TAUNTON'S

Fine WoodWorking

No-mess glue-ups

October 2003
No. 165

Tool test: Miter gauges

A new twist on sharpening

How to deal with wood movement in furniture

Milling lumber

Best rulers for woodworking

Biscuit joinery

Ideal finishes for turned work

Build a country-style cupboard

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WINNING DESIGNS IN WOOD

The annual Design in Wood Exhibition, organized by the San Diego Fine Woodworkers Association, brings together a diverse collection of woodworkers, and the quality of craftsmanship is typically impressive. For five years *Fine Woodworking* has been a cosponsor of the event. This year we presented the Best in Show award to Alice and Edward Suszynski for their chandelier in walnut and quartersawn oak (top left). Other pieces that won awards during the exhibition include (clockwise from bottom right): a rocking chair in mahogany and ebony by Ken Minasian; a nightstand in mahogany, olive and ash veneer, and bamboo by Cindy Vargas; and a table in ebonized poplar and maple by Terry Holzgreen.

Photos: Andrew E. Patterson, San Diego Fine Woodworkers Association

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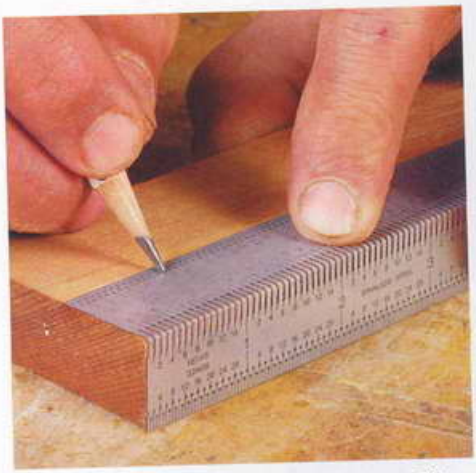
Photo: Matt Berger

Transform rough lumber into flat, square stock, p. 32



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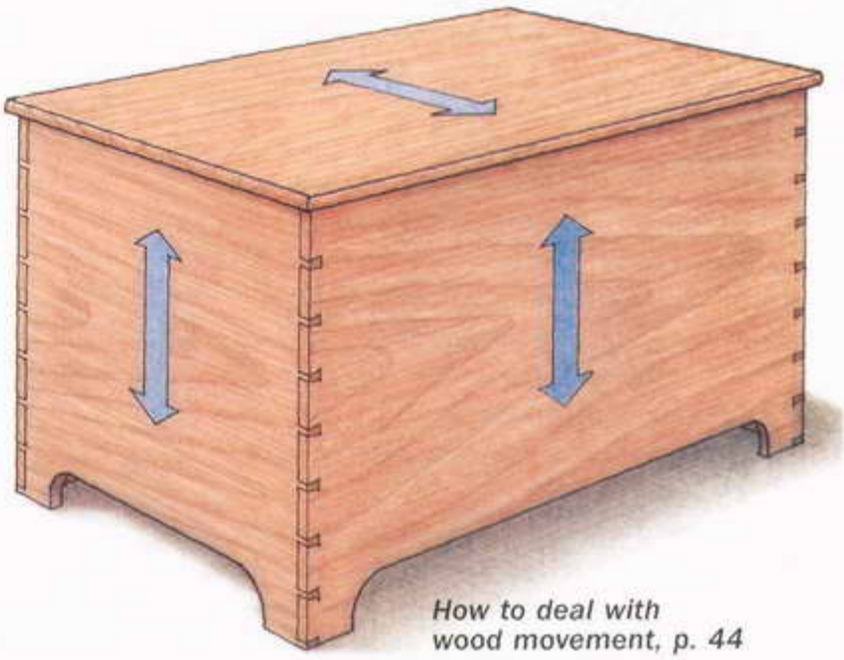

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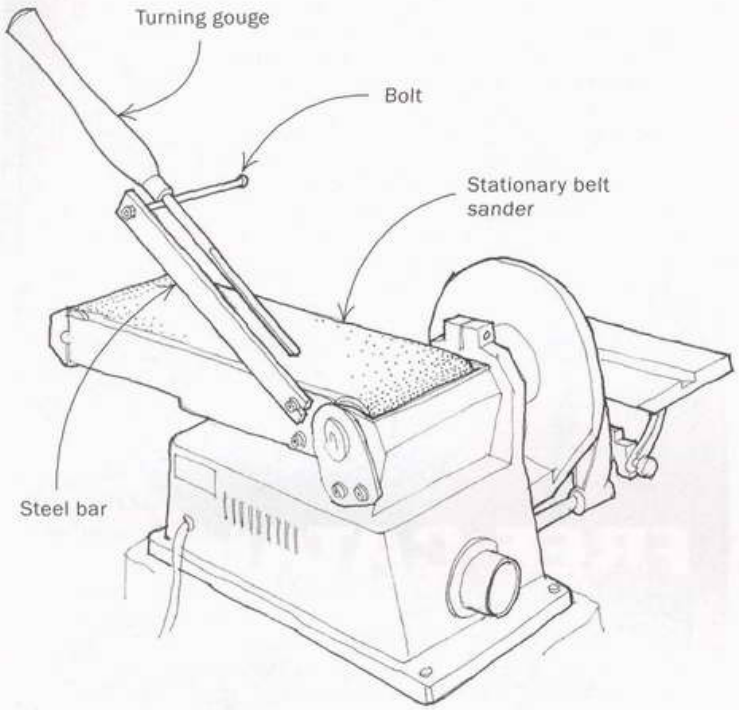


machine and attach a 12-in. length of rigid iron strapping (mine is ¼ in. thick by 1½ in. wide) in its place. Drill a ¼-in.-dia. hole through the top end of the strapping and attach a ¼-in.-dia. carriage bolt with a pair of nuts. The bolt should be long enough to span the width of the sanding belt.

To use, loosen the attaching bolt slightly and adjust the angle of the jig so that the bevel of the tool to be sharpened rests on the sanding belt, the tool's tang rests on the bolt, and the handle acts as a stop against the bolt. Now, simply lift the tool off the sanding belt, turn on the sander and lower the tool to the belt, rotating the tool to sharpen the beveled edge. If you start with an 80-grit belt, you can grind a new, flat bevel in seconds. Change belts to successively higher grits until you reach the level of sharpness you expect. For carving tools that just need touching up, start with 220 grit and work up to 600- or 800-grit sanding belts. Klingspor (800-645-5555; www.klingspor.com) and other abrasive-belt makers offer belts of very fine grades to fit any belt sander. If your belt sander has a quick-change release, this simple jig will enable you to grind a whole new bevel and hone it razor sharp in less than two minutes.

–Sandy Cohen, Albany, Ga.

Quick tip: To deal with sawdust accumulation in the shop, tamp the sawdust into empty half-gallon milk cartons, and burn the resulting "log" in your fireplace. Each log burns about an hour. And you will have the neatest firewood stack in town.

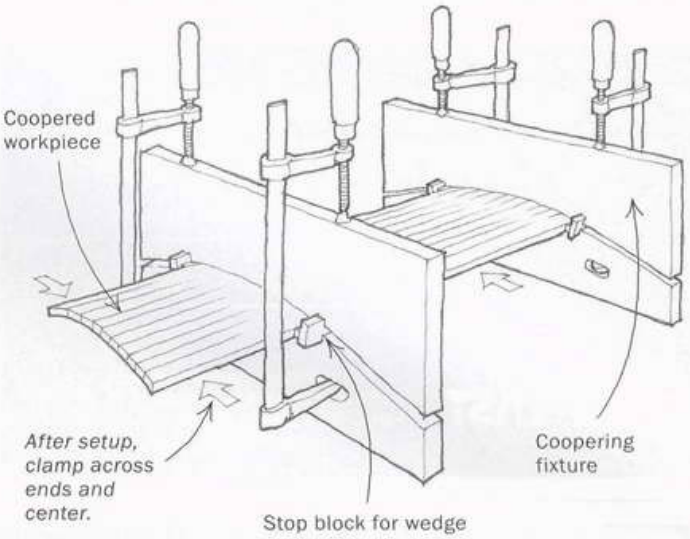
–Raymond Finck, Las Vegas, N.M.

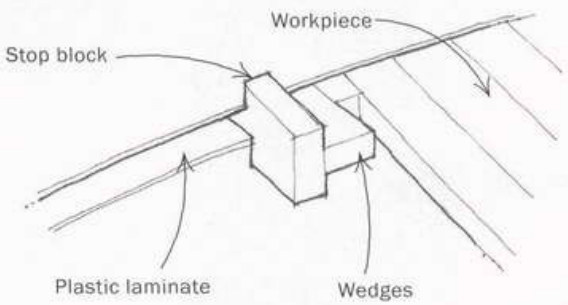
Coopering fixture

I decided recently to make a pair of coopered cupboard doors, each of which had a dozen staves, each only ½ in. thick but 1 in. wide. The reason for the thinner-than-normal timber was that I was using an Australian wood called woolybutt, which is very dense. Sized any thicker, the doors would have been too heavy.

Coopering thin stock carries its own set of problems. What I needed was a fixture that held the staves in alignment to allow uniform clamping pressure during the glue-up.

The solution I devised consists of two ¾-in.-thick medium-density fiberboard (MDF) clamping cauls sawed into the desired curved profile, in this case a radius of 35 in. In use, these cauls are clamped together with adjustable clamps, as shown below, to hold the staves in place for the proper radius. I added plastic-laminate strips to the jaws of the cauls to create a smooth surface for clamping and to keep glue from adhering to them.





To provide the necessary tangential clamping force, I used a wedge setup. When tightened, the wedges force the staves to conform to the cauls and provide cross-grain pressure for a good glue squeeze-out. The wedges work against a stop block that is captured in slots cut into the cauls. I also added extra clamps across the ends and the middle of the staves to provide uniform clamping pressure along the length of the doors.

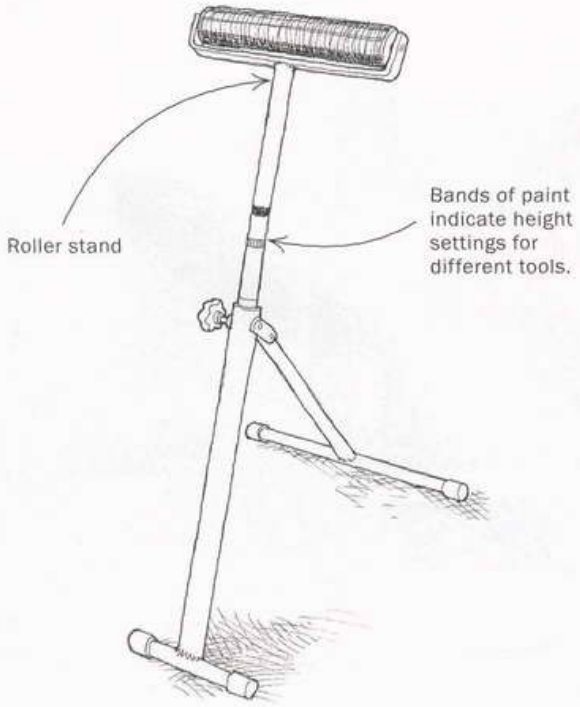
With this setup, I was able to glue up both doors by myself without getting glue all over my hands or my bench. Also, later when I needed to scrape and sand the inside of the doors, I was able to use the concave caul (turned upside down) to hold the doors steady.

–Jim Jackman, Batemans Bay, Australia

Quick tip: When lapping the backs of plane irons and chisels, my fingers usually take a beating and end up feeling tender for a day or two. Then one day, after my fingers had about all they could take, I had an idea. From an old computer mousepad, I cut a piece about

the size of the plane iron I was sharpening and used it to slide the iron back and forth across the abrasive. The rubber on the bottom of the pad gripped the iron quite nicely and saved my fingers from taking a beating. —*Jesse S. Bushman, Alexandria, Va.*

Roller-stand improvement



I work in a one-person shop, which often requires moving a roller stand to use with several machines of varying heights. To make setting the stand's height fast and easy, I sprayed a band of colored paint on the adjustment column at the various height settings. That way, I can simply raise or lower the column to the bottom of the color band that I use to identify a particular machine. The bands scrape off in time but are easily renewed.

—*Bob Gleason, Kurtistown, Hawaii*

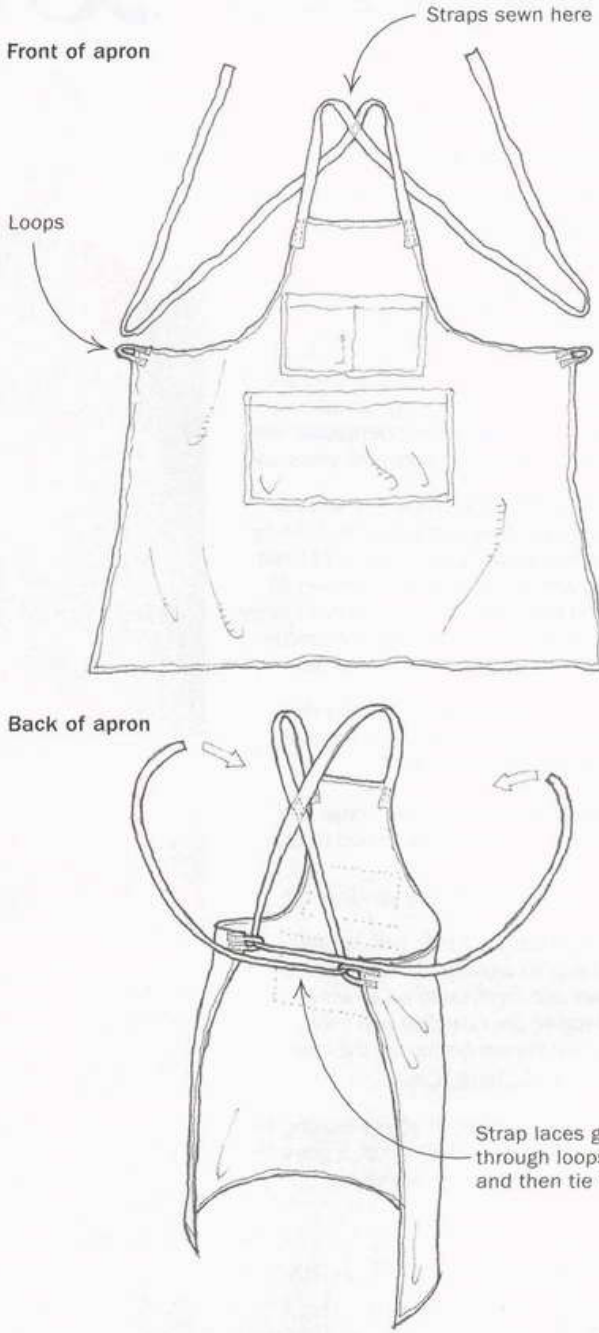
Quick tip: If you cut mortises with a router, you can save money by using end mills made for milling machines. For example, a ½-in., two-flute, high-speed-steel end-mill bit with a 2-in. cutting length is only $5.82 from my supplier (Enco; 800-873-3626). The bits are made with a spiral upcut design, which means they will clean out the sawdust nicely and leave smooth sides on the mortise. Many milling bits have a ⅜-in.-dia. shank, but these can be adapted for use in a router by using ½-in. to ⅜-in. reducer bushings, available from any machine-shop supplier.

—*Rich Haendel, Iowa City, Iowa*

Improved shop-apron design

A shop apron is an important but often forgotten tool in a woodshop. However, most woodworking aprons are uncomfortable because the pockets are stuffed full of nails, punches, rules, squares, pencils, and shavings. All of this weight hangs directly from the neck.

With the help of my wife, I rethought the traditional apron design and improved upon it to get a comfortable and practical apron. The key is in the strap lacing. Notice that the straps cross at



the back and are sewn together at this point. The strap lacing then threads through loops at the sides, crosses at the waist on the apron's back, and ties in the front. This lets the laces at the waist share in carrying the weight.

—*John Tolhurst, Coffs Harbour, Australia*

Quick tip: To make a simple and efficient pad for hand-sanding simply stick two pressure-sensitive sanding discs together back to back. For added versatility, select two discs of different grits.

—*S. J. Chant, Wyalusing, Pa*

Notes & Comment

An American carves out a career in Nepal

For more than 25 years, American Lee Birch and a group of Nepalese woodcarvers have been creating one-of-a-kind pieces in a quiet neighborhood of Kathmandu. By finding patrons around the world, the group of devoted craftsmen is preserving Nepal's carving heritage. Birch's studio is known for distinctive designs that blend traditional and modern elements. "Right now we are working on an Art Deco bed of our own design for a client in Washington, D.C.," Birch said. "We are grateful to be so much in demand."

From California to Kathmandu. *Lee Birch (front center), originally from California, runs a carvers cooperative in Nepal that is keeping the Newar-carving tradition alive by selling work to clients around the world.*

Trained as a painter at the California College of Arts and Crafts and later at the San Francisco Art Institute, Birch set out to explore the world in the early 1970s at the age of 23. Captivated by the land and people of Nepal, she settled in Kathmandu in 1974 and began to paint. While searching for craftsmen to build picture frames, she stumbled upon one of the world's oldest wood-carving traditions.

The wood-carving tradition in the Kathmandu Valley dates back to the 10th century, when the Newars, the original inhabitants of the valley, earned fame as decorative temple carvers.

Birch and the Newar woodworkers established a studio to make it possible for them to preserve their craft in the face of increased competition from the mechanized world. The 10 craftsmen use wooden mallets, foot-pedal scrollsaws, chisels, and other traditional tools.

For many years Birch struggled. Marketing was her biggest challenge. Nowadays, the studio's reputation for quality and reliability are well-known, and computers and the Internet make it easy to refine ideas for frames, tables, decorative panels, wall hangings, screens, and beds, and send them to clients around the world with a mouse click. For more information, go to www.leebirch.com. *–Jenny Dubin*

Wood web

www.woodbin.com

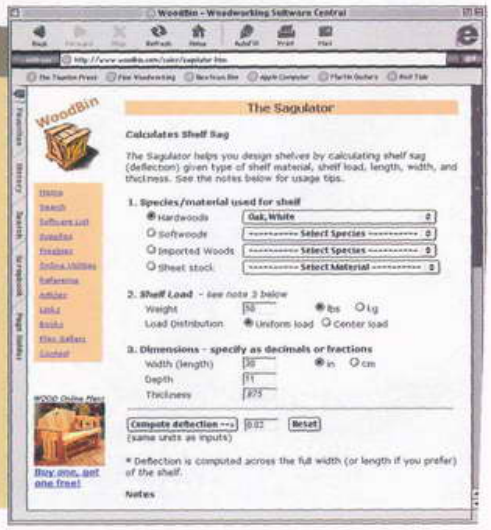
Woodbin.com offers the woodworking Web surfer a variety of free and useful calculators and utilities and has earned a coveted bookmark on my computer.

The Tabulator creates a nicely formatted cut list for any project, including board feet and total cost, even factoring in waste. I used it to create a quick cut list and cost estimate for a built-in bookcase.

Also on the site is The Shrinkulator, which calculates wood movement for 128 species. The Sagulator calculates shelf sag for a range of materials and spans. And a search engine for woodworking plans provides access to 10,000 projects, including 2,000 free plans, according to the site.

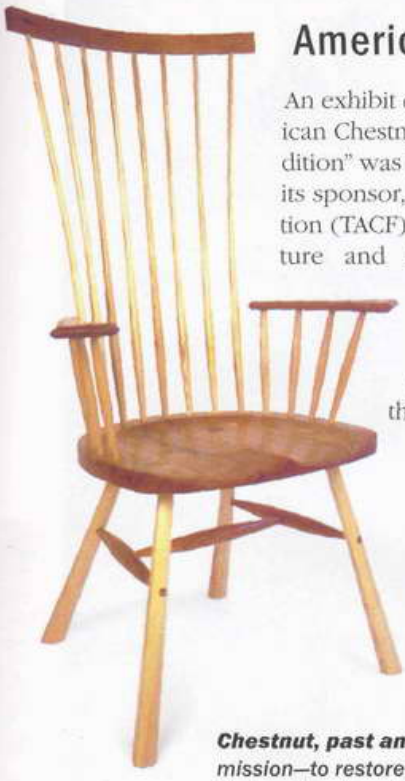
Woodbin.com includes links to special sales on the Web as well as the most popular woodworking-software packages and books, as rated by the site's visitors.

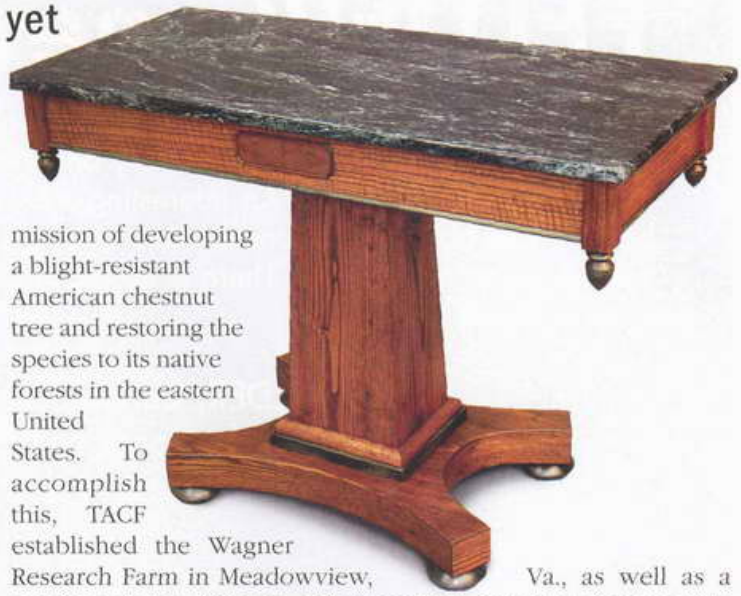
–Asa Christiana, senior editor



Photos, this page: Raju Bhandari

American chestnut not dead yet





An exhibit called "Fine Woodworks of American Chestnut: Restoring an Appalachian Tradition" was held in March to draw attention to its sponsor, The American Chestnut Foundation (TACF). The exhibit included only furniture and fine crafts made from native chestnut—just a few generations ago one of the country's premier hardwoods, before a blight left the species virtually extinct. All of the wood used by the more than 30 artisans in the exhibit was recycled from old barns, churches, furniture, and fence rails. The Grovewood Gallery in Asheville, N.C., provided the exhibit space at no charge, and more than 160 items sold at the show.

The nonprofit TACF was founded in 1983 with the mission of developing a blight-resistant American chestnut tree and restoring the species to its native forests in the eastern United States. To accomplish this, TACF established the Wagner Research Farm in Meadowview, Va., as well as a number of state chapters, where modern genetic techniques are used in a traditional backcross-breeding program. The essence of the program is to transfer the blight resistance of the Chinese chestnut to the American chestnut but not lose any of the American tree's characteristics.

"We are in the homestretch," said Phil Pritchard, development director. "Some of the trees from which the final selection will be made are already in the ground."

For more information on TACF, call 828-281-0047 or go to www.acf.org. —*A.C.*

Chestnut, past and future. *To draw attention to its mission—to restore chestnut trees to the eastern United States—The American Chestnut Foundation sponsored a large exhibit this year at The Grovewood Gallery in Asheville, N.C., featuring only items made of chestnut. These included Michael Brown's Contemporary Windsor and Dan Mosheim's chestnut table.*

My bad arm forced a good decision

It was a typical day on the Big Dig, Boston's $15-billion effort to bore a central traffic artery through the city. Working as a carpenter, I was building forms when I tripped and hurt my shoulder. I didn't think much of it at the time, but it turned out that I needed surgery. A year later, after two surgeries and rigorous physical therapy, my doctor broke the bad news to me: I would have to give up carpentry for good. Luckily for me, my doctor had heard of Boston's North Bennet Street School and its furniture-making program. I was willing to try anything, so I checked it out.

Construction on a different scale. *An injury on Boston's Big Dig (above) led construction worker Tom MacDonald to North Bennet Street School, where he built a Salem blockfront secretary (left) and launched a successful career.*

I was blown away by what I saw at the school, and I enrolled. Although at first I was intimidated by a classroom full of successful people from all walks of life (I was used to big construction sites full of wild guys), I found my second career at North Bennet.

The shoulder required cortisone shots and a third operation, but I made eight pieces (five more than required) over my two years at the school, one a Salem blockfront secretary, which took me 1,000 hours to complete and was featured on *Home Again*, Bob Vila's syndicated television show. I have sold all eight pieces.

—*Tom MacDonald*

Photos, this page: Michael Brown (top left); Dan Mosheim (top right); Tom MacDonald (bottom right); Mel Marchand, courtesy of BobVila.com (bottom left)

New 10-in. tablesaw from Wilke is well designed

Wilke Machinery Co. recently introduced the Bridgewood BW-10LTS, a left-tilting 10-in. cabinet saw. This saw is refined to an exceptional degree and rivals the quality of the Delta Unisaw and the Powermatic 66 tablesaws.

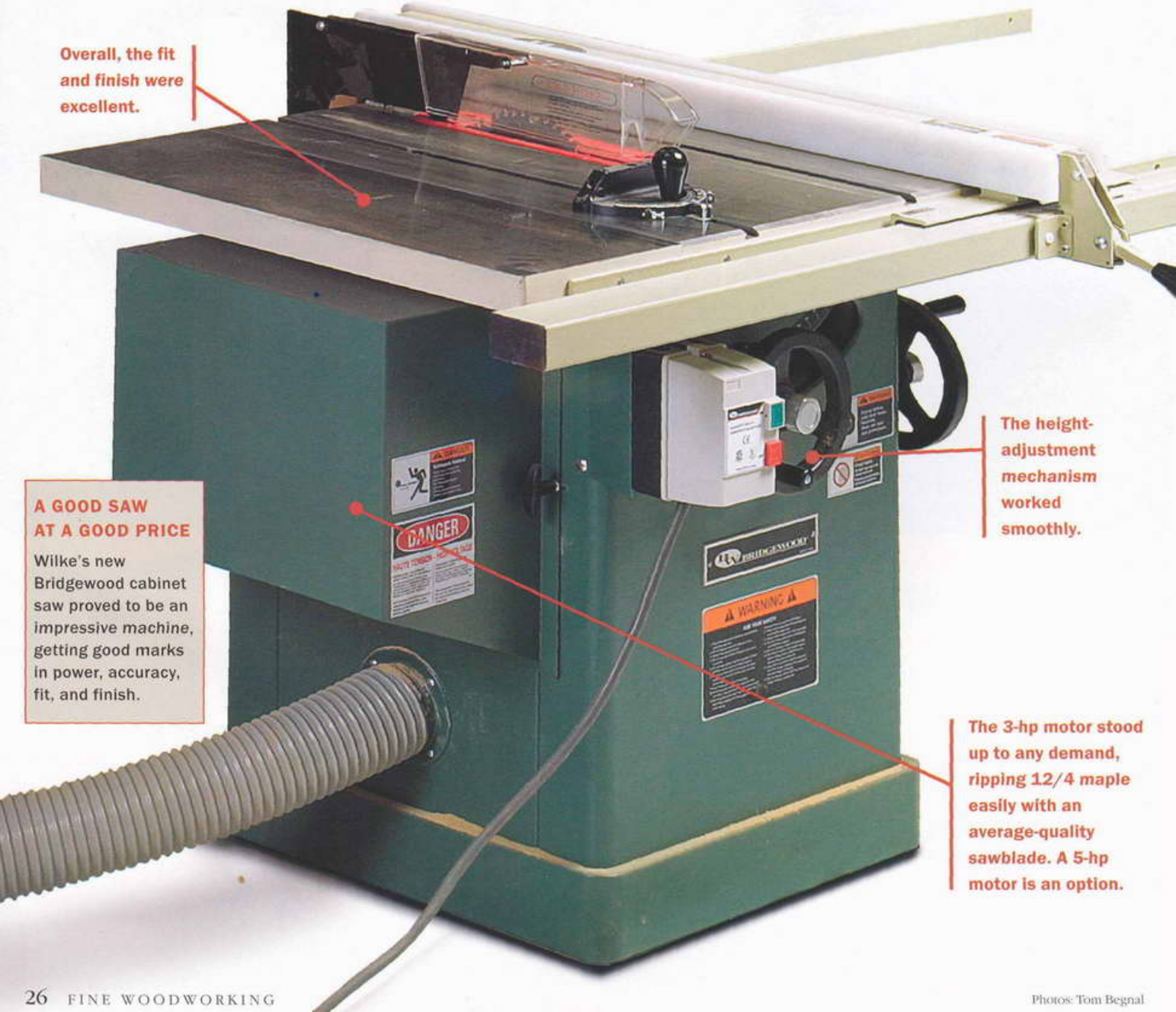
Even up close, the fit and finish were impressive. The top and the two cast-iron extension tables had an even satin finish. The cabinet and internal castings looked to be well made. Only a few edges were a little sharp, and one extension table was slightly rough underneath.

Several important parts were measured, and all of the results were excellent. The top and the extension tables, measured from front to back, were only mildly crowned and certainly within acceptable range—one wing was out by 0.003 in., the other by 0.002 in., and the top by less than 0.002 in. Arbor runout was less than 0.001 in. The tablesaw's miter-gauge slots were parallel to the blade but out of true by about 0.008 in. from the front to the back of the top, although this was easily corrected by adjusting the miter gauge.

The height-adjustment mechanism worked as smooth as silk. On the other hand, the tilt mechanism was noticeably rough. The problem seemed to be related to some roughness in the threads.

Some small details indicate that the designers were thinking. Flats on the arbor shaft let you use two wrenches to tighten or loosen the arbor nut. The pulley is a three-belt design, and a slanted floor in the cabinet directs dust toward the collection port.

The saw came with several unremarkable accessories: a 50-tooth blade, a stamped-



A GOOD SAW AT A GOOD PRICE

Wilke's new Bridgewood cabinet saw proved to be an impressive machine, getting good marks in power, accuracy, fit, and finish.

Photos: Tom Begnal

steel arbor-nut wrench, a blade guard with splitter, and a small miter gauge.

Vibration was very low. Indeed, my pencil stayed put on the extension table while the tablesaw was running. On my saw, it walks toward the edge and ends up falling to the floor.

The Bridgewood BW-10LTS sells for about $1,400. For more information, contact Wilke Machinery Co. (800-235-2100; www.wilkemach.com).

—Strother Purdy makes custom furniture in Bridgewater, Conn.

The rip fence is a high-quality, 55-in. Biesemeyer clone. The plastic faces were flat and straight.

A better dust mask

A new respirator from Moldex, model EZ-ON N95, has some features I like a lot. It fits my face better than any other lightweight dust mask I've worn; it doesn't cause my safety glasses to fog; it's easy to put on and take off; and it's comfortable.

Elongated and pleated sides (Moldex calls them "Flexwings") that extend along the side of the face help contribute to the good fit. And because of that good fit, exhaled air exhausts through the filter and the exhalation valve rather than leaking out at the bridge of the nose to fog safety glasses. The easy-on, easy-off feature comes courtesy of a plastic harness attached to a substantial strap. And the mask's light weight contributes to its comfort.

A dust mask that won't fog your glasses. *A new mask from Moldex is comfortable and easy to put on and take off.*

The Moldex EZ-ON N95 mask is approved by the National Institute for Occupational Safety and Health (NIOSH). It's available either with or without the exhalation valve; I tested one with the valve. You can choose from two sizes; small/medium and large. Currently, a bag of 10 masks with valves sells for $26.65. For more information, contact Gempler's (800-382-8473; www.gemplers.com).

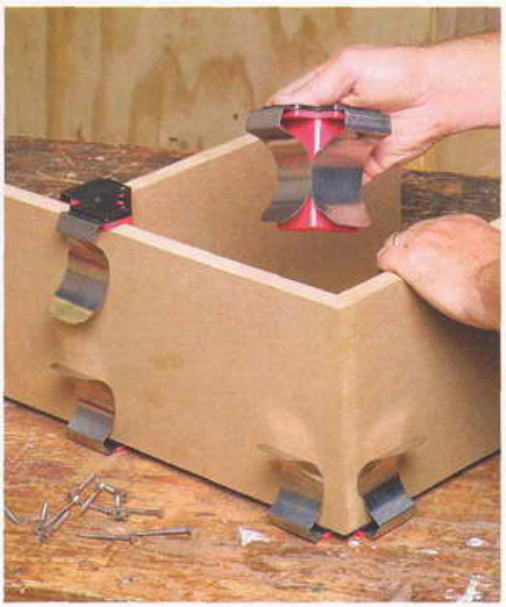
—Tom Begnal is an associate editor.

Handy positioning clamps from Jet

Most recreational woodworkers spend time alone in the shop, so it's not necessarily easy to find an extra hand when one is needed. Realizing that help isn't always going to be right around the corner, Jet now markets a small, easy-to-use clamp that's perfect for temporarily butting together a pair of boards and holding them in place at a right angle until clamps or screws can be added.

Called a jointer-clamp by Jet, it has spring-steel jaws that allow you to push the clamp into place with one hand. The clamp pulls off just as easily. It works with any material up to ¾ in. thick.

The jointer-clamps sell for about $20 a pair and are available from Woodworker's Warehouse (800-877-7899; www.woodworkerswarehouse.com). *—T.B.*



Clever clamps lend a hand. *Slip one of these clamps onto a pair of butted boards, and the boards stay put until you're ready to add a clamp or drive a screw.*

New shop vacuums from Alto Wap and Bosch

Editor's note: Our May/June 2003 issue (FWW #163) featured a review by Roland Johnson of 13 shop vacuums. At that time, however, two new shop vacuums–the Alto Wap ATTIX AS/E and the Bosch 3931–were not yet available for testing. The two vacuums have since arrived in our shop, where the author recently gave them a closer look.

ALTO WAP ATTIX AS/E

BOSCH 3931

Alto Wap ATTIX AS/E

Alto Wap's newest shop vacuum is a compact machine with a 1,000w (about 8.5 amps) motor that offers a reasonable amount of power. The machine also is lightweight and easy to move, making it ideal for small cleanup chores and light dust collection.

A built-in electrical outlet has an automatic starting feature, called auto start, that's handy if you connect the vacuum hose to a power-sanding tool, such as a belt sander.

Variable-suction control lets you adjust the suction for peak efficiency. Also, with the push of a button, the vacuum sends a blast of air backward through the pleated filter to dislodge built-up dust and debris.

The ATTIX AS/E sells for about $475. For more details, contact Alto Wap toll-free (877-366-2586; www.alto-online.com).

Bosch 3931

The two most important criteria for any shop vacuum destined for use in a woodshop are (1) plenty of power to suck up lots of sawdust and (2) efficient filters, so the collected sawdust does not escape into the shop air. Bosch has entered the shop-vacuum market with a machine that promises both.

On the new Bosch 3931, an 11.1-amp motor provides good suction. When used with the optional 2¼-in.-dia. hose, the Bosch did a good job collecting chips from a benchtop thickness planer.

The main filters are positioned above the sawdust in the upper housing. To ensure that the motor is cooled only by clean air, the filter system also includes a set of secondary filters behind the main filters. There's also a clever feature called Pulse-Clean, which gives the filters a vigorous electronic shaking to help dislodge accumulated sawdust and restore suction power.

The Bosch also has an outlet with an auto-start feature. With a maximum rating of 7.2 amps, the outlet should be able to handle most sanders and smaller-horsepower routers. Bosch has eliminated the annoying blast of exhaust air by diffusing the air around the motor housing.

The 3931 sells for about $440. For more information, contact Bosch toll-free (877-267-2499; www.boschtools.com).

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

MODEL	Alto Wap ATTIX AS/E	Bosch 3931
COST	$475	$440
AMPS	8.5	11.1
CAPACITY	8 gal.	11.35 gal.
AUTO START	Yes	Yes
VARIABLE-SPEED MOTOR	Yes	No
NOISE LEVEL	69, 72 db.*	74 db.
WEIGHT	22 lb.	42 lb.
HEIGHT (ON BASE)	23 in.	24 in. (not including handle)
EXHAUST	Diffused	Diffused
COMMENTS	Compact, quiet, and easy to move	Good filter system

*Decibel readings were taken at low and maximum power.

Smoothing plane with a classic pedigree

Late in the 19th century, British toolmakers Alexander Mathieson, Thomas Norris, and Stewart Spiers each was producing some of the most beautiful and effective planes ever made. The planes featured steel bodies, dense rosewood infill, and massive irons. Fortunately, that plane-making tradition remains in England, as toolmaker Ray Iles is making the most handsome of all those early designs: the Norris A5 coffin-sided smoothing plane.

The A5 is the tool to use when you want a final polished-wood surface. And the beautiful coffin shape maximizes the width of cut with less sole drag. Iles builds the plane with plenty of mass, which helps support the thick blade. Norris's original A5 planes were made using dovetails to join the steel sides and the sole. Iles welds his together for a stronger body that costs less to make.

The infill forms a simple front bun and a rear D-shaped handle. The handle might seem small, but it is ample enough for three fingers, with a fourth stretched along the side of the plane. True to the original, the Iles plane has an adjuster that sets both the depth of cut and the lateral alignment, making the plane easy to use.

I tested the A5 plane on a board with some curly grain. After first planing with the grain, I reversed the board to see how the plane cut against the grain. At the end of the test, both sides of the board had smooth surfaces.

New version of an old classic. *English plane maker Ray Iles now makes the A5, a handplane originally produced in the late 19th century.*

It seemed to me, however, that a slightly narrower throat would improve the surface. So, to create the effect of a narrower throat, I shimmed behind the iron with a thin piece of note card. As a result, the surface looked even better. The current crop of A5s, I'm told by the manufacturer, all come with throats that are a bit narrower.

The Iles A5 smoothing plane sells for $650. It can be ordered from the Museum of American Tools (800-426-4613; www.toolsforworkingwood.com).

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

How to Get Square, Stable Stock

For best results, rough-mill the wood, allow it to stabilize, then finish-mill

BY GARY ROGOWSKI

Take a piece of rough wood, fresh off the woodpile or lumber rack. Now transform that coarse stick into a square, flat piece of stock with parallel sides and ends, suitable for your latest project. It seems to take a sort of magic sometimes to make flat and smooth what starts out twisted and rough. The importance of this feat, however, cannot be overstated. If you lay a foundation of accuracy with your milling, then your joinery and assembly have a much better chance of going together smoothly and sweetly.

I am focusing here on milling rough lumber, as opposed to material already surfaced on two or four sides. When starting with rough lumber, you're not bound by the thicknesses that are commonly available in surfaced stock. Also, rough stock is less expensive. And there is no guarantee that surfaced material is truly flat or straight anyway. That leap of faith has gotten many a woodworker into trouble. So proper milling practices are important in any case.

Start with proper selection and storage

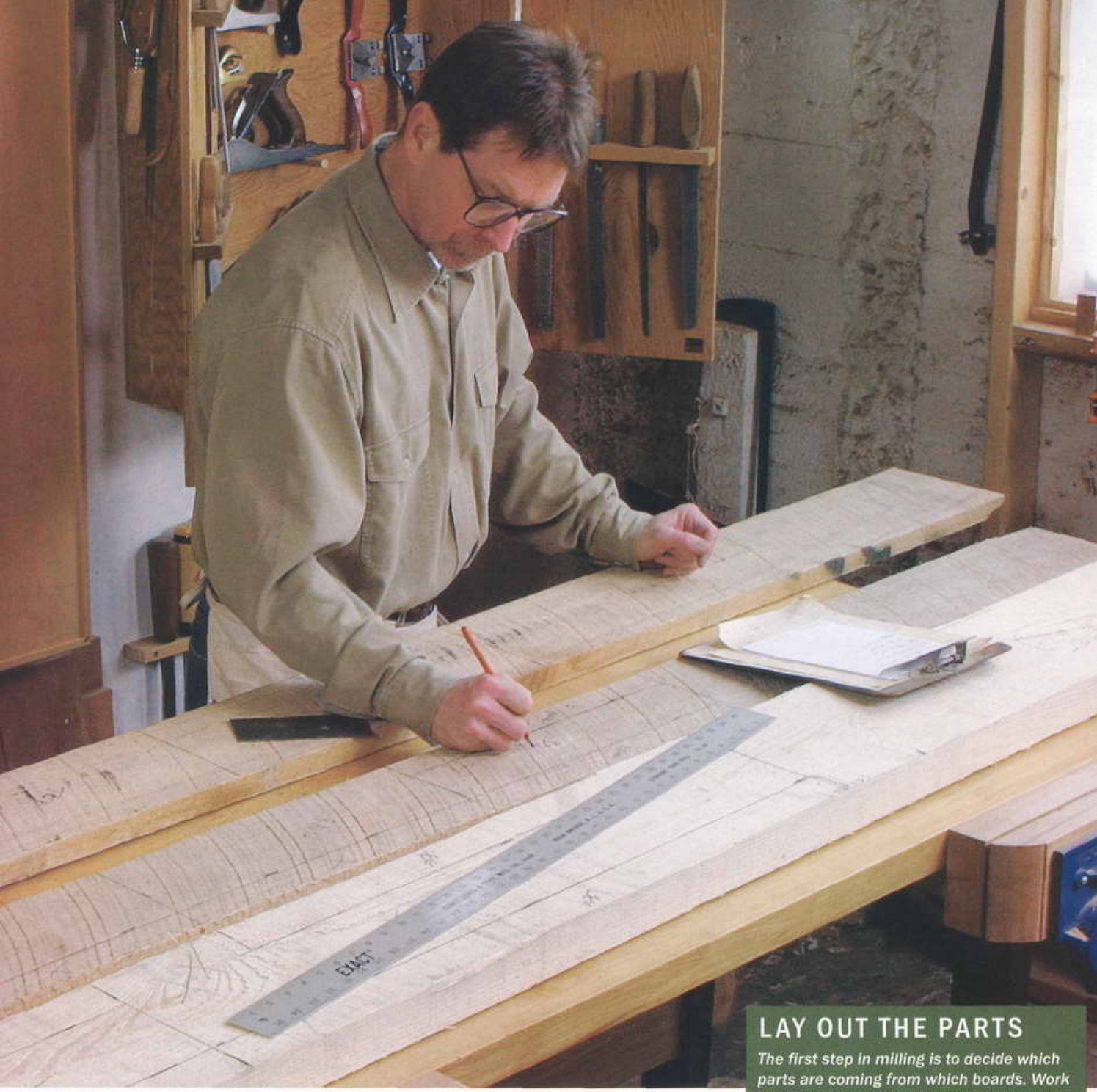
Wood is alive. It moves despite our best efforts to keep it flat and square. How can we mill it straight and flat and then keep it so? Start by learning to read lumber to get a better yield with fewer defects. Learn to recognize end and surface checking, cupping across the width, bowing along the length and twisted sticks. The first step toward having square, flat, stable stock is to leave bad boards at the lumberyard.

Wood movement is dependent on the difference in moisture content from the outside to the inside of the board, so where your lumber is stored along the way also becomes important. Consider the relative humidity of the lumber dealer's facility and your work area. For example, if the stock is kiln-dried but went from outside storage to your shop, you may need to let it acclimate for a few weeks before milling it.

Rough-mill to accommodate movement

As lumber dries in a kiln or elsewhere, different areas can dry at different rates, and internal stresses can develop that cause the board to move. By the time you get it, the board probably has stabilized, with its internal stresses in balance for the moment. However, when you cut the board into pieces or remove material from the outside, the balance of forces can be dis-

Photos: Asa Christiana



LAY OUT THE PARTS

The first step in milling is to decide which parts are coming from which boards. Work from a cut list and measure from an end that is freshly cut and free of defects.

turbed, causing the board to crook, twist, bow, or cup.

In the rough-milling stage, cut the boards a bit oversize and then wait for the stresses to work themselves out again. This may seem like piling more work onto an already big job, but it actually saves time and material. Rough milling won't stop wood from moving, but it leaves enough material to accommodate the movement. If the stock does warp or twist later, you will make it flat and square again when bringing it down to its final dimensions. You'll lose fewer boards this way and end up with flatter, more stable stock.

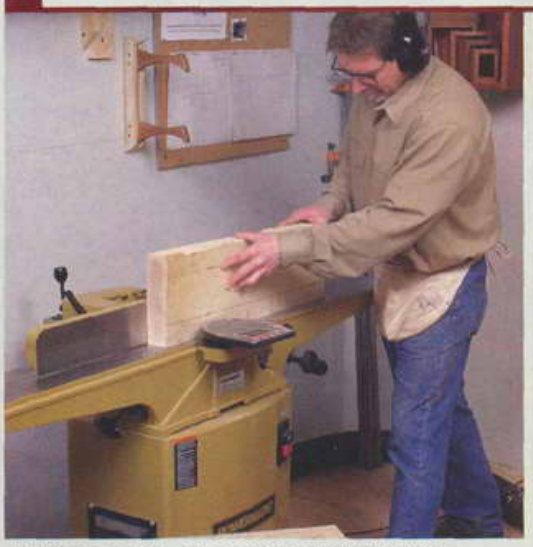
Using your power tools effectively also affects your millwork. Each of the tools in your shop is designed for a different part of the milling process.

Length, then width, then thickness— Start by crosscutting the stock by ½ in. to 1 in. over in length. Look for end checks and honeycomb checks inside the board after you make your first cut. End checks occur as a board dries out faster near its ends than it does in the middle. The wood cracks, or checks, to relieve this stress. It's very common and no cause for alarm. Plan on losing from 1 in. to 1 ft. of material at each end of a board. Look for checks in the end grain as you cut, but don't trust your eye. Take the offcut and tap it on the saw table or a bench. If the offcut cracks easily,

1 CROSSCUT OVERSIZE

Check for checking. *Take slices off each end of the board until the offcuts are sound. Test for cracks by striking the offcuts against the table. Then crosscut the parts ½ in. to 1 in. over in length.*

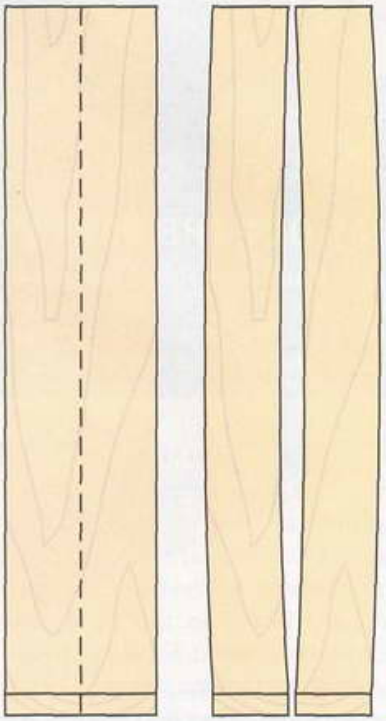
2 JOINT ONE EDGE, THEN RIP



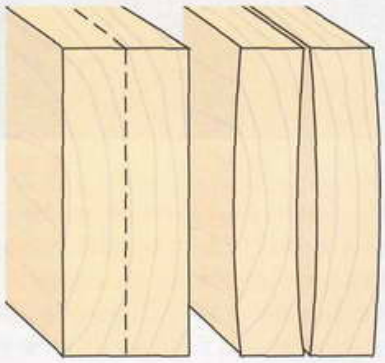
Joint one edge. *It's not important that the edge be square to a face; it just has to be straight and flat. Check grain orientation to get a smooth cut.*

Why rough-mill?

After a kiln-dried board is put into storage, different areas dry and move at different rates, causing internal stresses to develop. When you cut the board into pieces or remove material from the outside, the balance of forces can be disturbed, causing the board to bend or twist. Milling stock a bit oversize in all dimensions leaves enough material to allow you to bring the board back to flat and straight before it is cut to final dimensions. When ripped, lumber tends to go crooked; when resawn, lumber tends to cup or bow.



◀ **CROOK WHILE RIPPING**
When a board is divided into halves or even thirds, the new pieces tend to bend. Leave at least ⅛ in. extra width to allow for later straightening.



▲ **CUP WHILE RESAWING**
Resawing also disturbs the balance of internal stresses, causing the new pieces to cup across their width or bow along their length. Leave at least ⅛ in. extra in thickness so that you can flatten it later.

there is still some weakness there. Keep cutting until it doesn't snap easily.

Honeycomb checks are caused by a board drying too quickly on its outer surfaces. This "case-hardening" is often not visible on the surface but can riddle the interior of a board with checks, ruining it for anything but the fire pit. Other times the wood will relieve this stress with one large crack that runs the entire length of the 10-ft. board. Cut away the honeycombing when you find it.

Once the rough crosscutting is done, get your material roughed out to width. If a board is badly cupped across its width or length, running it over a jointer until it's flat can eat up a lot of wood. By ripping pieces to rough width, you work on narrower pieces and can get greater yield. You also can rough out around defects in a board, like knots, sapwood, or checks.

First, joint one edge on the jointer or with a handplane. Just get it flat; don't worry about its being square to any face just yet. When one edge is flat, rip the board ⅛ in. oversize in width on the bandsaw.

Bandsaw vs. tablesaw for ripping rough stock—A bandsaw is much safer than using a tablesaw for this ripcut, for a number of reasons: All of the cutting pressure is down into the table instead of at

Drawings: Michael Pekovich

3 FLATTEN ONE FACE AND RESAW

Rip to ⅛ in. over in width. *The bandsaw is a safer tool for ripping rough lumber than the tablesaw, which is prone to kickback. The bandsaw also wastes less material.*

Mill to rough thickness, if necessary. *If the stock must come down more than ¼ in. in thickness, flatten one face on the jointer (left), then resaw or plane to ⅛ in. over in thickness (right).*

you; there is a smaller kerf and therefore less waste; and if the board closes up on the cut, there is no danger of kickback. (I do not want to recommend that you rough-rip stock on the tablesaw, unless you get a note from your mother.)

Support both ends of the board on a runoff table or adjustable stand. Use a fence on the bandsaw and adjust for blade drift if your saw requires this to make a straight cut. Or just snap a chalkline on the board and make this cut freehand.

If your stock needs to come down more than ¼ in. in thickness, now's the time to do it. Joint one face flat on the jointer and then square an edge to that face before resawing the stock ⅛ in. oversize on the bandsaw. If your stock is close enough in thickness, rough milling is complete.

Now stack the pieces and wait—Next, you must sticker the boards so that air can move around them freely. Don't lay the boards flat on your bench or shop floor and expect them to dry any further. And avoid concrete floors, where boards may in fact absorb moisture and move some. Make ¾-in.-square by 12-in.-long stickers out of straight hardwood. The pile of stickers I made for my shop some 20 years ago still do their intended job very well.

Let the wood sit for a week or so, de-

4 STACK THE PARTS ON STICKERS

Stack it and wait. *Layer parts between stickers to let air circulate. Allow a week or more for the parts to move slightly and stabilize.*

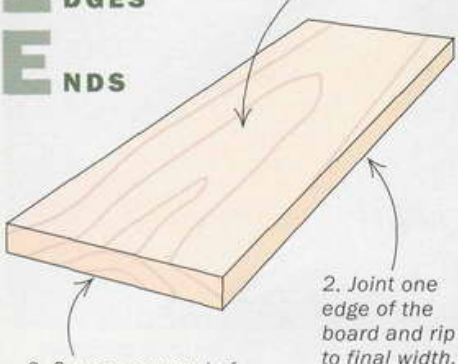
THE "FEE" SYSTEM

Follow this sequence for final milling.

F ACES

E DGES

E NDS



1 JOINT AND PLANE THE FACES

Joint the first face. *Start the finish-milling process by jointing one face flat. Use push sticks or pads to hold down the stock, concentrating pressure just past the cutterhead.*

With the jointed side facedown, run the boards through the planer. *Once both faces are flat, alternate faces to take off similar amounts from each side until the finished dimension is reached.*

pending upon how late your project is running, and allow it to finish moving before milling it to final dimensions.

Use the FEE system for final milling

When finish-milling, use the FEE system: Work the Faces, then the Edges, and finally the Ends. This order is exactly the opposite of that for rough-milling.

All of the final milling starts with the jointer. (For a better explanation of how the jointer and planer do their distinctly different jobs, see *FWW* #160, pp. 64-67.) Simply put, you must use the jointer first to flatten one face. Then run this straight, flat side facedown in the planer to create a parallel, flat face on the top side of the board. If you flip over the board and joint the other side, there is no guarantee the faces will be parallel.

If the board is cupped across its face, run the cupped side down on the jointer table because the board will reference off its two outer edges and not rock. Take off small amounts of wood with each pass until you eventually flatten the entire face. Then mark the unjointed face with an X. Bowing along a board is just like cup, only it's along the length of the lumber. Again, it's easier to run the concave side down to the table and the humped side up.

For any of these cuts, check the grain direction of the board before passing it over the jointer. The grain should be running down and away from the front end of the board. This will give you a smooth cut with little or no tearout. Also, slow down the feed rate for the best possible results.

> **Ripping to finish width is the first time during the entire milling process that the tablesaw has been turned on, and here only to take a sliver off one edge.**

A stumbling block you may encounter here is stock that is too wide for the jointer. There are many ways around this but none of them as convenient as having a wide jointer. You can level the first surface with a handplane, or use a sled or leveling strips to turn your planer into a jointer (see *FWW* #145, pp. 90-91). You may have to rip your boards to the width of the jointer, then reglue them after milling (see *FWW* #163, pp. 96-98, for other solutions to this common problem).

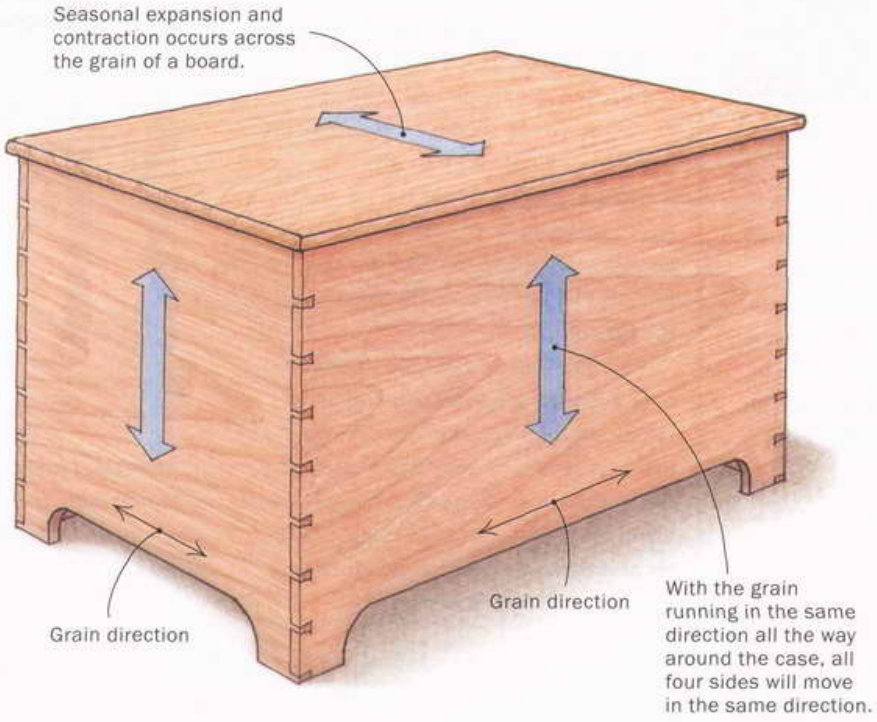
Next, run the boards through the planer, jointed side down. If you get considerable tearout on a face, dampen a rag and lightly wet down the surface of the wood before planing. This will soften the fibers and tone down the tearout. Also, wax your planer tables to help the machine feed the stock. A runoff table also is handy: It will catch boards for you and minimize snipe, which is the tendency of a planer to overcut at the end of a pass.

After the faces are flat and parallel, work on the edges. Check that the jointer fence is square to the outfeed table just beyond the cutterhead. This is the same point where your hand pressure should concentrate once the cut is established. Check for bowing along each board's edge and run the concave edge down on the jointer table. Arrange the grain direction for the best cut, and mark the squared edge and face after cutting.

The last edge needs to be cut parallel to the newly jointed edge. Again, you cannot just flip over this board and joint the second edge; it will not end up parallel to the first. Use the tablesaw to trim this second edge cleanly. Notice that this is the first time during the entire milling process that

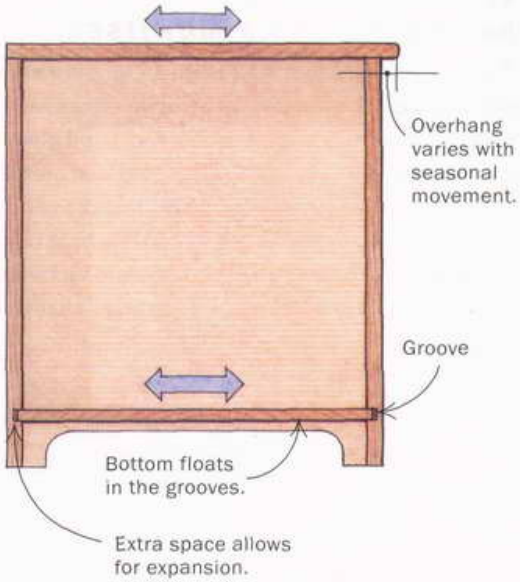
SLAB CONSTRUCTION ALLOWS ENTIRE PIECE TO MOVE

A blanket chest, in which the grain runs in a band around the entire box, is an example of slab construction. The depth and width of the chest remain constant, because the wood does not move lengthwise. But the wood does change in height in response to changes in humidity. The blanket chest gets slightly taller in summer and shorter in winter. Because movement in the top is from front to back, the hasps of the lock don't always fit. The solution is to use quartersawn wood for the top, file the hasp parts to increase clearance, and use a good sealing finish.



BOTTOM FLOATS IN GROOVES

Grooves are cut into the four sides of the chest to hold the bottom. The bottom is sized so that there's enough space in the grooves to allow for seasonal movement.

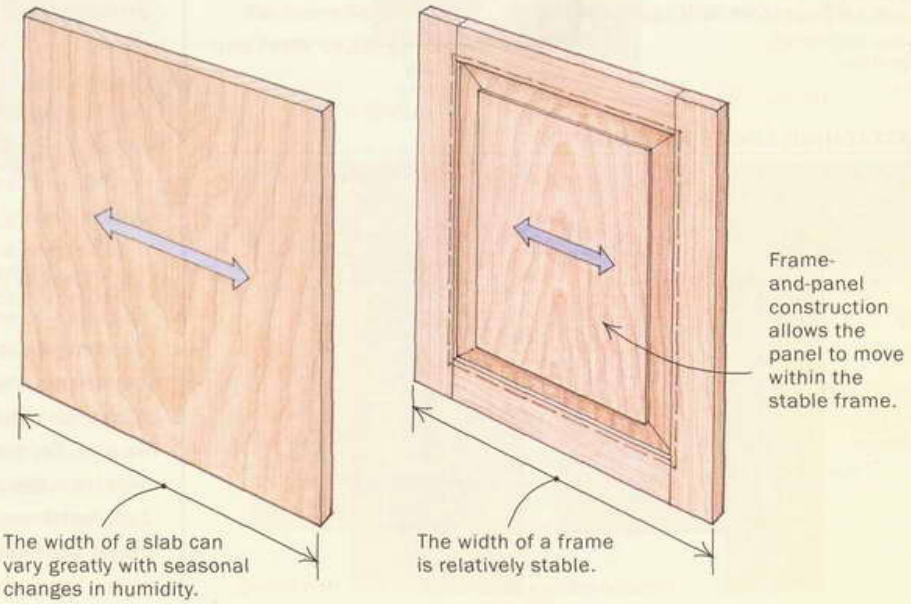


FRAME-AND-PANEL CONSTRUCTION ISOLATES MOVEMENT

Your approach to controlling wood movement will depend a lot on whether the piece is made using slab or frame-and-panel construction.

Slab construction is typical in chests, tabletops, and headboards and consists of single, wide boards or narrow boards glued up edge to edge. With solid-wood slabs, you have to worry about cross-grain movement, which can be significant with large widths.

Frame-and-panel construction, on the other hand, minimizes the effects of wood movement by isolating large areas (the panel) and restricting movement to relatively small areas (the frame). The panel is set into grooves of the appropriate depth, but it is not glued in place. Instead, this "floating" panel is free to expand and contract within the frame.



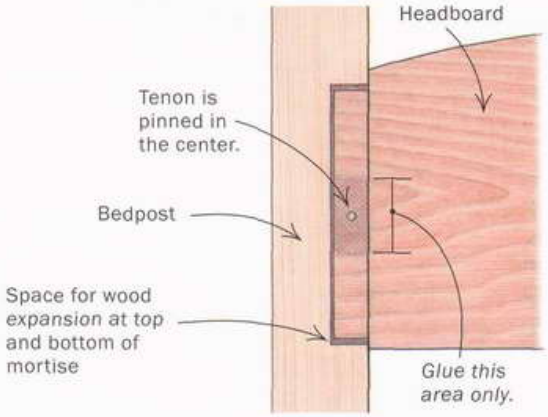
Drawings: Vince Babak

BEDS

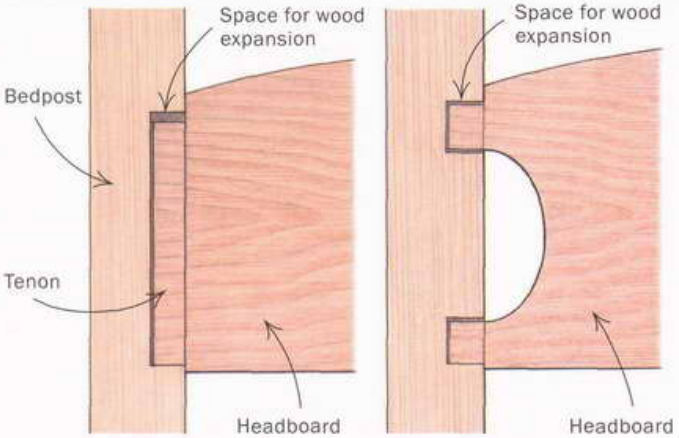
SLAB HEADBOARDS NEED EXTRALONG MORTISES

A slab headboard that's 12 in. to 14 in. wide may move up to ¼ in., which means the mortise into which it fits needs to be that much wider. If the headboard is to be pinned and glued in the middle (fixed), leave an ⅛-in. space at the top and bottom of the mortise. But the headboards on some beds, such as pencil-posts, sit loosely in the mortises on the posts. The unit is held together by bolts in the rails. Extratall headboards (as in old Victorian styles or sleigh beds) require extradeep grooves or large shoulders and mortises.

ATTACHING A FIXED HEADBOARD



ATTACHING LOOSE HEADBOARDS



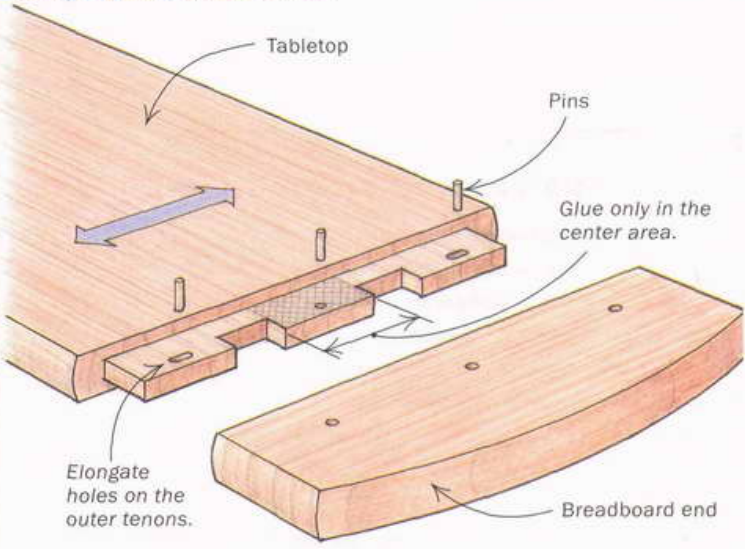
TABLES

BREADBOARD CONSTRUCTION KEEPS TABLETOPS FLAT

Breadboard ends are added to tabletops to help prevent the top from warping or cupping. But they must be attached so as to allow the top to expand and contract.

The preferred method for making breadboards is a single tongue with cutouts. For a stronger joint, parts of the tongue are cut out to within ¼ in. to ½ in. of the shoulder, and the corresponding areas of the mortise are left in place to hold the weak faces of the breadboard together.

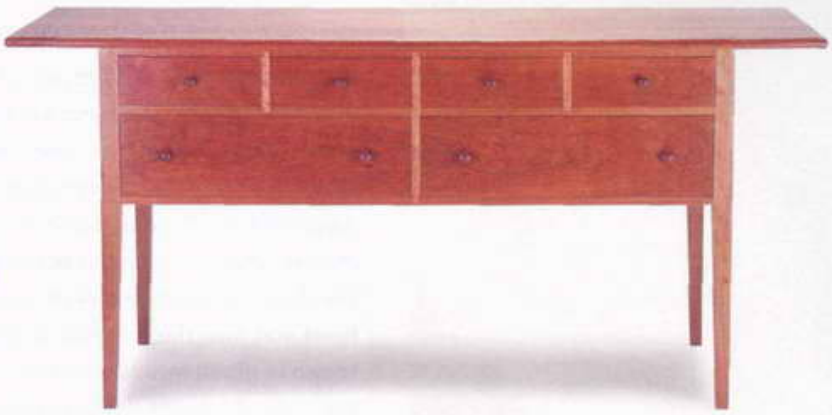
The trickiest part of construction is pinning and gluing the breadboard ends. I like to plane a slight (1/16-in.) concave bow into the breadboard to keep the ends tight against the table. I make the mortise longer than the tongue, center the breadboard, and clamp both ends onto the table. I drill a ⅜-in.-dia. hole in the center and then one (for narrow tabletops) or two holes (for wider ones) on either side of center.



I remove the breadboard end and scribe a line along the edge of the holes closest to the end. Next, I elongate all but the center holes with a ⅜-in. rat-tail file. The farther from center, the longer the oval. For very dry wood (6% moisture content or less), elongate away from the center to allow the top to expand. For wet wood (12% moisture content or more), elongate toward the center to allow for shrinkage. Do not file beyond the scribe lines; doing so will relieve the pressure holding the breadboard to the table shoulder.

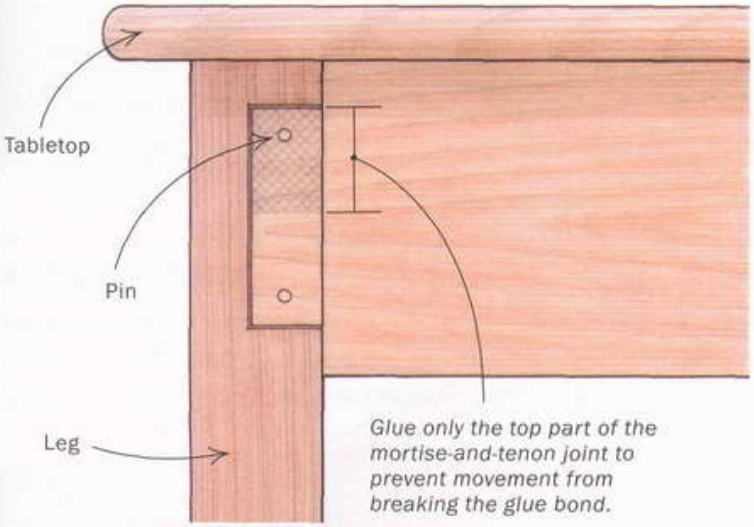
MORTISE-AND-TENONS THAT BREATHE

You may have have surmised that cross-grain gluing is a no-no. That is correct up to a point. Wood has a small amount of give to it, and aliphatic resin (yellow) glue is slightly elastic. So you can feel relatively safe making cross-grain joints, such as mortise-and-tenons, as long as the tenons aren't too wide. With cherry, for example, I limit cross-grain joints to a width of 5 in. As a precaution, I glue only the top half of the joint. Theoretically, the top of the rail will stay flush, and the bottom will move ever so slightly. That also should work for hardwoods that are less well-behaved than cherry.



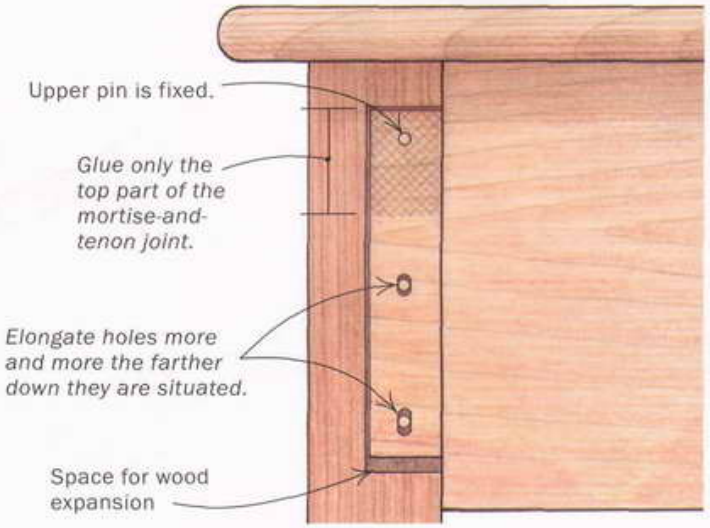
NARROW APRONS CAN BE GLUED AND PINNED

In general, tenons for aprons that are less than 5 in. wide can be glued and pinned, but glue only the top portion of the joint.



WIDE APRONS USE FLOATING PINS

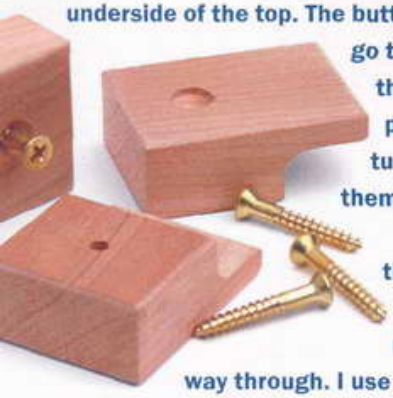
The tenon of a wide apron requires space at the bottom for expansion. A fixed pin at the top forces movement downward.



TABLETOPS NEED ROOM TO MOVE

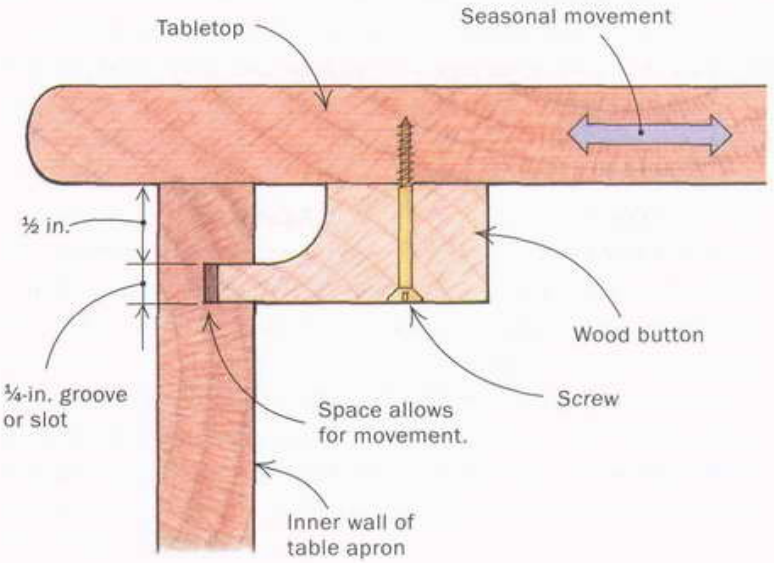
No matter how I go about attaching a top to its base, I anchor it firmly in the middle, ensuring that both halves are free to move equally. As a matter of course, I orient the grain in the long direction to minimize the amount of movement.

A good way to attach tops is to make ¼-in. grooves, or a series of ¼-in. slots, ½ in. below the inside top of the rail. I then install shopmade wood buttons, which grip the grooves and screw to the underside of the top. The buttons at the ends of the tabletop can go to the full depth of the groove, while the buttons along the sides must be placed according to the wood's moisture content and the time of year. (Fit them tighter in summer, looser in winter.)



For a table with rails substantially thicker than ¾ in., I countersink ½-in.-dia. holes from the bottom of the rails. Then I drill ¼-in. holes all the way through. I use a rat-tail file to elongate holes away from the center. Holes in the center of the end rails stay as they are. Because the wood movement is side to side, the ovals in the long rails run across the thickness of the rail. That's why I don't recommend this method for thin rails.

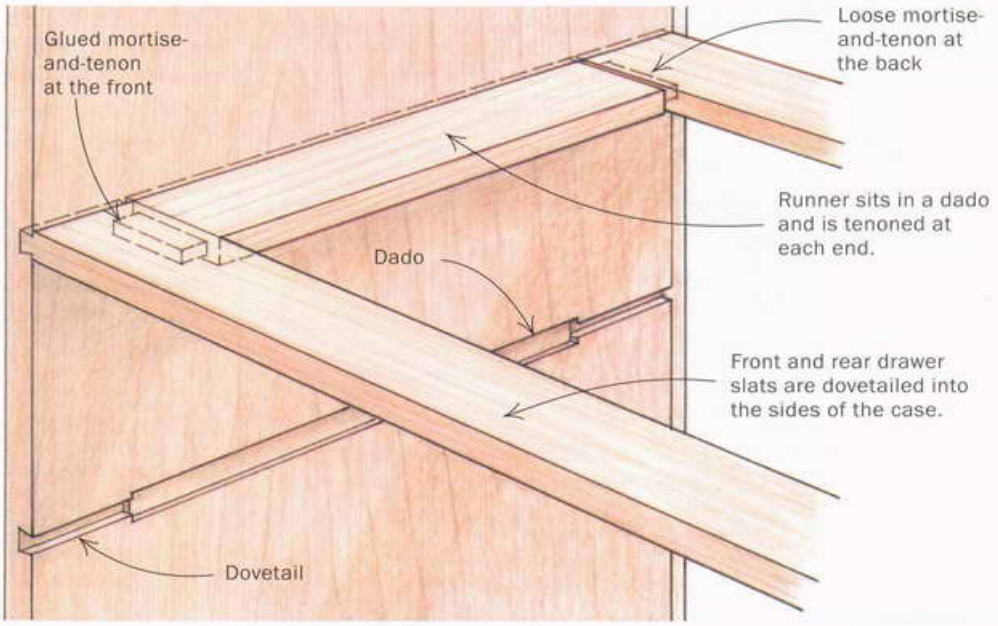
For more details on attaching tops, see *FWW* #62, pp. 58-59 and *FWW* #112, pp. 54-57.



Photo, this page (bottom left): Kelly J. Dunton

WEB FRAMES PROVIDE UNDETECTABLE MOVEMENT

Web frames provide lightweight, low-movement alternatives to solid drawer dividers. For frame-and-panel cases, web frames are merely four slats—mortised and tenoned and then glued. For slab-constructed cases, web frames become a bit more involved. I start with four slats. Two are dovetailed into the sides of the case; one slat in the front, and one in the back (flush with the back rabbet). Before gluing, I rout a dado to connect the front and back dovetails. Then I cut a mortise into each end of both dovetailed slats. I measure the length of the drawer runners and add the depth of the two mortises, minus 1/16 in. for dry wood, or minus 3/8 in. for damp wood. I glue the front slat into the dovetailed slots and then cut the tenons on the front-to-back runners. The front tenon is glued into the mortise, and the runner is forced into the connecting dado. The back slat is then glued into its dovetail slot, but the back mortise-and-tenon is not glued.



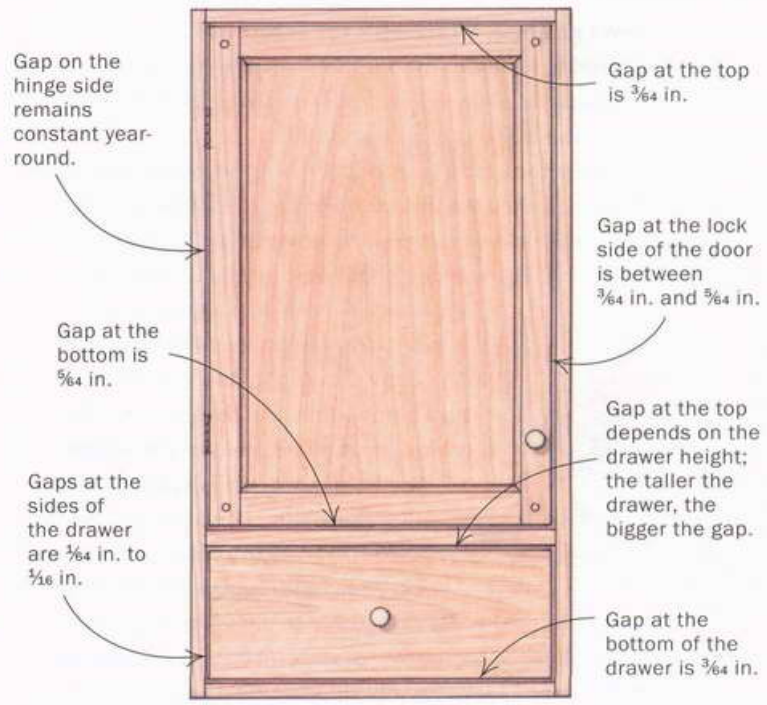
FITTING DOORS AND DRAWERS

The issue of wood movement in doors and drawers must be taken into account. Because they will change in width over the course of a year, I install slab doors only in narrower case openings using quartersawn wood and then stabilize the door with battens.

Frame-and-panel doors are much less of a headache. For quartersawn cherry, I aim for a gap at the lock side of the door that is between the thickness of a nickel (5/64 in.) and a dime (3/64 in.). The hinge-side gap is constant year-round; the top gap is a dime fit; and the bottom gap is a nickel fit.

Fitting drawers is bit more involved. Again, I prefer to use quartersawn stock to minimize wood movement. I start by making drawers the same size as the opening, side to side. When assembled, I trim them to fit, with a 1/64-in. (minimum) to 1/16-in. (maximum) total side clearance.

The top-to-bottom dimension is another story. The opening is constant, but the drawer front changes in height. I also make my front about 1/32 in. narrower than the sides by planing that amount off the bottom (after cutting the grooves for the drawer bottom).

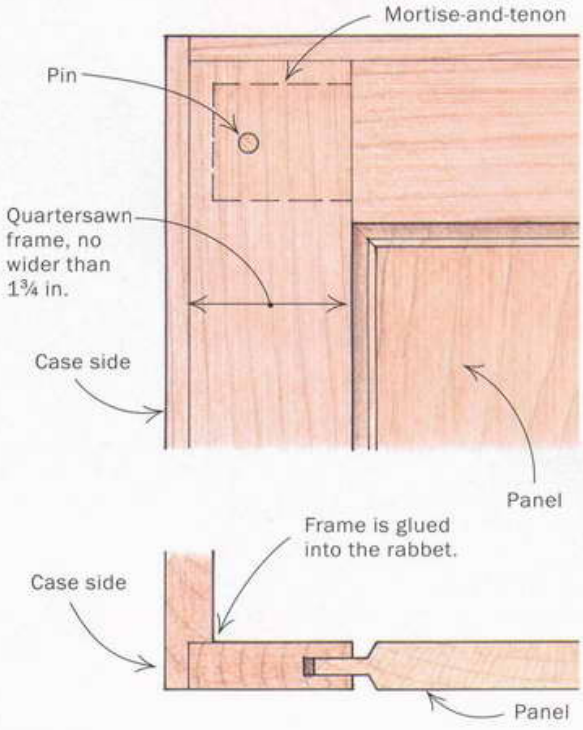


Photo, this page: Michael Pekovich

A FRAME-AND-PANEL BACK ACCOMMODATES MOVEMENT

Building high-end furniture and having a preference for solid wood, I make my backs as frame-and-panel units, set into rabbets and glued into place. This method creates a totally sealed back, which allows for movement yet provides racking resistance.

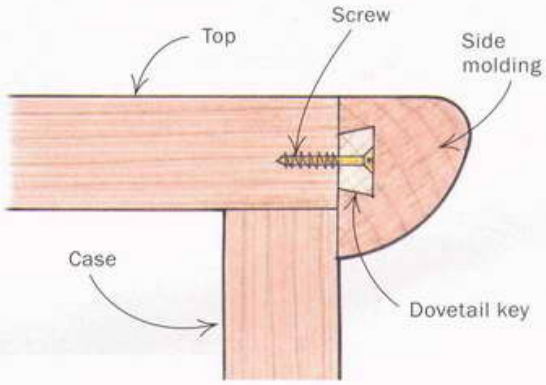
The success of this method depends on the width and grain orientation of the outside frame members. Because the frame is glued into the rabbets, any excess wood movement will break out the lips of the side and top rabbets. I have determined that by using quartersawn cherry no wider than 1¾ in. for the sides and top of the frame members, there is enough give in the wood to accommodate any potential movement. Less well-behaved woods require correspondingly narrower stock. In any event, the stock must be quartersawn.

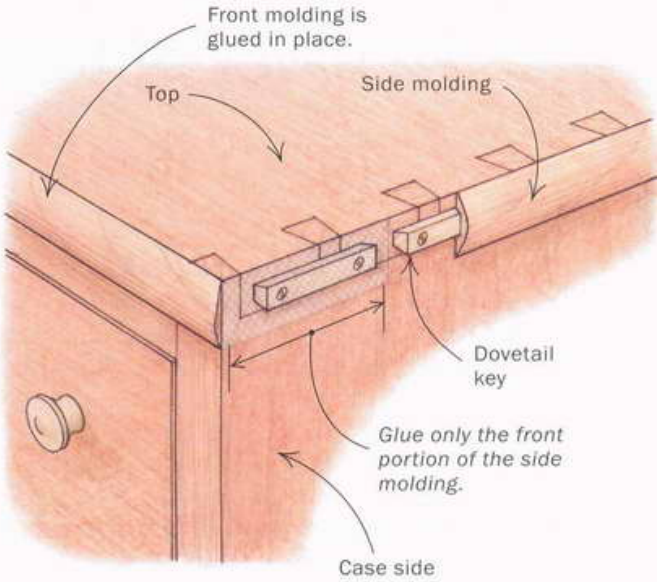


SIDE MOLDINGS THAT HOLD

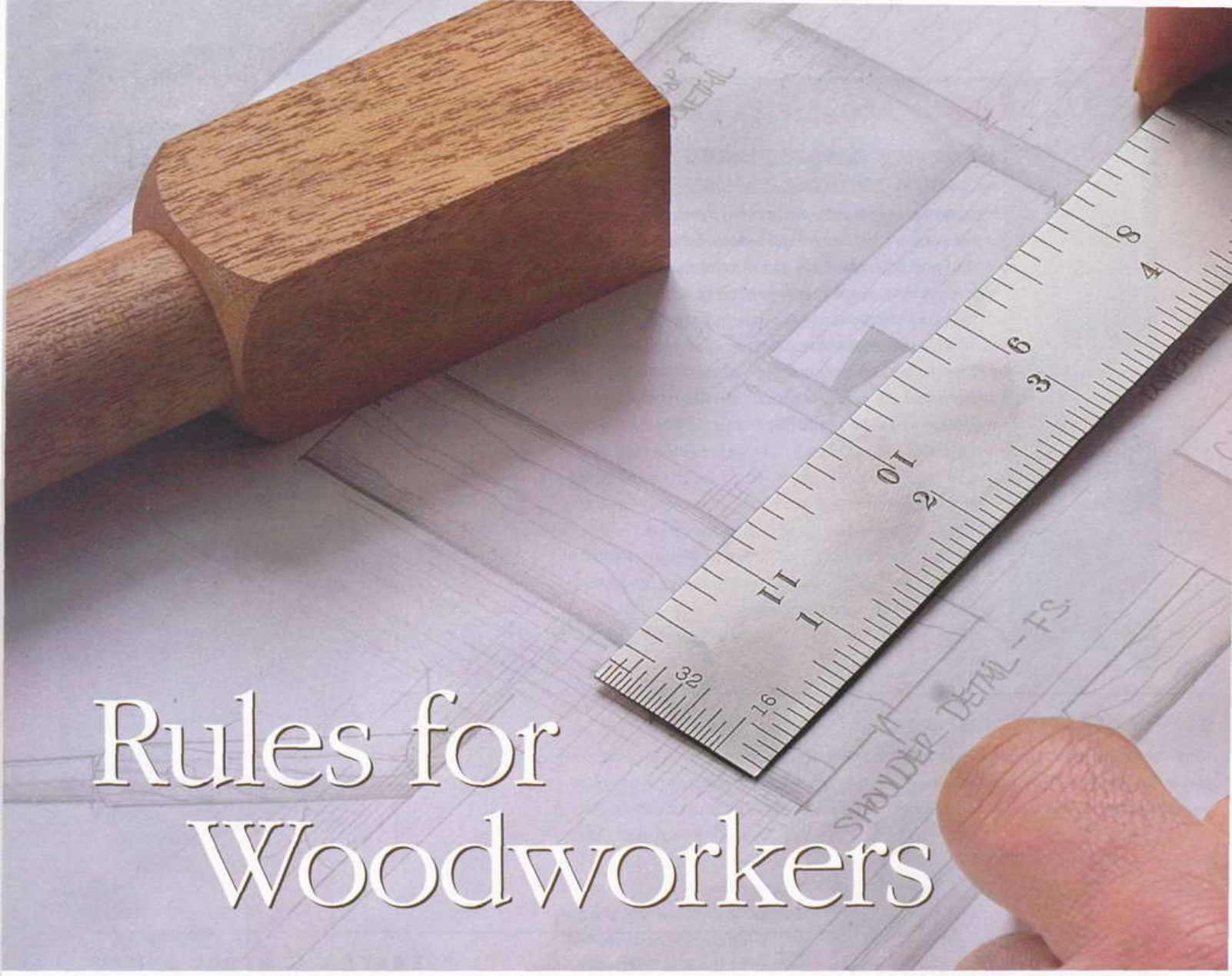
Most antiques that I've looked at have the side molding glued (and/or screwed) at the miter and nailed the rest of the way back. As the case side moves over the years, the nail holes widen and the nails lose their grip. The long-lasting solution is to use dovetailed keys and slots. I cut my molding and miter the corners to fit. The side molding receives a dovetail slot that runs its full length, in the meatiest portion of the molding, not necessarily its center.

To locate the dovetail keys, I hold the molding in position, then make knife marks on the case side at the top and bottom of the slot, at both the forward miter and at the back. I connect these tick marks, then cut a dovetail key the length of the cabinet side. Ideally, you want it to be 0.003 in. to 0.005 in. thinner than the depth of the slot to draw the molding tight. Then I mark the strip into five or six equal parts. Into each segment I drill and countersink two holes to accept #4 flathead screws, 1 in. apart. Between these holes, I drill for a 20-ga. brad, apply a drop of glue around the underside of the brad hole, and position the strip between scribe lines. I nail the brads, then sink the screws. Once the long length of the dovetail key has been installed, I chisel out a ⅜-in. section at each pencil mark, leaving five or six perfectly aligned dovetail keys.





Photo, this page (top): Michael Pekovich



Rules for Woodworkers

A survey of tools for making precise measurements

BY MARIO RODRIGUEZ

In the early stages of a project, preliminary measuring can be performed quickly and casually. Cutting large sheet goods or long boards to manageable dimensions doesn't require great accuracy. But as the parts are cut to final dimensions and joinery begins, even careful measuring with a tape measure will not provide the accuracy required for smack-dab machine setups or snug-fitting joints. At this stage a woodworker will benefit from the precision obtained from a ruler.

Basic shop rulers (the words rule and ruler are interchangeable and both in widespread use) are a varied group of short (usually 6 in. or 12 in.) strips of steel, available in different thicknesses and widths, engraved with clear, contrasting markings. Their compact size and the clarity of the markings make this group of specialized layout tools indispensable.

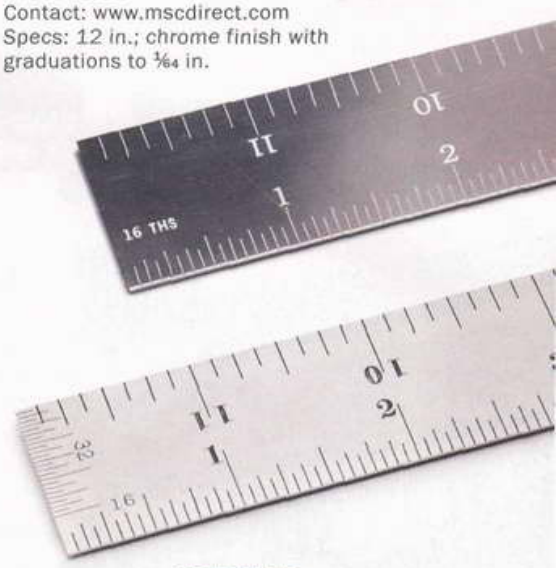
Besides the standard ruler design, numerous variations have been invented: There are rulers marked with perforations that accept a sharp pencil point, rulers that are triangular in section for rigidity, rulers that are hooked at one end for better registration with the work, and rulers that have a bend down the middle to al-

Flat rulers

Available in 6-in. and 12-in. versions, a flat ruler with clear markings and a nonreflective surface places less strain on the eyes when you're doing close-up, detailed work.

A cutting edge. *Steel rulers make excellent straightedges for cutting veneer. Thicker rulers work best because they provide a solid edge to guide the knife.*

PEC TOOLS
Model: 402-012 EZ
Price: $9.89
Contact: www.mscdirect.com
Specs: 12 in.; chrome finish with graduations to 1/64 in.



STARRETT
Model: C 304SRE-12
Price: $31.50
Contact: www.starrett.com
Specs: 12 in.; satin finish with graduations to 1/64 in.

low them to measure adjacent sides. I used each type of ruler to discover their strengths and weaknesses.

The flat ruler is the workhorse of the workbench

Most 6-in. and 12-in. rulers are about 1 in. wide with an average thickness of about 1/32 in., making them slightly flexible. The measurement graduations are usually reversed along the opposite edge and reversed again on the other side. Some rulers go down to 1/16-in. graduations, while others go down to 1/64 in.

How much accuracy you need in a ruler depends on the work you're doing. For instance, to check the accuracy of machined workpieces, graduations to 1/16 in. usually are adequate. Also, for this job it helps to have a thin, narrow ruler, which allows you to check the depth of the narrowest plow or the tightest corner of a mortise. When measuring and laying out full-size details on drawings and story poles, I think it's useful to have a ruler with more precision—one with 1/32-in. graduations.

How much do you have to spend for a flat metal ruler? I compared the $9.89 Pec Tools 12-in. ruler to the $31.50 Starrett 12-in. ruler and found the former adequate for the majority of shop measuring tasks. However, the Starrett ruler was machined better. The edges were crisp without being sharp, and the satin finish was smooth and uniform, providing a true nonglare finish. When you're in the shop surrounded by gleaming surfaces and harsh light, a ruler with a nonreflective surface makes reading the numbers a little easier on the eyes. The graduations on the Starrett were easier to read than those on the less-expensive ruler from Pec Tools. I don't know whether the Starrett model was any more accurate than the Pec Tools model, but it sure was nicer to look at and to use.

Because of its low profile, a flat ruler is perfect for setting up cuts on machinery, as the graduated edge can be held flush with the sawtooth or knife blade.

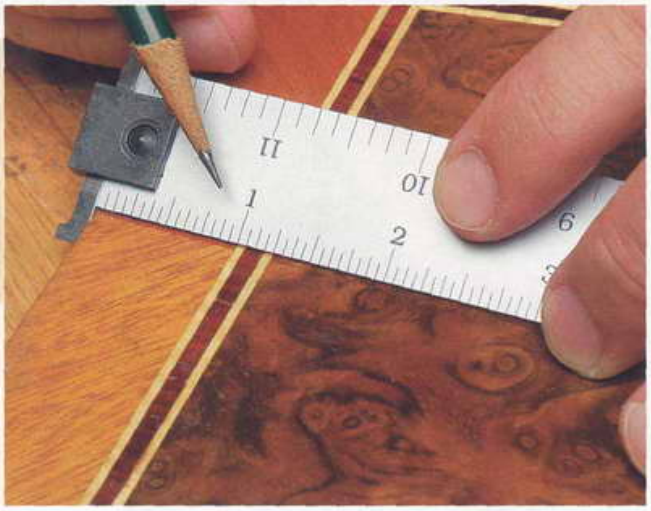
Flat rulers also work well as straightedges. For instance, when cutting edging or small pieces of veneer, I sometimes use a metal ruler as a straightedge to guide and support my marking knife or veneer saw. The thin profile provides excellent visibility exactly where the blade is cutting and a dead-straight edge. In this situation, I prefer a heavier ruler (close to 1/16 in. thick) that gives a

Photos: Mark Schofield

Specialized rulers

A USEFUL HOOK

Rulers with hooks on one end allow distances parallel to an edge to be marked accurately, which is useful when inlaying borders or stringing.



higher "curb" for better supporting my knife or saw.

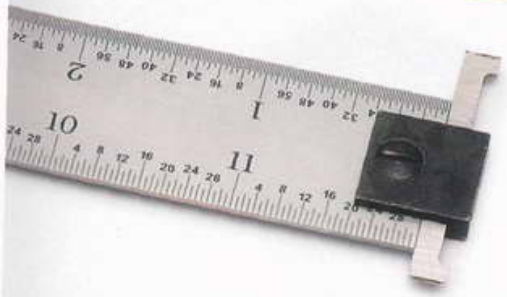
Specialized rulers are of mixed value

Over time, manufacturers have developed rulers purpose-built for particular aspects of woodworking.

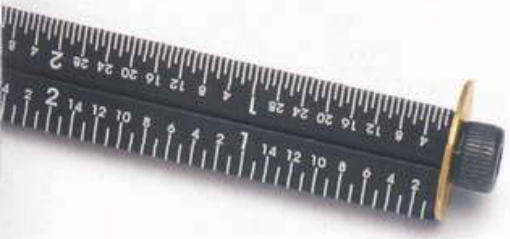
Hook rulers—The designs are meant to assist in registering the end of the ruler to the edge of the workpiece. However, in use the hook got in the way. The Lee Valley ruler's adjustable hook had sharp edges that could damage a workpiece easily. The hooks on both Bridge City triangular rulers were removable but stood a good chance of getting lost.

Triangular rulers—Available in 6-in. and 12-in. lengths from Bridge City Tools, triangular rulers provide an additional surface for graduations. On two sides there are 1/16-in. and 1/32-in. graduations that ascend in opposite directions, and on the third side there are millimeters and a center-finding ruler. On the plus side, these rulers were hard to lose on a cluttered bench, and the black surface didn't create any glare. On the negative side, I had to unscrew the end hook and spend a lot of time turning the ruler around until I found the scale I was looking for. Also, my eyes were strained by the concentration of numerals in a small space.

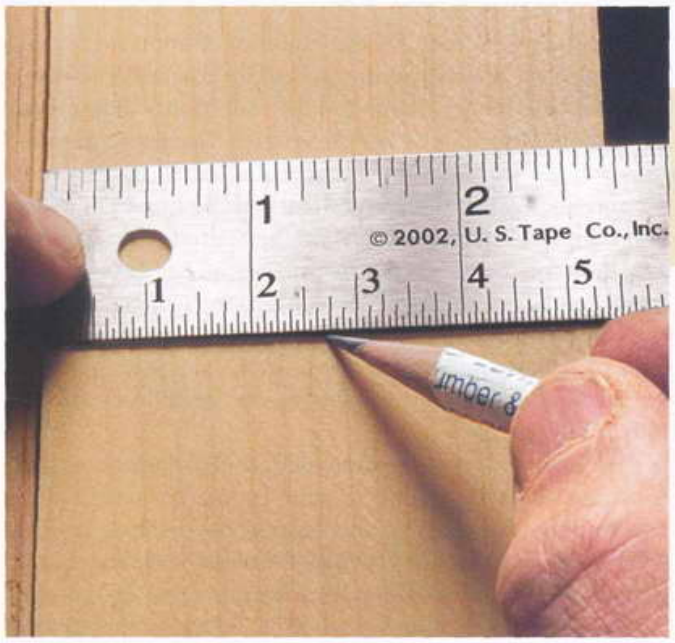
Center-finding rulers—These come in handy when laying out complex casework and frame-and-panel work or positioning hardware. The 12-in.-long Center Point ruler has 1/16-in. graduations along one edge, while the opposite edge is a half scale (1 in. takes up 1/2 in. of space) and goes up to 24 in. To use this ruler I first measured the actual distance on the 12-in. scale, then referred to the same number along the opposite edge: The location of that number was half the actual width, or the center of the object.



LEE VALLEY
Model: 12N08.11
Price: $21.95
Contact: www.leevalley.com
Specs: 12 in.; matte finish with graduations to 1/64 in.



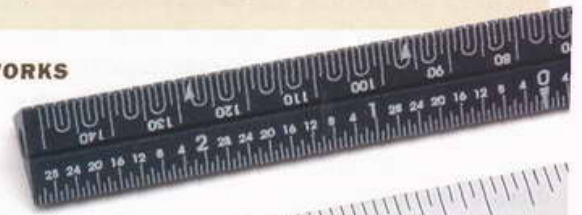
BRIDGE CITY TOOL WORKS
Model: 1101-137
Price: $19.95
Contact: www.bridgecitytools.com
Specs: 12 in.; black finish with graduations to 1/32 in.; includes millimeter scale and center finder.



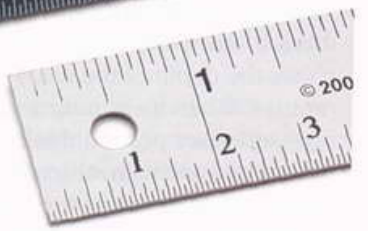
CENTER-FINDING RULERS

These come in two versions: One (left) has two scales on a face; the lower one is half the scale of the upper one. The other version (below) has "0" at the ruler's center with the graduations increasing to each end of the ruler.

BRIDGE CITY TOOL WORKS
Model: 1101-124
Price: $14.95
Specs: 6 in. (see above)

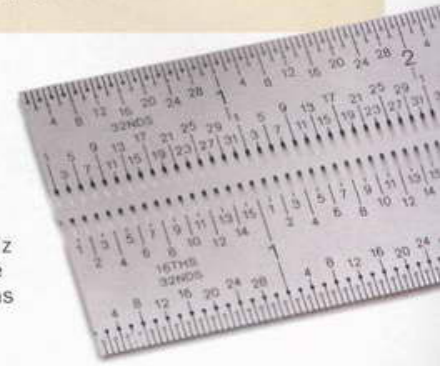


U.S. TAPE COMPANY'S CENTER POINT
Model: 60N46.02
Price: $8.95
Contact: www.leevalley.com
Specs: 12 in.; chrome finish with graduations to 1/16 in.



PERFORATED RULERS

This right-angle ruler has a series of slots and holes in it, allowing you to mark the same exact length on adjacent surfaces of a board, useful when cross-cutting or in joinery. Although it's designed for use with a 0.5-mm mechanical pencil, a conventional pencil with a very sharp point also works.

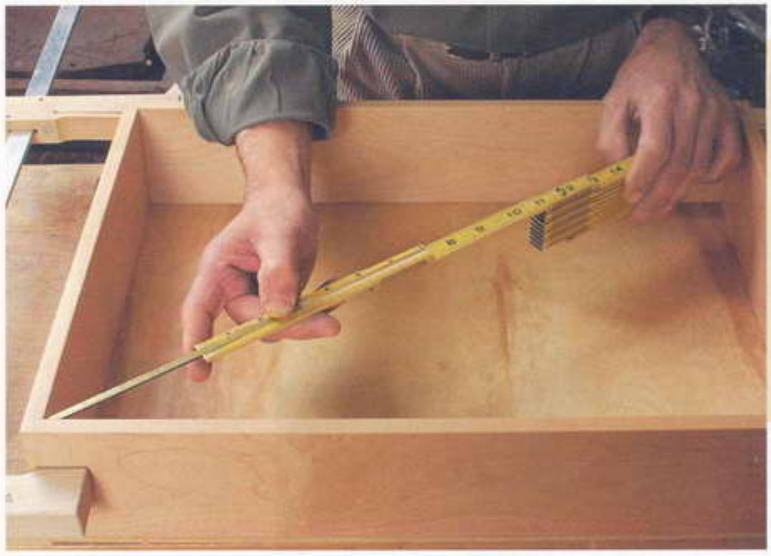


INCRA MARKING RULER
Price: $19.99
Contact: www.incra.biz
Specs: 12 in.; chrome finish with graduations to 1/32 in.

INCRA BEND RULER
Price: $24.99
Contact: www.incra.biz
Specs: 90° bent edge; 12 in.; chrome finish with graduations to 1/32 in.

The Bridge City triangular rulers are examples of another type of center-finding ruler that is marked "0" at the midpoint. From that point the graduations increase in both directions. To find the exact center, the ruler is moved across the workpiece until the same number on the ruler is at both ends of the workpiece.

Perforated rulers—This type of ruler made by Incra has small perforations at 1/32-in. intervals. The slots and holes are slightly offset so that they don't run into each other while providing pinpoint accuracy. Designed for use with a 0.5-mm mechanical pencil, these rulers also work with a regular pencil sharpened to a fine point. I suspect that once you get used to these rulers you will spurn any other kind, but I spent too much time making sure I stuck the pencil in the right hole.



FOLDING RULER

The brass extension of this folding ruler is useful for measuring the inside diagonals of a drawer to check for squareness.

Bend or corner ruler—Bent to turn a 90° corner, this ruler let me mark two perpendicular surfaces without moving the ruler. By measuring two surfaces at the same time, the ruler ensured a slightly higher degree of accuracy. Is the corner ruler essential? No, not at all, but each time I used it I shaved a few minutes off my layout work. Like the other Incra rulers, this one is perforated.

Folding extension ruler—This type of ruler was not as accurate as the other rulers I've described, but many a fine piece of furniture has been made using no other measuring device. The extension ruler offers acceptable accuracy to within 1/16 in. and has very clear markings—at least until they eventually wear away. A folding extension ruler takes up more room than a tape measure but supports itself over a longer length. Get one with a brass extension for taking inside measurements into tight corners. □

STARRETT
Model: 20K12.02
Price: $29.95
Contact: www.starrett.com
Specs: 72 in.; painted finish with graduations to 1/16 in.; 6-in. sliding extension

Mario Rodriguez is a contributing editor.

Step-Back Cupboard

Build this elegant 18th-century cupboard, and hone your hand-tool skills at the same time

BY MIKE DUNBAR

My wife had a narrow space in the kitchen where she wanted more storage. She had pestered me to make a piece of furniture to solve her problem, but I always had other things to do. One day I came home to discover she had bought a factory-made cupboard at a furniture store to fill the spot. One of the major reasons why I am a woodworker is that I want to be surrounded by furniture that is better than the mass-produced stuff. Factory furniture offends all of my sensibilities: It often lacks individuality, character, and craftsmanship; its designs are limited by the capabilities of machinery; and every surface is sanded to death.

I promised my wife that if she returned the piece, I would make something that we both liked better. She selected an antique cupboard on which this one is based. Besides the additional storage, she was happy to gain display space for some of her favorite items. The cupboard's small size also makes the piece versatile, and it can be used in any room if she redecorates or if we move.

The original piece that inspired this project was made in the late 18th century. The wood used in the original—eastern white pine—suggests that the piece was made in New England. While very handsome, the cupboard is not particularly complicated, especially if it is made using machines. However, the project presents a good opportunity to hone hand skills. So, even if you do use machines for most of the steps, I urge you to try at least some of the steps by hand.

Cut stock to rough dimensions

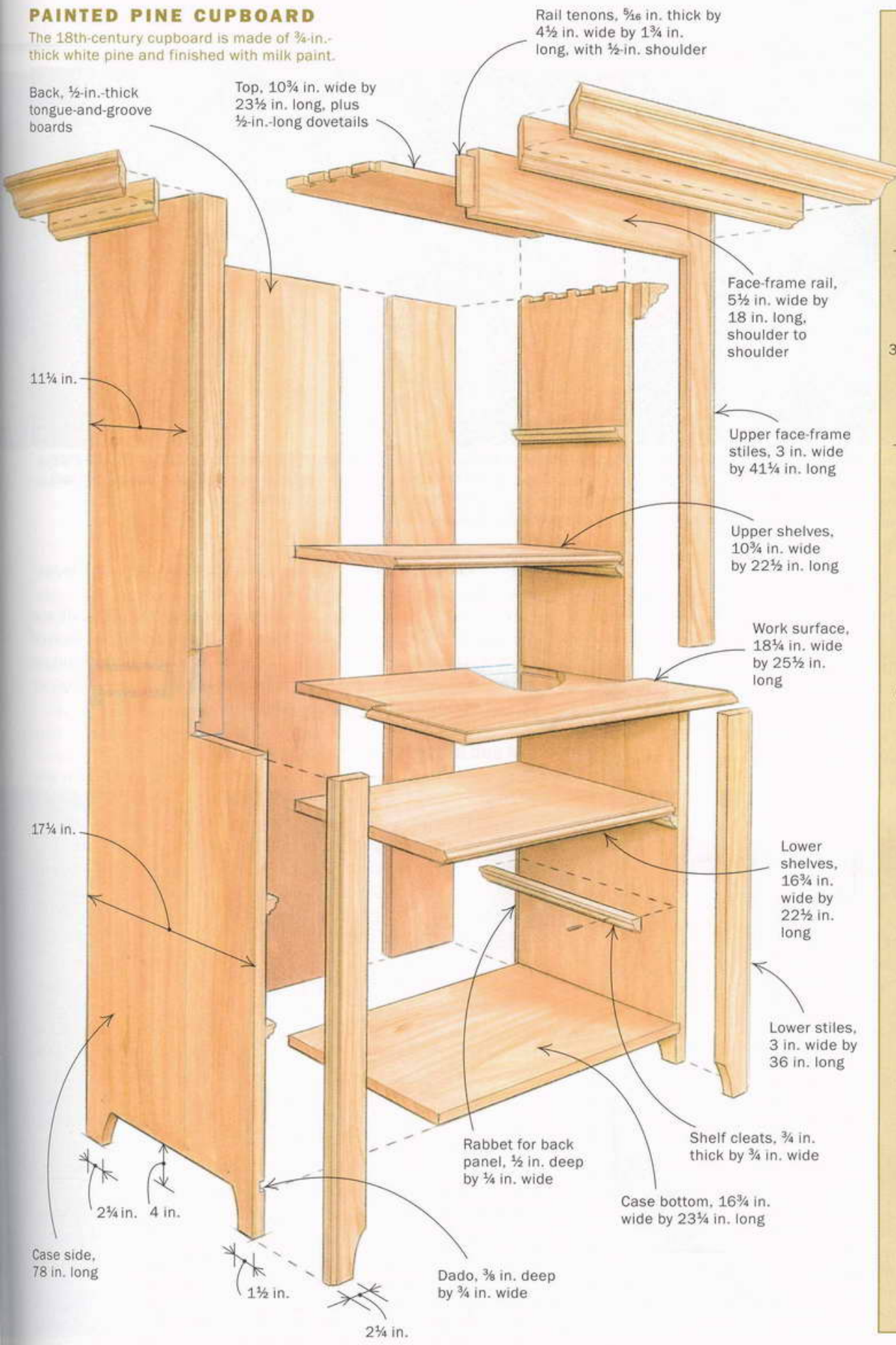
I purchased 4/4 stock that I dimensioned with a jointer and a thickness planer. This is an important step because the stock must be perfectly flat. If I buy wood that already has been planed to thickness, I have to work with whatever warp or wind it has experienced while it was in the dealer's rack.

Begin by laying out the various parts on the lumber. Select the straightest and best lengths for the sides and the frame-and-panel

Photos: Matt Berger

PAINTED PINE CUPBOARD

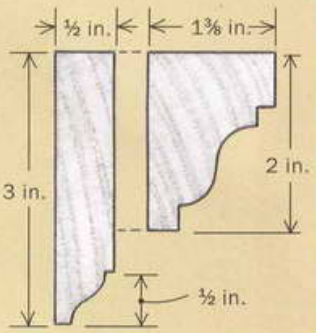
The 18th-century cupboard is made of ¾-in.-thick white pine and finished with milk paint.



EDGE PROFILES ADD DETAIL

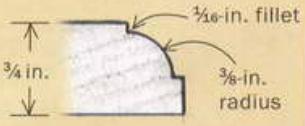
Although Dunbar used molding planes to make the edge treatments, router bits may be used to create similar shapes.

CORNICE MOLDING

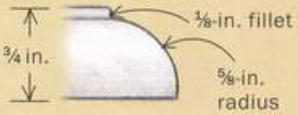


INSIDE EDGE OF UPPER FRAME

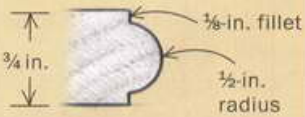
OUTSIDE EDGE OF UPPER AND LOWER FRAMES



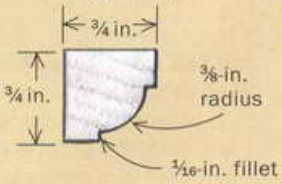
WORK-SURFACE EDGE



SHELF EDGE

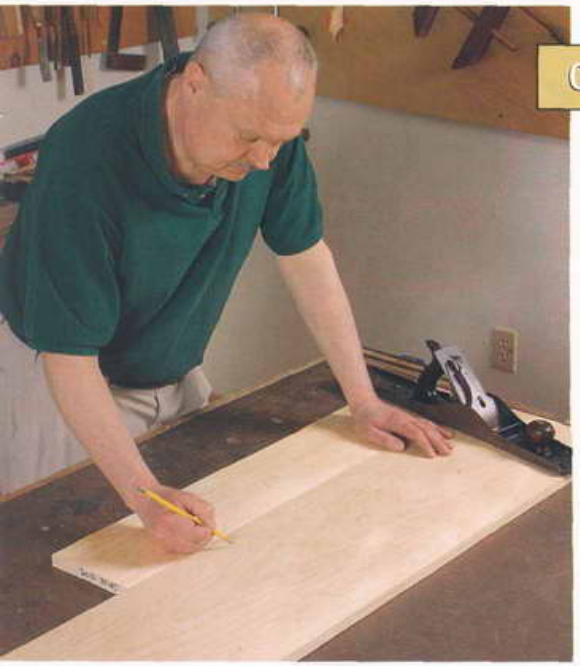


SHELF CLEAT



Drawings: Bob La Pointe

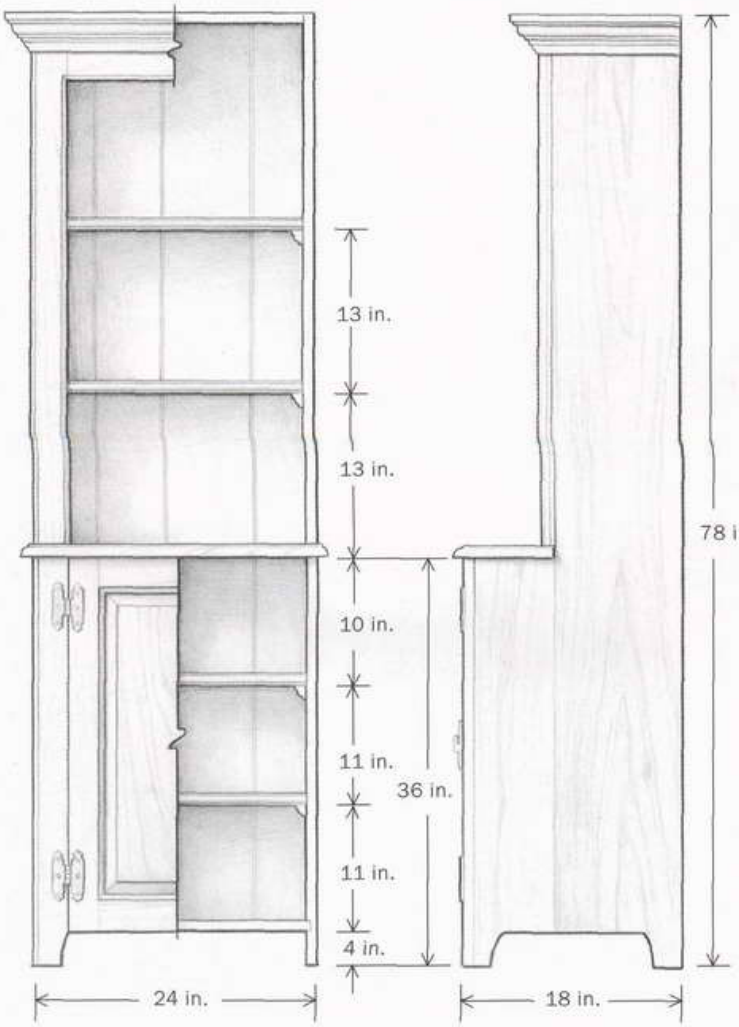
CONSTRUCT THE CARCASE



Form the step-back profile. *The base is built up by adding a short board to each case side.*

Joint the edges. *By clamping the face of the short board to the face of the case where they meet, both boards may be planed simultaneously, ensuring that they will meet up perfectly.*

Glue and clamp the two boards. *The show side can be handplaned to clean up any tool marks or excess glue.*



door. You don't want any warp or twist in these most visible sections of the cabinet.

Cut out the various parts to oversize dimensions. You will cut them to their final dimensions later. Finally, joint one surface of each board and plane them all to thickness. Use a handplane on each part to remove the planer marks as well as any dings or scratches that have occurred along the way.

Cut and assemble the carcase pieces

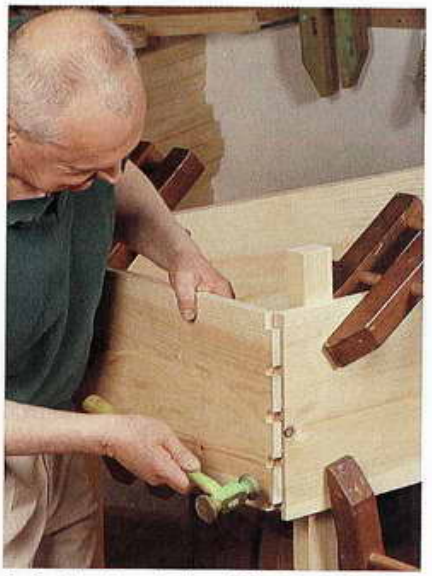
Cut the pieces for the carcase to their final dimensions. Each side of the cupboard has a long piece running the full height of the cupboard and a shorter piece that completes the bottom portion. When glued together they create the step-back profile. These short joints are a nice place to practice jointing with a plane. Clamp the two boards face to face and plane them at the same time. This ensures they mate well. Unless you have stock wide enough to be used for the door panel as well as the work surface, you also will need to joint and glue up these pieces.

Dadoes in the sides hold the bottom board and the work surface. The dadoes can be completed fairly easily with machine tools, but I chose to use a dado plane. For a couple of dadoes, this tool is just as fast and a lot more fun than a tablesaw or router. Dado planes are not hard to find and can be purchased from used hand-tool dealers. They feature two nickers (cutters) that scribe the wood and help the tool cut across the grain. To ensure that the dadoes line up perfectly, butt together the two side boards and pass the dado plane across both boards. It will take several passes to cut the upper and lower dadoes to their depth.

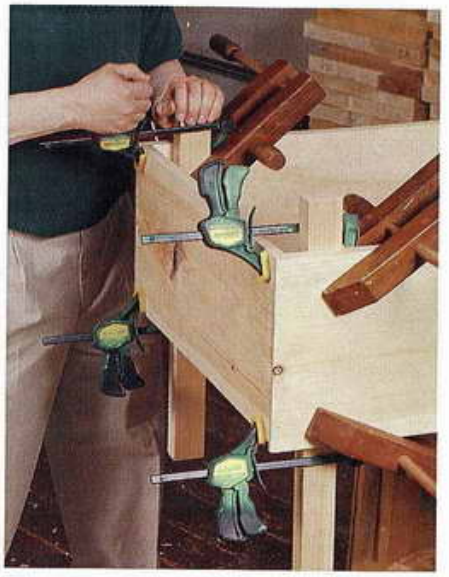
Cut rabbets along the back edge of the carcase to accept the back boards. This step would be faster if done with machine tools, but I did the job with a rabbet plane, which is adjustable for width and depth.

Next, lay out and cut the dovetails that join the top board to the side panels. I chose to use half-blind dovetails. They require a bit

Assemble the carcase. *The first step is to glue and clamp the case bottom to the cupboard sides.*



Join the dovetails with gentle force. *With the bottom securely in place, apply glue to the dovetails and tap the top board into place.*



Clamping the top to the sides. *Clamp blocks, positioned with wooden hand screws, provide gripping surfaces for the clamps to pull the dovetail joint tight.*

more work, but they make the project more interesting. Finally, trace the foot pattern on the bottom of both side boards using a template and cut out the feet with a coping saw. You might find it easiest to cut the curved portion with your coping saw and then use a panel saw to finish off the straight cut. The rough spots can be cleaned up with a spokeshave or rasp.

The carcase is assembled by first gluing and nailing the case bottom into the cupboard sides. Next, assemble the top to the cupboard sides. Clamp the dovetails while the glue sets.

When nails are exposed, as is the case with this project, I prefer to use cut nails. Their long, narrow heads are less obvious than the round heads of drawn finish nails. The right nails for this work are 6d fine finish cut nails.

After the carcase has been glued up, tack a cross brace across the back to keep it square while you work on it for the remaining steps.

Mold and attach the face frames

The upper face frame is made up of three pieces. I laid out the mortise-and-tenon joints with a marking gauge and cut the tenons with a backsaw, and the mortises with a mortise chisel. When done, test-fit the face frame to the carcase. If necessary, plane the outside edges flush.

Edge the upper face frame—The inside edges of the frame are chamfered, which can be done with a chamfering plane if you have one. The chamfers on this frame are so narrow that you can lay them out with a marking gauge and cut them with a block plane. The chamfers on the stiles are stopped, and the plane will not reach into the corners, so complete the chamfers at the

Slide the work surface into the dadoes. *The cupboard work surface should fit tightly in the dadoes cut into the cupboard sides. It is secured in place with glue and nails. The dadoes are hidden by the front of the work surface.*

ADD THE FACE FRAMES AND CORNICE

The upper face frame gets a chamfer on its inside edge. *Scribe the width with a marking gauge and use a block plane to bevel the inside edge of the top rail.*

The upper face-frame stiles require a stopped chamfer. *Dry-fit the frame and mark the end of the chamfer (left), then plane the chamfer to within an inch or two of the stop mark. A drawknife will give you a smooth edge (center) as you cut away the remainder of the chamfer. Dry-fit again and finish the corner with a chisel (right).*

corners with a drawknife. A drawknife typically is used for coarse work, but with a steady hand, the tool can take fine shavings. Use a sharp chisel to complete the mitered corners where the chamfers meet.

Cut the ovolo profile on the outside of the stiles. This is an important detail. Although small, this profile softens the cupboard's vertical corners while giving them definition. Used above and below, the ovolo also ties together the open top and closed bottom.

Because I had to nail through the molding profile to attach the stiles to the carcase, I used 4d headless cut brads (1½ in.), which are less visible than the larger 6d cut nails.

Thumbnail edge completes the work surface

The work surface separates the open top section of the cupboard from the lower, enclosed portion. Before cutting and fitting the work surface into the cupboard, add a thumbnail profile to its exposed edges. The thumbnail profile was common on 18th-century furniture. I made mine with a molding plane. Cut the molding on the end grain first. A waste strip on the far corner keeps the wood from chipping out on the exposed front corners. Now cut the thumbnail on the front, in the direction of the grain.

Attach the lower face-frame stiles—The lower face frame has only two stiles and no rails. Like the stiles on the upper face frame, the outside edges of the lower stiles are molded with an ovolo profile. Before securing the stiles to the carcase, cut out the feet to the same pattern as the sides. To protect the molding, I again used headless brads, but I used 6d nails to secure the stiles to the

Attach the face frame. *Once the upper face frame has been assembled, glue and nail it onto the cupboard.*

bottom board. A nail through the work surface also strengthens the stile-to-case connection. I don't use any glue.

Locate and cut the shelf cleats

The placement of the shelves is determined by what you plan to put in each section of the cupboard. The shelves are held in place within the cupboard by cleats.

Because some of the cleats in the open portion of the cupboard are visible, they are decorated with the same ovolo profile as the face-frame stiles. The easiest way to make these cleats is to cut the molding on the edge of a board. Rip off a strip to the width given in the drawing, and then cut the cleats to length. If you do not have stock long enough for all 10 cleats, run multiple strips.

Cut the cleats to length and nail them into the cupboard's upper and lower sections. Because the carcase sides are only ¾ in. thick and don't provide a lot of material for nailing, I also added a spot of glue in the middle of each cleat. The cleats run across the sides, but the nails are forgiving enough to accommodate seasonal movement. Also, gluing only in the center allows movement. The shelves are not secured to the cleats; gravity holds them in place.

Make an edge on the shelves—The molding profile on the front edges of the shelves is called an astragal and was a common 18th-century treatment for shelves. Its similarity to the ovolos on the carcase and the thumbnail on the work surface help tie together the piece's design.

You also can cut a groove in each shelf with a shoulder plane to prop up plates for display. Clamp a straightedge to the shelf and use this as a fence to guide the shoulder plane. Holding the plane at an angle will cut the V-shaped groove.

Complete the carcase with a cornice

Because this cupboard is so narrow and tall, it needs to be balanced with a large cornice. As long as you design the cornice to the prescribed dimensions, it does not matter what profile you use. I own a nice profile called a stepped reverse ogee (cyma recta), but by itself it is not quite large enough for the piece. Therefore, I made a larger cornice by stacking two layers. The first layer has a small ogee (cyma reversa) that projects below the larger, resulting in a cornice with the necessary scale.

Nail on the tongue-and-groove back boards

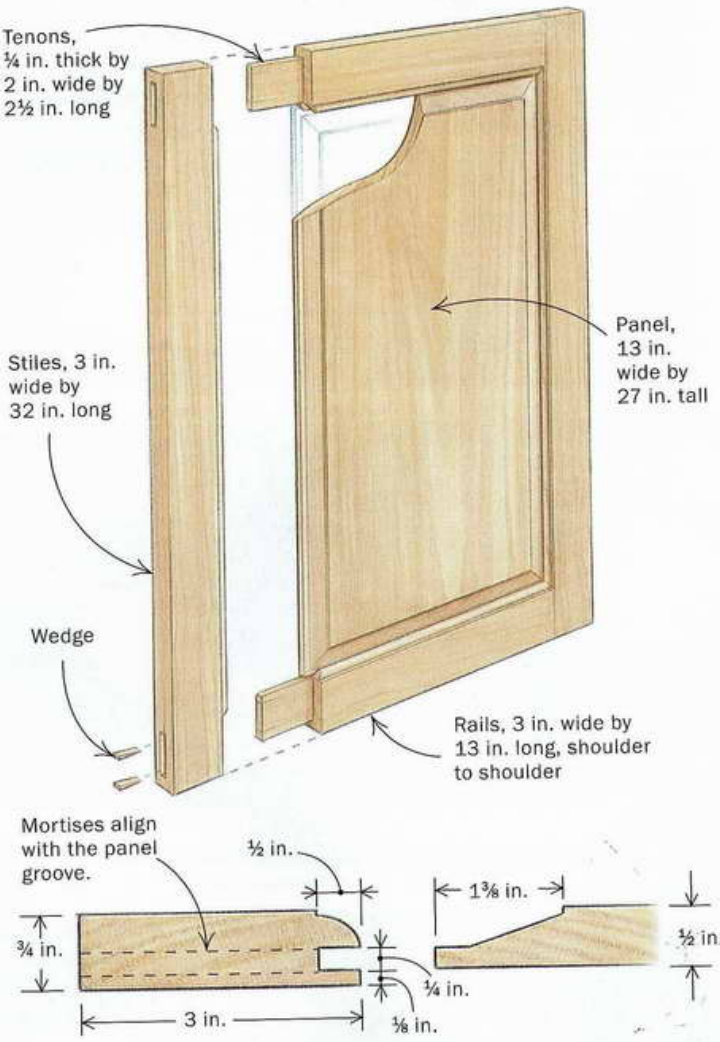
In 18th-century furniture, it was common to see back boards of random widths. Cabinetmakers typically used the widest boards

Secure the lower stiles to the case. *Use 4d headless cut brads through the molding into the sides and 6d cut nails into the bottom.*

Add a cornice to the top. *The cornice, shaped with a molding plane, is built up from two layers to achieve its pronounced profile.*

HAND-CUT FRAME-AND-PANEL DOOR

Raise the door panel with a molding plane. Wedges, not glue, secure the tenons in the mortises.



on hand and the fewest needed to fill the space. To achieve this feel I used two wider boards on the sides and a narrow one in the middle. For these I used ½-in.-thick pine.

To avoid gaps in the back boards caused by seasonal movement, I cut tongues and grooves into their edges. I have a pair of planes that make this joint, called match planes. Like most hand tools, they are quick and easy for a small job like this.

The back boards are nailed into the rabbets in the cupboard sides. They also are nailed into the top and bottom boards and the work surface. Once again, pay attention to seasonal movement. In the winter, fit the back boards loosely. In the summer, you should snug them up, as they will shrink in the winter.

Make the door parts by hand

The door is the most complicated piece of joinery in the cupboard. Using a plow plane, the first task is to cut a groove in the inside edge of each door stile. Next, cut a molding on the outer edge with the same plane used to make the thumbnail on the work surface. It is easiest to cut these profiles on long stock and then crosscut the stiles and rails from these strips.

Make the stiles slightly longer than the finished door. That way, you have extra length to help prevent the stiles from splitting when you're chopping the mortises. This extra length, known as a horn, can be trimmed after the door has been assembled.

Before cutting the mortise-and-tenons, identify all of the surfaces on the stiles and rails that will be facing out. The mortises are slightly offset and do not pass through the center of the stile's thickness. This will require laying out the mortises with the identical placement on both edges. And be sure to place the fence of the mortise gauge on the same surface of the stiles and rails. By always marking pieces with identifiers you will be able to cut consistently. The mortises are cut through, which means you can see the ends of the tenons in the edges of the stiles.

To avoid blowing out the back side of the stile when making the mortises, cut from both sides and then meet in the middle.

MITER THE THUMBNAIL MOLDING

Miter the inside corners of the door frame. *Saw and chisel away the waste. Cut the stiles slightly longer than the finished door to add strength to the board when chopping the mortises. The extra length, known as a horn, can be trimmed away once the door is assembled.*

A jig for perfect miters. *When cutting the miters on the door stiles and rails, use a jig with a 45° slope to guide your chisel.*

You will have to trim away the thumbnail to join the mortise and tenons.

Raise the door panel—I have a very nice panel-raising plane that I enjoy using, so I made the panel by hand. When making only one panel, the plane is about as fast as the tablesaw or router, which also will make this cut. Measure the panel's length and width from the bottom of the grooves in the stiles and rails. If you live in an area of the country with cold winters and humid summers, you will want to accommodate the panel's seasonal shrinkage and expansion across its grain by adjusting the width accordingly. If you are making the cupboard in the summer, you should create a snug fit. If you're making it in winter, fit the panel loosely, as it will swell in the humid summer.

After testing the panel's fit, complete the door assembly. In the 18th century, doors usually were not glued, and over the centuries these doors have not sagged, so I followed suit and did not use any glue. Two wedges are driven into the ends of each tenon to tighten it in its mortise. You can strengthen the joint further by pinning the tenons.

After trimming the horns, plane the door's stiles to fit the opening. Your door's fit also will depend on the season. If you make a snug door in the winter, it will bind in the summer.

SOURCES OF SUPPLY

MOLDING PLANES
Tod Herrli, 765-664-3325

HARDWARE
Horton Brasses, 800-754-9127
Ball and Ball, 800-257-3711

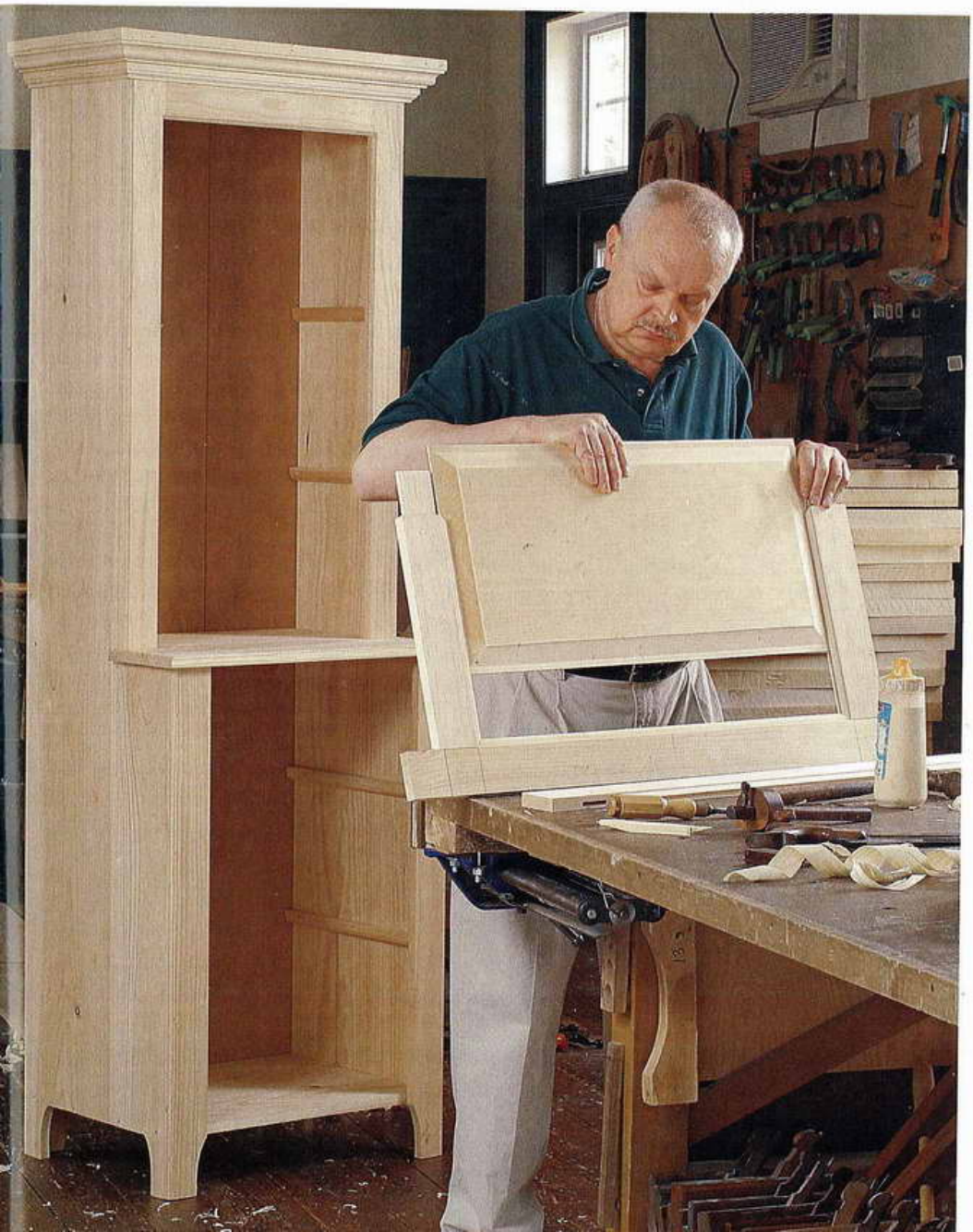
CUT NAILS
Tremont Nail, 800-842-0560

Finish with fine hardware and milk paint

The original cupboard's door was mounted with wrought-iron hinges and held shut with a wooden turn button. I spruced up mine with cast brass ornamental H-hinges and a matching catch. These items cost about $80, but after all the work I put into the piece and the cost of the lumber, it seems only fitting.

Once the piece was complete, I finished it with milk paint (for more on milk-paint application, see *FWW* #136, pp. 64-67). To match the color scheme of our home, I finished the outside surfaces of the cupboard with barn red. For the exposed inside walls and back boards, I used mustard. □

Mike Dunbar is a contributing editor. This article is the fourth in a series of hand-tool-oriented projects (see FWW #134, #142, and #151).



Assemble the door and wedge the tenons. *Drive wedges into the tenons to secure them tightly in the offset mortises. Typical 18th-century tenoned doors were left unglued. Pinning the tenons will add even more strength.*

Four Finishes for Turnings

When to use wax, shellac, lacquer, and oil

BY TERI MASASCHI

Wood that is spinning on a lathe allows the finisher to apply various finishes rapidly and flawlessly. While most of the finishing materials used on turnings are familiar to wood finishers, the method of application is different. Sanding is far less of a chore, grain filling is quicker and less messy, and the friction caused by the applicator (usually a pad or cloth) dries the clear coating instantly. The problems of sags, dust, or other imperfections are simply nonexistent. In short, finishing turned work provides almost instant gratification.

Which finish works best?

While the brand names are many, the actual categories of finishes used on turnings are few. The intended use of the turning is the key to choosing a finish: If it is a decorative object subject to occasional handling, such as a candlestick, shellac or wax would be fine. If it is a chair part subject to moderate wear, shellac or an oil finish are possibilities, while an item such as a kitchen-table pedestal needs a durable lacquer finish to resist shoe scuffs. Finally, salad bowls and other woodenware need food-safe materials applied to them, such as mineral oil, 100% tung oil, and some types of linseed oil (check with the manufacturer to make sure there are no added driers, which are toxic).

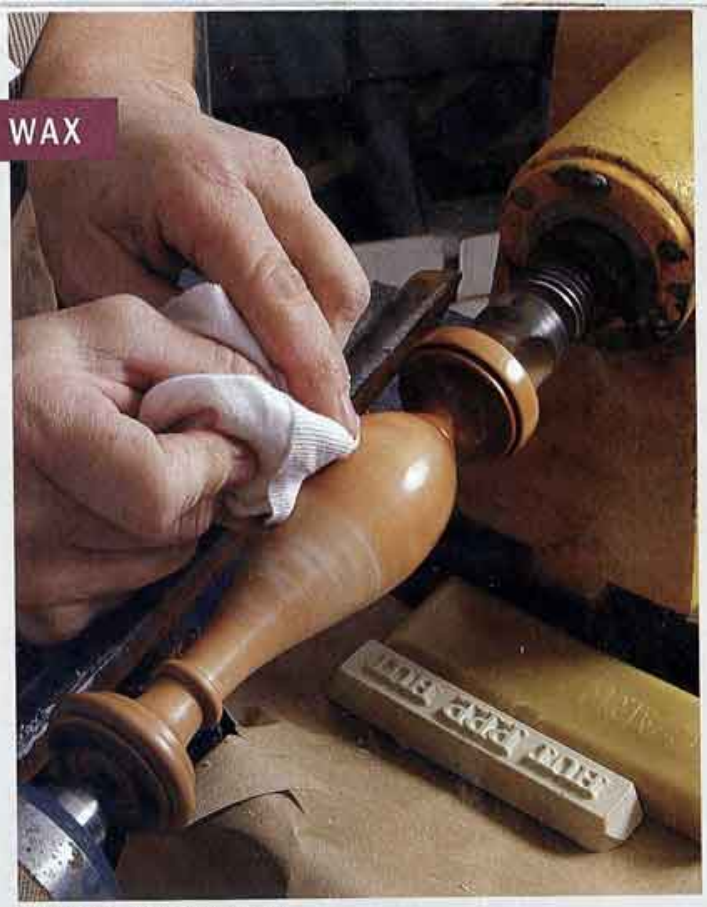
Some materials are initially applied with the wood standing still. Then, with the piece spinning in the lathe and a cloth held firmly against it, the surface is polished. Other materials are applied directly to the moving wood. They dry rapidly because of the friction and produce an instant gloss.

Teri Masaschi is a professional finisher who lives near Albuquerque, N.M.

Watch it on the Web
To see a video on finishing turned work, go to www.finewoodworking.com.

Photos: Mark Schofield

WAX



Solid wax. *After holding the solid bar of wax against the moving section of a candlestick, burnish the surface with a clean cloth pushed hard against the wood.*

Liquid wax. *Apply the shellac/wax cream while turning the work by hand. Once all of the wood has been coated, turn on the lathe and buff the surface to a high gloss.*

A WAX FINISH REQUIRES CAREFUL PREPARATION

Wax finishes are available in solid or liquid form. The traditional method of applying wax to turnings has been to use solid bars of carnauba wax or blends made by Hut. Press the bars against the spinning wood to apply a thin but uniform coating, then burnish the surface with a tightly held cloth. Turn over the cloth frequently to expose a clean surface to the wood. Burnishing leaves a thin but smooth surface that brings out the flawless beauty of the wood.

New alternatives to solid wax are the liquid shellac and wax mixtures such as Hut's Crystal Coat or Shellawax cream by U Beaut Polishes. These generally are applied to the workpiece while it is stationary in the lathe and then burnished with a clean cloth while the workpiece spins. As with solid wax, the gloss appears almost instantly, leaving a smooth surface.

SHELLAC

SHELLAC IS A GOOD ALL-PURPOSE FINISH

Applying shellac to a turning is rather like French polishing in that multiple thin layers are applied over a short time. Instead of a special rubber (pad), a simple piece of cotton cloth is used as the combination applicator and burnisher. Because the shellac is applied in such thin layers, you can afford to use a heavy 3-lb. cut. Avoid using shellac on items subject to constant handling, such as pens and walking sticks, because the acid in human hands can eat into shellac.

A moving finish. *Apply the shellac by moving the cloth up and down the turning wood. The shellac dries instantly, allowing several coats to be applied in quick succession.*

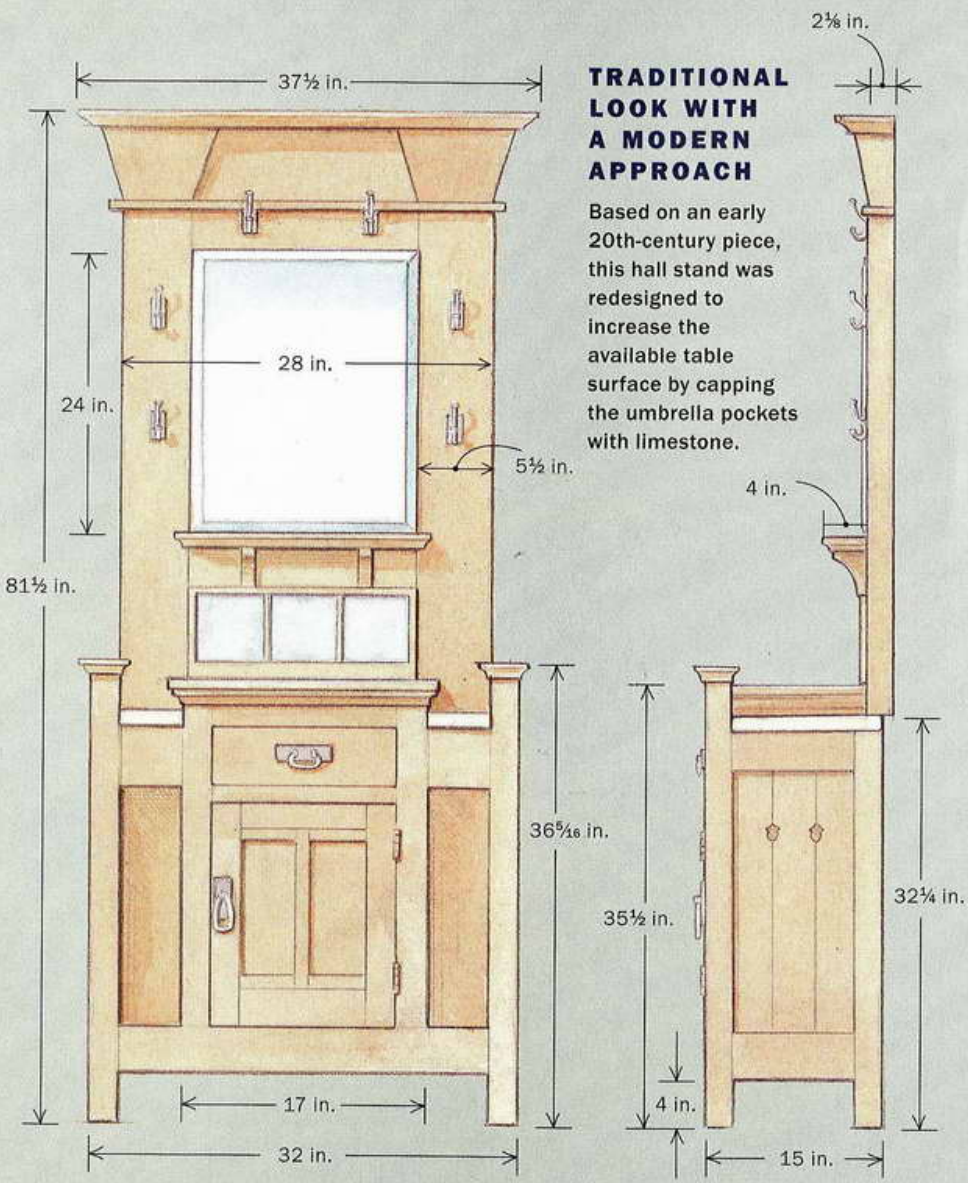
Mitered corners allow thin stock to be used in making heavier-looking pieces. With this technique, the grain pattern is carried around all sides of the cornice.

United States, relatively few people outside of urban areas use umbrellas. Still, I wanted to preserve the play between the different levels of the base that were integral to the piece's character.

I decided to enclose the umbrella-stand compartments and top them with a durable surface on which a person running out the door could place a cup of coffee while donning a hat or adjusting a scarf. For this surface I chore Indiana limestone because it's locally produced, affordable, and easily worked. To maintain the Edwardian character of the stand, I drew slatted side panels, incorporating a decorative cutout in period style. The side compartments can be used for storage or display, but at only 5½ in. wide, these areas are limited in their usefulness. I had considered enlarging the cabinet to make these areas more practical but abandoned the idea because it would have detracted from the hall stand's lovely proportions.

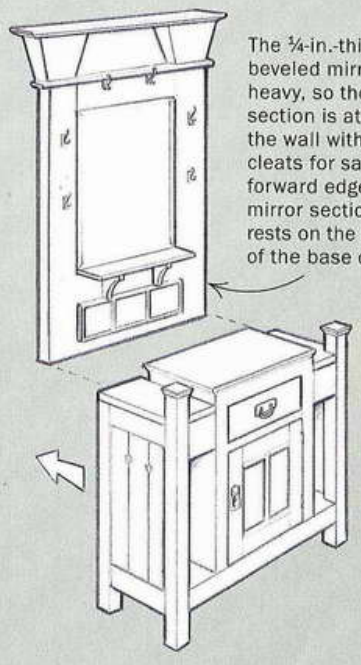
I designed my hall stand so that the mirror section fits against a wall, with the cabinet portion stepped forward slightly to accommodate a baseboard and shoe molding. The wooden top and side trim of the base cabinet end at the face of the mirror frame's bottom rail. It's a good idea to have a particular location in mind and to measure architectural moldings located there before finalizing this design detail.□

Nancy R. Hiller operates NR Hiller Design in Bloomington, Ind.



TRADITIONAL LOOK WITH A MODERN APPROACH

Based on an early 20th-century piece, this hall stand was redesigned to increase the available table surface by capping the umbrella pockets with limestone.



The ¼-in.-thick beveled mirror is heavy, so the mirrored section is attached to the wall with French cleats for safety. The forward edge of the mirror section also rests on the back edge of the base cabinet.

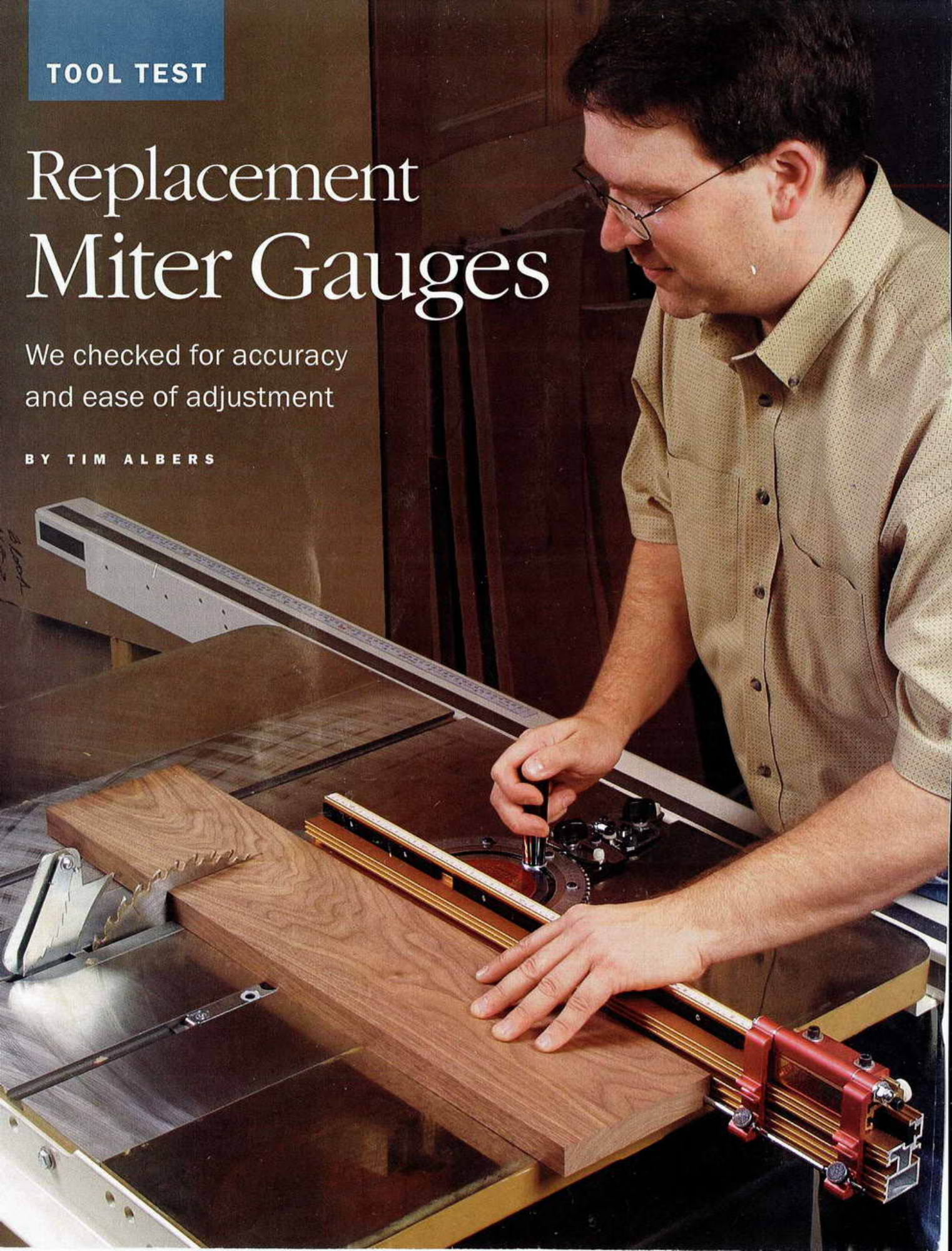
Drawings: Bob La Pointe

TOOL TEST

Replacement Miter Gauges

We checked for accuracy and ease of adjustment

BY TIM ALBERS



Look in just about any woodworking catalog these days, and you're sure to see two or three replacement miter gauges. But why should you consider spending upwards of $150 when your tablesaw came with a miter gauge? The reason is that most replacement miter gauges are precision woodworking jigs—usually a vast improvement over the crude miter gauges supplied as standard equipment. While features and quality vary on replacement miter gauges, they all provide improved accuracy when crosscutting. All have positive stops at 90° and other common angles and some means for adjusting the fit of the sliding bar to the miter slot. Almost all offer a long fence, and most fences have a stop system.

Miter gauges won't solve all of your crosscutting needs. For wide boards, you'll still need a crosscut sled. Boards that are roughly 12 in. or wider will force the miter gauge off the front of the table, and long, heavy boards will drag on the saw table, pivoting and pulling away from the fence.

However, metal miter gauges have some advantages over wooden crosscut sleds: They won't warp or go out of square, they cut a number of common angles accurately, they generally are lighter and easier to place on and off the saw table, and they accommodate a tilted blade or dado head.

The testing procedure

While miter gauges can be used on bandsaws, disc sanders, shapers, and router tables, for this review I limited my testing to the tablesaw, the machine most people think of when discussing miter gauges.

To test for accuracy, I verified that my saw was set up properly. I took test cuts in lumber that had freshly ripped and jointed edges, so both edges were perfectly parallel, straight, and square. Then I cut off a section from the end of the stock, flipped over the piece, and placed the two pieces together on the saw table. An accurate cut showed no light along the cut line.

I performed the same procedure at 45° and 60° on all miter gauges (except those with no fixed settings at 60°). And finally, I used all of the miter gauges in my shop over a period of several months.

The miter gauges come in three basic designs: variations on the traditional protractor head, the Incra products with their rack-and-key adjustment, and the Osborne product with its triangular support system.

What I reach for

I used all 10 of these miter gauges in my shop, but two of them stood out and received more use than the others: the Woodhaven Deluxe (with its optional fence) and the JDS Accu-Miter. The Woodhaven Deluxe saw the most all-around use. But the heavy Accu-Miter, with its smooth micro-adjustable stop, was my tool of choice for joinery cuts.

For the more budget-conscious, the Woodhaven standard miter gauge requires a shopmade subfence and makes only 90° and 45° cuts, but I found the cuts to be precise. It also would make a great second miter gauge for making box joints or for use on the router table, bandsaw, or disc sander.

Tim Albers is a woodworker and machine refurbisher in Ventura, Calif.

FEATURES AT A GLANCE

ADJUSTABLE GUIDE BARS

To increase accuracy, all of the gauges offer some means for adjusting the fit of the guide bar in the miter slot. The Delta Deluxe Miter Gauge has steel setscrews (left), which threaten to wear a track in the cast-iron slot. Others have plastic or graphite screws. The Incra miter gauge has nylon washers that spread to fit the miter slot (right).

EASY, ACCURATE MITER CUTS

Replacement miter gauges offer positive stops at a number of common angles, from as few as three angles to as many as 364.

ACCURATE CUTS TO LENGTH

Most gauges also offer stop systems on their fences. Many flip up and out of the way when not needed.

Photos, except where noted: Asa Christiana

SIX PROTRACTOR-STYLE GAUGES

These six protractor-style gauges all have a solid head that pivots on the guide bar, with positive stops at common angles. This is by far the most common miter-gauge design.

DELTA DELUXE

Overall rating: Very good

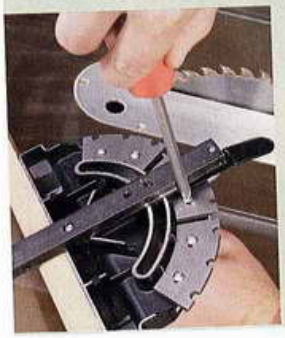
Source: Tool Crib/Amazon
800-635-5140
www.amazon.com

Price: $65

Positive angle stops (nine): 90°, 75°, 60°, 45°, 30° each way

The Delta Deluxe is an accessory miter gauge that offers good value for the money. It's a traditional design with the head mounted on a steel bar by means of a 4-in.-tall clamping handle. The cast and machined protractor head on the model I looked at was straight and square to the table.

The Delta Deluxe uses a spring-loaded pin for positive stops, which work well and are adjustable. There is an optional cam-action clamp attachment, but no auxiliary fence or stop available.



The Delta Deluxe is difficult to set up. *It took some trial and error to adjust the four plates that contain the positive stops, as they tended to shift when they were being locked down.*

WOODHAVEN DELUXE

The Woodhaven Deluxe is sold through mail-order companies as simply a "deluxe miter gauge." I tested it with its optional fence and stop, sold as a package by Woodhaven. Accurate out of the box, the Woodhaven has a 24-in.-long sliding aluminum fence extrusion attached to the head via T-slots, allowing it to slide close to the blade. The L-shaped flip stop has a micro-adjuster, which was solid with no play. The steel guide bar supplied has four adjustable graphite plugs; they wore faster than other adjusters, but readjustment took less than a minute.

Overall rating: Excellent

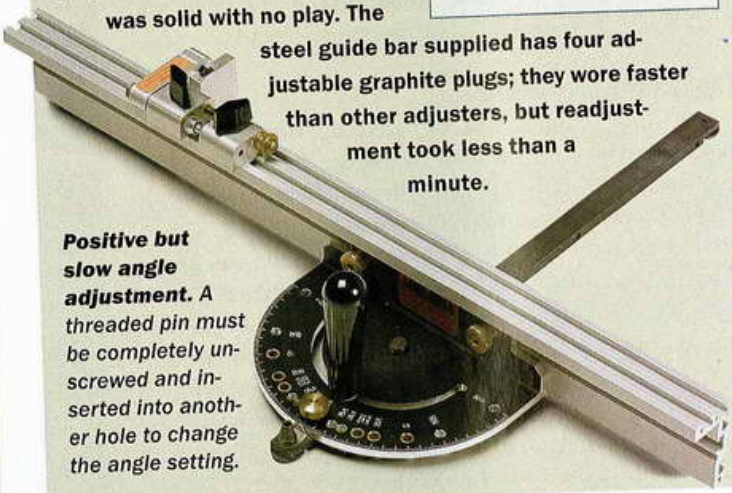
Source: Woodhaven
800-344-6657
www.woodhaven.com

Price: $176 (includes auxiliary fence)

Positive angle stops (15): 90°, 80°, 75°, 67½°, 60°, 45°, 30°, 0° each way

Fence length: 24 in.

Fence stop: One flip stop with micro-adjust



Positive but slow angle adjustment. *A threaded pin must be completely unscrewed and inserted into another hole to change the angle setting.*

ROCKLER SURE-LOC

Rockler's miter gauge looks like a basic design but actually uses a unique, secure locking system. The bottom of the head has small teeth that engage matching teeth on top of the bar. The head locks in place at a perfect 90°. However, the Sure-Loc does not allow any angle between the teeth increments.

The rest of the tool was disappointing. The guide bar—one of only two aluminum guide bars in the test—flexed easily when even light pressure was applied to the fence. The guide bar is actually made from two separate pieces that can be adjusted outward to fill the entire miter slot, resulting in a very weak bar. The 22-in.-long fence on the model I tested was slightly concave along its face and out of square to the table surface. For most crosscuts the fence doesn't have to be 90° to the table, but there are critical instances when a piece is placed upright against the fence, such as when cutting joinery. Last, the fence-adjustment knobs have only ⅛ in. of clearance below and were awkward to turn.

Overall rating: Fair

Source: Rockler
800-279-4441
www.rockler.com

Price: $130 (includes auxiliary fence)

Positive angle stops (240): at every 1½°

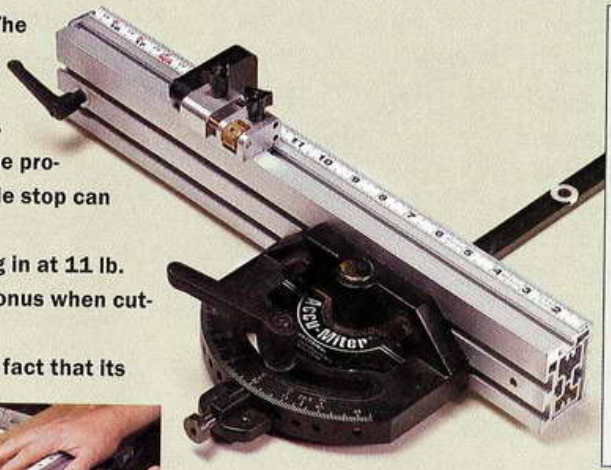
Fence length: 22 in.

Fence stop: One flip stop

The Rockler Sure-Loc has teeth. *These ensure accuracy but limit the miter gauge's settings to 1½° increments.*

Photos, this page (top left, top right, bottom left): Rodney Diaz

JDS ACCU-MITER



Overall rating: Excellent

Source: Tool Crib/Amazon
800-635-5140
www.amazon.com

Price: $180 (includes auxiliary fence)

Positive angle stops (nine): 90°, 75°, 67½°, 60°, 45° each way

Fence length: 18 in.

Fence stops: One flip stop with micro-adjust; one fixed stop on end of telescoping fence section

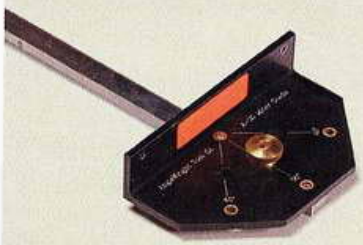
The JDS miter gauge is a big, heavy workhorse. The cast-aluminum head was solid as well as flat and straight. The steel guide bar has split nylon washers for adjustment. The Accu-Miter requires assembly and setup before it can be used, but the procedure was straightforward. The fence and simple stop can extend to 34 in., and the flip stop was accurate.

This was the heaviest tool to handle, weighing in at 11 lb. However, I found its extra weight and rigidity a bonus when cutting joinery and angles.

The only shortcoming of the Accu-Miter is the fact that its angle markings are cast into the head. This makes them large and easy to read but imprecise compared with some others. Also, it comes with a workpiece clamp, but I found it to be awkward, so I removed it.

Two-stop system. *A micro-adjustable flip stop fits on only the main 18-in. fence, but the fence extension offers a simpler stop for greater capacity.*

ANGLEWRIGHT A30



Overall rating: Very good

Source: AngleWright
510-608-2470

Price: $84

Positive angle stops (three): 90°, 45° each way

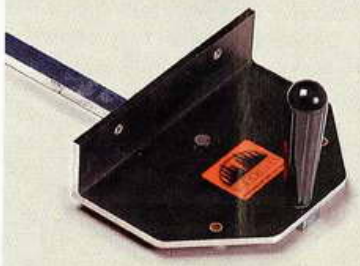
Miter gauges don't get much simpler than the AngleWright: a machined steel bar and simple aluminum head with only three attachment angles—one at 90° and two at 45°. There are no settings in between. To change angles, you simply unscrew the brass knob, remove the head, and reposition it on the guide bar. There are no fine-tuning features on the head of this miter gauge, but it doesn't need any: It was straight and square out of the box.

Shopmade fence. *The AngleWright and Woodhaven (at right) have holes for attaching a sacrificial fence.*

The AngleWright is supplied with a guide bar machined for the user's specific saw. The one specified for my tablesaw fit the miter slots almost perfectly. The guide bar has three small nylon adjustment setscrews for fine-tuning the fit.

The AngleWright has no additional features or available options. Basically, this streamlined but solid miter gauge cut the three commonly used angles accurately.

WOODHAVEN STANDARD



Overall rating: Excellent

Source: Woodhaven
800-344-6657
www.woodhaven.com

Price: $60

Positive angle stops (three): 90°, 45° each way

Woodhaven's standard gauge is similar to the AngleWright with a nearly identical head assembly. Its head is slightly larger than that on the AngleWright, and it was machined flat and square. The Woodhaven gauge uses four graphite plugs to adjust the bar for a tight fit in the miter slot, like the Woodhaven Deluxe. Both the AngleWright and Woodhaven standard models made perfect cuts right out of the box, but with its lower price tag, the Woodhaven has a slight edge.

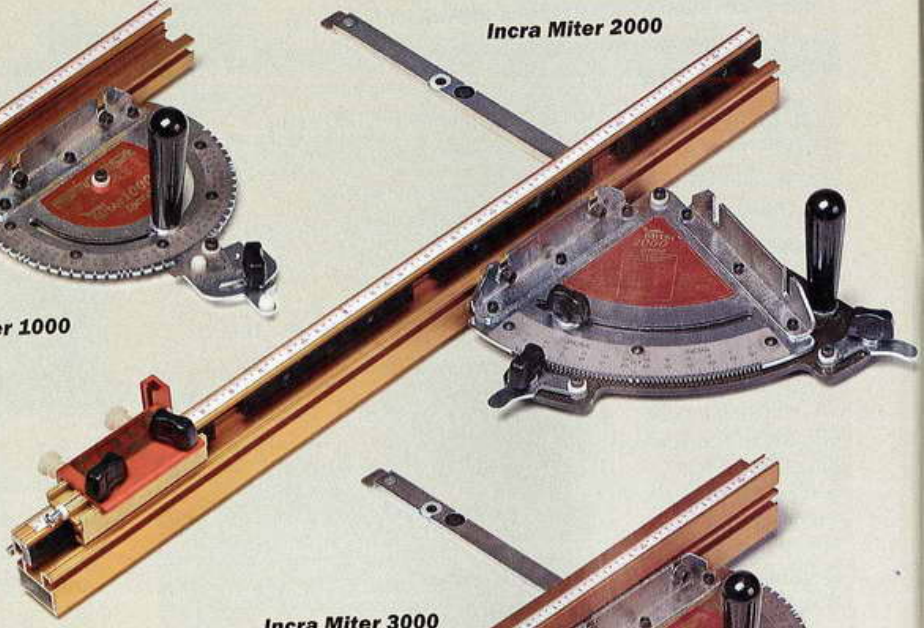
Only three angles. *The Woodhaven and the AngleWright (at left) require removing the head and unscrewing a nut or bolt to change the angle. But they are very accurate.*

Photos, this page (top right, middle right, middle left): Rodney Diaz

INCRA USES RACK-AND-KEY ADJUSTMENT

The Incra miter gauges are a protractor-head design, but they use a toothed rack for adjustment, creating a greater number of positive stops. All of the Incra products slid very smoothly and had useful features, but for the price I would expect a higher level of precision on the Miter 2000 and 3000, along with improved stops. The Miter 1000 is a better value, with its easily adjustable guide bar and good fence.

Incra Miter 1000



Incra Miter 2000

Incra Miter 3000

The Miter 1000 is Incra's basic miter gauge and one of the least expensive on the market. The markings on the protractor head were clear, and the head was quick and precise to adjust. Once the fence's mounting bracket was set at 90°, the remaining adjustments were accurate. The fence was perfectly straight but slightly out of square with the table, even at only 1½ in. tall.

Out of square. *The Incra fences weren't square to the table. The problem was fixed by shimming the fence-mounting bracket.*

All of the Incra models use nylon split washers to adjust for play in the miter slot. Easy to adjust, the washers allowed for smooth movement.

Aside from the initial adjustment of the fence-mounting bracket, the only shortcomings of the Miter 1000 were its small stop—which protruded only ¼ in. from the fence, leaving it unsuited for stacked cutting or pieces with angled ends—and the mini T-slot system for attaching an auxiliary fence. The size of the T-slots and their low position on the fence resulted in a wobbly auxiliary fence if it was more than a few inches high. However, at $90, the Miter 1000 is an excellent value, with 41 positive miter settings and accurate sliding action.

The Miter 2000 uses a different approach to the protractor head than the other two Incra products: a 90° head with fence-attachment brackets on two sides, for using the miter gauge on the left or right of the sawblade. The head is held to the bar by the handle bolt in the rear and a pivot point in front.

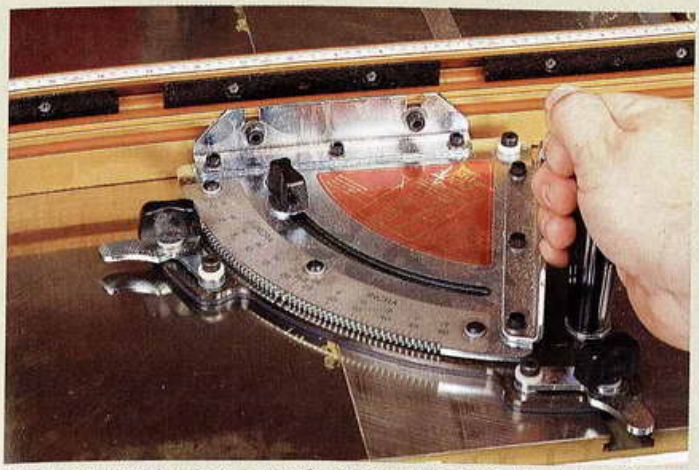
Overall, I found the Miter 2000 more cumbersome to set up and less accurate in the long run. The inaccuracy came from the fact that the handle's bolt hole is oversize, and in use the handle loosened, and the miter head and fence shifted slightly.

Another problem on the Miter 2000 was the fence itself: It not only was significantly out of square, but it also was warped. As with the Miter 1000, the manual suggests inserting shims, but it's difficult to correct both out of squareness and warp. The "Shop Stop" on the Miter 2000 offers a micro-adjustment feature that was not as precise as on the other designs, and it does not flip out of the way.

INCRA MITER	1000	2000	3000
Overall rating	Good	Fair	Fair
Price	$90	$150	$210
Positive angle stops	41 stops: every 5°, plus 22½° and 67½° each way	220 stops: every ½° on one side	364 stops: every ½° each way
Fence length	18 in.	27 in.	27 in.
Fence stop	One	One with micro-adjust	Dual flip stops with micro-adjust

Source: Woodpeckers (800-752-0725; www.woodpeck.com)

Photos, this page (top, middle, and bottom right): Rodney Diaz

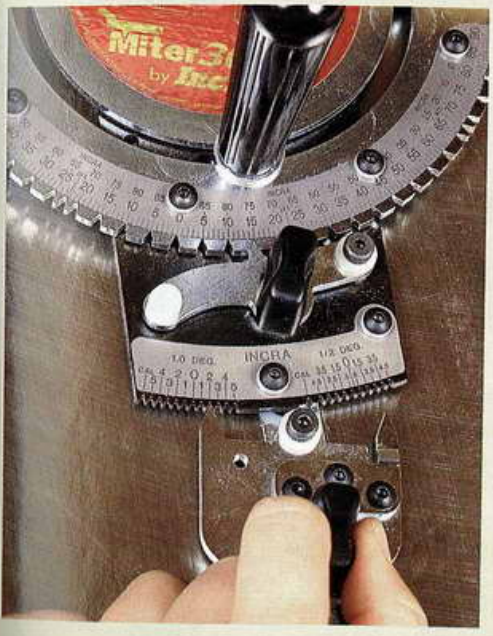


The Incra 2000 can go out of square. *If the large black handle loosens with time and use, the fence-support plate will shift slightly left or right.*

The Miter 3000 reverts to the head mechanism found on the Miter 1000 (which I prefer) with the addition of a 1° and ½° increment assembly. The finer degree adjustment was a nice feature, but with it the gauge took longer to adjust. However, if I were doing a lot of cutting that required precise half-degree adjustments, it would be a handy option.

The fence on the Miter 3000 was almost perfectly flat, but like the other Incra products, the fence was out of square to the table. Again, this can be corrected with shims.

After the testing period for this article, Incra debuted special editions of the 1000 and 3000 miter gauges, the 1000SE and the 3000SE, which offer longer, telescoping fences. Also, the 1000SE includes the two-armed flip stop found on the 3000 model.



Setting angles is less straightforward on the 3000. *The big rack has stops every 5°, and the smaller rack is used to add single and half degrees to those settings.*

OSBORNE MITER GAUGE

Overall rating: Fair

Source: Tool Crib/Amazon
800-635-5140
www.amazon.com

Price: $160 (includes extension fence)

Positive angle stops (nine): 90°, 75°, 67½°, 60°, 45° each way

Fence length: 24 in.

Fence stop: One flip stop

The Osborne gauge has a unique design with a support arm that forms a triangle with the fence and guide bar. The arm adjusted quickly with accurate detents at common angles. However, the gauge allowed too much flex and yielded inaccurate cuts in certain situations.

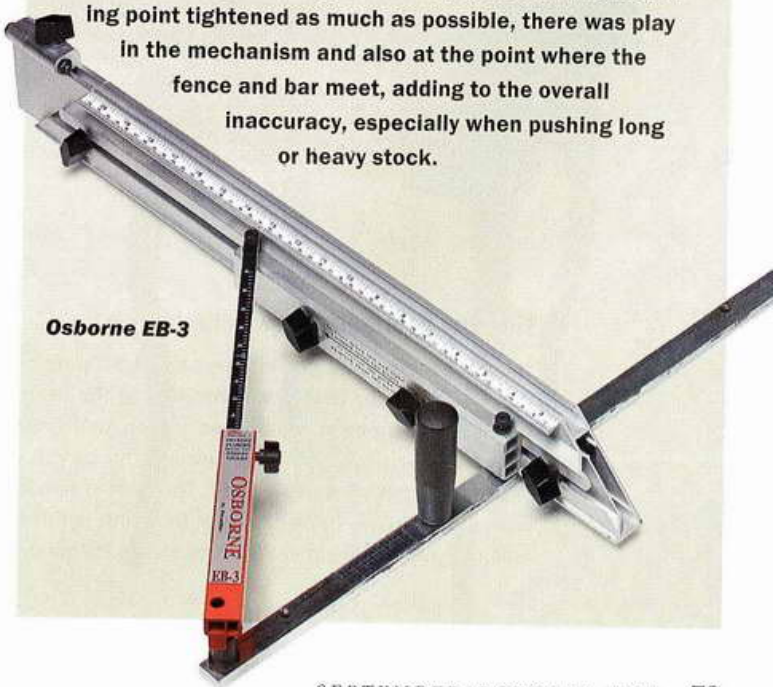
One end of the fence connects to the center of the guide bar. The opposite end of the fence mounts to the support arm, which, in turn, is attached to the front of the guide bar. The parts pivot at each of these three attachment points.

Markings on the adjustable arm measure the angle, and a ball plunger holds the fence in place. The plunger allowed for a quick return to 90° or any of the preset angles in each direction.

The longest crosscut capacity. *The telescoping arms and extension block allow the stop on the EB-3 to work on boards as long as 42 in.*

The EB-3's guide bar has three adjustment points to help provide a snug fit in the miter-gauge slot. The problem with the overall design is that wide stock pushes one of these points out of the miter slot, allowing the guide bar and entire miter gauge to flex.

The EB-3 incorporates an eccentric mounting point at the rear of the bar for the adjustment arm, allowing the user to fine-tune the angle settings. However, even with this mounting point tightened as much as possible, there was play in the mechanism and also at the point where the fence and bar meet, adding to the overall inaccuracy, especially when pushing long or heavy stock.



Osborne EB-3

Photos, this page (bottom right): Rodney Diaz

Current Work

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

Jeff Koopus Pittsford, N.Y.

Koopus was commissioned to build this cupboard (22 in. deep by 74 in. wide by 84 in. tall) for a client. Made from crotch mahogany and sycamore with bird's-eye maple and ebony veneer, the base was inspired by a Federal bowfront sideboard pictured in Albert Sack's *Fine Points of Furniture* (out of print), while the upper section was a collaborative effort with his client. The cupboard has an aniline dye, oil, and lacquer finish. Photo by Bruce Litolff

Timothy Brennan New Paltz, N.Y.

This mahogany chair (21 in. deep by 24 in. wide by 40½ in. tall) was made by tracing and measuring the design of an antique one. Brennan reproduced the original's carvings on the splat, crest rail, and ears; however, he carved the knees based on those of another chair. The seat is upholstered with wool brocade over horsehair, and the chair is finished with aniline dyes and shellac. Photo by Marlis Momber

Ric Martinelli and Cat Dellavalle Madera, Calif.

Martinelli and Dellavalle were commissioned to make this backgammon board (21⅝ in. deep by 11¾ in. wide by 3 in. high) as a gift from son to father. Based on an Art Deco theme, the piece is veneered in amboyna burl, Macassar ebony, African satinwood, and holly stringing. Each of the game pieces is inlaid with eight 2.35-mm black-and-white mother-of-pearl dots. The finish is conversion varnish. Photo by Mullins Studio

Ian Christoph San Francisco

Christoph built this dresser (20 in. deep by 58 in. wide by 35 in. tall) based on a design his wife had worked out. The primary wood is cherry, and the secondary woods are maple and oak. The piece features rosewood drawer pulls and has 122 hand-cut dovetails. The finish is linseed oil and wax.

Tom Bodett Gig Harbor, Wash.

"After working in the Arts and Crafts style for some time," said Bodett, mostly known as the voice of Motel 6 commercials, "I wanted to try a more fluid design in a table for my own living room." This lacewood, koa, and ebony table (20 in. deep by 20 in. wide by 25 in. tall) is what he came up with. The legs were shaped using the proportions found in the Fibonacci sequence, which "helped create a feminine foundation to the handsome Arts and Crafts lines and details." The finish is a combination of varnish, tung oil, mineral spirits, and wax.

Jim Probst Hamlin, W. Va.

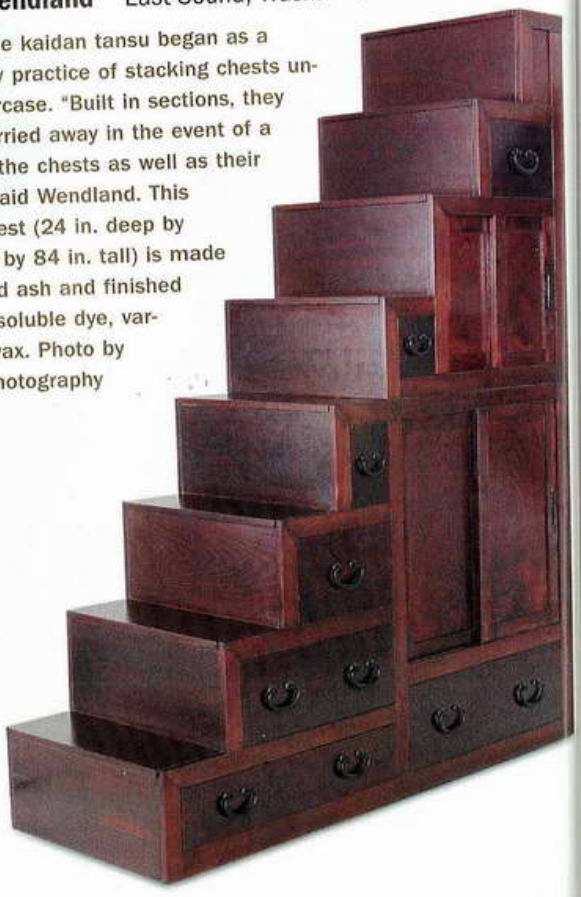
In 2001, Probst, a 13-year professional "mission-influenced" furniture maker, started producing a new style of furniture line that he had been designing and developing for several years. "My desire was to achieve an aesthetic that had a slight Asian influence and was a little softer, curvaceous, and more feminine," said Probst. This cherry and curly maple sideboard (22 in. deep by 62 in. wide by 32 in. tall) is representative of that new style, which he calls the Dora Collection. The piece has a tung oil and urethane finish.

Keith Rogers Plain City, Ohio

Rogers built this 18th-century desk (19 in. deep by 44½ in. wide by 42 in. tall) with some assistance from his wife, Sally. "My wife and I drew our own plans," said Rogers, "and changed them to suit us as construction went on." The desk is made from 60-year-old figured cherry that he bought from a friend. Rogers consulted various back issues of *Fine Woodworking* to make the shaded fan inlay, the cock beading, the hand-cut dovetails, and the column flutes. The desk is finished with stain and lacquer.

Thomas Wendland East Sound, Wash.

The Japanese kaidan tansu began as a 13th-century practice of stacking chests under the staircase. "Built in sections, they could be carried away in the event of a fire, saving the chests as well as their contents," said Wendland. This stairway chest (24 in. deep by 60 in. wide by 84 in. tall) is made from figured ash and finished with water-soluble dye, varnish, and wax. Photo by Blaisdell Photography



Richard R. Colter Gore, Okla. ▲

Made for Colter's daughter, this dressing glass (14 in. deep by 21 in. wide by 32 in. tall) was designed from plate No. 98 in Verna C. Salomonsky's *Masterpieces of Furniture* (Dover Publications, 1974) and a picture of the same piece obtained from the Boston Museum of Fine Arts. The piece is made of satinwood and basswood, with a secondary wood of poplar, and features crotch walnut veneers and ebony and holly stringing and banding. The gold-leafed mirror frame was carved out of basswood. The finish is French polish. Photo by Jim Fowler

Réjean Roy ▶
St. Lambert, Que., Canada

Roy built this cherry bookcase (13½ in. deep by 23 in. wide by 60 in. tall) to fit a narrow space in his bedroom. "I started making furniture a year ago after retiring from my regular job and taking a course in wood carving," said Roy. The bookcase's door is set with a pane of antique glass. The piece is finished with mahogany stain, shellac, and beeswax.

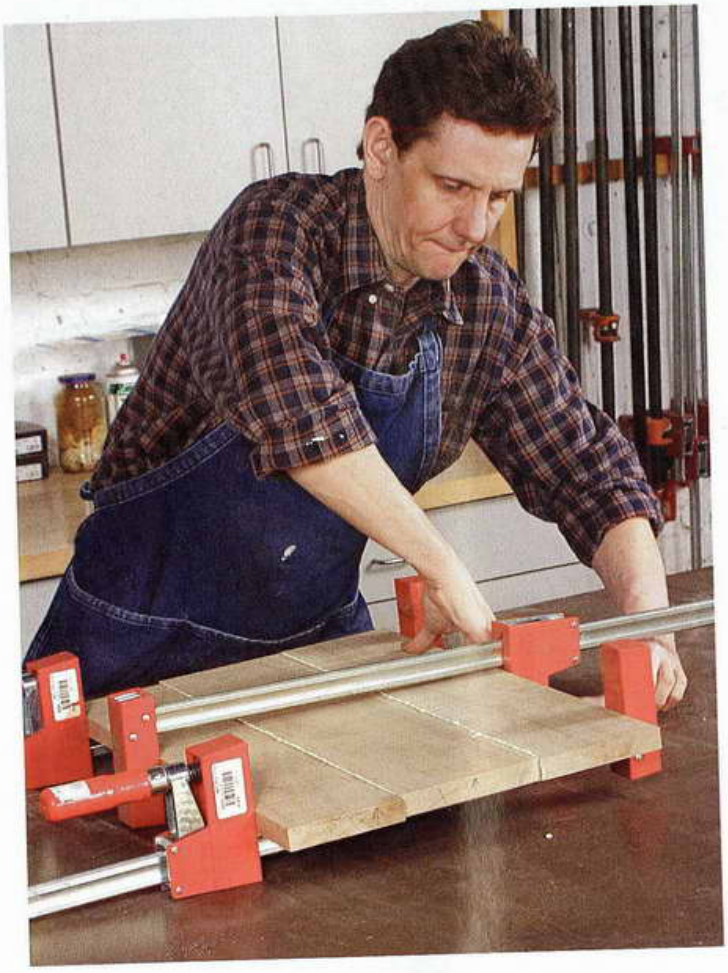
Joe Mendel North Andover, Mass. ▶

Mendel made this chest (18 in. deep by 43¾ in. wide by 26½ in. tall) as his first project as a student at North Bennet Street School in Boston. Constructed out of quartersawn white oak with a pine bottom, the chest was inspired by a John Thurston piece on display at the Wadsworth Atheneum in Hartford, Conn. It is finished with Danish oil and a mixture of carnauba and beeswax. Photo by Lance Patterson

Rules of Thumb

No-mess glue-ups

BY JEFF JEWITT



Every woodworker experiences the trauma of discovering an errant glue splotch on their project when they apply a finish. Over the years I've experienced many glue mishaps and tried every trick out there.

Problems with errant glue can be grouped under three headings: avoiding glue squeeze-out in the first place; planning for squeeze-out; and removing glue when it does squeeze out.

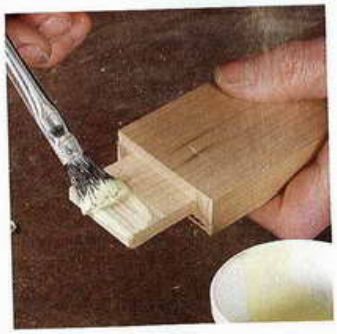
Woodworkers have access to all sorts of modern and traditional adhesives, but for the purpose of this article I'll deal with the most common glue, polyvinyl acetate (PVA), also known as aliphatic resin, which comes in white and yellow forms.

I do all of my gluing on a 4-ft. by 8-ft. melamine table that's about mid-thigh height and on casters. For convenience I put a few shelves underneath the table to store clamps. The slick melamine allows furniture to slide pretty easily as I'm pivoting and turning it during assembly, and it's easy to wipe up errant drips of glue. A good alternative surface material is tempered Masonite.

Before every glue-up, it's important to complete a dry run of the clamping procedure. The dry run allows you to double-check that all of the joints are correctly machined and to get all of the clamps that you'll need within easy reach. The other thing to do is fill a container with distilled water and place it nearby with rags. Keep your hands clean during gluing, and wipe them immediately

AVOID GLUE SQUEEZE-OUT ON MORTISE-AND-TENON JOINTS

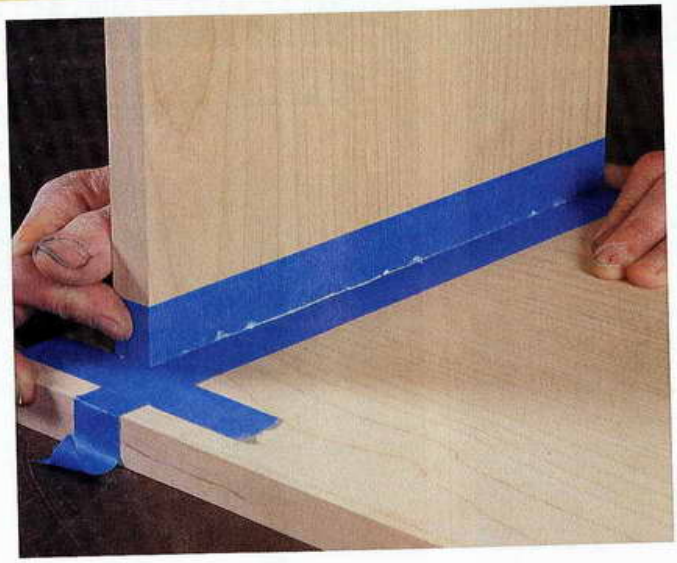
Bevel the tenon and edges of the mortise. *Use a chisel, a shoulder plane, or even a coarse file to bevel the end of the tenon, which leaves additional space inside the joint for excess glue. Bevel the edges of the mortise with a chisel (right) to leave an area for any excess glue to hide in.*



Apply glue only to the bottom end of the tenon. *Leave ½ in. below the shoulders glue-free. As the tenon slides into the mortise, the glue is spread along the tenon by the walls of the mortise.*

Photos: Mark Schofield

PROTECT THE WOOD FROM GLUE WITH TAPE



Containing squeeze-out. *Prior to assembly, apply blue masking tape to visible areas of a joint where squeeze-out may occur. During assembly, any squeeze-out goes onto the tape (right).*

with water and a clean rag if you get glue on them.

Tricks to eliminate squeeze-out

With practice you can eliminate glue squeeze-out and still achieve full-strength joints. Two of the best ways to avoid glue seepage are to alter the design of the joint and to apply just enough glue to form a strong bond but not so much that you get excessive squeeze-out.

With mortise-and-tenons, both of these techniques come into play. The key is to keep the glue from coming out of the mortise when you clamp the joint. Cut the mortise ⅛ in. deeper than the length of the tenon, and bevel the edge of the mortise and the end of the tenon on all four sides with a chisel. This gives more room for excess glue to hide in.

Apply glue to the mortise walls and the tenon, keeping the glue at least ½ in. away from the shoulders. As the two sections are brought together, the excess glue is pushed up the tenon, but the bevel prevents it from riding up onto the mortise and instead rolls it over the glue-free section of the tenon.

Ways to contain squeeze-out

Another approach is to accept glue squeeze-out but to employ strategies that make removing it easier.

Tape off the wood—With dadoes and sliding dovetails like those often found in chests of drawers and bookcases, I dry-assemble the piece and tape off around the joints with blue painter's masking tape, which can be removed cleanly with no residue. Apply the glue and assemble the piece in the normal way. When the glue has dried, peel away the tape, removing any residual glue. This doesn't require a lot of extra work, and the clean, glue-free joint is worth it.

Apply finish before glue-up—With any workpiece you always have the option of prefinishing, but it's my favorite technique for multislatted pieces or where there are a lot of complicated areas to finish. Cover tenons with blue masking tape and stuff paper-towel pieces into the mortises. Stain the piece, if applicable, and apply a couple of coats of finish. Don't apply a final coat of finish, as the surfaces may get slightly marred during assembly. Make sure you use clamps with protective faces so that you don't mar the piece. If your clamps have metal faces, use squares of HomaSote (an insulation material sold at builder's merchants) to protect the workpiece.

Removing squeeze-out

Sometimes glue squeezes out no matter what precautions you take. On a prefinished surface, most glue squeeze-out can be scrubbed off with a toothbrush and water, and the surface wiped clean with a damp cloth. If you miss some of the glue, perhaps because it is under a clamp, let it dry for a few hours, at which point you can

PREFINISH PARTS BEFORE GLUING

Apply finish before glue-up. *Mask off areas that will receive glue. Tenons are wrapped in tape, while mortises are stuffed with paper towels.*

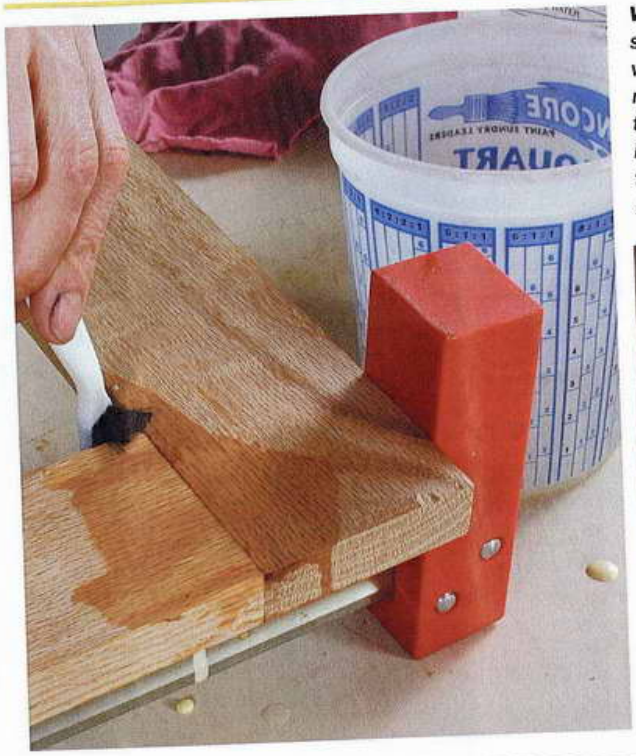
practically peel the glue off the finished areas with a chisel.

But if you get glue squeeze-out on bare wood, you have the options of letting it dry or semicure, or wiping it off immediately with water. In most cases I prefer to clean off the squeeze-out before it dries. Dried glue can be a horror to remove.

Rather than grabbing any old wet rag to remove glue, I take a more systematic approach: First, use distilled water, as tap water may contain dissolved iron salts that will cause little gray spots on tannin-rich woods like oak. Use a toothbrush to remove the glue, scrubbing with plenty of water. On open-pored woods, this method removes the glue that's inside the pores. Then, with a clean cloth dampened with distilled water, wipe the joint clean.

Because large panels are usually flattened using a drum or belt sander, don't bother to thoroughly clean off the beads of glue; let them dry six to 12 hours before scraping. If you wait any longer, the beads get too hard, and you risk pulling off hunks of wood as you scrape. □

REMOVING SQUEEZE-OUT



When all else fails. *If you get squeeze-out on open-pored wood, use a toothbrush to remove glue from the pores rather than a cloth, which forces glue into the pores. To avoid staining tannin-rich woods like oak, use distilled water.*

Glue scraper. *On large panels, let the glue dry six to 12 hours and then use a cabinet scraper to remove the surplus glue. Waiting longer increases the chances of tearing out the wood.*

Q&A

How stable is walnut?

I am planning to build one or more secretaries like the one that Lonnie Bird built in FWW #154, #155, and #156 (see the photo below). Like Bird, I intend to use black walnut, but I have not used walnut before. My other choice for this project would be mahogany. How stable is walnut in comparison to mahogany? Will I have a terrible time keeping walnut flat and straight?

—Robert La Placa, Allentown, N.J.

Lonnie Bird replies: Black walnut is a beautiful wood with rich, chocolate color and dramatic figure; as it ages, it becomes lighter and reveals warm red and yellow tones. The moderately hard, even texture of walnut makes it a pleasure to handplane and carve.

Although walnut isn't as dimensionally stable as mahogany, it's not difficult to work. In fact, the steps I take to ensure stability are no different from what I do with any native hardwood.

Begin by using dry lumber, and allow it to acclimate to your shop. Before milling the lumber to final dimension, use a jointer or large bench plane to flatten the face and true one edge of each piece of stock. Wait to flatten wide boards such as the hinged writing surface and door panels until you're ready to use them; if left lying around for several days, the boards are likely to warp.

Walnut works for furniture. *Dry lumber, an awareness of movement patterns, and a good, sealing finish will ensure success with walnut.*

Second, be aware of potential cross-grain construction problems, and take the necessary precautions to allow for seasonal wood movement. For example, the breadboard ends on the secretary's hinged writing surface must be attached to allow for small amounts of movement that take place when the relative humidity changes.

Finally, after the secretary is complete, seal all surfaces with finish so that moisture exchanges occur at an even rate.

I'm sure that if you follow these guidelines, the surfaces will remain flat and free of stress cracks, and the doors and drawers will operate smoothly for years to come.

[Lonnie Bird teaches woodworking in Dandridge, Tenn. Visit his Web site at www.lonniebird.com.]

Inlay, marquetry, and boulle work

What is the difference between inlay and marquetry? How do those differ from boulle work?

—Parker Reeves, Shreveport, La.

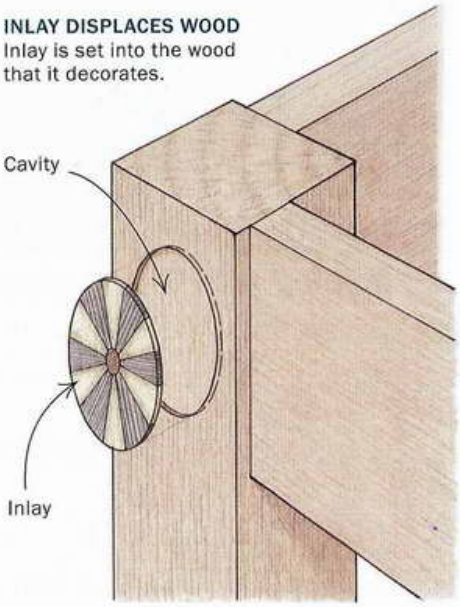
Julia Godfrey replies: Inlay, originally termed intarsia, began as early as 350 B.C. in Asia Minor. Artisans used a long-handled knife resting on the shoulder to cut cavities about 5 mm deep so that a veneer or composition of veneers could be placed into them.

Marquetry is the process of covering a surface with assembled veneer instead of placing veneer into cavities.

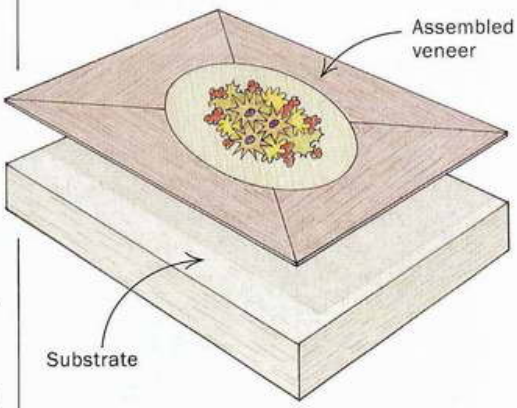
Boulle work refers to a unique style of marquetry that combines metal and other materials, such as tortoiseshell, mother of pearl, and wood veneers that have been stacked and cut with a fretsaw. Although named after Andre-Charles Boulle, he did not invent the method but rather refined it. Boulle created spectacular works for Louis XIV, and many of these works can be found in prestigious museums around

HOW INLAY, MARQUETRY, AND BOULLE WORK DIFFER

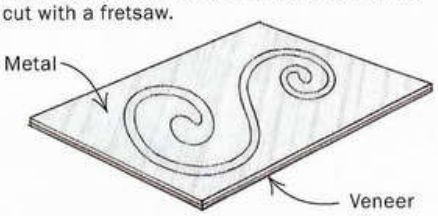
INLAY DISPLACES WOOD
Inlay is set into the wood that it decorates.

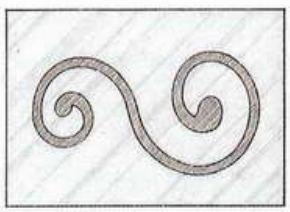


MARQUETRY IS APPLIED TO WOOD
Marquetry pictures are assembled and veneered over a substrate.



BOULLE WORK IS A FORM OF MARQUETRY
A stack of metal and one or more other materials, such as veneer or tortoiseshell, is cut with a fretsaw.





The positive and negative cutouts are combined into one unit.

Drawings: Vince Babak; photo, this page: Matthew Teague

the world. A school, L'Ecole Boulle in Paris, continues to teach the method.

Boulle-style marquetry owes its existence to the invention of the fretsaw in the 17th century. This tool was ideal for cutting sinuous curves with precision. German marqueteurs developed a technique of stacking and cutting veneers along the lines of a drawing placed on the stack.

In the 18th century, a German named David Roentgen discovered the technique of conical sawing. By angling his saw at about 12°, Roentgen found that stacked veneers would mate perfectly, with the angled cut eliminating the sawblade kerf.

The idea virtually was abandoned until the 20th century, when the studio of Pierre Roseau revived the technique of conical sawing, now called bevel cutting. Most marquetry done today in North America uses a variation on this technique. [Julia Godfrey builds custom furniture in Greenfield, Mass.]

Cutting square pin walls in half-blind dovetails

I recently learned to hand-cut half-blind dovetails. However, after I make the initial, diagonal sawcuts for my pins, I find it difficult to chisel them out square and cleanly. Nine times out of 10, I wind up undercutting. Is there a way to deepen the kerf squarely into the pin in the first place?

—Mike Brewer, Bozeman, Mont.

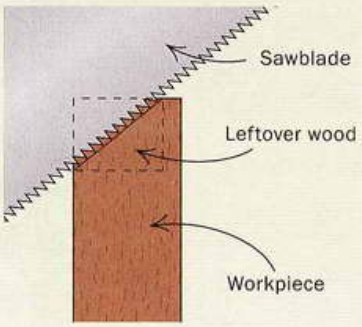
Karen Wales replies: After I cut the initial kerfs in half-blind dovetails, I use a modified saw to finish the kerf squarely. I took an inexpensive dovetail blade and filed off the teeth from about 2 in. of the forward end of the blade. Some people use an old scraper blade for this technique. While that will work, I prefer a sawblade that has a spine. The spine protects the striking tool, which, in turn, lets me make better contact with the pin corners.

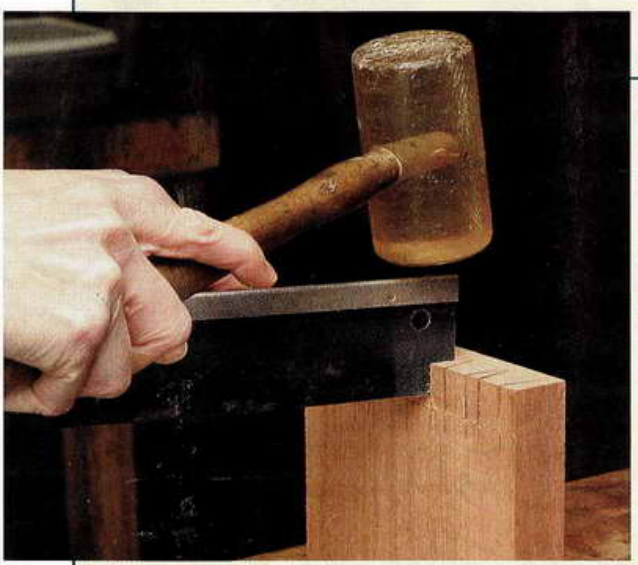
Once the initial diagonal kerfs have been sawn, I set the toothless part of the blade in the kerf, sighting it to line up with my layout lines. Then I pound out the channel with a deadblow hammer or mallet. I don't try to get the blade all the way in with one blow. That's a sure way

CUTTING DOVETAILS SQUARE AND STRAIGHT

SAW A DIAGONAL KERF

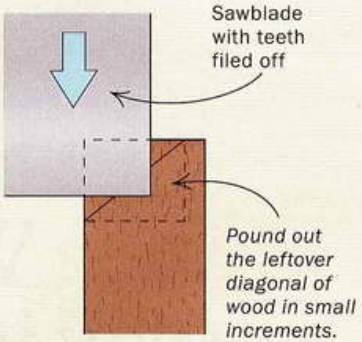
The kerf of a half-blind dovetail leaves a diagonal of wood that can be difficult to chisel out cleanly.

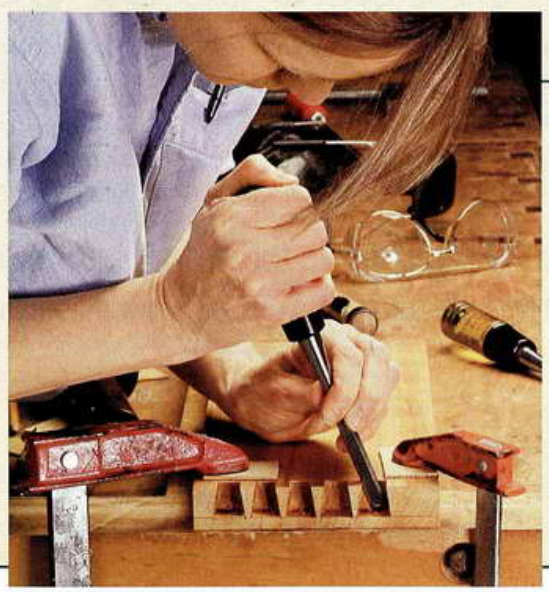




DEFINE THE WALLS WITH A MODIFIED SAWBLADE

Pound out pin walls in small increments, tapping the blade out of the kerf, realigning it and driving it in farther, until the pin walls are defined.





CLEAN OUT THE CORNERS WITH A SKEW CHISEL

Use a bench chisel to clean out the majority of the tail pockets. Then turn to a skew chisel to remove the corner nib, which is hard to reach with a flat-edged chisel.

Photos, this page: Kelly J. Dunton

to split out the sides. Instead, I pound out a little at a time, working the toothless blade out of the kerf, resetting and pounding it in a bit farther, and pulling it out again. I repeat these steps until the saw fits squarely into the corner of the pocket. It usually takes about three repetitions until the chisel has a clear path to follow.

The toothless blade cuts cleanly to the base of the pin wall, reducing the leftover diagonal of wood to a tiny corner nib. This method makes cleanup of the pins more accurate, too.

[Karen Wales is an assistant editor.]

Tearout trouble

I love the figure of curly maple, but I have great difficulty working with it, especially when putting it through the planer. Is there any way to put this type of wood through the planer without tearing out the curl too much?

—George Michaels, Atlanta, Ga.

Brad Gordon replies: There are a few things you can do to lessen tearout. First, make sure that your planer blades are razor sharp. If you haven't changed them out in a while, now would be the right time.

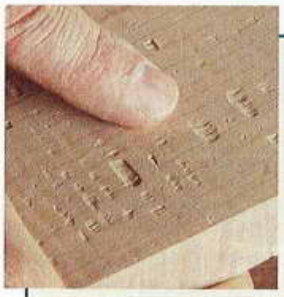
Second, feed your wood into the planer at an angle. Even a slight angle will make a difference. Angling the board allows the planer's cutterhead to slice shavings on the bias to the direction of the grain rather than shearing along the grain. This is important for planing curl, because the grain is compacted vertically like ribbon candy along its length.

Third, take light passes. Don't plane too much at once, or you will gouge the wood. Also, if you own a planer with a variable-speed feed rate, put it on the slowest setting to achieve the most cuts per inch while planing.

One final measure is to dampen the surface to be planed prior to feeding it into the machine. Just like raising your beard before shaving, dampening gets the wood fibers to stand up and be clipped.

Combining these methods will help you plane curly maple more successfully.

[Brad Gordon builds custom furniture and makes wood sculpture in York, Maine.]



PREVENT TEAROUT IN FIGURED WOOD

Curly maple tends to chip out when put through a planer. If the face of the board is dry, and it is fed into the machine perpendicular to the cutterhead, tearout can be so bad that it renders the piece useless.

Dampen the board face. *Dampening will swell surface fibers slightly, raising short fibers while keeping longer ones flexible.*

Feed at an angle. *Angling the board will keep cutterhead blades from lifting long, undulating wood fibers along the grain.*

Photos, this page: Karen Wales

Master Class

BY JAY HAAVIK

Bring life to flat panels by adding texture

Tools for texturing wood. *The elbow adze (top) takes a bigger bite than the crooked knife (bottom). Both leave crisp, undulating surfaces that need no further work. These types of tools are available from Kestrel Tool (800-669-3943) or Diobsud Forge (360-468-4450).*

Native Americans along the Northwest Coast have a rich woodworking heritage distinct from what the early European settlers and their counterparts in the Old World were known for. Whether they created totem poles and masks or worked timber for their homes, Native American craftsmen worked wood with adzes and crooked knives instead of saws and planes, leaving textured surfaces, not smooth boards.

Although my work is primarily carving, I also build contemporary furniture, using the carving tools and techniques to add texture. A knife or an adze leaves texture that has a dramatic way of catching the light and can add interest to a plain panel, especially one surrounded by a smooth, nontextured frame in a contrasting wood.

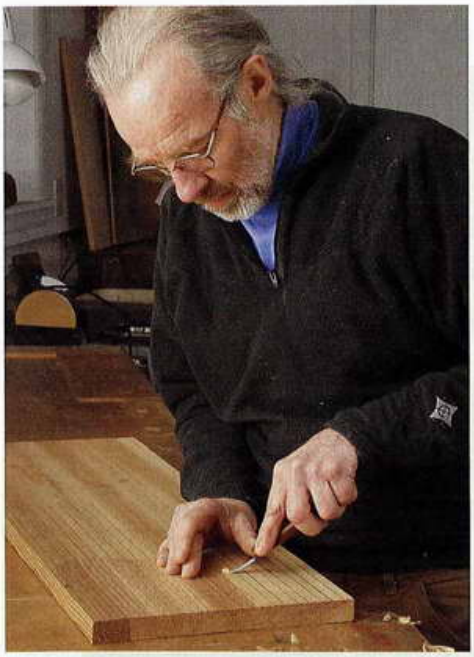
While Western tools such as gouges and slicks can be used to texture wood, adzes and crooked knives allow for a uniquely controlled, symmetrical patterned effect. Softer, straight-grain woods such as red and yellow cedar, soft maple, or alder are good candidates for texturing.

Crooked knife is a precision instrument

The crooked knife, also known as the curved or bent knife, has a blade of stone, metal, or bone, and the end is curved or hooked. One side of the blade is flat with the cutting edges on one or both edges. With a handle the blade forms a crook, or curve, at the tip. Before using the knife to carve, I usually draw lines on the wood with a soft lead pencil to serve as a guide.

There are two common ways of handling the knife. One is to hold the knife in hand and move your wrist away from the body as you carve. But I prefer to use two hands, with one hand holding the handle and the other pushing or pulling from the handle (called the haft) of the blade. Like all carvers, I have a large selection of knives for different effects. But if you want to test the water with this technique, I suggest getting either a Kestrel C-5 or Diobsud No. 012, which are good general-purpose tools.

For best results, hold the knife at a 45° angle to the grain while



TWO WAYS TO USE A CROOKED KNIFE

Push the tool. *Hold the knife in one hand. The other hand rests on the stock. Push with the thumb against the base of the handle and let your other hand guide the tool in an arc through the wood.*

Pull the tool. *One hand holds the knife while the other rests on the stock with the forefinger wrapped around the handle near the base of the blade. Pull the forefinger toward you while rolling the tool with the other hand.*

Photos: Anatole Burkin

making the cuts parallel to the grain. With more experience, you can create textured fluted rows across the grain and even on the end grain.

Adze is for heavy stock removal

Ideal for removing a large amount of material quickly, the adze has been in use for thousands of years, to shape wood for boats, wagons, houses, and masks. Handles often are of bone or wood. Blades have been made from bone, stone, or metal.

The native peoples of the Northwest Coast employed two basic types of adzes: the D-adze and the elbow adze. Both serve to shape and texture surfaces (for more on these tools, see *FWW* #63, pp. 58-61).

For this technique, I use the elbow adze, which has its handle cut away between the head and the grip, to give spring for popping out the chips. The blade is reversed so that the bevel of the cutting edge faces away from the wood. The elbow adze usually is held with one hand. The tool is positioned so that the thumb is at a 90° angle from the blade's outside bevel. As you bring down the adze, the blade should hit the wood just behind the edge so that the edge slices through the wood. As with the crooked knife, cut with the grain at about a 45° angle.

Hitting the wood with the edge of the blade will only dig into the wood like an ax chopping into a tree. The hand, wrist, and elbow should move in a rhythmic motion, continued at a steady pace. I recommend Kestrel's E-5 as a good adze for a beginning carver and general all-around use. □

ADZE TECHNIQUE

An elbow adze takes a bigger bite than a crooked knife. *Hold the tool at about 45° to the line of cut and strike firmly but without undue force to remove material of a uniform thickness.*

Sharpening knives and adzes

Sharpening a crooked knife. *To hone the cutting edge, use various grits of sandpaper wrapped around a dowel.*

The hook on the blade of a crooked knife calls for a rounded sharpening device. A new crooked knife should have its back flattened. Start by drawing the knife's flat surface over 600-grit wet-or-dry sandpaper on glass, then move to 1,200 grit. Next, hone the inside edge of the knife in sequence using 400-grit through 1,200-grit wet-or-dry paper rolled around a piece of ⅜-in.-dia. dowel. Then finish with a leather strop and buffing compound.

An elbow adze is sharpened the same way as a gouge or chisel. First work the back side until it is nicely polished, then hone the bevel edge. With a new adze, or if the edge is severely worn, start with a medium-grit waterstone, then move on to 600-grit wet-or-dry paper on glass, then 1,200 grit. Remove the burr, and polish on a leather strop using polishing compound.

Honing the adze. *Swipe the bevel edge across the abrasive as you would a gouge. Finish with a leather strop.*