's not much bigger than a cigarette lighter. Yet, despite its diminutive size, it can measure wood moisture contents that vary from 6% to 25%, a range that is perfectly adequate for furniture makers.

Small but effective. *The Moistec moisture meter is small enough to fit into a pocket, making it easy to bring along when buying wood at the lumberyard.*

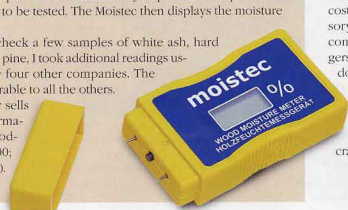
The Moistec won't take up much space in a shop drawer, and it slips easily into a pocket, making it handy for visits to the lumberyard. And with a meter at the ready, you can check the moisture content of a board before buying. (As a courtesy, however, it's best to let the clerk know what you're up to.)

It works pretty much like any pinned moisture meter. Just push the two pins on the end of the case into the wood to be tested. The Moistec then displays the moisture content on an LED panel.

After using the Moistec to check a few samples of white ash, hard maple, red oak and ponderosa pine, I took additional readings using moisture meters made by four other companies. The Moistec readings were comparable to all the others.

The Moistec moisture meter sells for about $60. For more information, contact Klingspor's Woodworking Shop (800-228-0000; www.woodworkingshop.com).

—T.B.



Photos, this page: Stephen Barr (Akeda); Tom Begnal (Moistec)

A micro-adjustable rip fence

The new Multi-Fence from HTC Products includes a unique feature: With the turn of a knob, the location of the fence can be moved left or right as little as a few thousandths of an inch.

The Multi-Fence is designed to replace the fence on the current models of the Biesemeyer, Jet Exacta and Powermatic Accu-Fence. If you don't have one of these three fences, you can buy a complete Multi-Fence system that includes the rails.

The Multi-Fence is available in both a contractor and a commercial version. I tried the commercial model, a well-made, heavy-duty product.

Both sides of the fence have smooth, durable plastic faces that can be replaced easily. And you can buy a kit from HTC that includes all of the hardware needed for an auxiliary fence should you want to add one.

The micro-adjustment mechanism adds a couple of steps to the process of adjusting a fence, and the mechanism tended to stick a bit, making the fence jump slightly as I turned the knob. As a result, the micro-adjustment feature looked to be only a marginal improvement over the random inaccuracies of a knuckle rap.

The cursor includes a magnifying lens to better view the scale, but the lines on the scale are too wide, and the cursor is located in the lens about ¼ in. above the scale. At that distance, it was difficult to align the cursor and a line on the scale unless they were viewed from directly above. Should you shift your head even slightly, the reading on the scale could easily change by ⅛6 in.

***Dialing for precision.** The HTC rip fence, a Biesemeyer look-alike, has a feature you won't find on the Biesemeyer: a dial that allows the fence to be micro-adjusted.*

The Multi-Fence was most useful for shaving a hair's width from a tenon and for trimming a box lining to length so that it pressed perfectly into position.

If you have an older fence system, check with HTC to make sure the Multi-Fence will fit the rails. It barely fit those on my 25-year-old Biesemeyer fence system, and it wouldn't fit at all on another saw with an older Biesemeyer clone.

Model 900 sells for about $270. The contractor's version, model 800, costs about $240. For details, contact HTC Products (800-624-2027). —*S.P.*

Making Mitered Boxes

Techniques for grain matching and achieving strong corner joints

BY GARY ROGOWSKI

If a dovetailed box speaks volumes about your craftsmanship, what can a simple mitered box say? From a practical view, mitered joints require only a quick setup on the tablesaw, and once set up, the cuts are repeatable; so a mitered box says that you're frugal with your time. From an artistic view, mitered joints are beautiful, with only long grain showing around the sides of the box. Because mitered joints need strengthening, you have to add splines or keys, but these can impart a distinctive and elegant flavor to your design. So, in the end, a mitered box also can speak well about the level of your craft.

To achieve continuous grain on a box, resaw the parts from thick stock (see the facing page). For a four-sided box, cut carcase miters on the tablesaw with the blade tipped to 45°. Use a miter gauge or a dedicated crosscut jig for these cuts. Don't use a standard crosscut jig for your angled cuts or you'll end up with a gaping hole in the middle of the jig. Make a pair of practice cuts on scrapwood, and check the results with a combination square.

When making the cut on the second end of each side, be sure to use a stop on the jig to ensure that your cuts are made exactly to length. If you need to make minor adjustments or clean up a rough

Photos, except where noted: Mark Schofield; this page: Rodney Diaz

sawcut, use a tuned and sharpened handplane. I use a low-angle block plane because it cuts end grain effortlessly.

Assemble and glue up the boxes

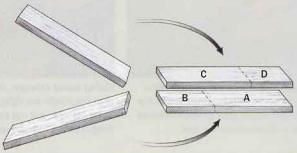
All but the smallest of carcase miters need strengthening. The mitered joint is actually a cross between long grain and end grain, so it's not the most optimal gluing surface. You can strengthen a joint either before or after the box has been assembled. In either case, assembling a box miter requires planning. Lay out and practice your clamping system before applying glue. Some finessing always is required to get the pressure in exactly the right spots.

Band clamps work well if they don't have to apply excessive pressure. Inaccurately cut joints will not pull together with band clamps, but well-cut joints will snug right up with just one or two band clamps. Masking tape also can provide light clamping pressure suitable for smaller boxes. Wrap a dry-assembled box with masking tape across the width of each of the miter joints. Then slice open one joint, lay out the box flat and apply glue to the joints. Fold the box back together and retape that last joint.

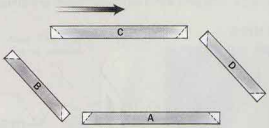
Whatever kind of strengthening you employ, it is a good idea to

Resawing for continuous grain

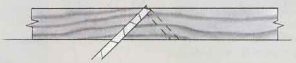
Sides resawn from thick stock on the bandsaw will produce a box with four matching corners.



Flipping over the resawn stock gives the outside of the box two corners of continuous grain and two corners of book-matched grain.



Before cutting the miters, label each side of the box so that the corners match up.



To minimize the gap in the grain caused by the miter cuts, set the blade height on the tablesaw to barely clear the top, or outside, face of the stock.

Drawings: Michael Gellatly

MITER AND GLUE UP THE BOX

Keep a carriage jig exclusively for cutting miters. *Use a stop block when cutting the second miter to ensure matching parts are cut to the same lengths.*

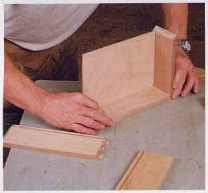
size the mitered end of each piece of wood before assembling the box. Wipe a thin layer of glue across the end grain and, before it has dried hard, scrape off the excess glue. Now the porous end grain won't suck up the glue and weaken the joint when you're ready for final assembly.

Strengthen miters before you assemble the box

The two simplest ways to strengthen the miter joints are to add biscuits or through-splines before gluing up the box. Because you cut them in the length of the joint, the sides of the box still show only long grain, and the biscuits and splines help align the joints during glue-up.

Biscuited miters provide unseen strength—With the miters cut and trimmed exactly to length, set the biscuit-joiner fence at 45° and adjust for the proper depth of cut. Make the cuts about one-third in from the inside edge to use the greatest depth of wood. If your biscuit joiner won't make a cut this close to the fence, attach a block of wood to the fence with double-sided tape (see the left photo below). Mark the center of the cut or cuts on the inside face of the stock, clamp the board securely and make the cuts.

Through-splined miters are strong and decorative—The easiest method of cutting through-splines is to use the tablesaw. With the blade already angled 45° from the miter cut, make the spline groove using a miter gauge and the saw fence. Set the blade height carefully and set the fence so that the groove is cut about two-thirds back from the outside corner. This makes for a longer and stronger spline. If available, use a flat-tooth blade for a square-bottom groove.



Preparations make perfect. *After a dry run with the band clamps set to the right length, apply glue to each mitered surface and assemble the box.*

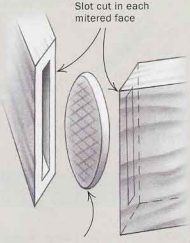
Using band clamps. *Once you have verified that the joints are tight, crank down on the band clamps, but not so much that the webbing crushes the corners.*

Two methods of strengthening a joint before assembly

Reinforcing a miter joint with a concealed biscuit or a through-spline aids assembly by aligning the sides during gluing.

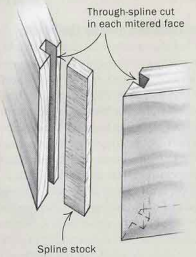
BISCUITS

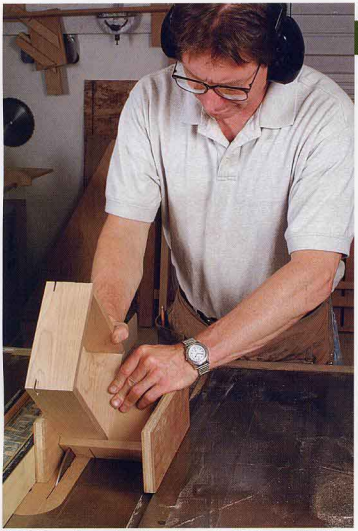
Cut the biscuit slot in the workpiece one-third of the way in from the inside face. An auxiliary fence on the biscuit joiner may be required.



SPLINES

When cutting splined miters on the tablesaw, set the blade and fence to make the spline cut in the thickest part of the workpiece.

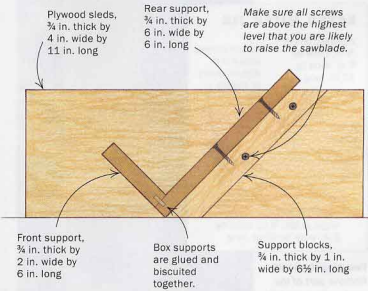




Cutting keys. *The carriage jig registers against the fence of the tablesaw and slides on two sleds.*

TABLESAWN KEYS

For easy and precise key slots cut on the tablesaw, use this cradle jig that carries the box at a 45° angle.



Well-stuck keys. *It is important that the keys are firmly seated at the bottom of the groove when they are glued in.*

Don't break the keys. *Plane away from the corner of the box to avoid breaking out the short grain of the keys.*

For an interesting design detail, I like to make up spline stock from a contrasting wood. When doing so, it's important that the grain runs in the same direction as the box sides so that all of the parts shrink and expand in unison, but this is also the strongest orientation for the splines. Rough out the stock on the bandsaw as wide as you need it and close to thickness. Make the stock long enough to easily hang onto, and trim it to thickness as if it were a tenon, using a tenoning jig or holder to support the piece as you pass it vertically by the sawblade. Then cut off a length of spline material.

You'll be working with some wide short-grain stock that will likely break in your capable hands, but that won't matter as long as the spline pieces fit snugly in the groove when you glue up. Make sure to cut the splines exactly to length, or a hair under, so that the miters still fit together nicely. Use a block plane and a bench hook to trim the splines to length or thickness. Leave the splines a bit wider than necessary and clean them after you're finished gluing up.

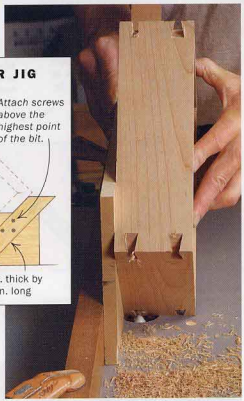
Unlock different looks with keyed miters

Pieces of wood inserted diagonally into the outside corner of miter joints are known as keys. Added after the box has been as-

Watch it on the web

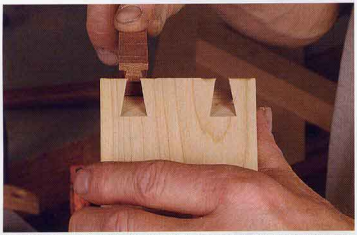
For a video on cutting keys on the tablesaw, go to www.finewoodworking.com.

DOVETAILED KEYS



Two-step dovetails. *Remove part of the waste with a straight bit, then use a dovetail bit to cut the finished profile.*

Use a dovetail bit to form the dovetail key. *Cut the stock higher than needed to provide a surface to ride against the fence.*



The right key. *Check the fit of the key. If it is too tight, plane off a little from the bottom of the key.*

sembled, keys can be made from wood that matches the carcase or from a contrasting wood.

Hand-cut keyed miters—Place the box in a vise and, using your best backsaw, cut across the joint, making sure your sawcut depth is consistent on both sides. Use veneer stock for the key and fit this to your sawcuts. If the veneer is too thick, pound it with a metal hammer. Don't worry if it's a bit loose; when the key hits the glue in the joint, it will swell up, providing a nice long-grain to long-grain joint. If you use the same wood, the keys almost disappear into the joint and the surrounding wood.

Keyed miters on the tablesaw—There are two jigs you can use to hold the work when you cut keyed miters on the tablesaw. For smaller boxes, a keyed miter jig run against the tablesaw fence works fine. Screw a straight fence to a piece of medium-density fiberboard (MDF) or plywood at a 45° angle. Make sure the screws are higher than any possible cut you'll ever make.

A more secure method for holding larger boxes is to use a cradle jig. Make this out of plywood or MDF with a right-angle support in the center. Hold the box in the cradle and run the jig right against the fence to make the cut.

After the first cut has been made, rotate the box for the next corner. When all four corners on the bottom are done, spin the box and do the matching joints for the top of the box. Use a flat-tooth blade for the nicest look, or clean up the bottom of the cuts with a ⅛-in. chisel.

On the bandsaw, rough out stock for the keys, making them oversize in width but close in thickness and long enough to hang onto. Your key stock should be inserted with its grain running parallel to the long grain of the box. Pass it by the tablesaw blade to trim it to size, using a thin push stick to hold it securely. When gluing in keys, use a hammer to tap down each key to the bottom of the slot on both sides of the corner.

Dovetails meet miters—Dovetailed keys employ the same keyed miter jig used on the tablesaw. A cradle jig also may be used, but you likely will need a dovetail bit with an extralong shaft for

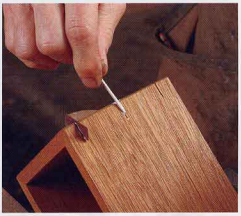
Take the top off your box

Like the base, the lid fits into a groove in the box sides. After the box has been glued together, plan the spacing of the keys to match where the lid will be sawn off; then saw it off with a tablesaw and a handsaw. Clean up the edges with a block plane and attach hinges.

HAND-CUT KEYS

Hand-cut key slots. *Use a backsaw to cut diagonally into the corner. Make sure the depth of cut is even on both sides.*

Tenderized veneer. *If the veneer spline is too thick to slide into the sawkerf, a few hammer blows will persuade it to fit.*



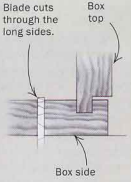
Thin but strong. *Despite its flexibility, the long-grain to long-grain glue bond strengthens the whole joint.*

this jig. First, rough out the waste with a straight bit, then set the dovetail bit to the final depth of cut and make the pass.

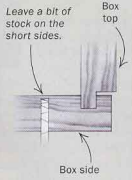
Mill the key stock out of a contrasting wood almost to width and taller than required. This way, when routing the keys, there will be some wood left to run against the fence. Use the same bit to rout the dovetail slots, but set it for a slightly taller cut to make the key stock, which will allow the keys to slide more easily into the slots. Trim both faces of the stock. If a key is just a hair too thick, plane off a shaving from the bottom where it's widest. Cut the keys overlong and glue them in place on the box. Clean up all your keyed miter joints on the bandsaw first. Then, working down and away from the corner of the box, use a block plane to smooth the keys. If you work toward the corner, you will tear out the short grain of the keys. □

Gary Rogowski runs the Northwest Woodworking Studio in Portland, Ore., and is a contributing editor.

1. Through-cut. *Set the tablesaw blade slightly higher than the thickness of the sides to cut through the two long sides.*



2. Partial cut. *Lower the blade to leave 1/16 in. of wood on the short sides. This alleviates clamping or supporting the lid with shims during the final cut.*



3. Final cut. *Use a handsaw to cut through the two short sides. Clean up the edges of the box and the lid with a block plane.*

Photos, this page (bottom three): Michael Pekovich

A Guide to Modern Wood Screws

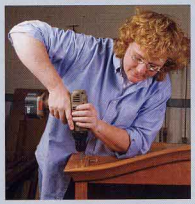
They're stronger, easier to drive and hold a lot better, too

BY AIMÉ ONTARIO FRASER

The traditional, cut-formed wood screw, which is commonly called a tapered wood screw, has changed little since it was first made by machine more than 100 years ago. Walk into any hardware store or home center, and you will find it in a wide range of sizes and lengths.

In recent years, however, a new breed of wood screw has come along. Because of the way it's designed and built, this modern wood screw enjoys several advantages over the traditional version. Although the acceptance of this screw by the general population has been somewhat slow, as time goes by, more woodworkers are learning to appreciate all of those advantages.

It's not difficult to tell the old and new apart when you see them side by side. The most obvious difference is at the shank. On a traditional wood screw, the shank diameter and the major thread diameter (the outside diameter of an outside thread) are the same.



But on a modern wood screw, the shank diameter is smaller than the major thread diameter. That's one of the main reasons why modern screws are easier to drive. They also have fewer yet sharper threads formed at a steeper lead angle, and almost always have a drive that's either square (Robertson) or Phillips, or a combination of the two. A star (Torx) drive is used sometimes, too. And the drive options continue to grow as some manufacturers develop their own drives.

By the way, be careful not to confuse modern screws with drywall screws. That's easy to do, mainly because drywall screws have all of the general characteristics just mentioned. And for some woodworking applications, drywall screws are okay. However, because they lack some important qualities found in modern wood screws, drywall screws are not usually the best choice. For example, drywall screws don't have special tips (see the facing page), so they are considerably harder to drive, and

Photos: Michael Pekovich

Modern screws like man-made materials, too. *With sharp, coarse threads, modern screws work better than traditional screws in MDF, particleboard and plywood.*

they're more brittle, so they break more easily. Also, the threads extend from the tip to the underside of the head, which can create assembly problems related to bridging (for more on bridging, see the facing page).

After a few years of using modern screws, I've concluded that they outperform traditional screws in a number of ways. The thread angle, or pitch, is higher on modern wood screws, meaning they can be driven faster because the screws reach full depth with fewer revolutions. That's a plus when you have a lot of screws to drive. Of course, the high pitch requires more torque, but with the right drive, you can apply plenty of turning force without much fear of damaging the drive or having the tip slip out and mar your work.

Most modern wood screws have special tips or serrated threads that, in many cases, eliminate the need for a pilot hole. Keep in mind that this self-drilling feature isn't found on all modern screws, and those that have it don't work perfectly in all woods or in all situations. For example, when drilling in woods that are particularly hard, or where the screws are near the ends of a board, you'll need to drill pilot holes to prevent the screws from breaking or the wood from splitting. That said, though, it's possible to screw #10 by 2½-in.-long modern wood screws into some hardwoods without drilling any pilot holes.

Because the threads on modern wood screws are coarser and deeper, they bite into the wood at an angle that is approximately parallel to the wood's surface. As a result, when compared with traditional wood screws, modern screws require more force to pull out.

The threads on modern wood screws are stronger than on traditional versions. That's because modern wood screws are formed by rolling the threads out from the shank under high pressure, so the grain of the alloy flows approximately parallel to the surface of the thread. On the other hand, the threads on most traditional wood screws are shaped by cutting. As a result, cut threads end up with short grain that is more likely to fracture.

Because they're made by rolling rather than cutting, modern wood screws can be created from stronger alloys than traditional screws. The pressure exerted during the rolling process adds even more strength to the alloy. As a result, modern screws have higher torque, tensile and shear strength.

If you've ever tried to drive a screw at the outside of your reach, you'll appreciate the fact that many modern wood screws have square drives. Because the four-sided drive provides lots of surface area between driver and screw, you can put the screw on the driver and then maneuver the screw into position without having it fall off the bit. Often called "stick fit," this small detail makes a big difference in ease of use.

Plywood, particleboard and medium-density fiberboard (MDF) are widely used these days, but traditional wood screws don't get a good grip in them. That's not so with modern wood screws. Their sharp, coarse threads enable them to hold well in these difficult materials, so there's no need to keep two different screws on hand for wood and manufactured products. A modern screw works just fine in both.

Manufacturers often customize modern screws in an effort to tweak their performance. For example, some screws contain a dry lubricant, which makes them easier to drive. You can get flathead screws with tiny serrations on the underside of the head that enable the screw to form its own countersink as it is being driven. Modern screws are available in a range of alloys, surface platings and head options. Also, some screws have longer shanks to reduce bridging. Finally, modern wood screws typically cost less than traditional screws, although screws with special features may be more expensive.

Faster, cheaper, stronger and usually better suited to the job at hand—what more could you ask for? Modern wood screws in a variety of sizes are pretty much all you need. □

Aimé Ontario Fraser is a woodworking teacher and boatbuilder in Westport, Conn.

Getting a grip. *Square-drive screws grip the driver tip, making one-handed installation possible.*

Installing modern wood screws

As a modern screw enters wood, the self-drilling tip removes some wood to make way for the screw, but it leaves enough for the thread to bite. The threads cut some wood fibers and crush some others, but for the most part, the wood is compressed; engineers say the wood flows around the threads. The tight contact made with largely intact wood fibers keeps the screw from pulling out.

In dense woods, the fibers don't compress easily. As you drive the screw, the wood has nowhere to go, and it jams around the screw threads so tightly that the force required to turn it may become greater than the screw can handle. When that happens, the screw breaks. Sometimes the screw is strong enough to shove aside the wood, but the fibers won't compress around the screw, and the piece splits. A similar situation occurs when driving screws near the end of a board—there's not enough material to absorb the compressive forces, so the piece splits. In these cases, the only way to get a full-strength joint is by driving a pilot hole to remove a core of wood so that the screw can go all the way in.

SOURCES

HIGHLAND HARDWARE
(800) 241-6748

MCFEELY'S
(800) 443-7937

ROCKLER
(800) 279-4441

WOODWORKER'S SUPPLY
(800) 645-9292

WOODWORKER'S WAREHOUSE
(800) 767-9999

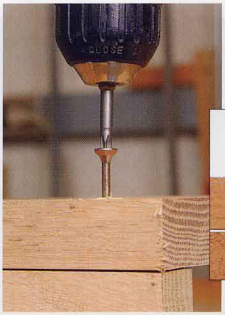
Once you've drilled the pilot hole, you should attend to the details of proper screw driving. First of all, if the screw isn't lubricated by the manufacturer, you'll want to add lubrication. Use wax, paint, boiled linseed oil or proprietary mixtures, but use something. This small detail makes your screws much easier to drive.

It takes a lot of power to drive a screw. If you're not situated correctly, you won't have the strength to oppose cam-out, which is the tendency of the driver to rise out of the screw drive as the screw becomes more difficult to turn. The turning driver bounces out of the slot, spins and then falls back into the slot. Not only does cam-out make driving slower, but the hardened-steel driver can damage the screw drive, making it impossible to drive the screw farther in or get it out.

Resist the temptation to mash the trigger and drive the screw at full speed. Turn the high-low switch to low and use a steady, moderate speed to drive the screw until the head is near the surface (at this point the screw becomes most difficult to drive). Then, while pushing down, pulse the drill by quickly pushing the trigger on and off. If you still get cam-out, reposition yourself to allow more downward force on the drill.

Another common problem with modern screws is called bridging, or jacking (right), which occurs when you're screwing two boards together and the threads cross the joint line and bite into the upper piece. Driving the screw causes the parts to separate, and it can be a chore to get them back together. If your pieces don't pull together tightly when the screw is driven to full depth, simply bore another pilot hole in the upper piece with a diameter sufficient to prevent the threads from biting.

BRIDGING IS A COMMON PROBLEM

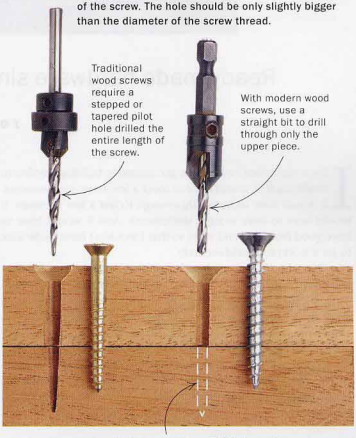


Threads that extend across a joint line can sometimes cause the two parts to separate as the screw is driven home.

Threads in contact with upper piece create a gap between pieces.

PREVENT BRIDGING

Simply drill a hole in the piece that accepts the shank of the screw. The hole should be only slightly bigger than the diameter of the screw thread.



Traditional wood screws require a stepped or tapered pilot hole drilled the entire length of the screw.

With modern wood screws, use a straight bit to drill through only the upper piece.

In dense woods, a pilot hole may be necessary to prevent the screw from breaking or splitting.

Rock-Solid Workbench

Ready-made hardware simplifies end-vise construction

BY JON LEPPO

I knew that when I eventually got around to building my dream workbench, it would have to meet a few basic requirements. It would have to be sturdy enough to last a few lifetimes. It would have to have storage underneath. And it would have to have good front and end vises so that I wouldn't have to do a lot to get a workpiece held securely.

In 1998, I finally built my bench. And I'm pleased to say that after five years of heavy work, it has fulfilled my expectations, and then some. It's rock solid and has plenty of useful storage, thanks to 15 drawers and an area of open space between the base and the top.

Building such a large workbench can be an intimidating task, but it's actually basic woodworking. The only parts of the bench that call for anything other than straightforward biscuit and mortise-and-tenon joinery is the end vise. Whether you decide to build this bench using the foldout plans or add the end vise to a bench you already have, this article walks you through the process.

Vises, benchdogs and a board jack help anchor workpieces

The front and end vises, along with benchdogs and a board jack, offer plenty of clamping options.

In the front of the bench I had planned to use a typical cast-iron vise with wood jaws until I ran across an Internet ad for a used patternmaker's vise, and I couldn't resist the temptation to buy. The vise, built in the 1930s by the Emmert Manufacturing Co., allows me to clamp a workpiece in almost any position. Patternmakers favor this type of vise because it adjusts in several planes, making it possible to hold work of almost any shape. Like me, you'll occasionally see a used Emmert vise offered for sale on the Internet. Also, you can sometimes find them at vintage tool dealers or, more rarely, at flea markets. Expect to pay upwards of $500 for one in good condition.

My vise is one of the larger ones Emmert produced. Modern reproductions of the vise are available in mostly smaller sizes, generally about 15 in. long. Some of these are fairly inexpensive, about $300, and the quality is decent. Higher-quality ones can cost more than $1,000.

A sliding board jack helps support long, wide stock, with the front end of the stock held in the Emmert vise. The board jack is adapted directly from one I found in *The Workbench Book* by Scott Landis (The Taunton Press, 1987), modified only slightly to fit my

Photos: Tom Begnal

Anatomy of a sturdy bench

The base of this bench, modeled after the one master woodworker Robert Whitley built for his bench, consists of five frame-and-panel assemblies—two end frames, a back frame and two horizontal frames—bolted together with carriage bolts. And while I wouldn't exactly call this a knockdown bench, it can be disassembled.

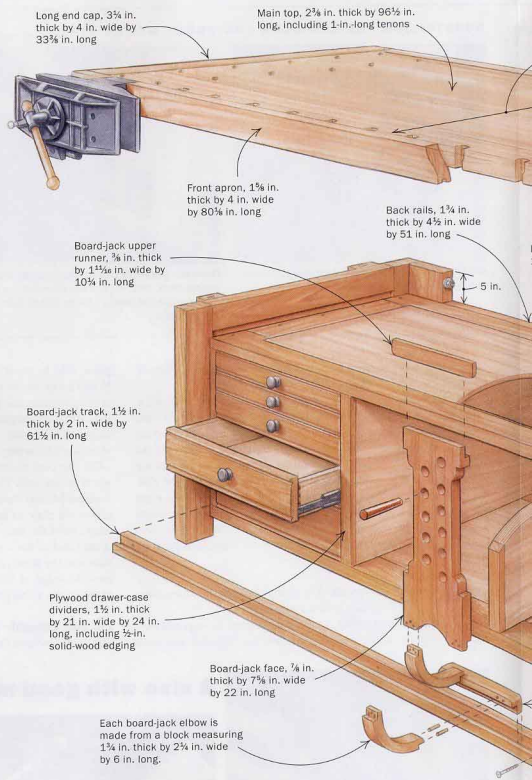
I joined the panel frames with a double row of #20 biscuits, mostly because of speed and convenience. The base carcase sees mostly compression loads on vertical grain members rather than racking forces, which would stress the biscuit joints. A purist would have used mortises and tenons here. But I've had no trouble using biscuits in this kind of application.

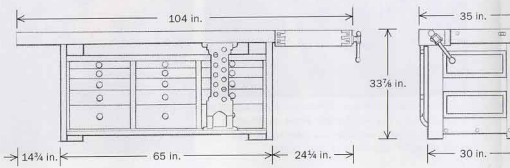
The top is made from hard-maple laminations face-glued together. Each end of the bench has a long tenon. Later, when a pair of caps is made, each tenon fits into a mortise in the corresponding cap pieces.

I used a circular saw to cut the tenons. With a straightedge clamped to the benchtop to guide the saw, I made several crosscut kerfs and chiseled away the waste.

Both the long and short end caps are mortised to accept the tenons on each end of the bench.

To allow the top to move, the end caps aren't glued in place. Instead, each one is held in place with a pair of bolts. One of the bolt holes on each end cap is slotted so that it can move with the top. Once I had the end caps mounted, I flattened the entire benchtop using handplanes and winding sticks. Mounting an Emmert vise is relatively simple, although they are often heavy (mine is about 85 lbs.). The vise itself mounts on a large hinge that's mortised into the top face of the benchtop and also the front face of the front apron. To allow clearance for the vise screw, a channel is cut into the underside of the apron and the benchtop.






31¾ in.
6½ in.
17⅞ in.
Back apron, 1⅜ in. thick by 4 in. wide by 94½ in. long
Short end cap, 3⅜ in. thick by 4 in. wide by 28½ in. long
All bolts are ⅜ in. dia.
Filler block, 1⅜ in. square
Clearance for guide plate
Horizontal supports, 1¼ in. thick by 3¾ in. wide
Back dividers, 1¾ in. thick by 4½ in. wide by 15½ in. long
Cleat, 1¾ in. thick by 2 in. wide by 16⅝ in. long
End panel mortise, ¾ in. wide by ½ in. deep by 9¼ in. long
Back stiles, 1¾ in. thick by 5¼ in. wide by 31½ in. long
Back panels, ¾ in. thick by 14⅞ in. wide by 16⅝ in. long
Mounting cleats, 1¾ in. thick by 2 in. wide by 3 in. long
Upper end rails, 1¾ in. thick by 4 in. wide by 21 in. long
Horizontal plywood panels, ½ in. thick
End dividers, 1¾ in. thick by 4½ in. wide by 21 in. long
End panels, ¾ in. thick by 9⅛ in. wide by 21⅞ in. long
Board-jack lower runner, 1¼ in. thick by 1⅜ in. wide by 10¼ in. long
Horizontal frames, 24 in. wide by 61½ in. long, are made from 1¾-in.-thick by 4¼-in.-wide stock.
Plywood drawer-case ends, ¾ in. thick by 21 in. wide by 24 in. long, including ½-in. solid-wood edging
Lower end rails, 1¾ in. thick by 4½ in. wide by 21 in. long
End stiles, 1¾ in. thick by 4½ in. wide by 31½ in. long
35 in.
30 in.

The main plate is mounted to the edge of the benchtop with wood screws and is the only vise part that doesn't move. All of the other wood and steel vise parts simply slide back and forth along the main plate.

END-VISE CONSTRUCTION

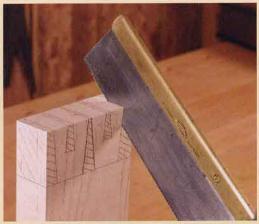
bench. The bottom track screws to the bottom frame, capturing the board jack. An occasional application of paste wax to the tracks keeps the jack sliding smoothly.

End vise adds versatility

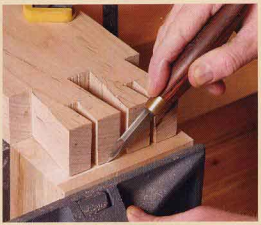
I originally considered a commercially made twin-screw end vise, but in the end the extra versatility that a traditional vise offers has made the effort worthwhile. Whether you build my bench from the ground up or not, adding an end vise to a workbench will make it much more user-friendly. Building the end vise is also the trickiest part of the process.

The end-vise hardware consists of four parts (the vise hardware is available from Woodcraft—800-225-1153): a main plate that includes a cylindrical nut; a long screw with a flanged bracket and handle collar; a top guide plate with a lengthwise groove and a pair of threaded bolt holes; and a bottom guide plate with a corresponding groove and a pair of countersunk through-holes. A pair of bolts is also included. By the way, it's important to have

DOVETAILING THE END CAPS AND FRONT OF THE VISE



Cut the dovetails. *Use a fine-toothed backsaw to cut the sides of the dovetails.*



Mark the pin locations on the outside and inside ends. *With the end cap clamped in a vise, the front piece is used as a template to mark the pin locations.*

Cut the pins. *Use a Forstner bit to remove most of the waste material from the pin ends. A chisel takes care of any waste that remains.*

the hardware on hand before making the vise. Some of the dimensions are taken directly off the steel parts.

The main plate is screwed to the edge of the benchtop. All of the other parts, effectively working as one component, simply slide along the main plate. One end of the long screw is attached to the outside end of the vise, while the other end is threaded into the nut on the main plate. As the screw is turned, it threads in or out of the fixed nut, and in the process the vise is carried along for the ride. The top and bottom guide plates connect the vise and the main plate while allowing the vise to slide. The secret here is the single lengthwise groove near one edge of each guide plate. The grooves in the guide plates simply slide over the main plate, held apart by the wooden core.

Core prevents a sloppy fit—The core maintains the correct distance between the top and bottom guide plates.

To make the core, start by measuring between the top and bottom guide plates while the two parts are assembled to the main plate. Add 1/64 in. or so for clearance, then rip the core to width. Now clamp the two guide plates to the core and try sliding the core along the main plate. If the fit is too loose, remove the plates, then run the core through a thickness planer, but make the cut an especially thin one. Repeat as needed. If the fit is too tight, add shim stock between the core and a guide plate.

Cut the core to length and drill a clearance hole for the vise screw in one end. Then hollow out the center of the core using a Forstner bit, and clean up what remains with a chisel. Now use the top guide plate to mark the locations of the mounting holes on each end of the vise. The end of the plate should be flush with the drilled end of the core. To provide a little clearance between the core and the main plate, the slot in the guide plate should extend past the edge of the core by no more than about 1/32 in. Once marked, use a drill press to bore the holes.

Cut and assemble the end-vise parts—After cutting the front, end, top, jaw and dog-hole block to size, it's time to tackle the

A vise with good moves

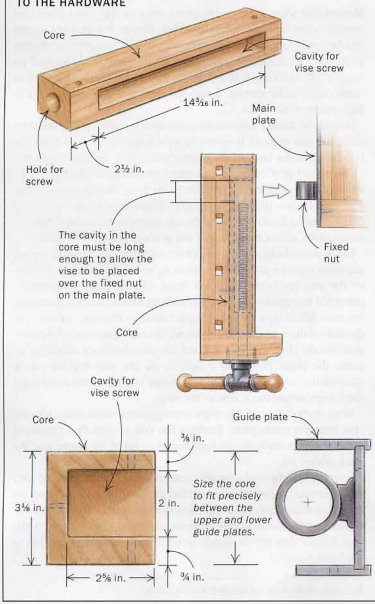
The jaws on an Emmert patternmaker's vise adjust in three planes, a feature that can prove useful when clamping odd-shaped parts. The jaws rotate 360° (left), pivot 90° (center) and taper (right).

ASSEMBLING THE VISE

Begin gluing the vise parts. *Glue the end, the jaw, the dog-hole block and the top. You'll need several clamps to squeeze the four parts together.*

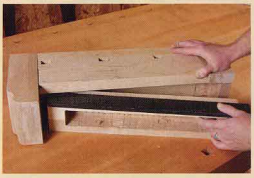
Add the front piece. *Apply glue to the tails on the front piece and the pins on the end and jaw, then use a mallet to tap the front into place.*

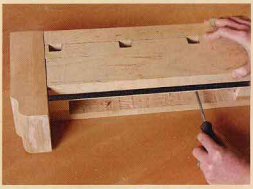
THE CORE CONNECTS THE VISE TO THE HARDWARE



MAKING THE CORE

The core provides a means to secure the vise hardware. *The core is made from a glued-up block of wood. After drilling out the cavity, use a chisel to clean up any waste that remains.*





Mounting the core. *With the upper guide plate temporarily placed on the core to serve as a spacer, slip the core and plate into the vise cavity (top). Then attach the core to the vise by driving four screws through the core and into the dog-hole block (bottom).*

INSTALLING THE END VISE

Secure the main plate. *Position the top edge of the plate slightly above the bottom edge of the groove in the top.*

Slide the top plate onto the main plate. *When properly located, the top guide plate should slide smoothly along the main plate without interference.*

Mount the vise. *With the cylindrical nut on the main plate roughly aligned with the open space at the back end of the core cavity, slip the vise onto the guide plate. Then thread the screw into the nut.*

Bolt the guide plates. *After slipping the lower guide plate onto the bottom edge of the main plate, add the two bolts that thread into tapped holes in the upper guide plate.*

double dovetails that join the front to the end and the jaw. Double dovetails simply are small dovetails cut between larger ones (see the top photos on p. 54). They require a lot of chopping by hand, even after hogging out much of the waste with Forstner bits. Plus, it takes special care to avoid breaking the pins at the narrow end.

Mark the tails on each end of the front, then use a backsaw to remove a good part of the waste. Finish the work with a chisel. Now mark the pin profile. I clamped the jaw on end in the Emmert vise and used a chisel to mark most of the pin profile, reaching places my marking knife couldn't. Remove the pin waste using the drill press. You can do this with Forstner bits and then finish with a chisel. Repeat the steps to cut the pins on the end piece.

The dog-hole block has three tenons on each end that fit into mortises cut into the end and the jaw. Cut the dog holes first, then use a router to expand the top end slightly, creating a small step.

The top piece has a spline groove on three edges. Cut matching grooves in the end, the jaw and the dog-hole block.

After dry-fitting all of the parts to make sure everything goes together okay, glue and clamp the end, the jaw, the top and the dog-hole block. Then glue the front in place.

Mount the vise—The entire vise hangs on the main plate that mounts at the notch in the right end of the top. But, before the vise can be mounted, you need to cut a groove in the edge of the top to provide clearance for the upper guide plate. A router and an edge guide, with the router operated horizontally, can be used to create most of the groove. A chisel is used to extend the groove to the corner of the notch.

Before the main plate can be mounted, a shallow hole must be drilled in the edge of the benchtop to provide clearance for the bolt head on the back of the plate. Finally, glue the cleat in place.

The top edge of the main plate must be parallel to the benchtop, and the front edge of the plate must be flush with the front of the end cap. It also must be located a distance from the benchtop that's equal to the thickness of the top plus the thickness of the top guide plate, minus the depth of the groove in the guide plate.

Once everything is lined up, drive a couple of screws to secure the main plate in place. The remaining screws will be installed after the vise has been test-fitted. Next, add the core. Temporarily place the top guide plate on the core and slide the two parts into the vise. While squeezing the plate between the core and the underside of the top, drive four screws through the back of the core and into the dog-hole block. Once the core has been installed, remove the plate. Now drill a hole in the jaw and slip the screw through the hole and into the core. A pair of screws driven through the flange secure the screw to the vise.

Next, with the top guide plate resting on the main plate, slip the vise over the guide plate. Position the vise so that the cylindrical nut ends up in the opening between the end of the screw and the back of the core.

To complete the vise assembly, insert the two bolts supplied with the hardware through holes drilled earlier in the core. Snug up each bolt with a few turns of an adjustable wrench. The wood handles are made from maple dowels, with ends made from hardwood balls that are available from a number of woodworking mail-order outfits. □

Jon Leppo is an amateur woodworker in Denver.

Aerosol Finishes

Convenient and easy to use, aerosols now offer better technology and more finish options

BY CHRIS A. MINICK

No doubt about it; I am a confirmed finishing junkie. My finishing arsenal consists of a bevy of expensive brushes, half a dozen spray guns and more cans of finish than I care to count. It may seem odd, given my well-stocked shop, that my weapon of choice for finishing small projects is usually the common and much maligned aerosol spray can.

Aerosol finishes aren't what they used to be. Gone are the days of sputtering low-tech paints. They've been replaced with professional-quality wood finishes in an amazingly broad array of types. A trip to your local home center will reveal spray cans of varnish, lacquer, stains, toners, water-based finishes and even precatalyzed finishes.

What about durability? It doesn't seem logical that an easy-to-use finish should yield good performance results. To satisfy my curiosity, I started a long-term test a few years ago comparing aerosol lacquer and varnish with their brush-on cousins. The test results are impressive: I found that most of the aerosol finishes have essentially the same stain, scratch and solvent resistance as the brush-on variety, if applied in a thick-enough finish.

Before learning the few tricks that make finishing with aerosols effective and easy, it is best to start by learning how they operate.

A diluted solution is what makes aerosols work

When the spray-can nozzle (known as the actuator in spray-can lingo) is pushed down, a small valve opens, allowing the

CHOOSING AN AEROSOL FINISH

FINISH TYPE	SAMPLE BRANDS
ACRYLIC LACQUER	Sherwin-Williams Krylon All Pro Spray Clear Acrylic Master Water Clear Acrylic
NITROCELLULOSE LACQUER	Deft Behlen Rust-Oleum
OIL-BASED	Zar polyurethane Minwax spar urethane
WATER-BASED	Minwax polycrylic Behr polyurethane
SHELLAC	Zinsser Bulls Eye

A choice of finishes. *Finishes available in aerosol cans include polyurethane, lacquer, water-based polyurethane, shellac and spar varnish.*

head pressure in the can to force a mixture of finish resin, solvent and propellant up the dip tube and out of the nozzle. As the finish solution leaves the tip, a liquefied propellant instantly vaporizes, exploding the finish and solvent mixture into millions of droplets.

Because the dip tube and actuator orifice of a typical aerosol can are rather small compared with the similar parts of a spray gun, the liquid finish in the can must be very thin to spray properly. Consequently, most aerosol finishes contain less than half the solids and significantly more solvent than the same volume of their non-aerosol cousins. A ratio of high solvent to low solids is a recipe for runs, drips and sags if ever I heard one. These problems are easily avoided, though.

Nozzle design makes the difference—Aerosol cans are not all created equal, especially when it comes to nozzle design. Some aerosols spray an evenly shaped tapered fan pattern similar to the best conventional spray guns, while basic aerosol nozzles produce a simple doughnut-shaped cone pattern. In my experience, aerosol nozzles that fan out the finish are easier to control and provide fewer runs than those that spray conical patterns (see the photos and drawings on the facing page).

When shopping for an aerosol finish, remove the cap and inspect the nozzle. Fan nozzles will be made from two pieces of plastic: a large button actuator with a small plastic disc inserted in the face. This easy-to-spot disc has a raised line running across the orifice. The disc can be rotated to produce either a vertical or horizontal fan, a handy feature when spraying large projects. Cone spray actuators, on the other hand, can be made from one or two pieces of plastic but have no line. While you are at the store, pick up a plastic trigger handle (see the top right photos on p. 60). This handle dramatically improves control and reduces finger fatigue, turning a simple spray can into a functioning spray gun.

Spray gun vs. spray can. *The left half of the panel received two coats of lacquer from a spray gun. The right half received two coats of lacquer from an aerosol can. The aerosol finish is only half as thick as the spray-gun finish.*

You can't cover up poor preparation

Someone much wiser than me once said, "Cleanliness is next to godliness." I can't vouch for that, but I do know that cleanliness is a very important part of finishing, especially when you're using aerosol cans. Heavy-bodied brush-on finishes are more forgiving when it comes to dirt or grime: They tend to bridge over the offending contamination, whereas thin aerosol finishes often pull away from it.

Dust creates an uneven stippled look in the dry finish while oily or waxy residue results in a moon-cratered appearance on the dried surface.

Photos, except where noted: Mark Schofield

ADVANTAGES	DISADVANTAGES
• Fast dry time • Clear film	• Pinholes are possible during hot weather
• Available as gloss, satin or flat • Easy to sand	• Medium dry time • Heavy solvent odor
• Good leveling qualities	• Slow dry time • Difficult to sand • Hard to repair
• Little solvent odor • Nonyellowing cast	• Bluish tint on dark wood • Raises grain on first coat • Slow dry time in humid weather
• Fast dry time • Good adhesion on oily woods • Natural color • Easy to sand	• Produces "fat edge" when applied in heavy coat

Make sure all surfaces to be finished are free of dirt and grease before you start because fixing the problem after the fact means sanding off the entire finish and starting over. Before starting the finishing ritual, I make it a habit to vacuum the sanding dust thoroughly from my projects, as opposed to wiping with a tack rag, which just moves around the dust.

Proper technique yields a flawless finish

The method for spraying with an aerosol can is quickly learned, but as with any new finishing technique or product, practice on some scrap until you are comfortable. Shake the can vigorously up and down for a minute or until any agitator balls inside are loose (these are not present in most clear finishes), then swirl the can for one minute to blend the ingredients. It is good practice to swirl the can occasionally during the finishing job to ensure that the ingredients stay well mixed.

I get better results if I start the spray pattern from the front portion of the project and work toward the back, but feel free to experiment. The distance you hold the can from the surface is a function of the spray-nozzle geometry, the amount and type of propellant in the can and the viscosity of the liquid, but in general the distance is anywhere from 6 in. to 12 in. Follow the manufacturer's recommendations on the side of the can. Trigger the aerosol can 2 in. to 3 in. off the edge of the piece and continue in one smooth motion across the entire width, finally releasing the

A choice of nozzles

Aerosol cans are equipped with one of two nozzle designs. The basic model sprays a cone-shaped pattern. A better design sprays an evenly shaped tapered fan pattern similar to that made by conventional spray guns.

BASIC
This nozzle's conical spray pattern makes it difficult to spray an even coat.

A fan of this can. *The raised lines on both sides of the pin hole indicate that the nozzle can be rotated 90° to shift the spray pattern.*

BETTER
This style of nozzle produces an adjustable fan-shaped spray pattern.

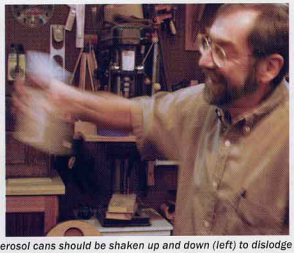
Cans with a horizontal fan nozzle produce a long, elliptical spray pattern.

Adjusting the orientation. *A pair of pliers may be used to turn the nozzle to get a vertical spray pattern.*

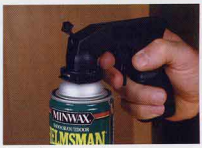
With the nozzle rotated, the spray pattern becomes vertical, which makes it easier to get into back corners of projects.

Photos, this page: Kelly J. Dunton; drawings: Bob La Pointe

APPLYING AN AEROSOL FINISH



Shaken, then stirred. *Before being used, all aerosol cans should be shaken up and down (left) to dislodge any solids that have settled, and then swirled around (right) to combine the solids with the propellant and the solvent.*



Instant spray gun. *An accessory handle makes spraying any aerosol much easier and more precise.*

trigger 2 in. to 3 in. past the other edge (see the drawings below). This method eliminates puddling at the beginning and end of the stroke. Spray in short bursts, stopping at the end of each stroke. Repeat the procedure, overlapping each successive swath about 50% until the entire surface is covered.

Turn the piece 90° and spray another light coat (called boxing in spray-finishing lingo). Avoid heavy coats. It is easier to spray on another coat than it is to sand out a run. Let the finish dry, then repeat the entire process until you are satisfied with the appearance.

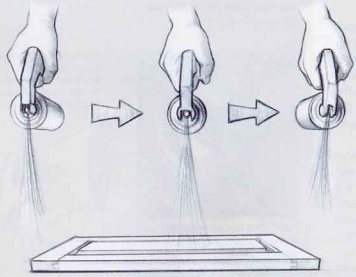
The number of coats for maximum protection varies with the percentage of solids in the individual finish. As a crude rule of thumb, for decorative projects I apply multiple coats until the pores on tight-grained wood are filled with finish. Projects that will see heavy use get two or three additional coats after that. In general, I use satin finishes because they hide defects that a gloss finish would highlight.

The technique for rubbing out an aerosol finish can be identical to that for any other kind of finish. However, because each coat of finish is so thin, it is possible to sand out any defects such as dust specks, apply a final show coat and buff that with a dry rag to give a silky smooth finish.

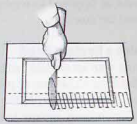
Always clear the nozzle after use by turning the can upside down

SPRAY TECHNIQUE

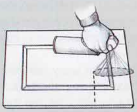
The secret to achieving even coverage is keeping your wrist locked. Keep the can a steady 6 in. to 12 in. from and parallel to the workpiece. Don't let your wrist move the can in an arc.



APPLY COATS IN BOTH DIRECTIONS



To avoid streaking and missed areas, overlap each pass by 50%.



Spray another coat perpendicular to the first.

Watch it on the web

For more on aerosol spraying techniques, go to www.finewoodworking.com.

A SIMPLE SPRAY BOOTH

A gentle breeze. *A router speed control slows the fan driving air through the spray booth. Without this reduction, the force of air would bounce the overspray and vapors back into the operator's face.*

and spraying on some scrap until nothing but propellant is coming from the nozzle. In this way the actuator won't be clogged with dried finish the next time you try to use it.

Don't spray when it's hot and humid

Most aerosol finishes perform best at temperatures around 75°F and low relative humidity, conditions rarely seen in most woodshops. With a conventional spray finish, the solvent can be manipulated to suit various atmospheric conditions, but because aerosol finishes come in a sealed pressurized can, you cannot adjust the solvent mixture to account for less-than-ideal conditions.

This means that some finishes will almost certainly blush when sprayed on a hot, humid day. Blush occurs when the rapid evaporation of the solvent from a finish cools the surface to below the dew point of the surrounding hot, humid air. Water vapor in the air then condenses into liquid water on the surface of this cool finish. This in turn forces some of the finish resin to crystallize into microscopic white specks of solid finish. Avoiding blush is fairly easy: Don't finish when both the temperature and the humidity are high.

If you do end up with blush on your project, all is not lost. It can usually be eliminated by waiting for the humidity to go down and then spritzing a light coat of the same finish over the entire project. The solvents in the fresh coat often will release the trapped moisture in the dried finish, eliminating the blush. You also can minimize the chances of blush if you can match your finish to the weather conditions. I've found through trial and error that aerosol acrylic lacquer finishes have fewer tendencies to blush than aerosol nitrocellulose lacquer finishes when it is hot and humid, while aerosol varnishes are virtually blushproof any time of year.

Aerosol cans require respect

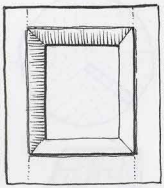
Without a doubt, the ready-to-use, spray-it-and-forget-it nature of aerosol finishes makes them a valuable asset in any shop; however, this convenience comes with a price. The warnings on the cans of aerosol finishes read something like this: "Contains propane, isobutane and petroleum distillates. Vapor harmful. Do not puncture or incinerate. Exposure to heat or prolonged exposure to sun may cause bursting." Pay attention to these important warnings. That innocent-looking aerosol can is really a little bomb.

A makeshift spray booth. *Made from a cardboard box and a furnace filter, this cheap and disposable spray booth is ideal for collecting overspray when using aerosols.*

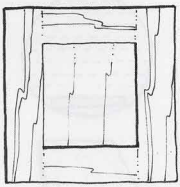
A few precautions will prevent disaster. When I use an aerosol finish, I always open a window or a garage door and turn on a fan behind me that sweeps air across the project toward the outside. The flow of fresh air keeps the fumes away from my face. I wear a good organic vapor respirator, too (see *FWW* #155, pp. 117-118). While these precautions keep me from inhaling the vapors, they do nothing to keep the overspray from sticking to everything in its path. My solution is to spray small projects inside a large cardboard box fitted with a furnace filter (see the photo above). This easy-to-make, disposable filter collects overspray.

The shelf life of aerosol finishes varies: For lacquer and shellac it is almost indefinite, but with varnish the driers lose their effectiveness after about two years. With any can of finish of uncertain age, it is best to do a sample spray to make sure that it dries properly. □

Chris A. Minick is a consulting editor.



18th- and 19th-century paneling typically has a frame consisting of stiles and rails of different widths, invariably molded on the inner edges surrounding a fielded or raised panel.



Arts and Crafts paneling is typically square, with equal-width rails and stiles. Panels are sometimes carved, but more often than not they are plain and flat in unmolded frames.

well-known designers have used other species, such as walnut, mahogany and cherry.

2. Construction techniques—Although cabinet construction with veneered surfaces is occasionally used for the body of an Arts and Crafts piece, the majority of authentic pieces are made using solid wood and frame-and-panel construction.

Consistent with the directness and honesty that are the hallmarks of this style is the use of slats where a solid piece or a frame-and-panel section would be overkill. Unlike the furniture of the Gothic Period, turned elements are rare in Arts and Crafts designs. All of this is in keeping with the principle of using the simplest possible methods of work for the most honest and unpretentious result.

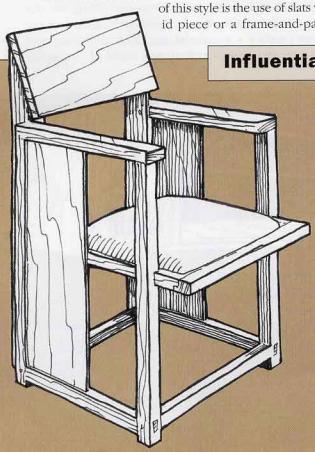
Simple does not, however, mean sloppy, especially in terms of the construction of a piece. In fact, because the aim of the Arts and Crafts movement was to design furniture that the maker could be proud of, a nice execution, particularly of exposed joinery, is essential when building a genuine Arts and Crafts piece.

3. Joinery—Without a doubt, the mortise and tenon is the king of Arts and Crafts joints (see the drawings on the facing page). Dovetailing, doweling, lapped and housed joinery also are used where appropriate, but in keeping with the demands of strength and honesty, the mortise-and-tenon joint plays a major role in the majority of Arts and Crafts pieces.

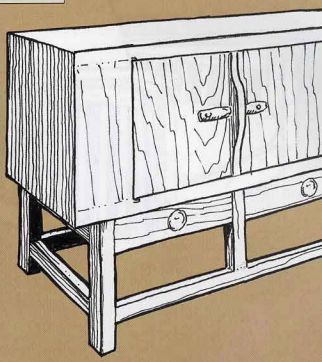
Several varieties of tenons are used, including stub, blind, through- and tusk, but each is used only when and where necessary for maximum strength without compromise. This means that if, for example, a through-tenon is the strongest possible form in a given situation, the design will make a virtue of the necessity by not attempting to hide or disguise the joint. This results in the ends of through-tenons being finished a little proud of the surface, often nicely chamfered and with any wedges thoughtfully arranged for a pleasing visual pattern and the most efficient use.

4. Design paradigms—In American Arts and Crafts pieces, whether of the mass-produced variety typified by Gustav Stickley's Craftsman furniture or the higher-end custom designs of the Greene brothers, there is an immediate impression of squareness. This is most evident in the profiles of tops, edges and other flat surfaces, such as broad chair arms. Molding is almost completely ab-

Influential makers (continued)

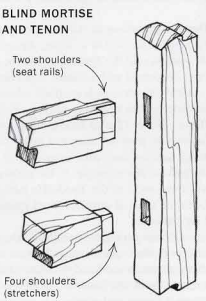


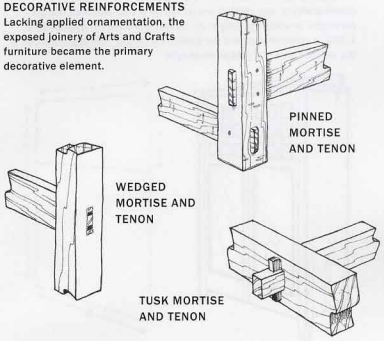
FRANK LLOYD WRIGHT
ARMCHAIR, 1904
Although not an avowed member of the movement, the architect Wright, like the Greene brothers, designed furniture for his houses—such as this extremely rectilinear pine chair with exposed joinery, which although typically "Wrightian," is also distinctly in the Arts and Crafts style.



MORTISE-AND-TENON JOINERY

Stronger and more appropriate than dowels or biscuits, mortise-and-tenon joints may be unshouldered (as for seatback slats) or shouldered on anywhere from one to four sides, depending on their intended use and particular design.

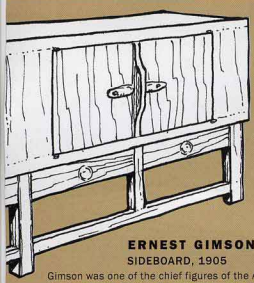




sent, sharp edges are gently relieved but not rounded, and overhangs are kept to a minimum.

Although many details are, in fact, square—such as in paneled framing, where a bottom rail wider than other frame members is rare (see the facing page), and in the design of glazed doors, where all panes are equally square—absolute squareness is largely illusory, and slopes and curves are common. It is not that the style is inelegant—many pieces can be found based on elegant design paradigms such as the golden rectangle (see p. 66)—but the strength and utility of a piece always dominate.

Both gently and boldly formed curves are common in skirts, chair rails and the lower edges of cabinet sides, but they are invariably simple and rarely compound, except for occasional tight cutouts on stool bases. Such shapes, including ogees and intersecting arcs, are nods to the influence of medieval Gothic oak

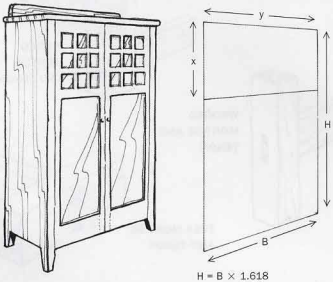


ERNEST GIMSON
SIDEBOARD, 1905
Gimson was one of the chief figures of the Arts and Crafts movement. His sideboard, with its rectilinearity, simple lines, use of native wood (chestnut) and restrained use of minor ovolo molding on the legs, is an expression both of the values of the movement as directly expounded by William Morris and of the related attempt to reintroduce traditional country crafts to high-quality furniture.

CHARLES VOYSEY
DINING CHAIR, 1907
Voysey was another admirer of William Morris and a leading exponent of the British Arts and Crafts movement. His particularly spare style—a Shaker-like simplicity complemented by more flowing and elegant details such as the heart-shaped cutout and square legs that taper to octagonal feet—was the precursor to the American Mission style popularized by makers such as Gustav Stickley.

DESIGNING USING THE GOLDEN RECTANGLE

The perfect squareness of the upper glazing and the general rectilinearity of this cabinet are based on a sophisticated design paradigm in which the height (H) equals the base (B) multiplied by 1.618, a proportion called the golden rectangle. The upper portion of the cabinet also is a golden rectangle.



furniture, much valued by leaders of the Arts and Crafts style for its craftsmanship and honesty. Curved yet square-edged brackets are another common feature of many pieces.

One other detail that would seem to belie an apparent squareness and angularity is the frequent use of tapered legs. The tapers, however, are usually limited to a short section near the base. Tapering legs like this prevents the piece from appearing too heavy, but because the tapers are equally formed on all four sides of the leg, a general feeling of squareness persists.

5. Decoration—Despite a superficial plainness characterized by square edges, the lack of molding, the use of a relatively homogenous material and the flatness of panels, Arts and Crafts furniture often is decorated with a variety of techniques ranging from simple curved cutouts to delicate floral inlays. Reflecting a continuing sensitivity to other styles and fashion on the part of designers such as Harvey Ellis or Charles Rennie Macintosh, who are perhaps better known for their Art Nouveau styles, the influence of the more flowing, nature-based Art Nouveau style is felt in many Arts and Crafts pieces—for example, in the products of various "utopian" workshops such as the Byrdcliffe Arts Colony in Woodstock, N.Y.—in the form of pastel-colored painted sections, tulip inlays and lily patterns.

Central to the principle of craftsmanship in this style of furniture is the use of other natural materials, such as reed and rush for seats, leather upholstery and hand-wrought hardware made from iron or hammered brass. The hardware often is as square and sturdy as the furniture it serves and stands in complete contrast to the elegant and finely wrought shapes found on 18th-century pieces or the overworked fantastic shapes common on much 19th-century furniture. A gratuitous form of decoration in terms of structural function, but one that is consistent with the incorporation of natural materials, is the frequent use of a row of hand-wrought nails as an edge decoration.

6. Finish—It would be inappropriate to finish an Arts and Crafts piece with a glossy lacquer. But while natural finishes like simple oiling and waxing may predominate, other processes, such as filling, staining and fuming, are common.

Careful surface preparation is most important. In the case of an

Influential makers (continued)

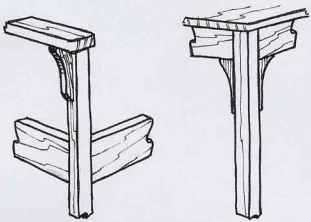
CHARLES AND HENRY GREENE

SERVING TABLE, 1910 (left) AND DINING TABLE 1929

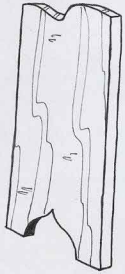
Well known as architects, the Greene brothers designed Arts and Crafts furniture recognized for uniquely distinctive details such as the cloud-lift lines seen on various members of their tables and plugged mortises on breadboarded tabletops. Their work represents some of the highest expressions of the American Arts and Crafts movement.

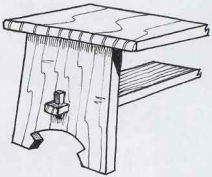
BRACKETS AND CUTOUTS

Not all details are perfectly rectilinear. Small accents, many in the form of brackets or cutouts, enliven otherwise straightforward designs.



Brackets, though square-edged, unmolded and flat, often are given a gently curved profile.



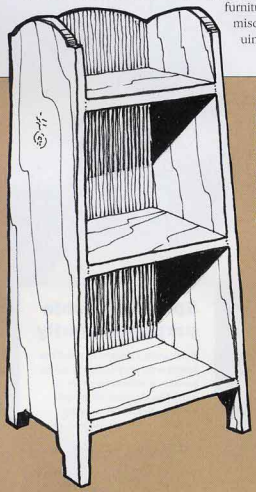


The angularity of wedges and curved cutouts lends a refined look to Arts and Crafts pieces.

open-grained wood like oak, a matching wood filler should be used. If oak is filled first, it then may be waxed or perhaps lightly oiled and then waxed. If wax alone is used, it should be colored so that the wax-filled pores in the wood do not show white.

Fuming, the process of exposing oak to the fumes of ammonia, is a common method of turning oak darker without producing the irregular color that can result from careless staining. The popularity of fuming, especially among early proponents of Arts and Crafts furniture, resulted from the misconception that genuine Gothic furniture was extremely dark. That darkness, in fact, came from centuries of exposure to smoky atmospheres. When new, however, most Gothic furniture was brightly painted or valued precisely for its light golden color. □

Graham Blackburn is a furniture maker, author, illustrator and the publisher of Blackburn Books (www.blackburnbooks.com) in Bearsville, N.Y.



ROYCROFT COMMUNITY

MAGAZINE RACK, 1910

In contrast to the previous one-of-a kind pieces by Charles Voysey, the Roycrofters, founded by Elbert Hubbard—an ardent believer in many aspects of the Arts and Crafts movement not limited to furniture alone—produced extremely simple and unsophisticated "factory-made" pieces in white oak.

SIDNEY BARNSLEY

CABINET-ON-STAND, 1914

This walnut cabinet-on-stand (with holly and ebony stringing) is in many ways far removed from the output of the Roycrofters and the Stickley shops but owes its essential design to the same principles of honesty of purpose and design shorn of superfluous decoration. Barnsley, his son, Edward, and Ernest Gimson constitute the "grand old men" of the Arts and Crafts movement and were the leading influences.

Spindle-to-table perpendicularity

Maas used a square to see if the tables were perpendicular to the spindle on which the chuck is mounted. On most of the drill presses, the tables were adjustable to correct for any errors.

Drill-Press Review

Nine floor models that sell for $420 or less offer good options for the home shop

BY BERNARD MAAS

The drill press is an indispensable machine in any woodshop. A number of accessories can broaden the machine's usefulness, but mostly, you want a drill press to do one thing: Drill holes cleanly and accurately.

Drill presses come in a variety of sizes and prices, from small benchtop machines to heavier production-level floor models. For this review, I decided to search for lower-priced, full-height machines that might be a good choice for a home shop. After surveying the market, I chose nine 15-in. to 17-in. models, which ranged in price from $297 to $419: Bridgewood BW1785F, Craftsman 0922917000, Delta 17-965, General International 75-200, Grizzly G7947, Jet JDP17, Powermatic 1170, Ridgid DP15500 and Woodtek 816-805.

To evaluate and compare these drill presses, I established a set of broad-based criteria. First, I took note of the condition of each machine after shipping and the ease of assembly. I looked over the basic specifications of each machine: chuck-to-post distance, table size, overall height, motor rating, speeds, length of quill stroke, finish and stability. I tested the accuracy of each machine out of the box: runout on the chuck and spindle-to-table perpendicularity. Finally, I looked at how each machine operated: noise level, vibration, table-height adjustment, speed changes, depth adjustment, quill-return tension and the presence or absence of a quill lock.

The chuck, spindle and quill matter most

The business end of a drill press is where the chuck is attached to the spindle at the bottom of the quill. The quill is the hollow shaft that makes the plunge toward the workpiece. The spindle turns within the quill. You want a spindle that is perpendicular to the table and a chuck that rotates perfectly on center with very little, if any, runout (see the story at right). Although with all of these machines I found no problems with perpendicularity, I did find variances in runout measurements (see the chart on pp. 70-71).

All of the machines have ⅝-in. capacity chucks, except for the General International, which has a ½-in. chuck. The chucks

Chuck runout

To check the comparative accuracy of the various machines, I took a series of readings from a ½-in. ground steel rod chucked into the drill press with the spindle retracted.

To be sure that I was getting the best readings the machine could offer, I cleaned out the taper fittings for all of the chucks. You might want to do this, too, if you find your machine has excessive runout. Start by tapping the chuck loose. Often chucks are mounted either by a taper fitting or by a combination of a taper fitting and a threaded ring. The drill-press manual or the manufacturer's service department should have instructions as to the chuck's removal. Once the chuck is in hand, see that the jaws meet properly when closed. Inspect the interior of the chuck for debris, burrs or machine tailings, which can affect the closure of the jaws. Next, use a solvent to clean both male and female taper fittings.

Readings for my runout test were taken within ½ in. of the underside of the chuck. The rod also was inverted and readings were taken. This way, the integrity of the rod was insured. Whether the rod was rotated or inverted, no appreciable difference in the various readings was detected.

Photos: Tim Sams

vary in quality. The jaws on some of the machines opened and closed smoothly, while others tended to bind. I took the time to clean out the chucks first, because they all came covered with a sticky rust-preventive coating. After a thorough cleaning, I still found the chucks on the Grizzly and Craftsman to be difficult to turn at times. Also, the length of the jaws that grab onto a bit on all of these machines is only about ½ in. The Delta and Jet had the smoothest operating chucks.

Designs of the chuck keys also vary. Those with spring-loaded safety pins were difficult to manipulate and tended to kick themselves out of the chuck without a lot of hand-pressure to hold them in place. The Delta and Grizzly have springs that are very stiff. I found the Bridgewood and the General, both of which don't have springs, to be the easiest to use. I don't take safety lightly, and I would not advocate disabling any safety device. But I do prefer the old-style keys without springs, and I don't have a problem maintaining a good dose of vigilance when it comes to removing the chuck key before switching on a machine. One annoying chuck key that stood out to me was the one on the Jet. I'm left-handed, and the chuck-key handle is so long that it hits the nut holding the depth gauge in place on the left side of the machine. This made it difficult to use the chuck key with my left hand.

As for the quill travel, with the exception of the Delta, Grizzly and Jet, I was surprised to find that many of the machines I tested have a miserly quill stroke of under 4 in. This is barely adequate for the range of operations in a busy shop. Drilling through 8/4 lumber wouldn't be a problem, but plunging all the way through a 4x4 in a single stroke would cause you some grief. The Delta, Grizzly and Jet each has a quill stroke of more than 4 in., but they still are shy of the 6-in. capacity that I prefer.

You should be able to adjust the tension on the mechanism that retracts the quill if the movement feels either too loose or too tight as you drill holes and release the bit. Unfortunately, none of these drill presses makes that easy to do. The procedure requires dealing with a tenuously held coiled spring that is all too prone to release itself with a loud snap. My reward for attempting this adjustment left me with one very blue thumbnail.

To me, a quill lock is an important feature. The ability to lower a bit to the work surface and lock it in place (to set cutting depth) or to register a bit against a jig (to position it properly) is often critical. At best,

NINE MODELS TO CHOOSE FROM

Overall, most of these drill presses are built solidly enough to serve you well with the occasional use that a small home workshop demands. But Maas's favorite was the Delta, because of its smoothly operating chuck, quick-action depth stop, unique quill lock and long quill stroke. The Ridgid was his second choice, a solid value for the money with minimal chuck runout.

MODEL	BRIDGEWOOD BW1785F	CRAFTSMAN 00922917000	DELTA 17-965
PRICE / CONTACT	$329 (800) 235-2100 wilkemach.com	$399 (800) 407-4567 sears.com	$399 (800) 438-2486 deltamachinery.com
CHUCK-TO-POST DISTANCE	8½ in.	8½ in.	8¾ in.
TABLE SIZE	13¾ in. dia.	14 in. square	14 in. square
QUILL STROKE	3⅝ in.	3¼ in.	4⅞ in.
MOTOR RATING	¾ hp	¾ hp	¾ hp
NUMBER OF SPEEDS	12	16	16
WEIGHT	154 lbs.	175 lbs.	195 lbs.
RUNOUT	0.008 in.	0.005 in.	0.002 in.

GENERAL 75-200	GRIZZLY G7947	JET JDP17	POWERMATIC 1170	RIDGID DP15500	WOODTEK 816-805
$349 (819) 472-1161 general.ca	$375 (800) 523-4777 grizzlyindustrial.com	$399 (800) 274-6848 jettools.com	$419 (800) 274-6848 jettools.com	$297 (800) 474-3443 ridgidwoodworking.com	$379 (800) 645-9292 woodworker.com
8½ in.	8½ in.	8½ in.	8½ in.	7½ in.	8⅞ in.
12 in. square	13⅜ in. square	13¾ in. dia.	12 in. square	11 in. square	11 in. square
3¼ in.	4¾ in.	4⅜ in.	3¼ in.	3¾ in.	3¼ in.
¾ hp	1 hp	¾ hp	1 hp	½ hp	¾ hp
12	12	16	16	12	12
200 lbs.	275 lbs.	178 lbs.	188 lbs.	179 lbs.	165 lbs.
0.0055 in.	0.007 in.	0.0035 in.	0.0055 in.	0.0006 in.	0.007 in.

this is a two-handed job, but without a quill lock to set and hold a bit in place temporarily, at least three hands are needed. The only drill press in this lot with a conventional-style quill lock is the Delta. It's nothing more than a small hole tapped into the head of the machine, in which a brass screw bears against the quill. Brass is used because it's softer than steel and won't dig into the quill when you tighten it. The Craftsman, Grizzly and Jet use locknuts on the depth rod to lock the quill. While not as convenient, it works.

Another innovative plus on Delta's part is the quick-release positioning nut on the depth-stop rod. This is a wonderful design detail, and it simplifies setting the depth. Any woodworker who has ever twirled one of the old-style nuts up and down, over and over, for the full depth of travel will appreciate this improvement.

Motors and belt changes determine power and speed

With the exception of the Craftsman, all of the machines were equipped with motors rated 110/220 volts or 120/240

Changing speeds

Belts are difficult to change when there is not enough slack, which was true with the General, shown here.

Setting belt tension. *Belt tension is adjusted by moving the motor away from the spindle. All of the models have a crank handle for this adjustment.*

volts. The Delta and Ridgid machines have wiring diagrams displayed on their motors, and the Jet includes wiring diagrams in its manual. This is important if you want to convert the motor to run on higher voltage circuits, which help machines start up faster, run cooler and not bog down as readily under load. Also, higher voltage circuits often eliminate that annoying momentary dimming of the house lights as a motor starts.

All of these drill presses have a motor pulley, a spindle pulley and an idler pulley set between the two. A pair of belts completes this arrangement. Cranking back on the tensioning lever tightens the belt running from the motor to the idler. The idler, in turn, has to draw the belt between itself and the spindle taut. Any stretching or mismatching of these two belts is apt to cause a loss of traction, and thus a loss of torque.

Changing the belts on all of these drill presses required following the same procedure. First, I loosened a bolt that swivels the motor, which released tension on the belts. Then it was a matter of moving the belts to the correct pulley. Each drill press provides a diagram of the correct pulley placement for the desired speed. The Craftsman was the easiest to change because there was enough slack to slip the belts on and off easily. The belts on the General and Grizzly machines, however, were very tight, which made belt changes difficult.

A comparison of basic specs

While all of these machines are in the same price range, they do vary in size. It struck me that these machines all have a relatively small footprint, except for the Grizzly, which is the largest and weighs in at 275 lbs. All of the machines have bases designed to be fastened to the floor to help dampen potential vibration, but only the Delta and Grizzly actually come with instructions on how to do it, and only Delta includes the bolts for doing so. Many manufacturers recommend attaching the drill press to a large piece of plywood to help stabilize these top-heavy machines.

The table sizes differ somewhat, with the Craftsman and Delta having the largest tables at 14 in. square, and the Ridgid and Woodtek having the smallest at 11 in. square. The chuck-to-post distances vary, too: Ridgid has the smallest at 7½ in., while the others range from 8¼ in. to 8½ in.

The fit and finish varied considerably among the machines, with the Woodtek being the worst. When I finished assembling the Woodtek, I noticed that my hands were yellow with paint that had rubbed off the table bracket. Also, the plastic pulley shroud could not be seated properly. On the other end of the scale was the Ridgid, which one of my students dubbed the "Martha Stewart model" because of its nearly impeccable fit and finish and its tool-caddy accessory.

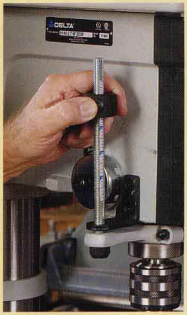
Other features, good and bad, worth noting

A nice feature on some of these models is an on-board lamp that makes it easier to view the workpiece. I wouldn't base a purchase decision on this feature, but it is a handy perk. With the exception of the Delta and Jet, all of these drill presses come with lamps. I should point out, though, that on the Bridgewood and Powermatic, the bulbs hang down far enough to constitute a breakage hazard. And bulb installation on the General was difficult due to its small opening.

A minor point, perhaps: The angle scale for the tilting table on the Woodtek and General International have stick-on decals that look as though they won't hold up to wear and tear very well, rather than the typical

Depth stops

Two styles of depth locks. *On the models examined, the depth lock (which sets the bit depth) is often mounted on the feed handle (above) or on a simple stop mechanism (right) with knurled nuts.*



Depth lock slides into place. *For easy depth adjustment, Delta's depth locknut slides up and down with the push of a button.*

riveted metal plates found on the other machines.

The Ridgid is the only drill press with the option to change the quill handle, or feed lever, from the right side of the machine to the left. Left-handed woodworkers will likely find this feature useful, though I must confess that after all these years of using a right-handed drill press, I'm so used to it that I didn't bother to make the switch on this machine.

All of these drill presses feature rack-and-pinion crank mechanisms to raise and lower the table—a big improvement over older designs that could strain your back when you have to raise a heavy table. The General is the only drill press that does not have a setscrew that allows the user to adjust the table for perpendicularity.

Final recommendations

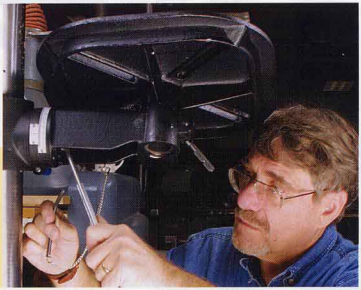
If outfitting your shop with a drill press is something that you're looking forward to, I'd like to offer a few suggestions. Before you go any further with your purchase decision, decide what your performance expectations will be. Then research the choices and go shopping. Don't rely on glossy catalog photos: I advise against buying a machine sight unseen. Go to a showroom and look at machines up close. Ask to see the floor model run and inquire about returns and parts replacement. Should you decide you want to buy one, take a machine from the stockroom, have the shipping carton opened and (if at all possible) inspect the drill press before you buy it. Make sure that all the parts are there and in working order. If you look before you pay, you might avoid the frustration of having to wait for a missing part to be shipped to you later.

Overall, if these drill presses are up and running to the published specifications, they are an excellent value for the money. If the limited quill stroke and the absence of a quill lock don't bother you, then you'll find that most of these drill presses are built solidly enough to serve you well with the occasional use that a small home workshop demands.

My pick? Because of its smoothly operating chuck, decent runout results, quick-action depth stop, unique quill lock and longer quill stroke, I liked the Delta. As a second choice, the superior fit and finish of the Ridgid, including the tool caddy and the option of moving the quill handle to the left side of the machine, as well as the price, all made it an appealing alternative. □

Table-tilt mechanisms

To tilt the tables on these machines, you must remove a pin and loosen a nut. But it's faster and safer to use a tilted-table jig instead of tilting the table itself.



Bernard Maas teaches woodworking at Edinboro University of Pennsylvania.

Build a Sofa Table

An Arts and Crafts design with a contemporary twist

BY SCOTT GIBSON

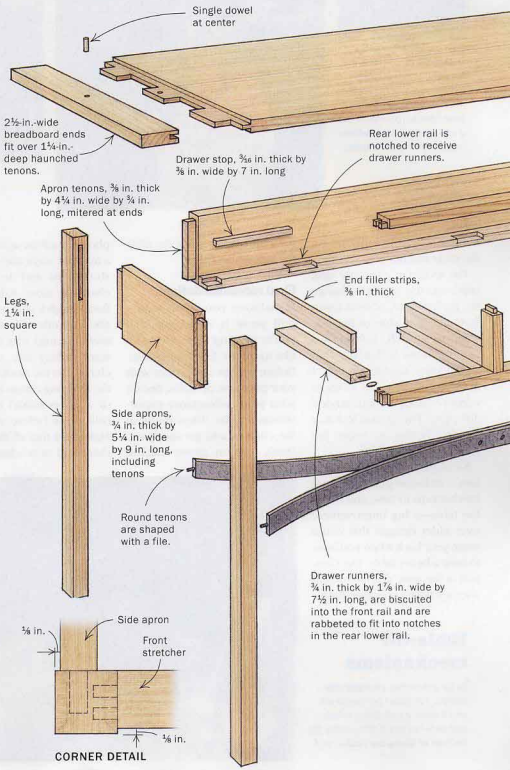
A couple of years ago, some friends expanded their small farmhouse by adding a wing that included a new a living/dining room. At one end they built a big fieldstone fireplace and moved in a Stickley-style sofa. The back of the sofa faces the dining-room table a half-dozen feet away. A narrow table at the back of the sofa would offer a convenient place to lay out food, plates or serving utensils, but there was very little room to work with. The tabletop could be no deeper than 12 in. In addition, the base could not completely obscure the quartersawn oak panels in the back of the sofa.

This table was designed to fit that space. Its top is exactly 1 ft. deep and 60 in. wide, big enough to be useful but not wide enough to block traffic. Its drawers are shallow—just 3 in. deep inside—so the upper part of the table presents a low profile. To keep it from looking too spindly, I added a curved steel stretcher at the base. The table fits the spot perfectly, but it also could work in any long, narrow space, like an entrance hall.

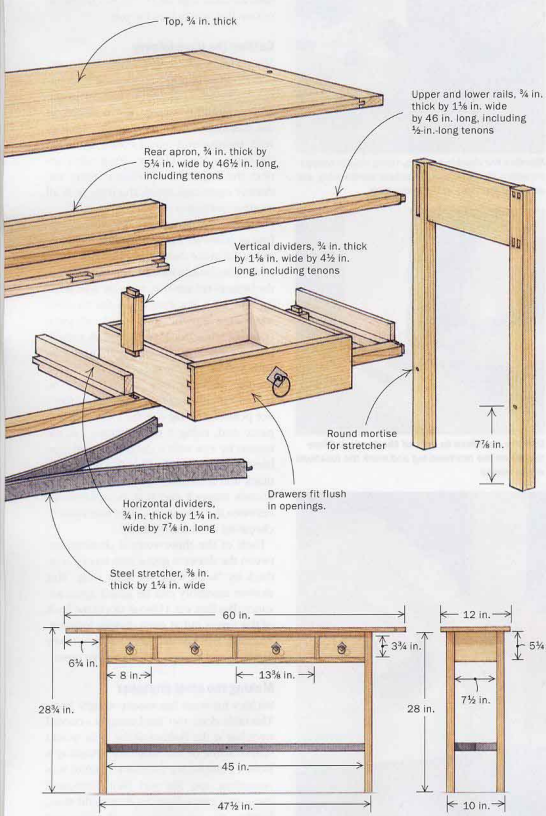
Nothing about the construction is complicated, although two components—the legs and the steel stretcher—require more than their fair share of planning.

Making the legs

Gustav Stickley's Craftsman furniture gets a good deal of its charm from its simple, rectilinear lines and the rays exposed on the radial face of the white oak he typically

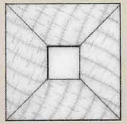


Drawings: Vince Babak



Four ways to make a quartersawn leg

Quartersawn legs are a signature of Arts and Crafts furniture. Here are four ways to make them.



MITERED ASSEMBLY

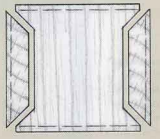
Set up your tablesaw at 45°, miter all four pieces and glue them together.

LOCK MITER

With a lock-miter router bit, assembly can be easier and the leg stronger.

VENEER ON TWO FACES

A simple solution is to cut the leg ¾ in. undersize and glue on two ⅜-in.-thick quartersawn veneers. The glueline virtually disappears, especially if the edges are chamfered.

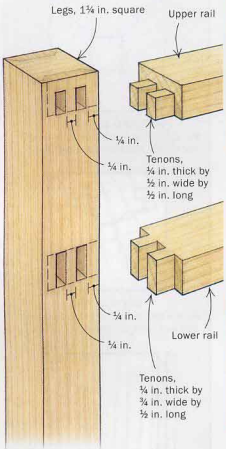


AUTHOR'S SOLUTION

Gibson starts with a leg that is ⅜ in. oversize. Then he makes 45° cuts in the four corners and plows out the middle of two faces with a dado blade. He uses epoxy to glue in oversize wedges with quartersawn faces, then planes all four sides down to size.

DOUBLE MORTISE-AND-TENON JOINERY

For strength, the upper and lower rails are joined to the legs with double tenons.



Mortise for double tenons. *Using double tenons creates a stronger joint. To ensure consistency, cut all of the mortises at the same time.*

Use the mortises to lay out the tenons. *Place the rail on the mortised leg and mark the locations of the tenons.*

One pass removes the waste. *Clamp the rail to your miter-gauge fence and use a dado blade to remove the waste. Use a chisel to fine-tune the fit. A taller fence and a sturdier clamp would be safer.*

used. To make the legs, Stickley milled an interlocking profile into the edges of four pieces of 4/4 quartersawn stock and glued them together so the distinctive figure showed on all four sides. There is more than one way to make the legs this way (see the drawings on p. 75), so choose an option that works best for you.

Cutting the base joinery

Milling leg pieces so that a radial face is exposed on each side takes time and patience, but the rest of the joinery in the table is straightforward. Apron pieces on the sides and back are joined to the legs with mortise-and-tenon connections. At the front of the table, two long rails connect the legs. Short dividers create the drawer openings. Here, the joinery is all mortise and tenon.

To make the drawer-rail assembly as sag-free as possible, the two rails are as heavy as I could make them: ¾ in. thick and 1⅛ in. wide. The double mortises on each leg for the bottom rail are ⅜ in. wide by ¼ in. thick by ½ in. long. For the top rail, the mortises are ½ in. wide. The ends of the rails get a corresponding double tenon. With a single tenon, you easily can adjust a tablesaw jig with a piece of scrap until the tenon fits the mortise perfectly, then run off all of the tenons quickly. For a double tenon, that's not possible. So lay out the joints on each piece and, using a miter gauge, cut the tenons by eye with a dado blade on a tablesaw. If you're careful, the process is quick and accurate. At the very least, a dado sure makes it easy to remove the waste between the tenons—a chore when you're chopping them out by hand.

Each of the three vertical dividers between the drawers gets a stub tenon, ¼ in. thick by ⅜ in. wide by ⅜ in. long. This drawer assembly can be glued up in advance. But first, cut a biscuit slot in the back of the lower rail at each divider location. The slots will be used later for the drawer runners, and it's easiest to cut them now.

Making the steel stretcher

Stickley furniture has mostly straight lines. This table does, too, but I thought a curved stretcher at the bottom of the table would relieve some of that monotony. Making it from a completely different material was appealing, too. My son, Ben, fabricated these two curved pieces from mild steel, heating the pieces in a coal forge and

Photos: Tim Saris

WHERE METAL AND WOOD MEET

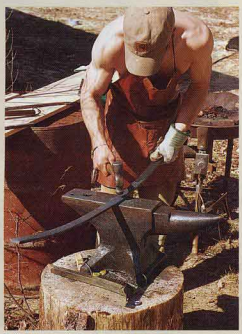
The two pieces of curved steel that form the bottom stretcher are tenoned on both ends. The tenons, shaped with a hacksaw and a mill file, fit into holes drilled by hand, on an angle, into the legs.

hammering them into shape over a pine log (see the photo below). The two pieces are joined at the center by a pair of ¼-in. steel rivets.

Ben had to make the stretcher fit exactly between the legs of the table base. To guarantee a good fit, I drew the stretcher full scale on a piece of plywood. That gave Ben a reference against which to check his work. At the ends of the stretcher pieces, he formed ½-in.-long tenons that fit into mortises drilled into the inside faces of the legs. The stretcher is glued to the legs with epoxy. Finding a blacksmith to make parts such as this is not always easy, but a national organization of blacksmiths can help

Steel tenons filed to fit. *Gibson uses a mill file to shape the stretcher tenons to their final thickness.*

Assemble the table on its side. *With the side flat on the floor, assemble all of the apron pieces and the steel stretcher. Then attach the second side assembly.*



Texturing the stretcher. *Blacksmith Ben Gibson uses a ball-peen hammer to create a dimpled texture in the stretcher.*

Finding a blacksmith

The heyday of the village smithy may be long past, but there still are thousands of skilled artisans capable of fabricating custom iron or steel furniture components. One place to look is on the web site of the Artist-Blacksmith's Association of North America (www.abana.org; 706-310-1030). The organization claims a membership of 4,500 in the United States, Canada, New Zealand and Australia. Although individual members are not listed, the site gives names, phone numbers and e-mail addresses for chapter presidents by state and region. They should be able to recommend someone local.

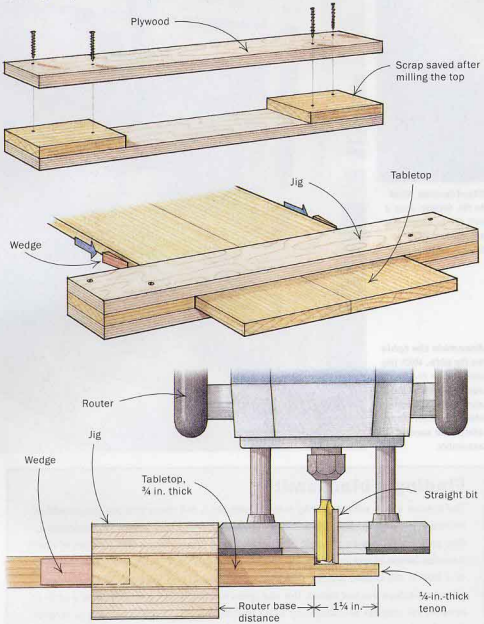
Jonathan Nedbor, president of the Northeastern Blacksmiths Association, said a blacksmith probably can offer ideas on how metal can be worked to complement a piece of furniture in ways a woodworker might not think of. Although he would rather fabricate metal parts with the piece of furniture in his shop, Nedbor said he also can work from scale drawings.

Nedbor said it's important to find a blacksmith who is competent and has a similar design sense to yours. "There's no way to know until you really look at their work and do a little research talking with them," he said.

Steel is relatively cheap, but labor rates vary considerably. Full-time smiths are likely to charge more because they carry higher overhead than do weekend or evening blacksmiths who hold down day jobs. Sound familiar? Labor rates also vary by region. Nedbor's shop rate is $58 an hour.

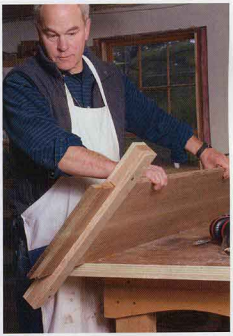
JIG FOR MAKING BREADBOARD ENDS

This jig slips over the end of the tabletop and provides a guide for a router to make the breadboard tenons. It's held in place by wedges and allows the tenons to be routed quickly and accurately on both sides of the tabletop.



1 ***Hold the jig in place.*** *Tap wedges between the sides of the top and the jig at the back so that it won't move during routing.*

2 ***Rout the tenon.*** *Butt the router against the edge of the jig. Rout out the tenon waste in two passes.*



3 ***Flip the tabletop to rout the other side.*** *The best part of this jig is that once one side is done, you simply flip the board over and rout the other side.*

(see p. 77). This table also can be made using wooden stretchers.

Once the steel stretcher has been made, the parts of the table can be glued together. To make the glue-up manageable, the side aprons and the drawer-rail assembly should be glued together first. After that, the drawer-rail assembly, the long back apron and the stretcher are put together. A dry run, and an extra pair of hands, is a good idea. Once the glue has dried, add the drawer runners and horizontal dividers. I made these from poplar. They are glued to the inside of the drawer-rail assembly to create level, square openings for the four drawers.

Adding drawers and the top

The drawer fronts were cut from a single board to create continuous figure and color across the front of the table. Cut the ¾-in.-thick drawer fronts first. They should fit flush into their openings. The poplar drawer sides, ⅜ in. thick, are cut to width in order to slide perfectly into the openings. I handplaned the drawers to fit after they

Remove the waste. *Use a jigsaw to cut away the waste between tenons for the breadboard ends. Leave a shallow stub tenon between them, creating a haunched tenon for the full width of the top.*

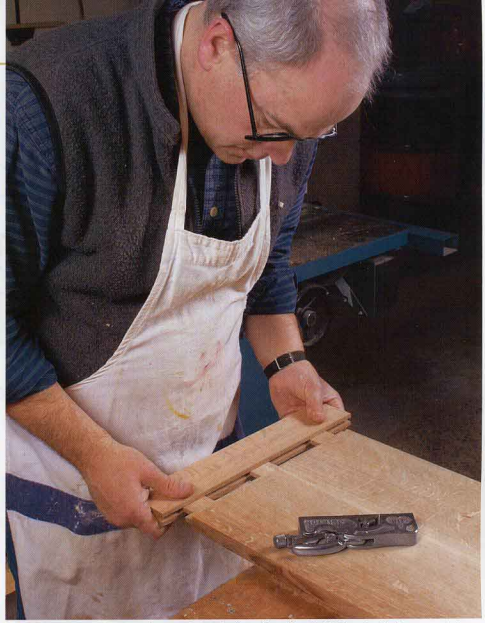
were glued up. To operate smoothly, they must fit their openings snugly.

The drawers come within ¼ in. of the rear apron. Small strips of poplar glued or screwed to the back of the runners stop the drawer fronts so they're flush. Once the drawer sides and front have been cut out, cut a ¼-in.-wide groove around the inside edge, beginning ¼ in. up from the bottom edge. The back of the drawer is not as wide as the sides and is cut to stop at the top of the groove for the bottom.

These drawer bottoms are clear white pine, ¼ in. thick. Just about any material will do, including ¼-in.-thick hardwood plywood. The bottoms should be oriented so that the grain runs side to side. Glue up the drawer box first, then add the bottom and secure it with a single screw set in the back. A slot in the bottom allows the pine to move seasonally without disturbing the dimensions of the drawer box.

Making the top and breadboard ends

I made the top from a plank roughly 7 in. wide by 10 ft. long. I cut it in half and edge-joined the pieces for a good match in figure and color. After the two pieces had been glued up and cut to finished size, I cut two breadboard ends 2½ in. wide and as long as the top is wide. A breadboard end is a wood cap that fits over haunched tenons on the end of a tabletop. I use them on tabletops because they are visually pleasing and keep the top flat.



Fit the breadboard ends. *After mortising the breadboard ends, fit them to the tenons using a rabbet plane or a chisel.*

This table's breadboard end is ¾ in. thick by 2½ in. wide by 12 in. long. On the tablesaw, I plowed a ½-in.-deep groove in the center of one edge. This is the depth of the haunched tenon. Then, on the grooved edge, I marked the locations for three tenons 2 in. wide, then cut a 1½-in.-deep mortise at each location. Transfer the marks from the breadboard end to the tabletop.

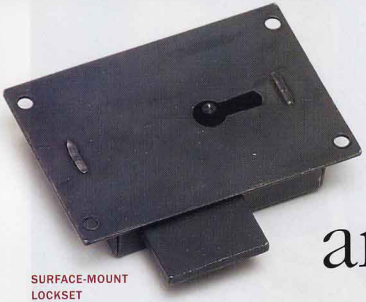
I used a router and a simple shopmade jig to make the tenons on the ends of the top (see the facing page). The jig ensured that the shoulder of the tenon would be in the same plane on each side of the table.

On the tenon, I extended the marks I'd made from the breadboard end and trimmed the tenons to width. I used a jigsaw for the inside tenons and a handsaw for the outside haunches. Finally, I fit the breadboard end to the tenons, trimming where necessary for a good fit.

On a wide top, each tenon can be pinned with a wood peg, but holes in the outer tenons should be elongated to allow for seasonal movement in the top. Because this top is only 12 in. wide, I used a single pin on the middle tenons.

This table is stained to the same reddish brown of the sofa. The stain color is a 50-50 mix of two Minwax stains, ipswich pine and puritan pine. The topcoat is Tried & True varnish oil. □

Scott Gibson is a furniture maker and freelance writer living in Maine.



SURFACE-MOUNT LOCKSET

HALF-MORTISE LOCKSET

FULL-MORTISE LOCKSET

Choosing and Installing a Lockset

Simple steps for securing boxes, doors and desk lids

BY LONNIE BIRD

Years ago, locksets were installed on most case pieces. Books, papers and other important documents were secured inside secretaries, while expensive tea and spices were housed in specially made, diminutive chests complete with tiny drawers and locking doors. Although most of us today are not as concerned about keeping our spices under lock and key, a carefully fitted lockset still can add a touch of class to a fine piece of furniture. And installing a lockset is not an intimidating task.

But when selecting a lockset for your project, you'll be faced with a wide variety of lockset styles and sizes. Flipping through a period hardware catalog, you'll see options ranging from basic surface locksets that simply screw onto doors or drawers to full-mortise locksets that are concealed. Half-mortise locksets are the most commonly used by furniture makers.

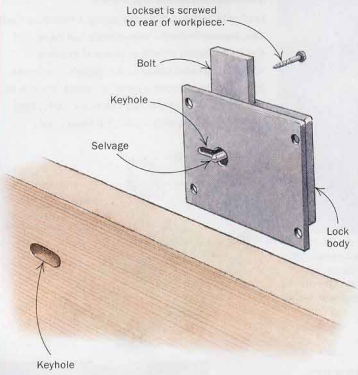
Lonnie Bird teaches woodworking from his shop in Dandridge, Tenn. For a list of classes, e-mail him at lonniebird@earthlink.com.

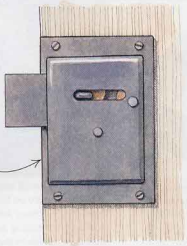
How much of the lockset are you willing to see?

Locksets are available in three types—full mortise, half mortise and surface mount. Choosing a lockset depends on how much work you're willing to do and how much of the lockset you're willing to see. As the name implies, surface-mount locksets simply are secured to the face of the work. If you want a more refined look, choose a full- or half-mortise lockset. In addition to cutting the keyhole, you'll have to cut a stepped mortise to accept the body of the lockset. But the finished job will have the elegance to fit with the rest of the piece.

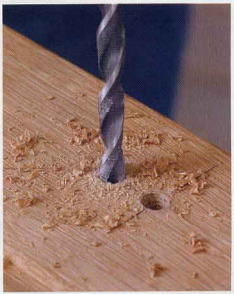
Photos, this page and facing page (of individual locksets): Michael Pekovich

SURFACE-MOUNT LOCKSETS INSTALL EASILY

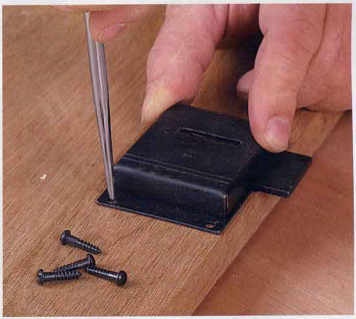




Lay out the keyhole. *Set a combination square against the lockset and align the blade with the center of the keyhole. Then place the square against the edge of the stile and transfer the measurement.*



Measure twice, drill twice. *Drill holes aligning with the top and bottom of the keyhole. Then remove the waste between these two holes.*



Attach the lockset. *To secure the lockset, set it in place on the workpiece, then mark and drill for the screws.*

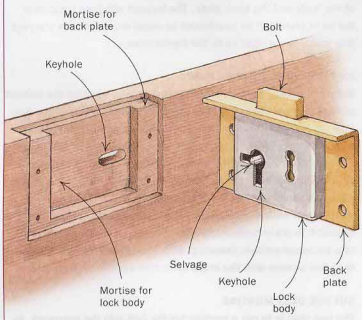
Surface-mount locksets call for less fuss than either full- or half-mortise locksets. Although surface mount probably is not the first choice for fine furniture, there are many jobs that don't warrant the time it takes to install a mortised lockset.

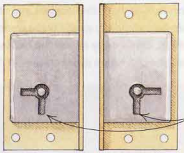
Surface-mount locksets simply are screwed to the inside surface of the door. As with other types of locksets, a surface-mount lockset is sized according to the distance from the selvage to the edge of the lock. I select a size that will properly position the keyhole with the escutcheon that I'm using.

Lay out and cut the keyhole first, then position the lock and mark the screw locations. Now you can simply fasten the lockset in place.

Photos, this page: Rodney Diaz

HALF-MORTISE LOCKSETS REQUIRE A STEPPED MORTISE





Locksets are available with keyhole orientations specifically designed for left- or right-handed doors.

Begin layout by marking the location of the selvage on the door stile. On upper doors, the lockset typically is placed slightly below center; on lower doors, it's slightly above. This positions the lockset for an easy reach. Now mark the height and the distance from the edge of the stile to the selvage. If the door, drawer or lid is lipped, as on the door shown in the photos, remember to add the lip dimension.

Next, lay out the mortise for the body of the lockset. To make fitting easier, add ½₂ in. on all sides. This small tolerance allows you to adjust the selvage placement easily.

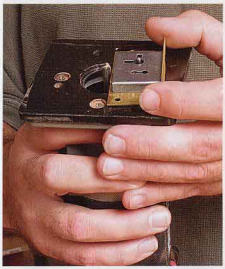
Once the selvage and body have been laid out, you're ready to cut the mortises for them. (The back-plate mortise will be cut after the body of the lockset is in place.) Drill a row of two or three holes just large enough to accept the key. Remove the waste between the holes with light chisel cuts.

Cut the mortise for the body using a straight bit in a laminate trimmer or router. To keep the lockset from bottoming out, set the bit depth slightly greater than the combined thickness

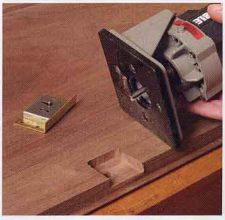
continued on p. 84

1. CUT THE MORTISE FOR THE LOCK BODY

First, lay out the mortise. *Begin by laying out the height of the body—the thicker portion—of the lockset.*



Determine the depth. *With a straight bit in a router or laminate trimmer, set the bit's depth to match the overall thickness of the lockset.*



Cut first by machine. *A router or laminate trimmer makes quick work of removing the bulk of the waste. Use a chisel to square up the round corners left by the router.*

Drawings: Heather Lambert

2. CUT THE MORTISE FOR THE BACK PLATE

Locate the back plate. *Once the body fits smoothly into the mortise, lay out the mortise for the top and bottom of the back plate. Marking with a knife ensures against tearout.*

Quick mortises by machine. *Set to the correct depth, a laminate trimmer quickly cuts the recess for the back plate. Rout close to the line and finish with a chisel.*

Mark out along the edge. *With the back plate in place, mark out the depth of the lockset along the rabbeted edge.*

This mortise is quicker to cut by hand. *A chisel easily pares away the mortise along the door's edge.*

of the body and the back plate. The lockset will then hang from the back plate and be unaffected by wood movement. As you rout this mortise, cut right up to the layout lines.

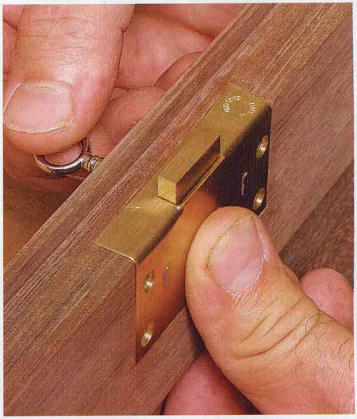
MORTISE FOR THE BACK PLATE

Before marking the location of the back plate, position the lockset so that the keyhole in the body aligns with the keyhole in the door stile. To mark the back plate accurately, scribe along the edges with an X-Acto knife. Using a laminate trimmer, set the bit depth to equal the back-plate thickness and rout close to the layout lines. Complete the edges of the mortise with a chisel. The chisel's edge will slip easily into the incision made by the X-Acto knife.

Once the lockset fits snug within the mortise, use steel screws to hold it in place temporarily. The steel screws will cut smoothly into the wood without shearing. After the piece is finished, replace the steel screws with the brass ones that came with the lockset.

CUT THE BOLT MORTISE

The last step is to cut a mortise for the bolt into the casework. In double doors, the mortise is cut into the stile of the mating door. To mark the location, extend the bolt and close the door until the bolt rests on the case; then mark the location and chisel the mortise. The key should turn smoothly as the bolt extends from the lockset, but if it's tight, that usually means the bolt is binding on the keyhole. A small shaving with a sharp chisel will fix the problem.

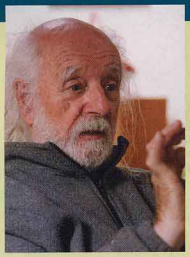


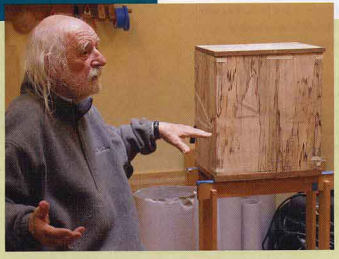
Check the fit. *Once the mortise is complete, check the fit and make sure the keyhole lines up. If necessary, tweak the fit with a chisel.*

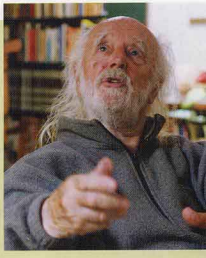
A Conversation with James Krenov

A "stubborn, old enthusiast" reflects on his life of teaching and woodworking

BY ANATOLE BURKIN







James Krenov retired this past summer from the woodworking program he founded at the College of the Redwoods in Fort Bragg, Calif. An influential teacher and author, Krenov began his career in woodworking after studying with Carl Malmsten in Sweden. His first book, A Cabinetmaker's Notebook, *published in 1976, articulated a new way of woodworking, one that intimately involved the maker with the material. I caught up with Krenov at his new home shop in Fort Bragg, a modest 12-ft. by 20-ft. space. Not surprisingly, he was going through the painstaking process of building a new cabinet-on-stand. We spent an afternoon discussing his work and his contributions to woodworking.*

FWW: Tell me about your early days in Stockholm, Sweden, after deciding to make your first go at being a furniture maker.

JK: We [wife Britta and I] bought a little cottage in the suburbs of Stockholm [in 1960]. We wouldn't be talking here right now if it hadn't been for Britta, who knew that there was a shortage of teachers. By then we had two daughters. She took an exam and became a teacher of economics. She had studied economics in the university at Stockholm. That kept us afloat. I just struggled from piece to piece and sold them for a pittance, and maybe sometimes she would remind me that I wasn't even paying for the electricity down in the shop, let alone my share of the cottage.

Then one or another person showed appreciation, and then the big thing happened: Craig McArt came to Sweden to study at the School of Arts in Stockholm. I met him, and he got me an invitation to come to Rochester Institute of Technology [RIT] where Wendell Castle was teaching. I taught as a guest a few months at a time.

Me, being a sort of pre-Kerouac hippie, I had a message that went with the '70s, "Live the life that you want to live. Don't be unhappy in your work." And students would open their eyes and wonder who this guy was.

It was McArt who encouraged me to write a book, and I wrote *A Cabinetmaker's Notebook* [reprinted by Linden Publishing, 2000]. And the first letter I got was from England from some kind of a critic who said it was going to become a classic, and that meant more to me, I think, than many other events in my life. I, a nobody, had written a book from the seat of my pants, and here's an English

Photos, except where noted: Sonya Jacobs-Burkin

Krenov saws his own veneers. *The exterior of the carcase is maple; the inside is tan oak; and bucote was used for the drawer fronts. The carcase measures 10 in. deep by 15 in. wide by 18 in. high and rests on a 32-in.-tall stand made of imbuia.*

critic writing me a letter saying that the book is going to become a classic. Later on I wrote the other three books more out of obligation than any thought of gain or anything like that. I wrote them because people were writing to me and saying, "You've told us why, now how about a little bit of the how." So I put the other three books together.

FWW: Why do you think people have responded so favorably to your books, your message?

JK: Well, a combination of the times, the '70s, with people radically changing their lives, and I think I will always believe that it is a part of the human need to do something well and to be proud rather than ashamed of the work that you're doing. That's inherent in some people. They're not happy unless they are expressing

"I will always believe that it is a part of the human need to do something well and to be proud rather than ashamed of the work that you're doing."

something, unless they're using their hands, whatever it may be—a shoemaker, a potter; a potter has wonderful hands. I think that it's not to my credit. It's not that I had a message that was outstanding or unique or anything like that. I just expressed the feelings that a great number of people had in the '70s. They felt certain ways about Vietnam and work, and here was this hippie walking around talking about it was nice you could work and not be ashamed of it.

FWW: Many people credit you with inspiring them to get into woodworking.

JK: That's true. I still get e-mail letters through the school from people I've never met, never seen. They write a wonderful little letter of gratitude for all that happened. "Thank you, Mr. Krenov," or whatever it is. Lovely, it's really heartwarming. But [in my writings] it was not a preacher talking, it wasn't salvation or anything like that. It was just a person who enjoyed it, an enthusiast. Now I say I'm an old enthusiast. At that time I was a young enthusiast. ... I was all aglow with this [feeling] that when you work well, I think it was my chiropractor who told me this, who referred to the idea of one hand clapping. I asked him what that meant, and he gave me a rather Zen Buddhist answer, and I said well, you know, sometimes when you're working and the work is flowing, you are almost detached from what

Photo, this page: Amanda F. Williams

terrific struggle for him. He made a little cabinet, and it started to turn out okay, and one day he told me, "You know, I was brought up on the fact that I couldn't do anything right. People just told me you can't do it, whatever it may be. You can't do it. You can't do it right. You can't do it well." Here he is starting to prove to himself, I can do it. He lit up. He was just aglow with the fact of this discovery. That he in the future was not going to be put down by that slogan, by that label. From then on, it was going to get better and better, and he would be all right. That was something I'll always remember.

FWW: Are you sometimes surprised at how people have interpreted what you have said in your books?

JK: Oh yes, in the work itself, in the object created. They have taken something from the book, and along the way something happened, changes and things, for better, for worse, but not always for better.

They wanted to interpret it, and that's almost a basic urge with some people. ... What I really dislike are the people that will make something and say, "This is what the Shakers really meant with this chair. This is my interpretation of what the Shakers wanted to say with this chair." I just do a backwards flip. I have to go outdoors and walk it off.

Pearwood is one of Krenov's favorite woods. *This cabinet is 11 in. deep by 21 in. wide by 19 in. tall and rests on a 30-in.-tall stand.*

you're doing, you're observing yourself in work and enjoying this person whose hands are doing these things. He sort of nodded, and maybe that was the other hand clapping.

FWW: Does that still happen?

JK: I find myself completely relaxed at times. Usually I worry about my work because I have too many things in my head, but sometimes, especially with carving and a few other things, I find myself really in harmony, in kind of an Eastern harmony. I enjoy that almost more than anything else.

FWW: What sort of influence do you think your books have had on people?

JK: The sense of possibility. The sense of, "Who knows? Maybe I can do this." We had a student last year, about age 35, with a very awkward body, which isn't necessarily a part of the story. It was a

FWW: Let's talk about inspiration and woodworking and where you find it.

JK: I think that one of the connecting elements has always been the material. I was reading about [Constantin] Brancusi the other day. He was one of the artists that really paid attention to his material whether it was wood or stone, or whatever he worked with, it meant something to him physically and emotionally.

Very often an idea by a student is connected with a memory of woods. ... I'll ask him, for example, "Do you imagine this object as light wood or dark wood or something in between?" And he'll say, "Well, dark wood." I'll say, "There's a plank of really high-quality mahogany back in the corner by the door. I want you to take a tool and go and scrape that and have a good look at it, put a little finish on it, ask yourself if that's what you're looking for." Starting with a question, you can imagine it like a ghost, gray or white, or you could say you want it to look antique. Well, if you want it to look

Photo, this page (left): D. Welter

antique, you better start with dark wood. A process is something in that direction.

FWW: Your name has been associated with a style of furniture. When you hear that term, Krenovian, what does that conjure up in your mind?

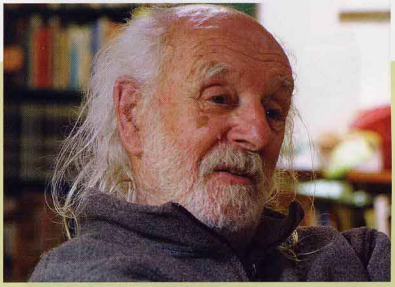
JK: I really don't know. I wish somebody would tell me. I think that people are reacting to the moderate, that is to say no radical curves, no sharp, aggressive edges. There is a friendliness about it that invites the hand. The edge is not gooey like a doughnut, but it's friendly. You put all that together and you find the person constantly tends to make things that are hand friendly, and the use of the wood also comes out, too. This fellow [me] likes certain patterns and certain colors and is forever looking for strange wood.

FWW: Do you still enjoy the hunt for lumber?

JK: That's incurable. Absolutely incurable.

FWW: You still go out looking?

JK: Always will be, yes. Maybe as I grow short on ideas and



"...no radical curves, no aggressive edges. There is a friendliness about [my work] that invites the hand."

short on energy and some other things, it will increase rather than decrease in importance. I'll be getting energy from the wood. The work might not be so hot, but the wood will be great.

FWW: Do you see furniture making as a craft or an art, or do you not even bother making that distinction?

JK: We're talking about a craft, of course, and I think artistic is a much, much better term than art. I don't think that there is any need to describe it ... certainly stuff in museums is going to be called art. I think that done by artistic people, it's artistic, and it has these elements. It's music. That's a good description.

FWW: I'd like to talk a moment about the studio furniture movement. We're seeing a lot of furniture showing up in galleries, where you can't actually touch the piece. You have to stand back and observe it. Putting the piece in this environment elevates furniture to more of an intellectual experience as opposed to one that is sensual and physical. What are your thoughts on that?

JK: This is where I become a very questioning person because I wonder in my mind where the Furniture Society is headed and what they want because they seem so self-preoccupied. They debate subjects such as "the meaning of this chair" and [ponder] the psychological, the cosmic meaning of objects. I question that in a friendly way. I don't want to rock the boat but [such questions] will put you into orbit finally.

FWW: How do you decide whether a piece is working or not?

JK: If you read the first chapter or two of *The Unknown Craftsman: A Japanese Insight into Beauty* [Kodansha International, 1972] by Soetisu Yanagi, you'll see that the main idea of his, the main philosophy is: You perceive. You do not analyze. You do not approach an object and say, "Well, I think this is the perfect triangle or rectangle or something, and this is a Greek proportion down here, and this joins them and brings them together." You don't. He thinks that the analytical way of judging things is anathema. ... I just don't want to know more about the thing than I can see and just react. Hey, there are five chairs here, I like this one very much. If you ask me why I like it, I probably haven't got the right answer. I have always respected the fact that good work is timeless. That's one of the reasons why I stay away from some of this modern creativity, knock-them-dead statements and all the stuff that's going on.

FWW: In your search for perfection in your own work, do you ever find yourself getting impatient with the progress of a piece?

JK: Impatient, yes, yes. I have to go at 10 o'clock at night and take another look at that thing and see how it looks at a distance, and the difference between daylight and lamp light, and am I really on the right track? Is this going to work out or not? Britta had to live with that throughout, during our whole existence together. She's been wonderful in that way.

FWW: One last question. How would you like to be remembered?

JK: Stubborn, old enthusiast. □

Anatole Burkin is the executive editor.

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Joseph S. Clark Chicago

This display cabinet (12½ in. deep by 42 in. wide by 60 in. tall) is constructed out of kwila, cypress, narra, European pear and secondary woods of Baltic birch and Italian bending plywoods. The lower case is kwila veneer outside—with the doors laminated on forms—and cypress veneer inside, while the upper case is solid narra. The center front and side windows were carved from a multilayered cross-bonded piece of European pear. The finish is shellac and wax.

Earl Walker Jr. Leadville, Colo.

Walker built this cabinet (22 in. deep by 22 in. wide by 60 in. tall) to put on consignment at the Toklat Gallery in Aspen, Colo. The idea behind the piece was that the interior could be customized to any client's desires. "It could be a jewelry case, wine or liquor cabinet or CD cabinet—just use your imagination," Walker said. It is constructed out of quilted sapele, ebonized mahogany and maple, and it has a wipe-on polyurethane finish.

Don Tredinnick
Greensboro, N.C.

Tredinnick built this hanging corner cabinet (15 in. deep by 22 in. wide by 60 in. tall) as a Mother's Day gift for his wife to display fine china. Constructed out of walnut, maple and chestnut, the carved details of water creatures reflect his wife's love of North Carolina beaches. The top finial is a carved representation of a Scotch Bonnet, the state's official shell. The piece has a water-based lacquer finish. Photo by Scott Crowder

Randall Shope
Hollidaysburg, Pa.

After his wife decided that they needed a larger desk, Shope volunteered to build this rolltop desk (34 in. deep by 56 in. wide by 48 in. tall). Using Kenneth Baumert's article "Building a Roll-Top Desk" (*FWW* #79, pp. 48-53) as a starting point, he incorporated design ideas from other antique desks as well. Made of white and red oak with trim and accent pieces of Brazilian cherry, the piece is finished with Danish oil and wipe-on polyurethane.

Ken Turner Medon, N.Y.

This card table (17½ in. deep by 35 in. wide by 28 in. tall) is the second project Turner completed while taking classes with Gene Landon at the Old Mill Cabinet Shop in York, Pa. The mahogany piece features lots of carvings and a wooden hinge at the back to allow the top to flip up to expose the felt-lined playing surface. The finish is a combination of walnut-husk dye, several coats of seedlac shellac, asphaltum thinned with mineral spirits to darken and accent the carving, and wax. Photos by J. Kent Campbell of Campbell Photos Inc., Rochester, N.Y.

Kerry Ackerman Middleton, Mass.

This sewing table (15½ in. deep by 22¾ in. wide by 29¼ in. tall) was Ackerman's first project as a student at North Bennet Street School in Boston. "I based the table on several Seymour-style pieces I'd researched but chose to make this particular one because of the unusual bow front, crisp, clean lines and the delicate turned and reeded legs," Ackerman said. The table is made of mahogany with a beeswing satinwood veneered drawer front. The silk bag, which she also made, slides out on a frame hidden in the side of the table. The finish is a stain with a French polish. Photo by Lance Patterson

Andrew Wappett Fairbanks, Alaska

Based on a design that Wappett regularly makes, this rocking chair (44 in. deep by 27 in. wide by 48 in. tall) was commissioned as a Mother's Day gift. The rocker is constructed out of figured birch and cherry. The relief carving of the two chickadees on the crest rail was done by Philip Marshall, a local artisan. The rocker is finished with an oil-and-varnish mixture, and the carving is highlighted with oil paint.

Nathan Currier Aurora, Ore.

As a first-year student at the Northwest Woodworking Studio in Portland, Ore., Currier designed and built this cabinet (18 in. deep by 30 in. wide by 36 in. tall) to serve as a small sideboard in the dining room of his old farmhouse. The cabinet is of frame-and-panel construction and is made from alder with ebony handles. The piece has a linseed oil and shellac finish.

Brian Bortz Durham, N.C.

"I am a high-tech corporate dropout who picked up woodworking as a hobby five years ago," said Bortz. He designed and built this bow-front entertainment center (30 in. deep by 43 in. wide by 77 in. tall) because he has always felt that televisions and stereos should not be considered furniture and should be hidden when not in use. Made of walnut, the piece features book-matched pommele sapele veneered door panels, Greek key dentil molding and turned ebony door and inside drawer knobs. It has a lacquer finish. Photo by Alex Justin

Robert L. Millard
Dayton, Ohio

Millard made this shelf clock with bracket (5¾ in. deep by 11¾ in. wide by 32¾ in. tall) based on a photograph of a David Wood original in *American Antiques from Israel Sack Collection: Volume 8* (Highland House Publishers, 1986). The primary wood is mahogany, and the secondary woods are poplar, white pine and basswood. The piece features inlays of satinwood, curly maple and ebony and a professionally painted clock face. Because the David Wood original is missing its bracket, Millard combined features from several examples for his reproduction. It is finished with a lime-and-water mixture, dye-tinted Danish oil and shellac.

Tips for photographing your furniture

1. *Clean and dust the furniture.*
2. *The furniture will appear more three dimensional if it is lit so that each plane has a different brightness. Take care, however, to avoid excessively bright highlights or dark shadows.*
3. *To be sure the photos will be free of distortion, avoid the use of wide-angle lenses, and photograph with the camera positioned even with the center of the furniture both vertically and horizontally.*
4. *Use 35mm color print (negative) film of moderate speed (ISO 200-400). If you're using a digital camera, shoot at the highest resolution and place the image on a CD.*
5. *Photograph the furniture from several angles. Include some head-on shots, as well as some shots that show both the front and side of a piece.*
6. *Keep the background simple. A cluttered or otherwise distracting background may draw the viewer's attention away from the subject.*

Make a habit of woodworking

BY MICHAEL DUNBAR

A well-known woodworking author and teacher recently visited me. While we were having dinner, he said, "My students could avoid so many mistakes if they would just do things the same way every time." I was amazed, as this was almost a direct quotation from a discussion on work habits that I give each of my classes. I explain to my students how to speed up their work while avoiding mistakes.

Working quickly and avoiding mistakes may seem contradictory: After all, your mother always told you "haste makes waste." But in woodworking you need to develop habits that will both increase your efficiency and help you reduce mistakes. Because the following are principles and not rules, I can give you only my own examples, and you will have to personalize them to your work.

Rationalize your setups

Choose setups that allow you to do the entire job (or as much of it as possible) without having to adjust the work. Whenever you have to clamp and unclamp the piece, you lose time. Before starting, think about how the work can be arranged so that you can keep it in one place. For example, the corner of a workbench often is more versatile than the middle, because the corner allows you to approach the work from two sides. When cutting dovetails, try stacking them like a set of stairs, which allows you to chop through most of each board one row after another without having to change your setup.

When sawing dovetails, turn the board in the vise so that the cuts are vertical. It is easier for your body to make vertical cuts a habit than for it to recall the many angles involved in woodworking.

Once you have found the best setup for an operation, use it every time you perform that operation. This habit allows you to develop what athletes call muscle memory. Not only will you work faster, but your memory of the setup and the muscle memory of your working position will set off an alarm if you do something wrong.

In a similar vein, once you have learned a skill, always follow the same process. If you

Efficient chopping. *Staggering dovetails like a flight of steps enables you to chop away most of the waste without having to clamp and unclamp each board. Finish chopping by unclamping the boards and working on each one from the opposite side.*

Photos: Mark Schofield

cut dovetails before pins, lay out mortises in a gang, or use one leg as a story stick—do it this way every time.

Complete one task before tackling the next

Much of woodworking is doing the same operation over and over. A four-legged table requires eight mortises and eight tenons. A four-drawer chest requires 16 sets of dovetails. No matter how many times you have done an operation, it takes a while to get back up to your optimum working speed. Do all stock preparation at one time: When laying out, lay out everything; when cutting, cut everything. If you are making a table, cut all of the mortises at once, then do all of the tenons. Finally, fit them one at a time. Your second and third mortises will go much faster than your first. So keep at one job until it is done. Once you are working at your optimum efficiency, it is a waste of time to stop short and move on to something else.

Measure once, saw often. *When cutting tenons, lay out all of the pieces before cutting them. By completing one job at a time, you are less likely to make a mistake.*

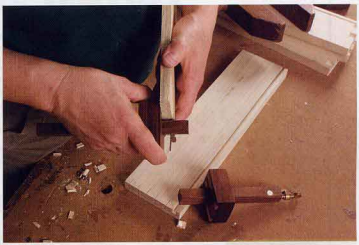
Staying in the same mode also cuts down on mistakes. Part of this is again due to muscle memory. Keeping to one task at a time avoids confusion because you are not overwhelmed with details and you need to keep fewer tools on the bench.

Reach for the same tools for each job

Every time you do a job use the same tools for similar tasks. I keep some chisels for rough work, such as chopping, and others for fine work, such as paring. The edges on the roughing chisels take quite a beating. By reserving some chisels for fine work, I save a lot of time in sharpening and maintenance.

With tools that need to be adjusted frequently, such as spokeshaves or planes, own more than one. This way you can preadjust the tool and use it repeatedly for a particular job.

Using the same tools every time for the same operation is especially important in marking and measuring. Bells go off if you pick up the wrong tool. While making chairs, where every part is at a compound angle, I frequently need to use two bevel squares. Confusing the angles is a disaster waiting to happen. I recommend that students buy two different-sized bevel squares and develop the habit of using both of them instead of constantly resetting one. The same applies to marking gauges: When laying out drawer dovetails, one is typically set for ¾ in. and the other for ½ in. Own two different gauges and always use the same one for these very typical settings.



Dedicated tools. *When doing a task that involves frequent adjustments to a tool, it is often easier to have two such tools and leave them at different settings. Here, one gauge is set to ⅛ in. for the drawer sides, while the other is set to ¾ in. for the drawer front.*

The opposite of having a dedicated tool is to do as much as possible with the tool in hand. Using one tool avoids the risk of picking up the wrong one. Plus, the more you can do with the same tool, the more time you save. This is especially true with jobs like carving: I have lots of carving tools but use most of them very little. I have learned to do much of my round work with a 1-in. flat chisel. I can get very close to my final form without setting down this one tool, and I save a lot of time.

Few of us are able to spend as much time in our shops as we would like. So wasting time by working inefficiently or fixing the things we have botched cuts into the enjoyment we should be receiving from our craft. The next time you are in the shop, try applying these suggestions until they become second nature. You'll be rewarded with more time to do the things you really like. □

Your flexible friend. *When carving, it is quicker to use one tool for a variety of tasks: Dunbar uses this 1-in. flat chisel to rough out and then define the details of this knuckle arm.*

Q&A

Locating bench vises

Your article on workbenches (FWW #160, pp. 54-59) raised a question that I've wondered about for years. Why, as you face the workbench, are the vises all on the left side, not the right? With all due respect to left-handers, it seems very awkward for us right-handers, especially when we want to cut a board.

—Margaret Beattie Jung, Bluffton, S.C.

Graham Blackburn replies: The short answer is because most people are right-handed. But your question deserves a closer look on several points.

First of all, you mention the awkwardness of sawing a board. Historically, benches were developed as planing tables, not sawing tables. The contemporary German term for a woodworker's bench remains, in fact, *Hobelbank*, or planing bench. It is far easier for most right-handers to plane a board secured to a bench when working from right to left. This is reflected in the very names of certain planes such as sash fillisters, which are made in different styles to work "off the bench" (like the majority of planes) or "on the bench," which refers to the shavings being ejected onto the bench rather than onto the floor. Both of those terms imply the standard practice of planing from the right end of the bench to the left end.

Given that such a standard planing direction is easier than the reverse, it becomes clear that a vise designed to hold the board on the bench and to resist the tendency of the plane to push the board off the bench is more effectively located at the extreme left end of the bench. Hence the development of bench stops and dogs, and finally vises, at this left end.

Second, while modern bench vises are invariably located at the left end of the bench, woodworkers trained to rely on vises (rather than on bench hooks, dogs or stops, which are more common in Europe) have indeed discovered the usefulness of tail vises located on the right end of the bench. Most of these right-end vises are designed not so much to hold a board for planing solely on their own, but to secure a board between a pair of dogs, one of which is located in the right-hand tail vise. As another solution to the same problem, 18th-century British benches often were outfitted with a pair of bench vises, one at each end.

Third, if by "cut a board" you mean the ability to saw the end off a long board held in the bench vise, that particular task would, in fact, be more easily accomplished if the vise were located on the right end of the workbench. You might improve the operation by standing on the other side of the bench vise, but you're probably better off just resting the workpiece on a pair of sawhorses. But if by "cut" you mean other tasks, such as chiseling or carving, those operations are probably better done with the help of some of the numerous other holding devices such as bench hooks, holdfasts and stops. In summary, the advantages (for right-handers) of a left-end bench vise far outweigh the help that one located on the right end would offer. [Graham Blackburn wrote the article in *FWW* #160 that covered the development of workbenches and the accessories that make them so useful.]

Replacement blades for old molding planes

I have a few old molding planes that I'd like to use, but I don't have any blades for them. Do you know of any sources, online or otherwise, where I can purchase blades for old planes?

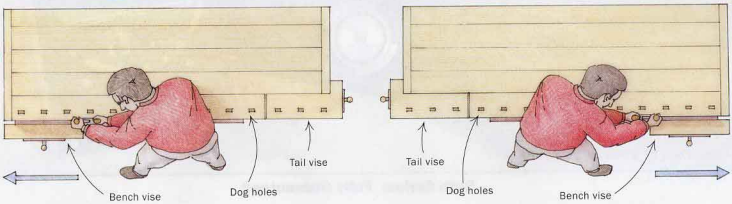
—Tom Hewitt, Ventnor City, N.J.

Garrett Hack replies: A molding plane missing an iron is not all that uncommon. I always keep an eye out for orphaned irons in boxes of junk at flea markets. But short of such a lucky find, there are other solutions to the problem.

You have a couple of choices. Either make a new iron from scratch or buy a

POSITION VISES FOR COMFORTABLE PLANING

Woodworking benches were developed for planing, not sawing, boards. When using the bench vise to secure the workpiece, the most comfortable position for right-handed workers is to mount the bench vise on the left side of the bench. Many left-handed woodworkers who don't make their own benches compensate by using tail vises and benchdogs to secure the workpiece for planing.



Drawings: Vince Babak

blank from someone who can taper it for you. If you do it yourself, you'll have to cut it roughly to shape, heat the tang to taper it, shape the profile of the cutting edge, heat-treat that edge to strengthen the steel and then grind and file the final shape of the cutting edge. Depending upon the width of the iron and the complexity of the profile, expect to pay about $10 to $20 for a factory blank and $30 to $40 for an iron blank tapered by others.

It's not all that difficult to make the iron yourself. Any good tool steel about ⅛ in. thick will do, such as another old tapered bench-plane iron (which saves you the tapering step), or new O1 flat-ground steel stock. The industrial supplier MSC (800-645-7270; www.mscdirect.com) sells Starrett blanks in a wide array of sizes. The advantage of buying new steel is that it will come relatively soft and ready to work. An old plane iron will need to be softened by heating it red hot and letting it cool slowly. You can use a propane torch or throw the iron into a woodstove as the fire is winding down, and pull it out the next morning.

Make a paper card pattern of the iron to get the size of the tang and the shape of the cutting edge, before you cut out the blank (I use a hacksaw). One important refinement of molding-plane irons is that they are slightly tapered along their length. This helps the wooden wedge hold them securely in the plane body, and you can tap on the end of the tang to loosen a stuck iron. Heat the tang and taper it on an anvil or the flat work area at the back of your machinist vise. A slight taper made by modest hammer blows along its length is all you need. Flip it occasionally and hammer it on edge to straighten it.

The next step is to grind or file the profile of the cutting edge. Wedge the iron blank in place. With a felt-tipped pen, scribe the shape of the sole on the back of the iron. Grind or file it to shape and add a 25° bevel on the back of the cutting edge as close to the final profile as possible. You'll still need to hone it to sharpness and exact shape after heat-treating the cutting end of the iron.

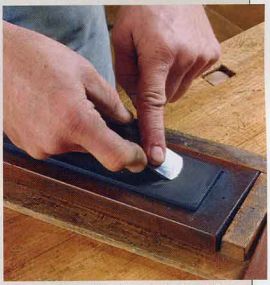
Heat-treating involves first hardening the steel by heating it red hot and then quenching it in oil, such as motor oil or

MAKE A BLADE FOR A MOLDING PLANE

1. Make a paper template. *Using thin card stock, fit a paper template in the plane to get the size and shape of the iron. Hack uses a hacksaw to cut the tang of the iron. Afterward, the rough edge must be ground and filed smooth.*

2. Taper the tang. *Heat the blank in hot coals or with a torch until the blank is red. Then hammer it out to create a slight taper away from the cutting end of the iron.*

3. Temper the cutting edge. *Use a torch to heat the cutting edge (above) until it reaches a sort of straw color, and then douse it in oil (right).*



4. Sharpen the edge. *Hone the back side flat and sharpen the other side of the cutting edge through successive grits by whichever sharpening regimen you prefer—stones or sandpaper.*

Photos: William Duckworth

peanut oil. Heat the first inch or so of the iron red hot and plunge it straight into the oil. This hardens the cutting edge but also makes it brittle. To soften it slightly, it needs to be tempered. Heat an area on the back of the iron near the cutting edge and carefully move the torch back and forth until you see a light straw color, then quench it in oil. Polish the back of the iron on abrasive stones or sandpaper and refine the profile to exactly fit the sole of the molding plane. Following these procedures, you might make a better iron than the original.

If you prefer to pay someone else to taper the iron blank, here's one source: Clark and Williams (479-253-7416; www.planemaker.com). They will sell a tapered 8-in.-long by 2-in.-wide blank of ⅛-in.-thick O1 tool steel for $36, plus shipping. You'll still have to cut the tang and bit sections, and then take care of shaping and heat-treating the cutting edge. [Garrett Hack is the author of *Classic Hand Tools* and *The Handplane Book*, both published by The Taunton Press.]

Which glue to use?

I am building a large hutch (of walnut and cherry) that is inspired by a project that appeared in* FWW *#89. I was thinking of gluing it together with hide glue because I know that it has been used successfully for centuries. Is the hot hide glue a good choice, or would I be better off with the premixed liquid hide glue? Or for large case pieces, would I be better off just using regular yellow glue or polyurethane glue?

—Steve Bowman, Jackson, Ohio

William Tandy Young replies:

I do most glue-ups by myself, so before choosing which glue to use, I plan out all of the joinery details. I try to use joinery that will allow me to assemble large projects in a sequence of small, manageable steps. Each of the glues you mentioned has its own strengths and weaknesses. You don't have to use one of them exclusively. I often use more than one type of glue on a project, employing each to its best advantage.

Hide glue is an outstanding furniture-making adhesive. I prefer the hot hide glue because it cures to a hard, rigid bond line, and develops more strength and durability than liquid hide glue. However, hot hide glue can be difficult to work with because it gels quickly. For time-consuming glue-ups, I slow down the glue's gel rate by adding up to 20% urea crystals or 12% salt (measured by weight in proportion to the dry glue granules) to the glue after it has been mixed with water and heated. This is easy to do and greatly extends the amount of available working time.

I would use either hot hide glue or polyurethane glue for your edge and face joints. The poly will allow more working time, but it also will require more clamping time. Ordinary yellow (polyvinyl acetate, or PVA) glue will work, but it's not very rigid or creep-resistant. Also, it will create a more visible glue line under a stain and finish.

Hide glue and PVA glue are the best choices for assembly joints like dadoes, dovetails and mortise-and-tenon joints. Don't use polyurethane glue for those types of joints because it won't develop full strength inside the joints. However, if you have veneering to do, polyurethane glue is a terrific choice. It is finish-friendly, and it won't add moisture that will affect the workpiece, as both hide glue and PVA do.

[William Tandy Young is the author of *The Glue Book* (The Taunton Press, 1998).

Two kinds of hide glue. *Hide glue made by heating dried granules is stronger and more durable than the premixed liquid hide glue.*

Mixing media: collaborating with a stoneworker

BY DAVID W. LAMB

Better than the sum of its parts. *A schist top and verde antique feet and beading add rich green color that complements both the mahogany wood and the traditional design.*

Collaborating with another artist opens design possibilities that otherwise would not be attempted or even visualized. In my case, it was a long friendship that made collaboration a reality. Twenty years ago Chance Anderson, a Canterbury, N.H., stoneworker, started saying, "David, we've got to use stone in furniture." But all I could imagine then was a park bench, or the usual approach of using stone for a tabletop. What I wanted was a true collaboration—a blending of inspiration and technique—not just the typical farming out of one or two parts. I just needed the right project.

It took me 16 or 17 years to come up with the right piece: a demilune table with a top, feet and apron beading made from stone.

At that point, I didn't understand the properties of stone. My thought was as naive as, "Why don't we just do this?" Had I gone to "the industry," the old-timers who have carved and shaped marble and granite for generations, I might have been laughed at. After all, who would handle and shape stone to 3/16 in. thick, the dimension I needed for a light bead along the apron? But my friend, an experienced woodworker himself, didn't dismiss it. Sure, he occasionally complained—"You want it how thin? An elliptical curve? Why not just a simple one?"—but he was on board.

Why stone?

Most people think of stone as cold, heavy and massive. My design would present stone in a different light. I was looking for warm colors, delicate and feminine form and lightness—

Templates are the key. *For each section of beading, Lamb (right) made a plastic template directly from the elliptical table apron, and passed it on to Anderson (left).*

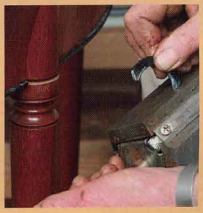
PLASTIC TEMPLATES FOR SHAPING STONE

The stoneworker's turn. *Anderson mounted each template on a rough-cut stone blank and used a bearing-guided diamond bit in a router-table setup to create the bead. A jet of water kept the cutter cool.*

Photos, except where noted: Asa Christiana; this page (top): Dean Powell

Attaching the bead sections. *Each section was screwed to the apron; the rubber washers distributed the pressure gently. Care was taken to maintain an even projection from the apron.*

A STONE-BEADED APRON



Round sections for round legs. *Anderson made these bead sections, which mirror the projection of the leg turrets, by turning a flat stone disc, removing the center, cutting off a section and mitering the ends to fit the adjacent beads. A few strokes on an oilstone fine-tuned the fit of one mitered end to another. These circular beads were epoxied into place.*

something that would complement the line and nature of the demilune table I had drawn. Metal would have been a natural choice, bending easily around the curve, but I chose stone, which has as much richness and variation as wood but at the same time can reflect light like metal does. Stone just felt right.

The main difficulty was asking the stone to take on a thin, bent form. Anderson told me I had only a couple of choices (this from a guy who has hundreds of stone samples at his shop). Marble was a possibility, or dolomitic limestone, or Vermont's verde antique (serpentine). The verde antique was the hands-down favorite. It has a rich and varied green base coloration with veins of quartzite and flecks of gold and silver that complement the mahogany. It also is easily shaped with diamond tooling yet will not fall apart at 3/16 in. thick. I also chose verde antique for the turned feet.

We chose green schist for a dramatic top. This top was not just set on a frame, as is the common practice; instead, it is inset and slightly elevated like a diamond in a setting. The schist's crystalline pattern has randomness and shape that seem almost Oriental and garnets that complement the mahogany as well as the verde.

Creating table parts from stone

Anderson was involved throughout the design and construction process. Aside from choosing the materials, we discussed methods of attachment, tolerance of fit, finishing and many other technical questions.

The apron bead—Making an elliptically shaped table instead of a simple arc made it much more difficult to determine the shape of the tabletop and the bead sections. Because the curve constantly changes from rather flat on the front to more pronounced on the ends of the table, each bead section had to be shaped specifically to its location. Along the way, the bead also had to project a uniform 5/32 in. beyond the face of the apron.

My solution was to use the apron-lamination form to make a template for Anderson's router, taking into account the bearing size and cutting depth of the diamond-tipped bit that Anderson custom-made for the job. Because water would be used to lubricate and cool the cutter, I made all of the templates out of plastic.

An interesting part of the beadwork is the circular sections that wrap around each leg. These discs were cut and mounted on a mandrel, then turned on Anderson's stone lathe (he created this machine by mounting a grinder in the tool post of an old engine lathe, opening a world of design possibilities of his own).

Turned stone feet—Working from a wooden sample that I turned, Anderson used his stoneworking lathe again to turn the

Another template for the inlaid tabletop. *The plastic pattern was made from the apron's lamination form. Anderson used the template to rout the final profile of the top.*

INLAID TABLETOP

Attaching a stone tabletop. *After laying on a coat of auto-body filler and running the tabletop slab through a wide-belt sander to create uniform thickness, Lamb and Anderson glued blocks to the bottom of the slab with epoxy. The blocks, in turn, were screwed to the apron.*

feet. He bored each blank for a mandrel, fitted it between centers and angled the lathe's crossfeed to the correct taper angle. Later, I used the hole from the mandrel to dowel the feet to the legs with some epoxy.

A difficult but beautiful top—The schist top had to fit the inside curve of the apron with no room to spare. Theoretically, the top was exactly the same shape as the form that the apron was made on. So I used the lamination form as a guide to rout another plastic template for the stoneworker's router.

At his shop, with water flying everywhere, Anderson rough-cut the stone slab with a diamond circular saw and trimmed it with a diamond bandsaw. Then he attached the top to the plastic template for routing the final shape. Afterward, a few touch-ups with the angle grinder fit the top to the apron perfectly.

Attaching the stonework

Before the stone bead was fitted and attached, I applied the patterned veneering to the apron and assembled and finished the wood part of the table. But I left the final rubout until after all of the stone was in place. Next came the tricky fitting and mitering of the nine joints in the bead assembly. Anderson fitted each joint by hand and attached each one in sequence with epoxy and screws, paying careful attention to the reveal.

Our perseverance and teamwork paid off: The table was purchased by the Currier Gallery of Art in Manchester, N.H., for its collection of contemporary works. □

TURNED STONE FEET

Precise pattern for the feet. *Anderson used a turned wooden mock-up of a foot as a template. By mounting a right-angle grinder (armed with a diamond wheel) in the tool post of an old metal lathe, Anderson created a stone-turning machine.*

A strong leg-to-foot joint. *Lamb used a dowel, epoxy and the same mandrel hole used for turning the stone feet to attach each one permanently.*

Ebonized finishes

BY SEAN AND ANGELA CLARKE

Many shades of black. *Applying lacquer tinted with yellow, blue or red penetrating dye on top of the ebonized finish gives subtle toning.*

The Rolling Stones may want to "Paint It Black," but woodworkers have more sophisticated ways of achieving a black finish. Intended to mimic the appearance of expensive solid ebony, the ebonizing method goes beyond basic black. The process can be sprayed or applied by hand, the level of grain visibility and final luster can be varied, and optional color overtones can be added.

Ebonizing part of a workpiece

Prep the surfaces by sanding them up to 220 grit, then seal off the areas that are not going to be ebonized. You can tape off straight-grain areas that are less subject to bleed-through. For greater protection and for end-grain areas, apply a lacquer-based sanding sealer. It's best to use vinyl sealer because it is compatible with the CAB acrylic lacquer that will be applied later. Leave a small area of sealer just inside the area to be ebonized to help control any bleeding from the stain that will be applied. This single seal coat needs to dry for at least four hours. All drying times are based on the hot, dry southern California climate; adjust them to match the conditions where you live.

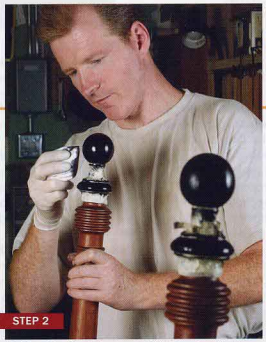
To achieve a black base on the ebonized areas, stain the surface with a black water-based aniline dye, using one teaspoon ebony black dye dissolved in 8 oz. hot water. After this mixture cools, it can be brushed or ragged on, and any excess should be wiped off. Let the wood dry for at least two hours.

Once dry, apply another coat of vinyl sealer. If you have sealed the unstained areas, don't worry about strictly keeping this seal coat only on the stained areas. If you simply masked off the non-stained areas, apply vinyl sealer to the whole piece. After four hours, lightly scuff the seal coat with 320-grit paper.

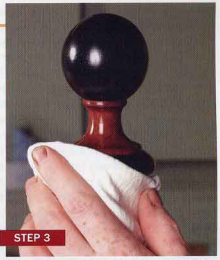
After sealing, apply a coat of black lacquer, which can be sprayed on or applied by hand. For spraying, mix 1 oz. black universal tinting color (UTC) with 1 qt. CAB acrylic lacquer reduced by 15% to 20% with lac-

FURNITURE PARTS

Paint it black. *Apply a black water-based dye to the areas being ebonized. Don't worry about straying into other areas, as they are protected by a coat of vinyl sealer.*



Pad on the black lacquer. *With the clear-finish areas masked off, pad on the acrylic lacquer that has been stained with black universal tinting color. Add coats until you are satisfied with the appearance, letting each coat dry for five to 10 minutes.*

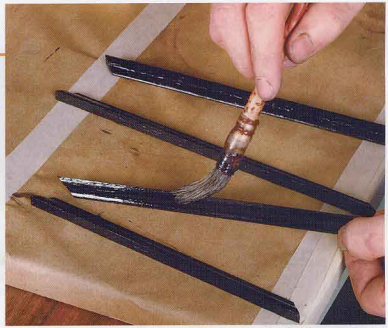


Wax and wool. *For a low-luster look, dip some 0000 steel wool in paste wax and rub the surface gently. With a clean cloth, polish the surface to produce a very smooth, medium-luster shine.*

Photos: Mark Schofield

APPLIED TRIM

Start by applying a water-based dye. *Then proceed to wipe off the surplus. Some woods, such as the oak on this picture-frame trim, only partially accept the dye.*



Apply the black lacquer. *Several coats will cover any areas not covered by the water-based dye.*

Prepare for gluing. *With a sharp blade, scrape any vinyl sealer or black lacquer off the surface that is to be glued. Traces of the water-based dye will not interfere with the glue.*

quer thinner. If you want more of the grain to show, reduce the lacquer by up to 50% and add up to ½ oz. more of the UTC, which gives adequate color coverage despite the lighter finish.

Pour the lacquer into the gun through a strainer to remove any undissolved lumps of pigment. Tape off the areas not to be ebonized, then spray as many coats of lacquer as necessary to attain the level of coverage you're looking for. Let each coat dry for four hours, then sand with 320-grit paper before applying the next coat.

When applying the black lacquer by hand, use a rubber consisting of cotton wadding wrapped tightly in a piece of cotton cloth. Mix between ½ oz. and 1 oz. black UTC with CAB acrylic lacquer reduced by 30% to 40% so that the lacquer will flow freely through the rubber. Reduce the lacquer even further to 60% if you want grain visibility. Apply the lacquer mixture in straight strokes with the grain. Let dry for five to 10 minutes between applications, sanding as necessary, and repeat until the level of finish is satisfactory. At this point, let the workpiece dry for three to four hours, then lightly sand with 320-grit paper. If you are happy with the coverage, finish the job by applying a final clear coat of lacquer to the entire piece.

Color-tinted lacquers can be sprayed or applied by hand over the black lacquer coat for different effects. For a sharper, richer black, mix 1 qt. CAB acrylic lacquer, thinned by 50%, with 2 oz. black penetrating dye. For a warm plum black, substitute ½ oz. red penetrating dye for the black dye. Follow the same ratio and use yellow penetrating dye for a cool, greenish effect. These applications should be allowed to dry overnight and be followed by a final lacquer clear coat.

Ebonizing trim to be applied

The process for ebonizing pieces of trim that are separate from a workpiece is, of course, much easier. Simply prep knobs or other types of trim, stain with the water-based dye mixture described earlier, seal them (keeping in mind that knobs, being end grain, are extremely absorbent and require several coats of sealer), then apply the black lacquer. If desired, apply a color-tinted lacquer. A final clear coat of lacquer enhances durability.

SOURCES OF SUPPLY

CAB acrylic lacquer: Can be found at most paint stores

Dye powder: Water-soluble dyes are available at Woodworker's Supply (800-645-9292; www.woodworker.com)

Universal tinting colors: Available at most craft and paint stores

Penetrating dyes: Wizard Tints from Woodworker's Supply or TransTints from Homestead Finishing (216-631-5309; www.homesteadfinishing.com)

Before attaching the trim to the workpiece, be sure to scrape off any sealer or lacquer from the surface that will have glue applied to it. Remnants of the water-based dye, however, will not interfere with the adhesive.

Rubbing out the finish up or down

There are two ways to enhance or lessen the sheen left by the lacquer. To achieve a dull or satin sheen, use steel wool and wax. For a high-gloss sheen, use a rubbing compound. (If you wish to compound the finish, it may be helpful to add a second coat of the clear lacquer topcoat for additional depth to rub into.) If you're working with an open-grain finish, be sure to add dry black pigment to the compound to avoid turning the grain white. □