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Make premium bar clamps for a discount price.

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American Woodworker Subscriber Service Dept., P.O. Box 8148, Red Oak, IA 51591-1148, (800) 666-3111, e-mail AWWservice@rd.com

Article Index

A complete index is available online at www.americanwoodworker.com

Copies of Past Articles

Photocopies are available for \$3 each. Write or call: American Woodworker Reprint Center, P.O. Box 83695, Stillwater, MN 55083-0695, (715) 246-4344, 8 a.m. to 5 p.m. CST, Mon. through Fri. Visa, MasterCard, Discover and American Express accepted.

Back Issues

Some are available for \$6 each. Order from the Reprint Center at the address above.

Comments & Suggestions

Write to us at American Woodworker, 2915 Commers Dr., Suite 700, Eagan, MN 55121, (651) 454-9200, fax (651) 994-2250, e-mail aweditor@readersdigest.com

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Classified Manager, **Don Serfass**, (215) 321-9662, ext. 30

PUBLISHED BY HOME SERVICE PUBLICATIONS, INC.,
A SUBSIDIARY OF THE
READER'S DIGEST ASSOCIATION, INC.

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Issue #116, American Woodworker®, ISSN 1074-9152,
USPS 738-710 Published bimonthly, except monthly
October and November by Home Service Publications, Inc.,
260 Madison Avenue, 5th Floor, New York, NY 10016.
Periodicals postage paid at New York, NY and additional
mailing offices. Postmaster: Send change of address notice
to American Woodworker®, P.O. Box 8148, Red Oak, IA
51591-1148. Subscription rates: U.S. one-year, \$24.98. Single-
copy, \$5.99. Canada one-year, \$29.98 (U.S. Funds); GST #
R122988611. Foreign surface one-year, \$29.98 (U.S. Funds).
U.S. newsstand distribution by Hearst Distribution Group,
New York, NY 10019. In Canada: Postage paid at Gateway,
Mississauga, Ontario; CPM# 1447866. Send returns and
address changes to American Woodworker®, P.O. Box 8148,
Red Oak, IA, USA 51591-1148. Printed in USA. © 2005
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of interest to you. If you would rather we not share information,
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Woodworker, Customer Service Department, P.O. Box 8148,
Red Oak, IA 51591. Please include a copy of your address label.
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Tips of the Month

We are proud to be associated with the premier woodworking magazine, and we are pleased to offer the following tips:

True Your Framing Square

Testing the accuracy of your framing square:

Find a straight board that measures about one foot wide by two feet long. Lay the long leg of the framing square along the edge of the board so that you can mark a one-foot long line across the middle of the board. Next, flip the square over and align it with the opposite side of the pencil line that you just drew. If the edge of square and pencil line are perfectly parallel, then you have the accuracy you want and need. If the pencil line and the edge of the square don't align, then the square is not "true" and thus the square will need to be adjusted.

Truing your framing square with a hammer and a nail punch:

If the test determines that the existing angle of the square is less than 90 degrees, then your adjusting point becomes a location near the inside corner of the square. If greater than 90 degrees, your point will be near the outside corner of the square.

Here's how the actual adjustment is made:

- Lay the square flat on any solid surface – like a concrete patio or walk.
- Using the rules above to determine where to make an adjustment, sharply rap the inside or outside corner of the square with the hammer and punch. Use a firm blow to strike the punch. The punch will leave a circular mark in the surface of the square. The mark won't hurt a thing, but will stretch the metal on that side of the square.
- Retest the square after each blow with the punch until the square and the line are perfectly parallel. Bet you didn't realize that "truing" a framing square could be so easy.

Ask the Carey Brothers a woodworking, home improvement or remodeling question on their live radio broadcast every Saturday from 9:00 a.m. to 1:00 p.m. Eastern Time. Call toll-free at 1-800-737-2474 to ask your question. Visit their website at www.onthehouse.com for recaps of the show and other helpful info.

The Woodworker's Corner

A note from the Publisher of American Woodworker, Jim Schiekofer

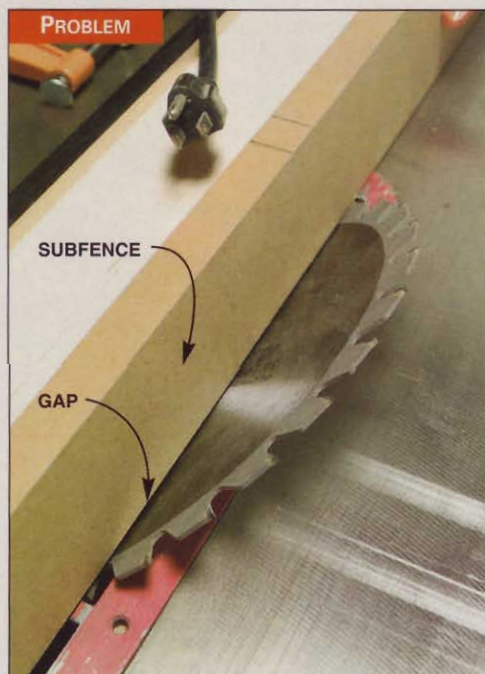
Every once in awhile, I come across a company who not only puts out an excellent product but goes above and beyond the business of woodworking to give something back to society. In that spirit, I'd like to congratulate Laguna Tools for their major sponsorship of the Taller San Jose Organization. This group's purpose is to provide under-educated and unskilled young adults with an opportunity to finish their education, build self-esteem and develop skills that will enable them to find work and earn a living wage. It's refreshing to see this commitment from Laguna Tools, which will no doubt make a difference in the lives of those enrolled in the program and the communities in which they live.

LAGUNA TOOLS

See the latest Laguna Tools ad on the back cover of this issue.

WHY DOES MY TABLESAW BURN ANGLED RIP CUTS?

Q My contractor saw burns its way through long rip cuts when the blade is cranked over to a 45-degree angle. What gives?

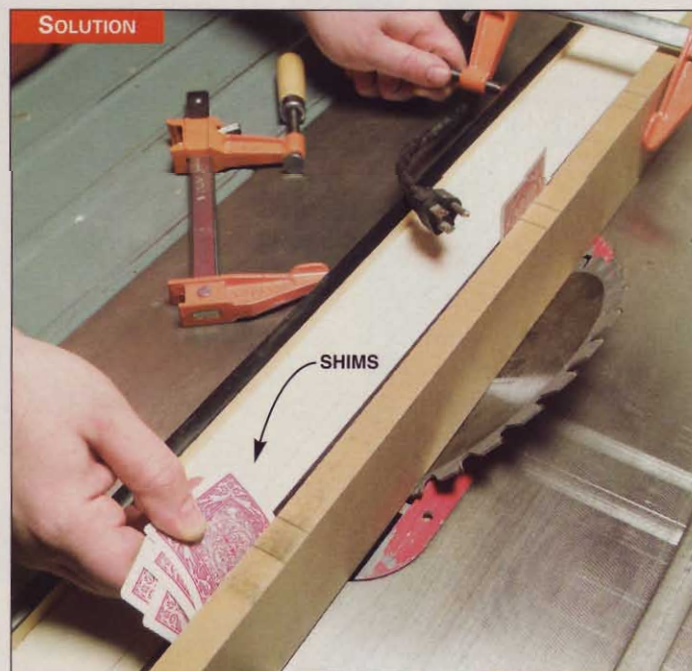


Here's the problem: With the blade at 45 degrees, the subfence is no longer parallel with the blade.

Here's the solution: Use playing cards to shim the subfence parallel with the saw blade.

A The lighter trunnions on the contractor saw can twist a bit when the blade is tilted. At 90 degrees, the weight of the motor is parallel with your blade. At 45 degrees, the whole motor and trunnion assembly is essentially tipped on its side. The weight of the motor can be enough to twist the trunnion and force the blade out of parallel with the fence.

The solution is to shim out a subfence to compensate for the misalignment when making bevel cuts. With the fence now set perfectly parallel with the blade, you should get clean, burn-free bevels on your rip cuts.



WHAT IS A RECONDITIONED TOOL?

Q I'm always looking for a bargain, and I've seen "reconditioned tools" in stores and catalogs at a 20 percent to 40 percent discount. What are they?

A Reconditioned tools can be a real bargain, but you need to know a few things before you buy one. Reconditioned tools have been returned to a manufacturer before they're sold to you. They come from three main sources: warranty returns, demonstration tools from trade shows and returns from a retail store, including overstock. You can't tell where a tool came from just by looking at it, however. It may have been used quite a lot or not at all.

As a general rule, if a box has been

opened at a store and returned to the manufacturer, the tool must go through a reconditioning program. Every manufacturer maintains a department where these tools are inspected, repaired if necessary and then put through a quality-control program.

Reconditioned tools usually have a shorter-term warranty than a new tool. Be sure that the seller is willing to guarantee your satisfaction. If the tool does not meet your expectations, you'll want to know if the seller will take it back.

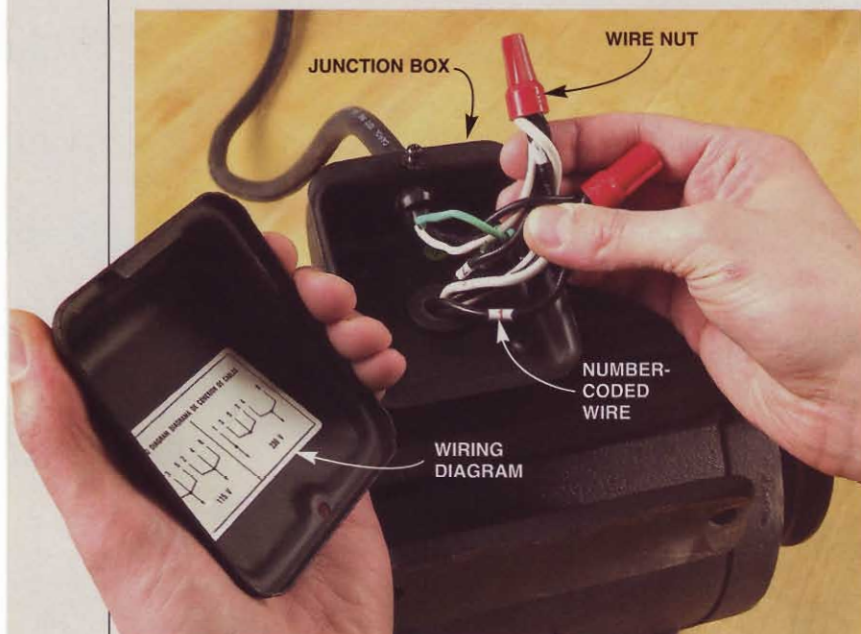
CONVERTING A MOTOR'S VOLTAGE

Q I need to change the wiring on an 8-in. jointer from 240 volts to 120 volts. How do I do it?

A Motors that can be wired for either 240 volts or 120 volts should have a wiring diagram on the motor or on the inside of the wire junction box cover. The motor will have either numbered wires or color-coded wires. Rewiring you motor is a simple matter of rearranging the connections. To make the change, just match the numbers or colors to the diagram on the motor. Use new wire nuts, and make sure they are twisted on all the way. You'll know you're there when a wire nut no longer turns without twisting the whole wire bundle.

An often overlooked but important factor when going from a higher voltage to a lower voltage is the cord's wire gauge. Motors wired for 240 volts will have 14-gauge or 16-gauge wire. This wire is too small for the increased amperage draw required by a motor wired for 120 volts. Use 12-gauge wire for motors rated at or above 12 amps at 120 volts.

If you have a question you'd like answered, send it to us at **Question & Answer, American Woodworker**, 2915 Commers Drive, Suite 700, Eagan, MN 55121 or e-mail to qanda@readersdigest.com. Sorry, but the volume of mail prevents us from answering each question individually.



8 American Woodworker SEPTEMBER 2005

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edited by Tom Caspar

SIMPLE LUMBER MAKER

I've turned my bandsaw into a mini sawmill with the help of one dirt-simple jig and a pair of extension tables. The jig is nothing more than a piece of plywood screwed to the log. It steadies the log when I cut the first slab and provides additional support when I rotate the log to saw boards (see photo, below).

My bandsaw is equipped with a fence to guide the jig and a riser block to accommodate the additional height of a log. I use a very coarse 3/4-in. 2-tpi blade for sawing thick, green wood (see Source, below). My jig is a piece of 3/4-in. plywood 12 in. wide and 6 ft. long. (The largest log the saw and my back can handle is 11 in. dia. and 4 ft. long.)

Attaching the plywood to the log is easy. I just lay the plywood on top of the log and drive 2-in.-long deck screws at three or four points where the board touches the log. (The screws should penetrate at least 1/2-in. below the bark.) I lift the log onto the extension table and pound some carpenter's shims under both sides of the log to keep it from rocking. The first cut goes through both log and plywood. This creates a flat surface to support the log on its side for the following cuts.

Jay McClellan

SHIM



I flip the plywood jig on its side and ride it against the fence to saw boards. The jig automatically holds the log at a right angle to the first cut I made.

Source Suffolk Machinery, (800) 234-7297, www.suffolkmachinery.com
2-tpi PC Series 3/4-in. x 105-in. blade, \$24.



PRACTICAL PARAFFIN

Ordinary paraffin canning wax has dozens of uses in my shop. It's cheap at \$2 a pound, available at any grocery store and easy to cut into small chunks. Unlike candle wax, which often contains beeswax, or some spray lubricants, which may have silicone in them, paraffin won't contaminate oil and varnish finishes because it's a completely petroleum-based product. Most wax residue gets sanded off anyway.

Tom Caspar



I often lubricate my jointer and planer beds with a paraffin wax squiggle. Wood is much easier to push down a waxed bed.



Glue doesn't adhere to paraffin. I rub wax on clamping blocks to keep them from sticking.



I always wax new and old drawers to make them run smoothly.



My plane is much easier to push when it's waxed, too. I rub paraffin on its sole every 10 strokes or so.

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\$2 Mallet

My favorite chisel whacker comes from my hardware store's plumbing department. It's two pieces of malleable black pipe (not cast iron), a nipple and a reducing coupler, wrapped with a bicycle inner tube for a comfortable grip. It costs \$2, which is far less than the price of a turned wooden mallet, weighs 24 oz., which offers plenty of mass, and stands on its head when you're done. My handle is stout. You might find 3/4-in. pipe easier to hold.

I prefer a round- to a flat-headed mallet because I don't have to hold it so precisely. An iron or brass mallet like this is fine for durable plastic-handled chisels, but I use a lighter-weight wooden mallet on wood-handled carving tools.

The reducing coupler doesn't come with a smooth surface, however. To sand off the seams and lip, I put 60-grit sandpaper on my disc sander, threaded the coupler on the nipple to make a handle and rotated the coupler against the sanding disc. For the wrapping, I cut an old inner tube 24 in. long and tapered one end. I tucked this end under the wrapping to secure it.

Dave Munkittrick



If you have an original Workshop Tip, send it to us with a sketch or photo. If we print it, you'll get \$100! Send to **Workshop Tips**, American Woodworker, 2915 Commers Drive, Suite 700, Eagan, MN 55121 or e-mail to workshoptips@readersdigest.com. Submissions can't be returned and become our property upon acceptance and payment. We may edit submissions and use them in all print and electronic media.

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THE WELL-EQUIPPED SHOP

by George Vondriska



JOINTER WITH DISPOSABLE, INDEXED KNIVES

Finally, a jointer with easy-to-change knives! Double-edged, indexed, disposable knives have been simplifying knife changes on portable planers for years now. Jet is the first company to apply that time-saving technology to a jointer. Its new 6-in. JJ-6CSDX jointer, which sells for \$649, has all the bulletproof knife-change features that have delighted portable planer users.

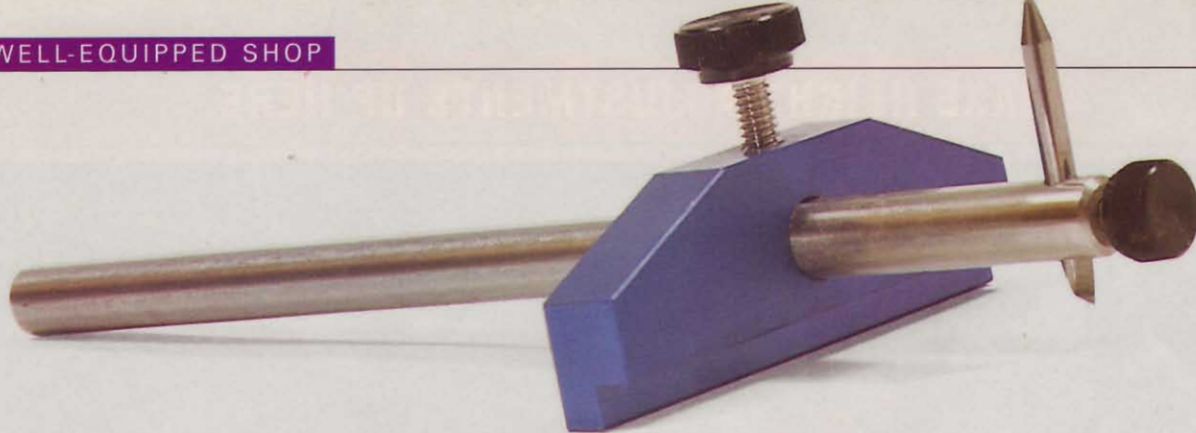
The knives on the JJ-6CSDX jointer drop onto pins set in the jointer head. The pins are preset at the factory to make the knives perfectly parallel to the cutterhead. That makes all the knives project exactly the same distance from the cutterhead, so you only have to level the outfeed table to the knives. Swapping all

three knives can be done in about 10 minutes. A cam on the registration pins lets you adjust them, but according to Jet, you shouldn't need to. Replacement knives cost \$80 per set. That's fairly steep for a set of jointer knives, but remember, they're double-edged, so you're getting two sets of knives for the price, and you'll eliminate hours normally spent changing knives.

The JJ-6CSDX with this new head uses the JJ-6CS as its base machine. The JJ-6CS has a 1-hp motor, 46-in.-long table and handwheels on both the infeed and outfeed tables. If you own a JJ-6CS, Jet plans to offer a jointer head upgrade, but at the time of this writing, had not established a price.

Source Jet Tools, (800) 274-6848, www.jettools.com 6-in jointer, JJ-6CSDX, \$649.

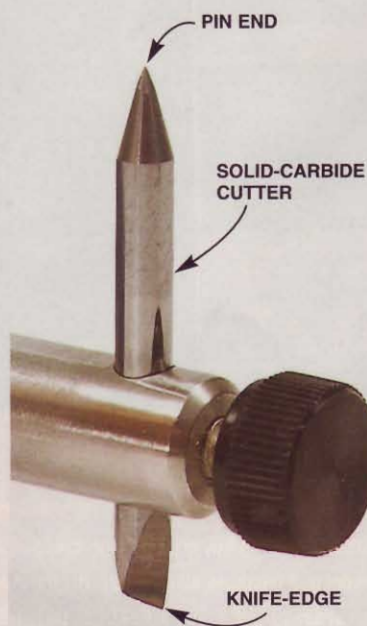
EDITOR: RANDY JOHNSON • ART DIRECTION: RICK DUPRE AND PATRICK HUNTER • PHOTOGRAPHY: PATRICK HUNTER, UNLESS NOTED



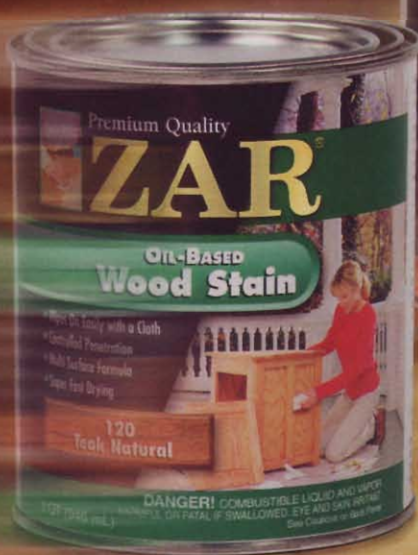
READY-TO-GO MARKING GAUGE

by Tom Caspar

Cutting across the grain for laying out dovetails and tenons requires a marking gauge with an extremely sharp edge. You want a crisp line, not a ragged one. Many gauges need tedious sharpening before they perform well, but not this \$35 one from Wood Artistry. Its solid-carbide reversible cutter is needle-sharp right out of the package. You get a knife-edge for marking across the grain and a bonus pin end for marking with the grain.



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Source: Wood Artistry, (707) 838-1976, www.woodartistry.com Marking gauge, #VAPPT-300-3000-001, \$35.

TWO COOL SCREW-POCKET CLAMPS

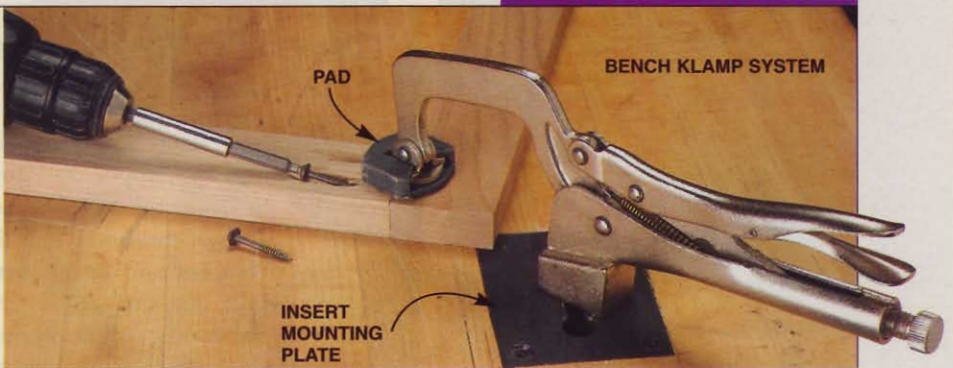
Pocket-hole joinery has become a basic joinery method for cabinetmakers because it's so fast and easy to use. Assembling the parts, though, can be a little tricky, requiring firm clamping to prevent them from squirming and going out of alignment. Two clamping devices from Kreg really simplify the process.

The Bench Klamp system, \$35, consists of an insert mounting plate and vise-grip-style clamp. It's great for assembling face frames and as a general hold-down for routing or sanding. The clamp head is padded to protect your work. The insert mounting plate gets routed into your benchtop. It has a keyhole slot that receives a bolt in the clamp. Extra plates are \$10.

The Right Angle Clamp, \$25, is used when joining cases to face frames. One jaw is a rod that's just the right size to slip into a screw-pocket hole. With the clamp in place, you can drive a screw through an adjacent screw pocket and leapfrog your way up the cabinet. My only complaint about this clamp is that the head isn't padded, so you'll need to add a clamp pad to protect your face frame.

Source Kreg Tool, (800) 447-8638, www.kregtool.com Bench Klamp, #KBK, \$35. Insert plate only, #KBK-IP, \$10. Right Angle Clamp, #RAC, \$25.

RIGHT ANGLE CLAMP



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FEATURES: Table height adjustable. Jack screw knife adjustment. Two feed speeds. Dust hood. Solid, cast iron table extensions. Enclosed stand with built-in wheels for mobility.



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4-knife cutterhead
\$649⁰⁰

YC-6J 6" Jointer

with 1 hp 1 ph motor
and 3-knife cutterhead
\$339⁰⁰

FEATURES: Center-mount fence with rack and pinion adjustment. Fence tilts both directions to 45°. Jackscrew knife adjustment. Enclosed stand with built-in wheels for mobility. Rabbling table and ledge. Dust hood.



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WELL-EQUIPPED SHOP

CYCLONIC SEPARATOR IMPROVES PERFORMANCE

Most dust collectors rely on air exhausting through both the upper and lower bags for the collector to work best. Unfortunately, as the lower bag fills, air flow decreases and performance goes downhill. Air can't get in if it can't get out, so dust collection drops off. Cyclone separators have been available in dust collectors for years, but they're usually part of a complete system that includes a motor and dust bags. If you've already got a dust collector but want the benefits of a cyclone separator, here's a product for you. The new Cyclone Separator, \$139, drops most dust and chips out of the line so nothing but relatively clean air continues on to the filter bags.

You place the separator in line between the tools and dust collector. Debris enters the separator and drops out of the air flow into the trash can below. (You provide the can.) In testing, I found only a few chips and a little dust continued into the dust collector bag.

Another in-line separator advantage is that it removes larger chunks before they reach your dust collector's impeller. Wood pieces, knots or fasteners that your system sucks up can damage an impeller. It's also easier to empty a trash can than it is to unhook and reconnect the bags on most collectors.

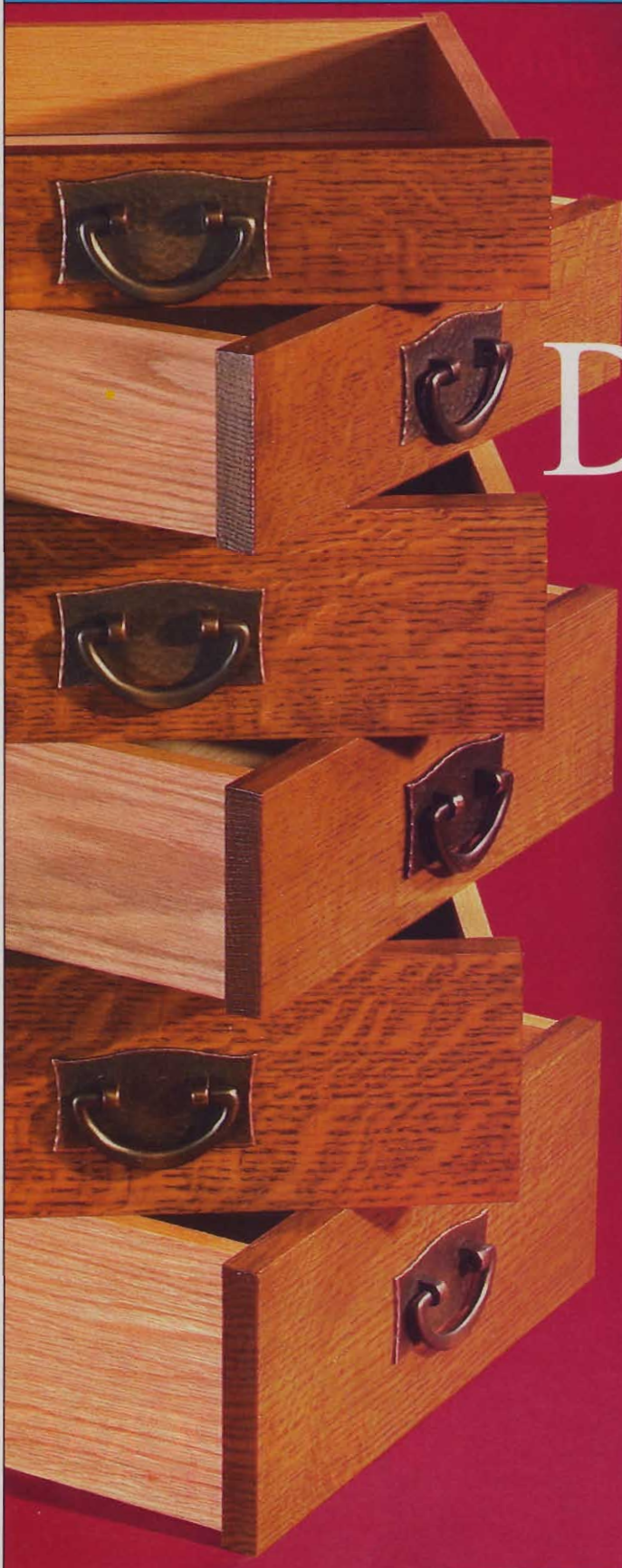
According to the manufacturer, the separator can be placed in line with dust collectors that move as little as 650 cubic feet per minute without seeing a measurable performance drop.

Adding the separator to the system affects your dust collector's mobility. If you need to pull the dust collector around from tool to tool, the job will become more cumbersome. To empty the trash can, you'll also need to remove and set aside the separator, which isn't heavy but is awkward.

The Cyclone Separator is available in two sizes, one with a 6-in. exhaust and 4-in. inlet, the second with a 7-in. exhaust and 6-in. inlet. Both units cost the same.

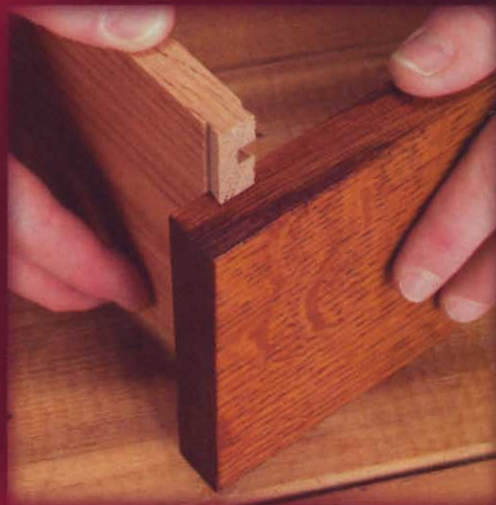
Source Gary MacIntyre Associates, (518) 835-2345, www.cycloneseparator.com
Cyclone Separator, \$139.





Sliding Dovetail DRAWERS

Quickly build a stack
of strong drawers
using your router table.



Without question, dovetails are the strongest way to hold a drawer together. Sliding dovetails are often used in production shops, because they're fast to make and easy to assemble. These shops use special equipment, but here's a dovetailing technique that requires only a router table and two ordinary bits.

FIGURE A EXPLODED VIEW



All the parts of this drawer slide together. The front slips down the sides from above. This makes an invisible joint, because the dovetailed socket stops short of the top. The back slides down between the two sides. The bottom slides in under the back.

TOOLS YOU'LL NEED

Accurate dovetailing requires flat, straight stock. You may be able to buy planed wood that's flat and straight already, but often it's cupped or bowed. To be sure your wood is flat, we recommend preparing your own stock with a jointer and planer.

You'll need a router table to make this joint. Our technique is easier to master if your router table has a miter gauge slot, but it isn't required. You'll need two router bits: a 1/2-in.-dia. 14-degree dovetail bit, such as the type used with a half-blind dovetail jig, and a 1/4-in. straight bit (see Source, page 28). Both bits will perform better if they have 1/2-in. shanks.

MILL THE PARTS

1. Joint and plane lumber for the front, back and sides (Fig. A, left). The front can be any thickness over 1/2 in. In this example, it's 3/4 in. thick. Plane the sides to 1/2 in. thick. Make some extra sides for testing the joint's fit.

2. Cut the front to width and length. Cut the sides the same width as the front. Trim the sides to length, allowing an extra 1/4 in. for the front dovetails. Leave the back and plywood bottom oversize for now.

SET UP THE ROUTER TABLE

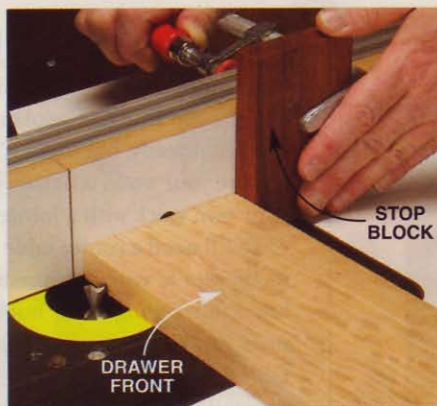
3. Install a dovetail bit in your router table. Raise it 1/4 in. above the table's top. This height determines the depth of the sockets. It's arbitrary, but routing a deeper socket can cause a bit to vibrate excessively.

Why Use Sliding Dovetails?

- **Fast.** The router cuts take no time at all. The joint doesn't require any sanding after you assemble the drawer.
- **Invisible.** For a sleek contemporary look, the joint is completely hidden when the drawer is open.
- **Versatile.** This joint works with many types of drawers: inset or overlay, with or without slides.



1 All the joints for this drawer are cut on the router table. Begin by installing a 1/2-in. dovetail bit to make sockets in the drawer front. Clamp a stop block one drawer-front width from the bit.



2 Rout the right end of the drawer front. Guide the board with a miter gauge to keep the board square and tight to the fence. Lower the board onto the bit to make a hole; then continue the cut on through (see inset photo). A 3/4-in.-thick backer board on the miter gauge automatically positions the hole 1/4 in. down from the top.



3 Rout the left end of the drawer front. Again, position the stop block one drawer-front width away from the dovetail bit. Turn the miter gauge around, push until the backer board hits the stop block and then tilt the drawer front. The result is an identical stopped socket with a hole.

4. Position the fence 1/2 in. or so away from the bit. This distance determines the setback of the drawer sides, so the precise amount depends on the type of drawer you're making. If you use 1/2-in.-thick slides and want a standard 1/16-in. gap on either side of the drawer front, make the setback 7/16 in. Use a combination square to adjust the fence so it's parallel to the router table's miter gauge slot.

5. Clamp a stop block to the fence (Photo 1). Position the block so your drawer front fits exactly between the bit and the block. Without using math or a ruler, this setup guarantees that the sockets in a drawer front of any size will be exactly the right length, stopping 1/4 in. from the top of the drawer.

CUT THE SOCKETS

6. Rout sockets on the right side of the drawer front (Photo 2). It's easy to get disoriented here, so mark your fronts well. In this step, the socket will be on your right as you face the drawer. When you lower the board onto the bit, you'll make a 1/2-in.-dia. hole. Don't worry; it will be covered by the 1/2-in.-thick drawer side.

7. Move the stop block and rout the drawer front's left side (Photo 3).

8. Without moving the fence or bit, rout sockets in the back of the drawer sides (Photo 4).

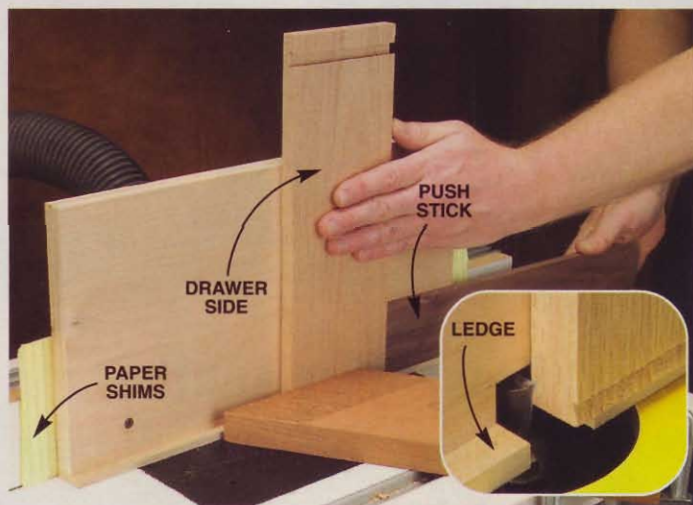
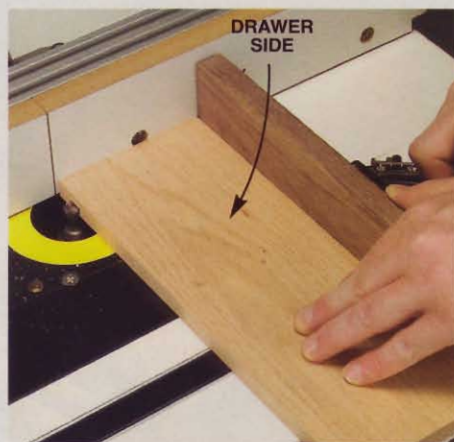
ROUT THE DOVETAILS

9. Fasten a tall shop-made fence to the router-table fence (Photo 5). Cut a small notch in the fence to house the bit (Fig. B, page 26). Add two 1/4-in.-thick ledges below the tall fence. The ledges narrow the throat opening around the bit, so the workpiece can't tip. Behind the fence, insert four paper shims on each side. You'll be able to micro-adjust the thickness of the dovetails by adding or removing these shims. Hold the workpiece tight to the fence with a featherboard. Push the lower end of the workpiece with a thin stick so it won't tip forward.

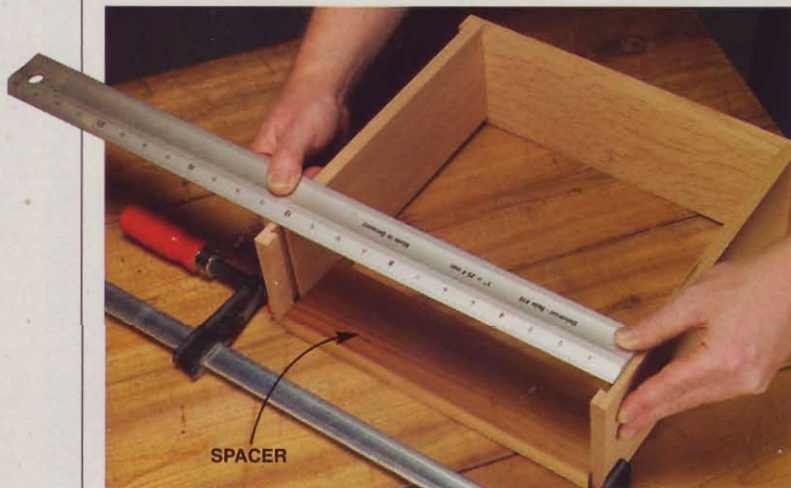
10. Raise the dovetail bit until it's slightly less than 1/4 in. above the ledge. This will create a small but important gap between the dovetail and socket, which is 1/4 in. deep. This gap should be 1/32 in. or less and will make assembly easier.

11. Position the fence so the bit makes a shallow cut. Make a trial cut on both sides of a spare drawer side. It's best to make the dovetail too fat to begin with and then slim it down using the same test piece.

4 Cut the same socket in the tail ends of the drawer sides. Unlike the sockets in the drawer front, these go all the way across. You won't need a stop block.



5 Rout long dovetails on the front end of the drawer sides. These dovetails will slide into the sockets, but it's a fussy fit. Add or remove paper shims behind this micro-adjustable tall fence to fine-tune the depth of cut. The fence's ledge prevents the workpiece from hanging up on the bit's opening or the insert's edge (see inset photo).



6 Assemble the sides and front to calculate the exact length of the drawer's back. Insert a spacer to hold the sides square and measure from the bottom of each socket. Crosscut the back piece and rout its dovetails with the same setup you used for the sides.

12. Test-fit the drawer side. If it slides all the way down with only a light tap or two, congratulations! If it's too tight, loosen the tall fence and remove one piece of paper from each side of the fence. If it's too loose, reposition the fence or add more shims. As you get closer to the right fit, add or remove shims on one side of the fence only. This effectively changes the depth of cut by one-half the thickness of the shim, less than .002 in.

13. Slide both drawer sides into the front (Photo 6). Cut a spacer board that fits tightly between the sides, and measure the distance between the bottoms of the dovetail sockets. Cut the drawer back to this length. (To be super-precise, subtract twice the gap, about 1/16 in., between the socket and dovetail you made in Step 12 from this length.) Rout dovetails on both ends of the drawer back.

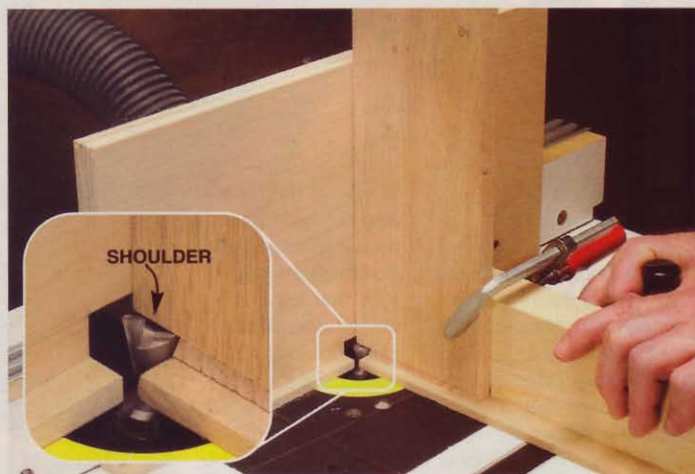
ROUT SHOULDERS

14. Rout a shoulder on the end of each drawer front (Photo 7). If your drawer sides are the same height as the front, move the tall support 1/2 in. back from the bit. Fasten another ledge piece to the bottom of a backer board. Then attach both the ledge and backer board to the miter gauge. Make this cut in multiple passes.

15. Test-fit the drawer side. The shoulder should be deep enough to allow the top of the drawer side to align with the top of the drawer front. It's OK to slightly overcut the shoulder's width. When you assemble the drawer, it's not necessary to push the sides' dovetails all the way to the end of the sockets.

FIGURE B TALL FENCE

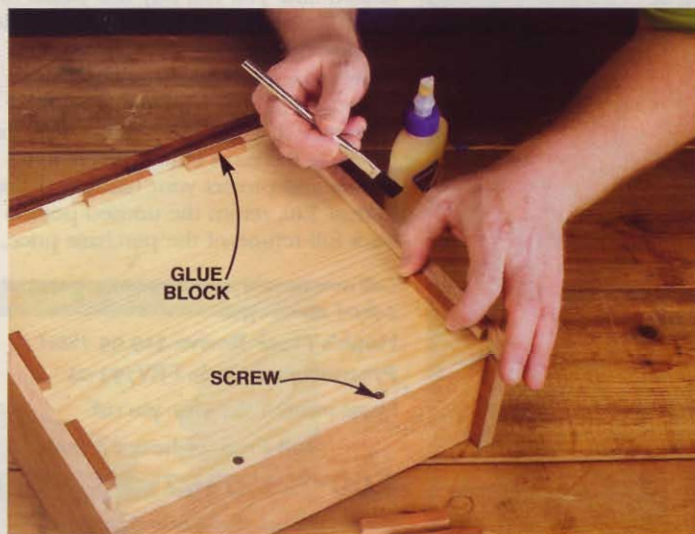




7 Cut shoulders on the drawer side's dovetails. The shoulder covers the uncut section above the socket. From the last operation, the bit is set at exactly the right height to cut a flush shoulder.



8 Cut a groove in the drawer front for the drawer bottom. Use a 1/4-in. straight bit. This groove starts and stops at the dovetail sockets. To avoid overcutting, which could ruin your day, set up two stops.



9 Add glue blocks around the drawer's perimeter after the drawer is glued and finished. These blocks stiffen the drawer box and keep the bottom from rattling in the grooves. Apply a thin layer of glue to each block and rub it back and forth until it sticks.

ROUT DRAWER-BOTTOM GROOVES

16. Set up the router table with a 1/4-in. straight bit. Raise the bit 1/4 in. above the table's top. Space the fence 3/8 in. away from the bit.

17. Clamp two stops to the fence and cut a drawer-bottom groove in the drawer front (Photo 8). You don't have to drop the board on the bit. To begin the cut, slide the first socket over the bit, hold the front against the fence and push forward.

18. Remove the stops and cut grooves the full length of the drawer sides. Be careful about orienting the boards, because now you'll be creating left and right sides. The bottom edge of the drawer side faces the fence; the inside face goes down.

ASSEMBLE THE DRAWER

19. With the grooves cut, you can rip the drawer back to final width. Measure the distance between the top of the groove and the top of the drawer side. Cut the back to this width and assemble the drawer without glue.

20. Cut a 1/4-in.-thick plywood bottom to fit the drawer box. The bottom should be 1/32 in. narrower than the distance between the grooves. If it's too tight, you'll have a hard time sliding it in during glue-up.

21. Glue the drawer box. Apply a thin layer of glue to the dovetails and the sockets in the front, sides and back. When the pieces are assembled, slide in the bottom—but don't glue it. The bottom will help make the box square. After the glue is dry, remove the bottom and apply finish to the drawer.

22. Replace the drawer bottom. Rub glue blocks around the perimeter of the drawer to bond the plywood to the box. The blocks prevent the drawer from racking corner to corner, so there's less strain on the front dovetail joints. Finally, screw the bottom to the drawer back.

Source Porter-Cable, (800) 487-8665, www.portercable.com 14-degree, 1/2-in. dovetail bit with 1/4-in. shank, #43705PC, \$15, with 1/2-in. shank, #43750PC, \$21. 1/4-in. straight bit, double flute, with 1/4-in. shank, #43718PC, \$16, 1/2-in. shank, #43207PC, \$14.

by Tom Caspar



Waterstones

Hone an incredibly sharp edge with a \$35 combo stone.

For this woodworker, it doesn't get any better than using a sharp hand tool. Not just kind of sharp, the way new tools come out of the box. I mean really, really sharp, with an edge honed to perfection by a well-maintained set of sharpening stones. In search of that perfect

edge, I've tried oil stones, diamond plates and sandpaper. With enough time, money or elbow grease, all these materials can deliver top-notch results. But none can beat waterstones, which combine fast cutting, easy maintenance and great value in one package.

TYPES OF STONES

Waterstones were first quarried from small mines in Japan more than 1,200 years ago. Today, most waterstones are made in a factory. They're composed of aluminum oxide, silicon carbide or chromium oxide abrasives heated at high temperature to fuse into a brick-shaped porous matrix. Many hold water just like a sponge.

Most waterstones come in two sizes: regular and large. Large stones are thicker, wider and longer, so they have more wear surface. The extra width of a large stone is handy for wide plane irons, but not essential.

Single grit

Single-grit stones are my first choice, because they have four working surfaces. I use the top and bottom for plane irons and the edges for chisels. The wider the edge, the easier it is to balance the stone.

Combination

Combination stones are the best value, because you get two grits for the price of one. However, the stone has only one working surface for each grit. Many different grit combinations are available.

Ceramic

Ceramic stones are a special type of waterstone. They're more expensive than ordinary waterstones, but save time sharpening. They cut faster and wear more slowly than other waterstones.

Natural

Quarried stones are the way to go if you use high-grade Japanese tools. They produce a softer-looking finish than manufactured stones do. Traditional artisans believe that's better for examining the edge of Japanese laminated steel.

recommended sets

Best Value

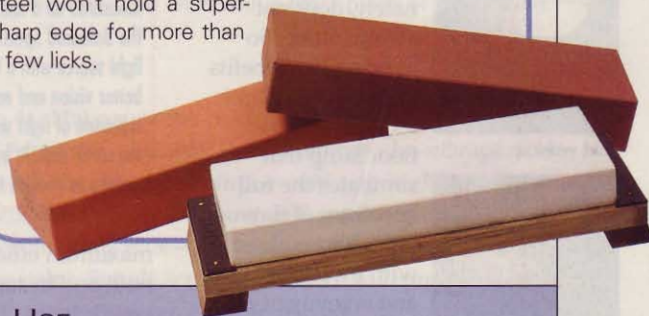
The least-expensive way to get a decent edge is to buy a regular-size combination stone. Go for a 1,000/6,000 coarse/fine, which runs about \$35 (see Sources, page 36). A large stone costs another \$15 to \$20 and requires reflattening less often. A 1,200/8,000 medium/fine stone, which costs about \$45, gives you a slightly sharper edge, but requires more strokes on the medium side to prepare a very dull edge for final polishing.



More Convenience

I use a three-stone system of large single-grit stones: 800 coarse, 1,200 medium and either 6,000 or 8,000 fine. Compared with using the two sides of a combination stone, this set requires fewer strokes on each grit. That produces less wear, so keeping the stones flat is much easier. Buying this set of three adds up to \$80 or more, but considering the dough I've spent on good hand tools, it's worth it. After all, your hand tools are only as good as the stones you sharpen with.

If your tools have very high-quality blades, such as A2 or cryogenically treated plane blades, super-fine stones with 12,000 or higher grit will produce an unbelievably sharp edge. They cost from \$100 to \$400 (see Sources, page 36). These stones don't help very much, though, on average-quality tools, whose steel won't hold a super-sharp edge for more than a few licks.



GRIT GUIDE

CATEGORY GRIT

USE

All manufactured waterstones are graded by grit numbers. The higher the number, the finer the grit. Roughly speaking, grits fall into five functional categories. In general, the higher the grit number, the higher the price. Within one grit category, higher-priced stones cut faster and resist wear better.

Extra-Coarse	80 to 700	Removes a nick, straightens an edge or renews an entire bevel. A power grinder is faster, though.
Coarse	800 and 1,000	Removes metal fast without leaving deep scratches. It's the best grit to start with when sharpening a very dull edge.
Medium	1,200, 2,000 or 3,000	Quickly removes the scratches made by a coarse stone. Medium serves as the final grit for carpentry tools.
Fine	4,000, 6,000 or 8,000	Makes a super-sharp edge with a mirror polish. This is the final grit for most cabinetmaking tools.
Super-Fine	12,000, 15,000 and higher	Super-Fine produces the ultimate edge, best suited for premium tools made of the highest-quality steel.

TIPS FOR USING WATERSTONES

SOAK 'EM

Check the directions that come with your stone; some types don't require presoaking, and others should not be soaked or they'll deteriorate.

Most coarse and medium waterstones, though, should be immersed in water when not in use. This keeps them saturated so the surface doesn't dry out quickly when you're sharpening. If you've just bought a new stone, soak it overnight before trying it out. Fine and super-fine stones don't absolutely require soaking, but if you do soak them, they'll be ready to go right away.

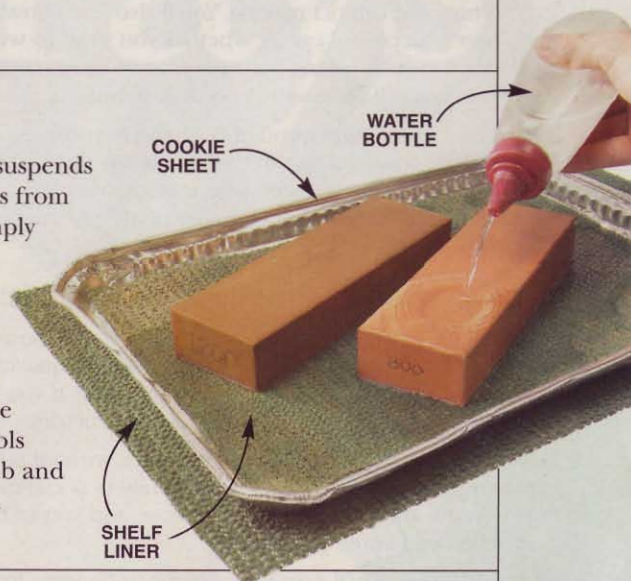
I keep my stones in a plastic tub with a lid. They've been soaking since 1979! I add a drop or two of bleach to keep the water free of green scum.



USE LOTS OF WATER

Flood the top of a waterstone with water when you sharpen. This suspends the small particles of worn-off steel in the water, keeping the particles from clogging the stone's surface. You can use a cup or spray bottle or simply dip your fingers in a water container to continually keep the stone wet. I use a plastic mustard bottle.

The undeniable downside to waterstones is that they're messy—though not as messy as oil stones. Your hands will get wet and grubby. To protect my bench, I place my stones on a cookie sheet. Open-weave shelf liner below the stones and under the cookie sheet keeps everything from slipping. After sharpening, I dry my tools right away so they don't rust, place the stones back in the storage tub and wash my hands. The gunk comes off quite easily with ordinary soap.



KEEP 'EM FLAT

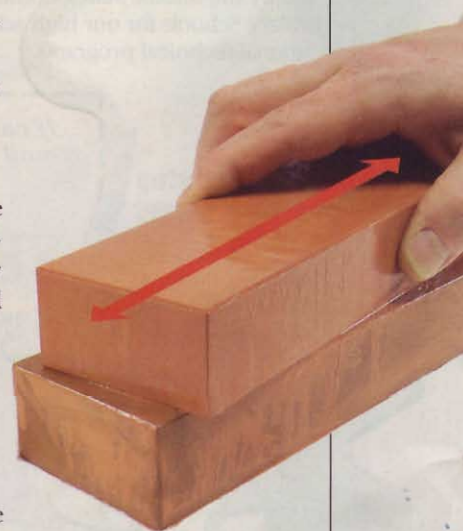
Routinely rub your waterstones with 220-grit wet-dry sandpaper placed on ordinary plate glass that's 1/4 in. or more thick. A waterstone cuts fast because its surface wears down quickly, constantly exposing new, sharp abrasive particles. This wear eventually creates an uneven surface, which produces an undesirable curved edge on chisels and plane irons.

Make a squiggle line with a pencil down the length of a stone before you flatten it. Put a little water on the plate glass so the sandpaper sticks. Then put lots of water on the paper and go at it. When the pencil line is gone, the stone is flat. I also sand a 45-degree bevel on every edge of the stone to prevent flaking.

With my three-stone single-grit system, I skip the sandpaper and glass method and simply flatten all three stones against each other. The trick to avoid making concave and convex pairs is to continually alternate sides. Rubbing medium against fine does no harm to the fine stone. This is so easy that I flatten my stones before each sharpening session. It only takes a minute or so. Flattening the sides removes the inked grit numbers, so I write them in pencil on the end of each stone.



Flatten a combination waterstone with wet-dry sandpaper on glass.



Flatten single-grit stones by rubbing them against each other. Both wear down until they mate perfectly flat.

MORE TIPS MAKE A SLURRY

The secret to sharpening on a fine-grit stone is to build up a paste slurry before you get going. It looks like thin mud. A slurry keeps the microscopic metal particles removed from the tool's edge in suspension more effectively than water alone. That makes sharpening go faster and results in a better edge. The paste also makes the stone more slippery, which prevents the backs of your chisels and plane irons from sticking to the stone's surface. You can get by without the slurry, but sharpening will be more difficult.

To create the paste, wet the stone and vigorously rub its top with a Nagura stone, which costs \$10 to \$20. The Nagura wears away the stone to leave a chalky paste. As you sharpen, the paste will be pushed to the ends of the stone. When that happens, wet your fingers and work the paste back over the whole stone, or rub the stone with the Nagura again. When you're done, leave the paste to dry on the stone, ready for next time.



NAGURA
STONE

GUIDES ARE OK

Some folks claim that the wheel underneath a honing guide will quickly hollow out and ruin a stone's surface, but I disagree. You just need to use the right technique. I concentrate my finger pressure on the edge of the tool, not on the honing guide itself. The harder you press on the tool's edge, the faster the stone will cut, but there's no reason to bear down on the wheel.



HONING
GUIDE

Sources The Japan Woodworker, (800) 537-7820, www.japanwoodworker.com More than 40 waterstones available from \$20 to \$100. • Shapton Sharpening Systems, (877) 692-3624, www.shaptonstones.com Ceramic stones with 120 to 30,000 grit, \$53 to \$130.



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Stickley Style Chest of Drawers

Build a masterpiece
with handsome quartersawn oak

This striking chest of drawers is closely modeled after one of Gustav Stickley's most famous designs. Both bold and graceful, the wide overhanging top, slightly bowed legs and arched apron of Stickley's chest show the strong influence of his brilliant associate Harvey Ellis. My version is nearly identical in appearance, but I've modified its joinery to strengthen the case and improve the drawers' operation.

Building nine drawers is a big part of making this chest. I've used a sliding dovetail joint popular in Stickley's time. The drawers run on center-mounted wooden guides, a recent innovation 100 years ago when the original chest was built. Center guides help wide drawers track well, even when they're pushed or pulled with only one hand. I've added web frames to strengthen the chest. They also make the guides easier to install.

Stickley built most of his Mission-style furniture from quartersawn white oak. I used quartersawn red oak. It generally has less pronounced figure, but I was able to

find some beautiful boards. I used quartersawn oak for everything except a couple of leg parts. I used the best-looking boards for the outside of the chest and the plainer-looking boards, which were more rift-sawn in appearance, for interior parts. Lumber that is quarter-sawn or rift-sawn is very stable and is a good choice for drawers and related parts.

I used heavy solid copper hardware with a hammered texture and antique finish. It cost an eye-popping \$350. Less-expensive Mission-style hardware is widely available, but I love the heavy feel and authentic appearance this hardware adds to my chest. If you're up to a real challenge, you can make your own hardware (see "Hammer Your Own Copper Hardware," AW #74, August 1999, page 67.)

Gustav Stickley considered his life's mission to promote the values of fine workmanship. He named his magazine and his line of furniture *The Craftsman*. When you build this chest and hammer out the hardware, you'll certainly be a craftsman, too!

by Randy Johnson



About \$1,250
(\$900 for the wood
and \$350 for hardware)

ART DIRECTION: VERN JOHNSON • PHOTOGRAPHY: MIKE KRIVIT • ILLUSTRATION: FRANK RHORBACH



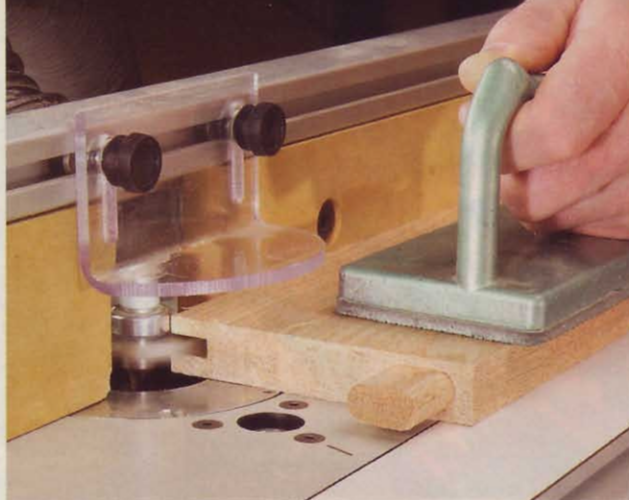
1 Stout mortise-and-tenon joinery make this chest strong enough to withstand many years of heavy use. I used the router-based Leigh frame-and-mortise jig to cut all the joints because it's quick and super-accurate, but many other joint-making methods will work as well.

BUILD THE SIDES

1. Machine the stiles (A, K), rails (B, L), and drawer dividers (N, P, Q and R) to final size. Cut the mortise-and-tenon joints in these parts (Photo 1; Fig. A, page 40). I used the Leigh frame-and-mortise jig and a Bosch 3-1/4-hp plunge router (see Sources, page 47), but you can cut the same joints many other ways as well.
2. Rout grooves in the rails and stiles for the side panels (C), (Photo 2; Figs. B and C, page 42). Note that the grooves in the stiles do not extend to the end of the boards but stop at the mortises. Rout similar grooves for the back panel (M, Fig. G, page 46) and dust panels (V, X, Fig. A).
3. Resaw boards for the side panels and glue them together. Plane them to final thickness.
4. Sand and stain the panels (Photo 3). Sand and stain the rails' and stiles' inner edges. A one-step oil finish works well or, for a more advanced finish that really makes quartersawn figure pop, see "4 Proven Finishes for Oak," page 48.
5. Assemble the sides and back (Photo 4).

MAKE THE LEGS

6. Saw 1/4-in.-thick quartersawn veneer for the leg faces (E). Glue these strips to the leg centers (D, Photo 5). Make the faces and centers 1/2 in. overlong. Plane the legs to final thickness, which will reduce the veneers to 1/16 in. thick. (This is far easier than making 1/16-in.-thick veneer.) Joint and plane the legs to 2-3/16 in. wide, which is 1/16 in. oversize. This



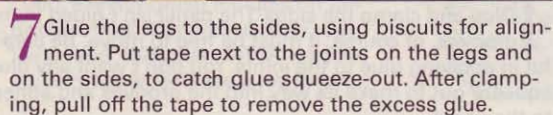
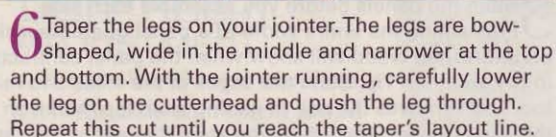
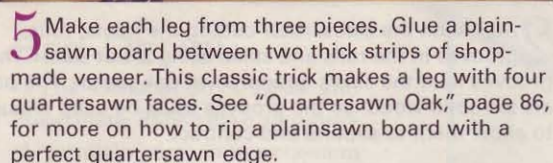
2 Start with the sides. After cutting the joints, rout grooves in the rails and stiles using a slot cutter. The grooves hold the side's quartersawn oak panels. The panels are solid wood, so the grooves must be deep enough to allow them to expand and contract.



3 Stain the panels before you assemble each side. Prestaining the entire width of a panel guarantees that no unfinished wood will show when the panel contracts in dry weather. **Tip:** Stain the edges of the stiles and rails, too. This removes the risk of getting stain lap marks on the center panel later when you stain the rest of the case.



4 Glue and clamp the sides. The panel isn't glued in the grooves, of course. It must be free to move. Be careful in applying glue to the joints. You don't want any glue squeeze-out to make its way into the grooves and adhere to the panel.



Technical drawing of a wooden chair back assembly, showing various components and their dimensions:

- 1/2" x 1" x 1" MORTISE CENTERED ON LEG**: Dimension for the mortise in the leg.
- 1-7/8"**: Dimension for the top rail.
- 15-9/16"**: Dimension for the backrest.
- 2-1/8"**: Dimension for the seat.
- 1-7/16"**: Dimension for the bottom rail.
- 1/2" x 1-1/2" x 1" MORTISES**: Dimension for the mortises in the seat.
- 1/4" x 5/16" GROOVE**: Dimension for the groove in the seat.
- STOP RABBET**: Dimension for the stop rabbet in the seat.
- 3-1/2"**: Dimension for the seat.
- 13/16"**: Dimension for the seat.
- 1"**: Dimension for the seat.
- Labels A, B, C, D, E**: Identify specific components of the assembly.
- (SEE FIG. C)**: Reference to another figure.

extra 1/16 in. will be removed after you taper the legs. Cut the legs to final length.

7. Mark tapers on the legs' faces (Fig. B). You can bandsaw and joint the tapers or do all the cutting on the jointer (Photo 6). With your jointer set for a 1/16-in. cut, the top taper should take four passes and the bottom taper 11 passes. Be sure to prevent the leg from moving backward when you lower it on the cutterhead. Hold it with a push pad. The jointer will cut a small, sniped depression at the small end of the tapers. Sand off the sniped area after jointing. Sanding this sniped area will remove the extra 1/16-in. width that you kept on the leg in Step 6. After sanding, the leg should be very close to a final width of 2-1/8 in. at its widest spot.
8. Mark each leg to indicate in which corner it goes on the chest. Select the legs with the best faces for the front. Put the less attractive sides of the other two legs facing the chest's back.
9. Cut stopped rabbets in the rear legs using a dado set or router. Use a chisel to square the stopped ends of the rabbets (Fig. B). Lay out and machine the mortises in the front legs. Cut biscuit slots in the legs and the side panels.
10. Sand the stiles on the sides and the inside faces of the legs. These parts form inside corners, which are hard to sand after assembly. Glue and clamp the legs to the sides (Photo 7).

ASSEMBLE THE CASE

11. Make the horizontal drawer dividers (N) and vertical drawer dividers (P). Glue quartersawn edging (N1, P1) to their fronts (Figs. D and E, page 45). Lay out and cut bridle joints on the vertical drawer dividers and two of the horizontal drawer dividers (Photo 8, Fig. D).
12. Machine all the web frames' parts (S, T, U, V, X). Assemble the vertical and horizontal drawer dividers and web frames as a unit (Photo 9). Bandsaw the curve in the arched rail (R) and glue it to the bottom web frame.
13. Cut biscuits slots in the sides of the web frames and the leg and panel assemblies (Figs. A and B).
14. Dry-fit the web frames into the sides (Photo 10). With this many mortise-and-tenon joints you may have to plane, scrape or sand to get things to go together smoothly.
15. It's time for the big glue-up. Glue and clamping the six web frames to the sides involves a lot of parts and will take a while to accomplish. If you've got an experienced helper, you can glue the case with regular yellow wood glue. If



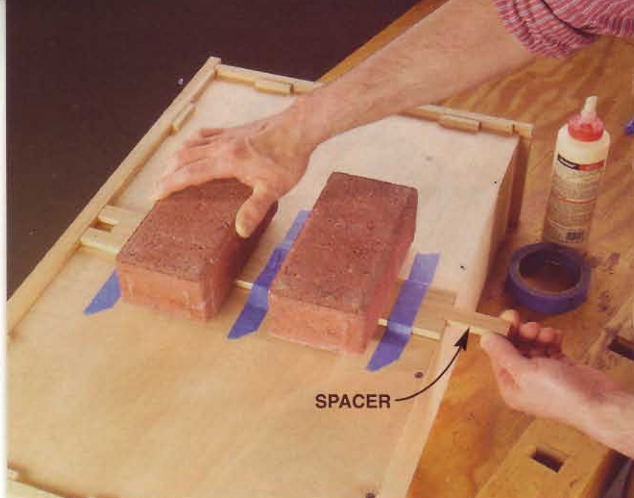
8 Cut notches on the vertical drawer divider: These notches interlock with complementary notches in the two top horizontal drawer dividers. You can free-hand these cuts if you've got a steady hand, or use a miter gauge.



9 Assemble the top three web frames as a unit. The top two web frames interlock with the vertical drawer divider. The third web frame is screwed to the bottom end of the vertical divider.



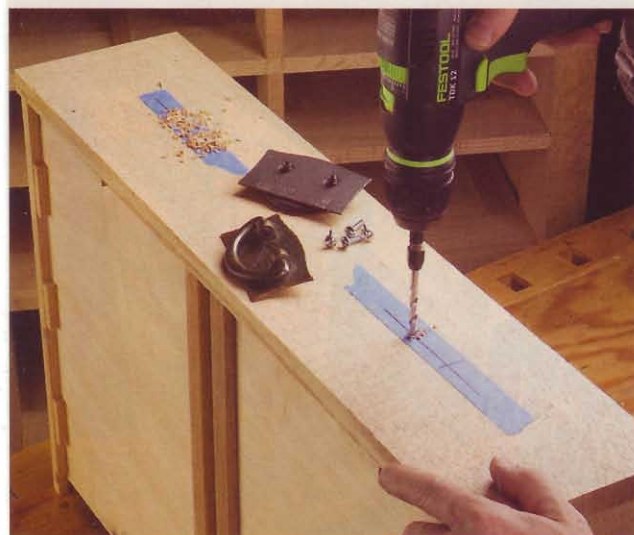
10 Check the fit of the web frames. All must be glued at the same time, so you don't want any surprises. For the actual glue-up, it's a good idea to enlist a helper.



11 Glue two bottom guides in the center of each drawer. Use an extra strip as a spacer, but remove it before the glue sets. Bricks supply sufficient pressure and are simple to use.



12 Install drawer center guides from the back of the chest. To position each guide, fasten the front end first. Slide in the drawer and align the drawer front with the case. Finally, fasten the guide on the back rail.



13 Drill holes for the drawer hardware. Apply masking tape on which you draw clearly visible layout lines. Marking on bare wood often requires a lot of erasing later on. Here, you simply peel off the tape.

you're working alone, use a glue with an extended open time (see Sources, page 47).

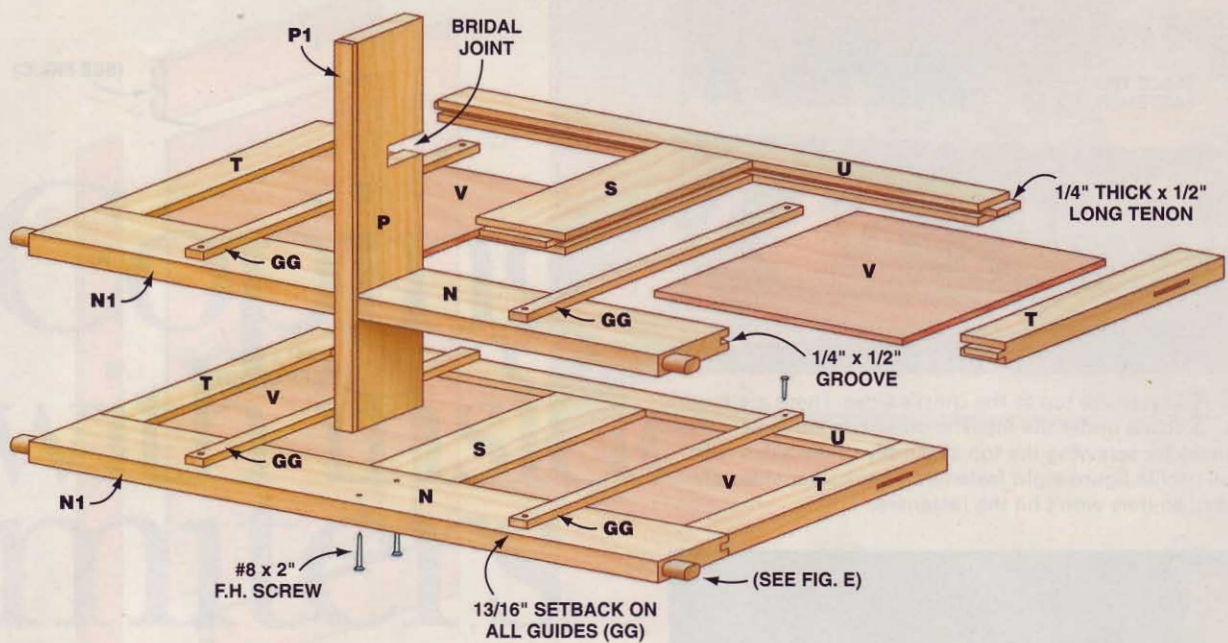
ASSEMBLE AND INSTALL THE DRAWERS

16. Build the drawers using sliding dovetails (see *Modern Cabinetmaker*, page 22). All the part dimensions are given in the Cutting List, page 47, and in Fig. H, page 46. Note that the sides and back of the top two drawers are narrower than their fronts, unlike the other drawers. These narrow parts are necessary for the drawer to slide under the screw cleats (J) attached to the top (F). Add bottom guides (HH) to the bottoms of the drawers (Photo 11).
17. Glue wear strips (Y) to the web frames (Photo 12; Fig. A). The strips are made from plastic laminate, so you must use contact cement or epoxy. These strips serve several important functions. First, they provide a very slick, durable surface for a heavy drawer to slide on. Second, they prevent the drawers from wearing unsightly grooves on top of the front rails. Third, they raise the drawer 1/16 in. above the rails, resulting in the gaps below the drawers matching those at the drawer's top and sides.
18. Add center guides (GG) to the web frames (Photo 12). The guides are set back from the front rail by 13/16 in., the thickness of a drawer front. The front of the guide stops each drawer so the drawer is flush with the front rail.
19. Drill the drawer fronts for the pulls (Photo 13).

ADD THE TOP AND BACK

20. Glue a piece of quartersawn edging (G) to the front edge of the top (F, Fig. F, page 45). Because the top is made from quartersawn wood, its front edge will have ordinary-looking plainsawn figure. Quartersawn edging here and on the drawer dividers makes the whole case's look harmonious.
21. Make the backsplash (H). It has a tapered top edge you can make on the jointer, like the legs. Attach the backsplash 1/2 in. in from the back edge of the top.
22. Make the screw cleats (J) that go under the top. Drill shallow holes in two cleats for figure-eight tabletop fasteners (Fig. F). Drill oversize screw holes in all the cleats for fastening them to the top. Attach the cleats to the top with washer-head screws, which allow the top to freely expand and contract (see Sources, page 47). Attach the cleats and top to the sides (Photo 14).
23. Install the back (Photo 15).

FIGURE D UPPER WEB-FRAME ASSEMBLY



Center
drawer
guides
provide
easy
tracking,
even for
wide
drawers.

FIGURE E DRAWER DIVIDER

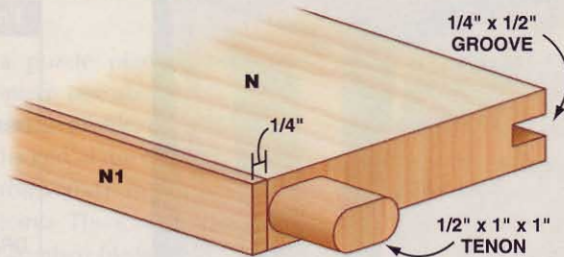
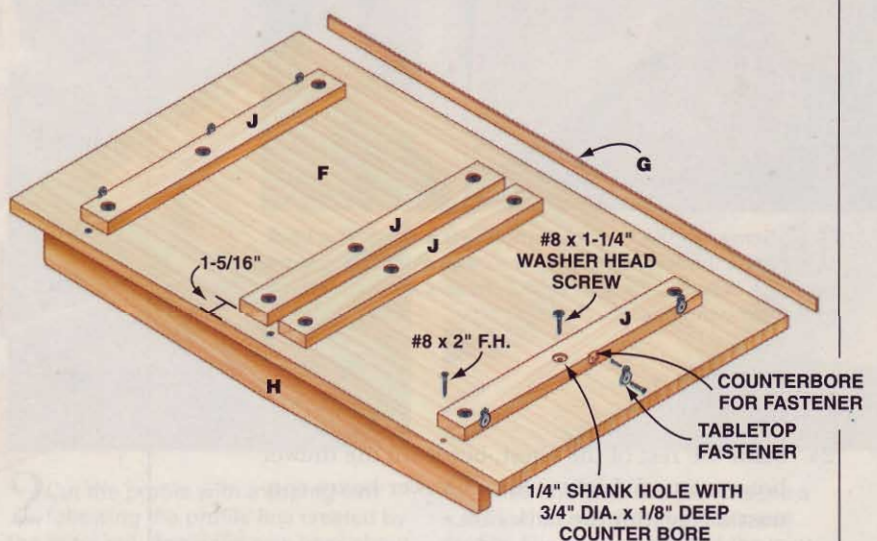


FIGURE F BOTTOM VIEW OF TOP ASSEMBLY





14 Fasten the top to the chest's sides. There are four cleats under the top. The outer two serve as braces for screwing the top assembly to the sides with low-profile figure-eight fasteners. The drawer sides are inset, so they won't hit the fasteners.



15 Screw on the back to complete the chest. The back adds the final rigidity to the case. Push it, lift it, slam the drawers—this beautiful chest is strong enough to last for generations.

FINISH

24. Stain the rest of the chest, but leave the drawer boxes natural. Light-colored drawer boxes contrast nicely with the dark case.

FIGURE G BACK FRAME AND PANEL

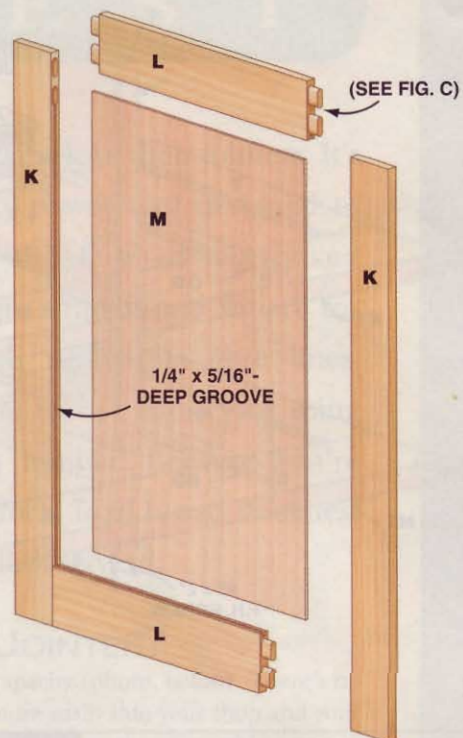
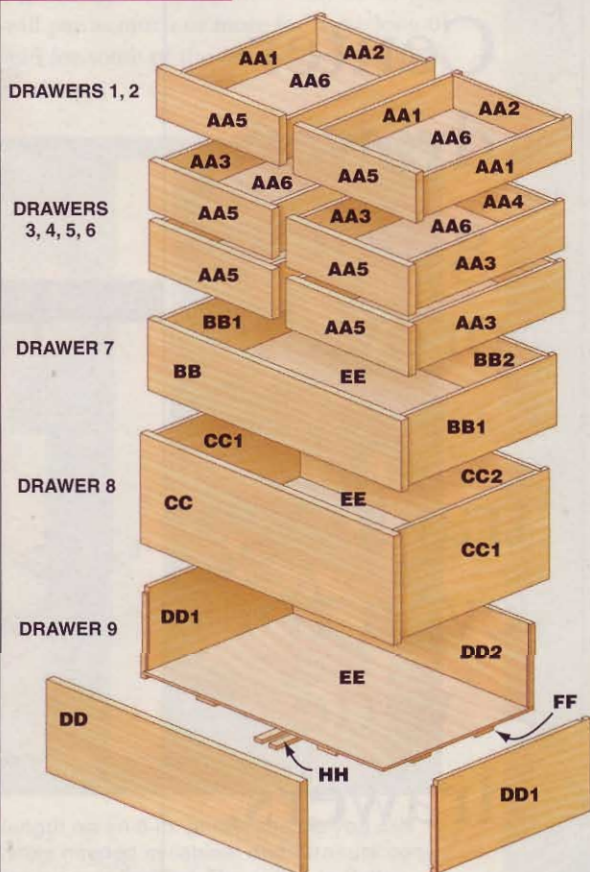


FIGURE H DRAWERS

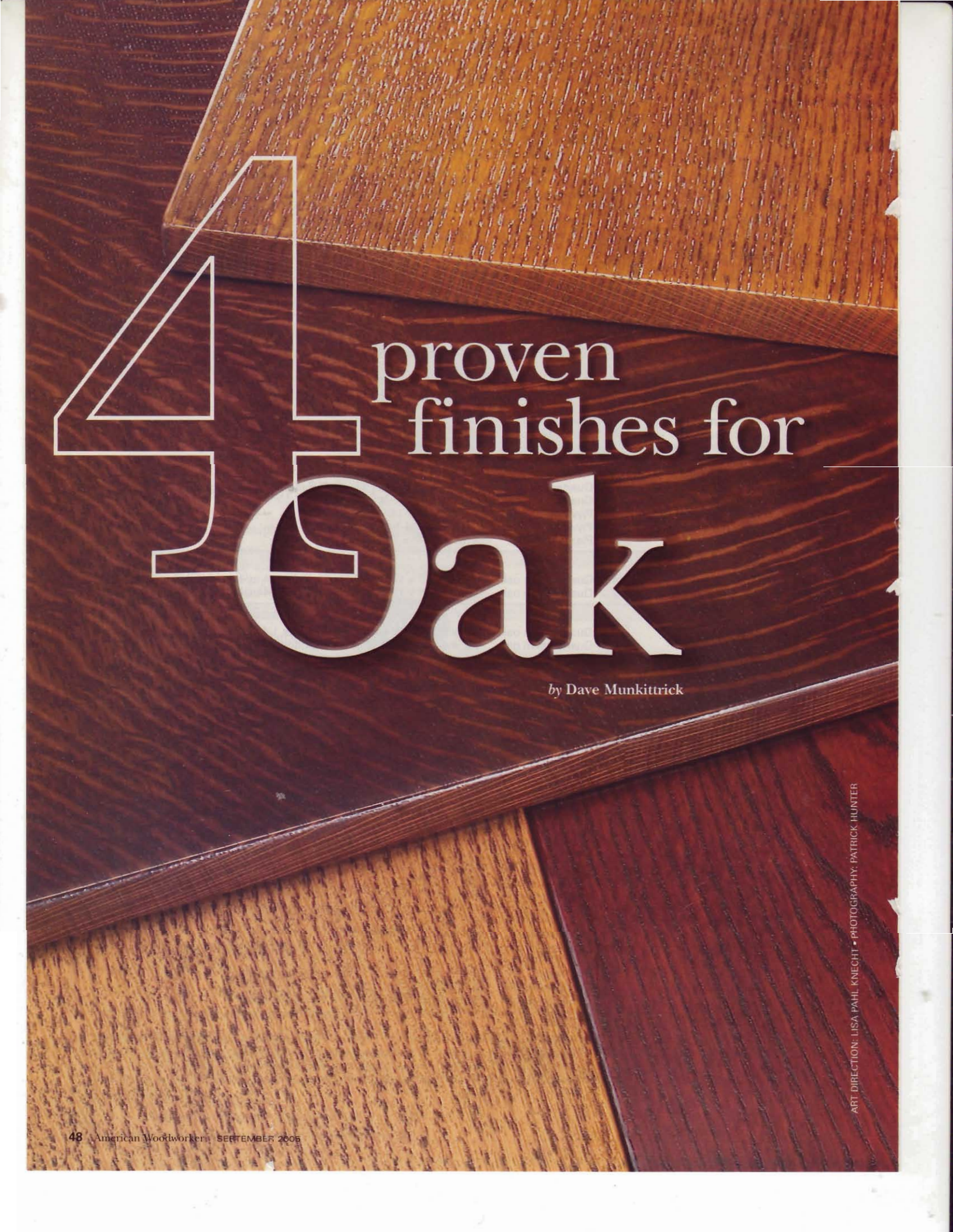


CUTTING LIST

OVERALL DIMENSIONS: 53"H x 36"W x 21-1/4"D

Part	Name	Qty.	Material	Dimensions (T x W x L)	Comments
Sides, legs, top and back					
A	Side stile	4	Quartersawn oak	13/16" x 4" x 45-11/16"	Includes 1-in. tenon at each end
B	Side rail	4	Quartersawn oak	13/16" x 4-3/4" x 10"	
C	Side panel	2	Quartersawn oak	1/4" x 8-1/2" x 36-11/16"	
D	Leg center	4	Plainsawn oak	1-5/8" x 2-1/8" x 49-3/16"	
E	Leg face	8	Quartersawn oak	1/16" x 2-1/8" x 49-3/16"	Make 1/4 in. thick, then plane to 1/16 in. thick after gluing to leg
F	Top	1	Quartersawn oak	13/16" x 21-7/16" x 36"	Make 1/4 in. thick, then joint to 1/16 in. thick after gluing to top
G	Top front edge	1	Quartersawn oak	1/16 x 13/16" x 36"	
H	Backsplash	1	Quartersawn oak	13/16" x 3" x 32"	Includes 1-in. tenon at each end
J	Screw cleat	4	Quartersawn oak	13/16" x 2" x 17-1/2"	
K	Back stile	2	Quartersawn oak	13/16" x 4" x 45-11/16"	
L	Back rail	2	Quartersawn oak	13/16" x 4-3/4" x 24-1/4"	
M	Back panel	1	Oak plywood	1/4" x 22-3/4" x 36-3/4"	
Drawer dividers and web frames					
N	Horizontal drawer divider	5	Quartersawn oak	13/16" x 4-1/4" x 30-1/4"	Includes 1-in. tenon at each end
N1	Edge banding	5	Quartersawn oak	1/4" x 13/16" x 30-1/4"	Includes 1-in. tenon at each end
P	Vertical drawer divider	1	Quartersawn oak	13/16" x 4-1/4" x 14-3/4"	
P1	Edge banding	1	Quartersawn oak	1/4" x 13/16" x 14-3/4"	
Q	Bottom rail	1	Quartersawn oak	13/16" x 3-11/16" x 28-1/4"	
R	Arched front rail	1	Quartersawn oak	13/16" x 4-3/4" x 30-1/4"	Includes 1/2-in. tongue at both ends
S	Web-frame center divider	3	Quartersawn oak	13/16" x 4" x 13"	Includes 1/2-in. tongue at front end
T	Web-frame side rail	12	Quartersawn oak	13/16" x 2" x 14-1/2"	
U	Web-frame back rail	6	Quartersawn oak	13/16" x 2" x 25-1/4"	
V	Web-frame dust panel	6	Plywood	1/4" x 13" x 11-1/8"	
X	Web-frame dust panel	3	Plywood	1/4" x 13" x 25-1/4"	
Y	Wear strip	18	Plastic laminate	1/16" x 1-1/4" x 18-1/4"	
Drawers 1 and 2					
AA1	Side	4	Quartersawn oak	1/2" x 3-1/2" x 17-1/4"	Includes 1/4-in.-long dovetail at front end
AA2	Back	2	Quartersawn oak	1/2" x 3-1/2" x 12-3/32"	
Drawers 3, 4, 5, 6					
AA3	Side	8	Quartersawn oak	1/2" x 4-1/4" x 17-1/4"	Includes 1/4-in.-long dovetail at front end
AA4	Back	4	Quartersawn oak	1/2" x 4-1/4" x 12-3/32"	
Drawers 1-6 common parts					
AA5	Front	6	Quartersawn oak	13/16" x 4-1/4" x 13-5/8"	Allows 1/16-in. gap all around drawer front
AA6	Bottom	6	Oak plywood	1/4" x 16-3/4" x 12-1/16"	
Drawer 7					
BB	Front	1	Quartersawn oak	1/2" x 6-1/8" x 28-1/8"	Allows 1/16-in. gap all around drawer front
BB1	Side	2	Quartersawn oak	1/2" x 6-1/8" x 17-1/4"	
BB2	Back	1	Quartersawn oak	1/2" x 6-1/8" x 26-5/8"	
Drawer 8					
CC	Front	1	Quartersawn oak	1/2" x 9-3/8" x 28-1/8"	Allows 1/16-in. gap all around drawer front
CC1	Side	2	Quartersawn oak	1/2" x 9-3/8" x 17-1/4"	
CC2	Back	1	Quartersawn oak	1/2" x 9-3/8" x 26-5/8"	
Drawer 9					
DD	Front	1	Quartersawn oak	1/2" x 7-7/8" x 28-1/8"	Allows 1/16-in. gap all around drawer front
DD1	Side	2	Quartersawn oak	1/2" x 7-7/8" x 17-1/4"	
DD2	Back	1	Quartersawn oak	1/2" x 7-7/8" x 26-5/8"	
Drawer 7, 8, 9 common parts					
EE	Bottom	3	Oak plywood	1/4" x 16-3/4" x 26-9/16"	
All drawers, common parts					
FF	Glue block	72	Hardwood	5/16" x 5/16" x 1-1/2"	Eight per drawer
GG	Center guide	9	Quartersawn oak	3/8" x 13/16" x 17-11/16"	
HH	Bottom guide	18	Quartersawn oak	3/8" x 13/16" x 16-1/2"	Two per drawer

Sources Woodworkers Hardware, (800) 383-0130, www.woodworkerhardware.com Low-profile washer-head screws, #SCLP8x114, \$4 per 100. Desktop fasteners, #KV1548, \$5.20 per 20. Titebond-Extend wood glue, #F9104, \$4.82 a pint. • Rockler, (800) 279-4441, www.rockler.com Dark copper Stickley V-drawer pulls, #62950, \$35 each. • Leigh Industries, (800) 663-8932, www.leightjigs.com Frame-and-mortise jig, #FMT, \$800 each. • Bosch, (877) 267-2499, www.boschtools.com 3.25 Plunge router, model# 1619EVS, \$330 each (street price).



4 proven finishes for Oak

by Dave Munkittrick

ART DIRECTION: LISA PAHL KNECHT • PHOTOGRAPHY: PATRICK HUNTER

A good finish should highlight the best characteristics of the wood it goes on. I've put together four finish recipes that make the most of oak's contrasting grain. The first three recipes use two different color layers, each separated by a seal coat of shellac. Light penetrates and reflects back through the layers, giving these finishes stunning depth and beauty. The fourth is a simple, out-of-the-can recipe that produces a surprisingly good-looking finish.

The layered finishes start with a ground color of water-based dye. I like water-based dyes because they don't bleed back out of

oak's pores like alcohol-based dyes do. Next, a barrier coat of dewaxed shellac seals in the dye. Shellac dries fast, allowing you to move through the steps quickly. A second layer of color, called a glaze, is applied over the sealed dye. The dark glaze fills the open-pored earlywood, increasing its contrast with the light-colored latewood. I use a gel stain for the glaze because it doesn't run all over or bleed back. Another coat of shellac seals in the glaze. The dewaxed shellac allows you to use your favorite topcoat. (Check out "Tips & Techniques for Fantastic Oak Finishes," page 89.)



1 Mission Oak

This finish is designed specifically for quartersawn white oak. Sanding the dye coat ever so lightly really enhances the ray flecks.

1. Apply a 50-50 mix of Trans Tint Dark Mission brown and medium brown dye to the bare wood and let it dry.
2. Very lightly scuff-sand the dyed wood with 320-grit paper.
3. Seal the dye with a barrier coat of wax-free shellac.
4. Scuff-sand.
5. Glaze with Minwax walnut gel stain.
6. Seal with wax-free shellac and scuff-sand when dry.
7. Apply a topcoat of your choice.



2 Golden Oak

This is a classic oak finish familiar to any antique lover. The glaze layer darkens the open-pored earlywood and contrasts beautifully with the brownish-gold latewood. This finish looks best on red oak.

1. Apply J.E. Moser's Wizard Tints honey amber dye to the bare wood and let it dry.
2. Seal with shellac and scuff-sand when dry.
3. Glaze with Minwax walnut gel stain.
4. Seal with shellac and scuff-sand when dry.
5. Apply a topcoat of your choice.



3 Deep, Dark, Red Oak

This finish looks great on plainsawn red oak boards and is impossible to get straight out of a can. The red dye is incredibly strong. But the gel stain is applied without a barrier coat so it darkens both the earlywood and latewood.

1. Apply J.E. Moser's Wizard Tints bright scarlet to the bare wood and let it dry.
2. Apply Minwax jet black mahogany gel stain.
3. Seal with wax-free shellac and scuff-sand when dry.
4. Apply a topcoat of your choice.



4 Simple, But Nice, Oak Finish

This finish is as easy as it gets. Its results are not as spectacular as those of the other three recipes. But it makes up for its plainer look with ease of application.

1. Apply two coats of Rockler's Mission Oak Wipe-On gel stain.
2. Seal with shellac and scuff-sand when dry.
3. Apply a topcoat of your choice.

Source Woodworker's Supply, (800) 645-9292, www.woodworker.com Zinsser Bullseye SealCoat Universal Sanding Sealer 100-percent wax-free shellac, #119-456, \$9 a quart. J.E. Moser's Wizard Tints: honey amber, #913-560, 2 fl. oz. bottle, \$18; bright scarlet, #913-616, 2-oz. bottle, \$18. • Woodcraft, (800) 535-4486, www.woodcraft.com TransTint Dyes: medium brown, #128484, 2-oz. bottle, \$17; dark Mission brown #128486, 2-oz. bottle, \$17. • Rockler, (800) 279-4441, www.rockler.com Mission oak wipe-on gel stain, #34921, 1/2 pint, \$7. • Home Centers and Hardware Stores Minwax gel stains: walnut, 1 quart, \$12; jet black mahogany, 1 quart, \$12.

Coping with inside miters

A time-honored technique for applying molding to inside corners

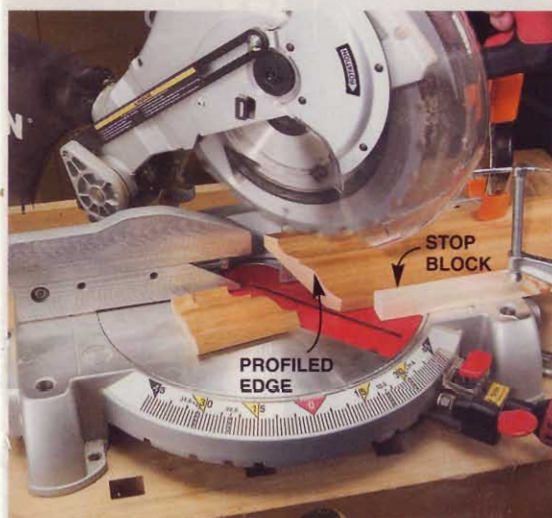
by Dave Munkittrick

The best technique for applying molding on an inside corner is called a coped joint. Cabinet-makers have used this joint to create great-looking inside corners for centuries. The technique involves cutting a profile on the end of the molding that

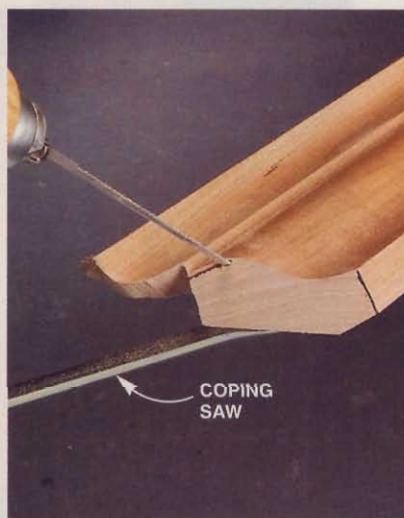
fits like a puzzle piece against the adjoining piece (see above).

To create the profile, cut a 45-degree miter on the end of the molding (Photo 1), just as you would if you were going to miter the joints. Then, use a coping saw with a fine-toothed blade to cut out the

profile (Photo 2). Only the simplest moldings will allow you to complete the joint with one long cut. For abrupt direction changes, you'll need to back out of the cut and approach it from a different angle. Use files to clean up the profiled edge and fine-tune the fit (Photo 3).



1 Make an inside 45-degree cut to create a profiled edge. The molding should be held upside down on the saw. A stop block clamped to the saw holds the molding in place.



2 Cut the profile with a coping saw following the profile line created by the miter cut. Angle the saw back about 30 degrees as you cut along the profile to remove more wood from the back of the molding.



3 Files fine-tune the cut. Choose a file that matches the particular profile. File and test-fit until the joint is tight.

8" Jointers

by Dave Munkittrick

Woodworkers love their jointers. It's the only power tool designed to flatten the face of a crooked board and make edges straight and square for perfect glue-ups with no visible glue lines. Jointers also allow you to save money by using less-expensive rough lumber. Because you're starting with rough stock, final board thickness is up to you, not the lumberyard.

WHY AN 8-IN. JOINTER?

The one-word answer is capacity (photo, below). There's no question a 6-in. jointer fits more easily into your shop and your budget, and some have tables as long as the 66-in. tables on standard 8-in. jointers. If you want your jointer primarily to edge-joint boards for gluing, a long-bed 6-in. jointer may be all you need. However, you will pay as much or more for these long 6-in. models as you would for some of the 8-in. jointers we liked that have even longer tables.



The extra width and length on an 8-in. jointer means you can machine most board sizes needed in cabinet and furniture construction. A 6-in. jointer is more limiting. The ability to flatten the face of an 8-in. board allows you to use the most common sizes of rough lumber. As a rule of thumb, you can accurately joint a board that's the length of the jointer's entire bed.

ART DIRECTION: VERN JOHNSON • PHOTOGRAPHY: PATRICK HUNTER AND VERN JOHNSON

A close-up photograph of a hand operating a green industrial machine. The hand is pushing a yellow plastic push block against a light-colored wooden board, moving it along a track. The machine has a green frame and a black handle. A red speech bubble is overlaid on the bottom right of the image.

Machines large
enough to handle
most boards
at a price small
enough to fit your
pocketbook

JOINTERS WE TESTED

We looked at a representative sample of 8-in. jointers on the market, including models from Bridgewood, Delta, General, Grizzly, Jet, Powermatic, Seco, Shop Fox, Woodtek and Yorkcraft. Most machines we looked at have almost identical castings for the tables and fence. But differences in price, bed length, motors, fences and other features distinguish them from each other.

(For a complete list of 8-in. jointers on the market, go to our Web site, www.americanwoodworker.com, click on "Tool Buyer's Guide" and then "Jointer, Spec Chart").

ELECTRICAL REQUIREMENTS

To get the most from an 8-in. jointer, you're going to need a 240-volt circuit in your shop. A 240-volt, 2-hp jointer has all the power you could want. If a 240-volt circuit is out of the question, you can certainly get by with a 1-1/2-hp jointer on a dedicated 120-volt, 20-amp circuit, but don't be surprised if you have to slow the feed rate on heavier cuts.

SPACE REQUIREMENTS

Jointers take up a lot of room. We recommend you get the jointer with the longest bed that will fit in your shop. Measuring from the cutterhead, allow at least 8 ft. of clearance on each end. Most machines need a good 24 in. of space from a wall.

TABLE LENGTH

The longer the jointer, the better job it can do on long boards. The table length on these jointers varies from 66 in. to a whopping 82 in. Our advice is to go for the longest bed you have room for—you'll never regret it. Because the infeed table guides the wood into the cutterhead, a long infeed table is particularly advantageous. To that end, Delta's 37-365X DJ-20 and Powermatic's PJ-882 have added

PROFILES

BRIDGEWOOD BW-8J, \$950

(WITH OPTIONAL SEGMENTED CARBIDE CUTTERHEAD, \$1,355)

PROS

This jointer's U.S.-made Baldor motor provides more power than the other 1-1/2-hp models, and a 2-hp Baldor motor upgrade is available for less than \$55. A four-blade cutterhead yields more cuts per minute than a three-knife head to create a smoother cut. Large-handled height-adjustment wheels are a plus. Bridgewood and Yorkcraft also offer the only U.S.-made segmented cutterhead, a \$405 upgrade. It's the only segmented cutterhead with inserts that have an arc ground on the cutting edges. This arc produces a shearing cut for a smoother finish on figured woods. Other segmented cutterheads cut at 90 degrees to the direction of feed, as a conventional knife would.

CONS

The Bridgewood comes with a standard-length 66-in. bed. The table lock levers are small and uncomfortable to use. The jointer also lacks a magnetic switch.



SHORT OUTFEED TABLE

LARGE HANDLES

TALL
FENCE

LONG
INFEED
TABLE

DELTA 37-365X DJ-20, \$1,670

PROS

The 37-365X gives you an extra-long 43-1/2-in. infeed table to guide the wood into the cutter. Because the outfeed table acts only as a support, it is considerably shorter, 31-in., to conserve space. This unusual design offers the benefit of a long bed jointer without being such a space hog.

The Delta's fence is the tallest of all fences on the jointers we tested. Adjustment and locking levers on the 37-365X are all large and comfortable. The parallel-gram bed design makes height adjustments smooth and easy. Aluminum lips bolted to the cutterhead end of the main tables are replaceable to compensate for wear.

The price of the X-series jointer includes one of four free tools (Delta tells us most people go for the mobile base) and a five-year warranty.

CONS

We wish this very fine jointer had a 2-hp option and a magnetic switch. The short outfeed table means you may need some kind of roller support when jointing long boards.





GENERAL INTERNATIONAL 80-200 M1, \$1,300

(WITH OPTIONAL SEGMENTED
CARBIDE CUTTERHEAD \$2,000)

PROS

The General 80-200 M1 is one of the smoothest running jointers we tested. An unusual feature is its pull-out bed extensions. The General segmented carbide cutterhead has 60 inserts, compared with the 40 to 50 cutters found on other brands. This should increase the cutters' longevity. A magnetic switch is another bonus.

CONS

The standard 66-in. bed length, 1-1/2-hp motor and jackscrews are the things we would change on this General. (See also "New Models and Features Update," page 58.)

GRIZZLY G0500, \$875

(G0543 WITH SEGMENTED
CARBIDE CUTTERHEAD,
\$1,295)

PROS

The Grizzly G0500 delivers great features at a great value. The extra-long 75-in. bed and 2-hp motor make this one of the best all-around jointers for the money in our book. But that's not all. The Grizzly jointer has a four-knife cutterhead that produces 22,000 cuts per minute, a higher number than for any other machine we tested. A magnetic switch and large-handled wheels for table height adjustment were excellent additional features.

CONS

A tall fence and a pedestal switch would make this machine perfect. (See also "New Models and Features Update," page 58.)



LONG
TABLE

CUTTERHEAD

Segmented carbide cutterheads are the most exciting new option on jointers.

They revolutionize knife changes and durability while allowing you to joint manufactured materials, such as melamine. (See "Carbide Cutterheads," page 61.)

For traditional straight knives, we like the spring-loaded cutterheads (photo below).



KNIFE-
SETTING
GAUGE

Spring-loaded cutterheads and a knife-setting gauge combine to greatly speed and simplify knife setting. Jackscrew cutterheads allow you to adjust the knife parallel with the outfeed table. Some machines have both designs built into one cutterhead.



JET JJ-8CS, \$1,100

PROS

We love the JJ-8CS's spring-set knife holders and the knife-setting gauge (also found on the Seco and Woodtek). Together, they make knife changes quicker and easier. The gauge automatically sets the correct protrusion of the knives from the cutterhead. A 2-hp motor, magnetic power switch and large-diameter height-adjustment wheels round out the package.

CONS

The Jet JJ-8CS's has a 66-in. bed, a standard-height fence and small table-lock levers. (See also "New Models and Features Update," page 58.)

SWITCH TYPE, LOCATION

We recommend a magnetic switch for an added safety in case of a power loss. A pedestal-mounted switch is the most convenient to use. The Powermatic PJ-882 and Shop Fox W1684 are the only jointers we tested that have both.

BED DESIGN

The Delta 37-365X DJ-20 and Powermatic PJ-882 have an unusual parallelogram support system that allows the tables to rise and lower in the same arc as the cutterhead. This keeps the opening around the cutter smaller than on conventional beds. The tables are spring counterbalanced, making adjustments super easy.

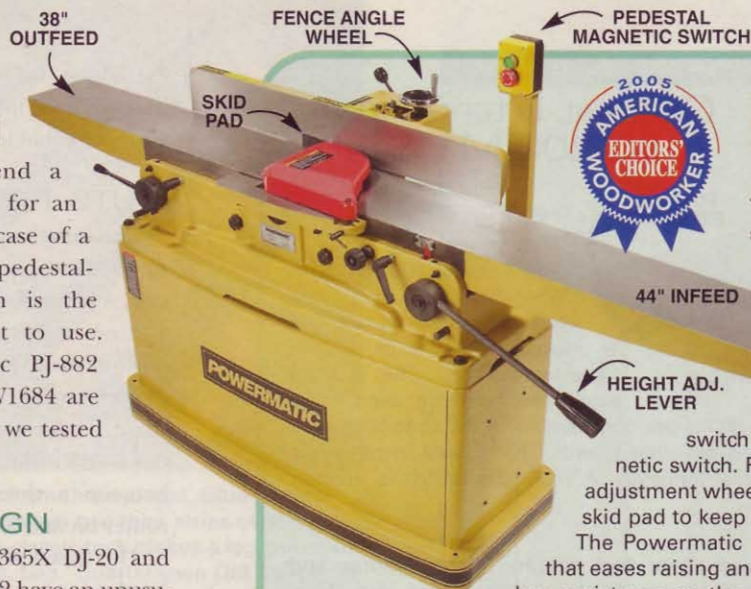
The parallelogram design allows you to adjust each table so they stay parallel to each other.

TABLE HEIGHT ADJUSTMENT

The choice of hand wheels or levers for table adjustment is one of personal preference. Levers give you quick macro adjustments; hand wheels make micro adjustments easier. Overall, we like a



Long, easy-to-grasp handles on the Bridgewood, General, Grizzly, Jet, Seco and Woodtek table height-adjustment wheels are a joy to use.



POWERMATIC PJ-882, \$1,500

PROS

This jointer has a lot to offer. For starters, it has a huge 82-in. overall bed length with an extra long 44-in. infeed table. Plus, its 2-hp motor has power to spare and its cutterhead delivers 21,000 cuts per minute for smoother boards.

It offers a convenient pedestal switch combined with the safety of a magnetic switch. Finally, the tall fence features a nifty adjustment wheel for angling the fence and a plastic skid pad to keep the fence from scratching the bed. The Powermatic uses a parallelogram table design that eases raising and lowering the tables. This results in less resistance on the height-adjustment levers, allowing fine adjustments to be made with ease. The height-adjustment

levers are conveniently located on the side of the machine, rather than tucked underneath the table control. Built-in depth-of-cut stops allow you to instantly set a 1/8-in.-deep cut or just a whisker cut.

CONS

The Powermatic PJ-882's working surface is set back further than it is on most jointers. This forces the operator to lean over the machine a little more than on the typical jointer.



SECO SK-0008JT, \$995

PROS

This Seco jointer offers great features, including a spring-loaded knife holder and setting gauge for simplified knife changes. The 2-hp motor has plenty of power. The magnetic switch

and large-handled height-adjustment wheel round out the package.

CONS

A longer bed would be a great addition to this jointer. Small levers on the table and fence locks are uncomfortable to use.

WOODTEK 907-064, \$920

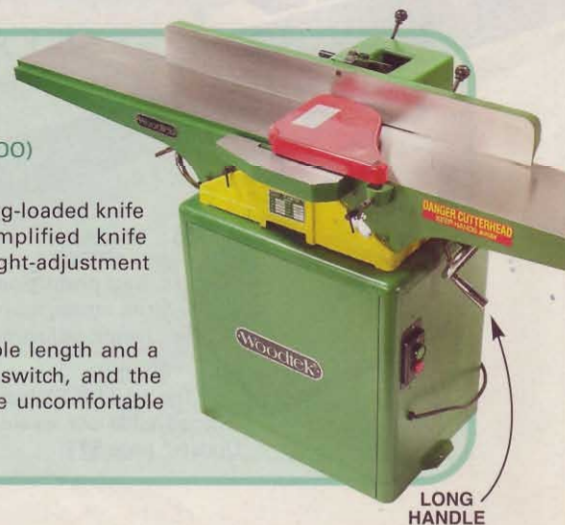
(WITH CARBIDE-INSERT CUTTERHEAD, \$1,200)

PROS

The Woodtek 907-064 features a spring-loaded knife holder and setting gauge for simplified knife changes. Long handles on the height-adjustment wheels are user-friendly.

CONS

This model has a standard 66-in. table length and a 1-1/2-hp motor. It lacks a magnetic switch, and the small adjustment and lock levers are uncomfortable to use.



SHOP FOX W1684, \$1,000

(W1705 WITH SEGMENTED
CARBIDE CUTTER, \$1,300)

PROS

The Shop Fox W1684 has a long 70-in. bed, a tall fence and a 2-hp motor. The magnetic switch is mounted on a sturdy pedestal—a great feature, especially if you have a bad back. Large table- and fence-locking handles feel comfortable in the hands.

CONS

Hand wheels have small knobs instead of handles, making them awkward to use compared with long-handled wheels.



large-diameter wheel with a long handle best (photo, page 56).

FENCE

The fence and the infeed table are the two critical guide surfaces on a jointer. A bigger fence is better. A tall fence is especially important, as it provides support for edging wide boards or glued-up panels.

MOTOR

All the 8-in. jointers we tested come with a 240-volt, 2-hp motor or a 120-volt, 1-1/2-hp motor. We found the 2-hp motors better suited to the power requirements of an 8-in. jointer. The 120-volt, 1-1/2-hp models bogged down and tripped the breaker with a 1/16-in. deep cut on an 8-in.-wide piece of hard maple. Full-width cuts can be made with the 1-1/2-hp models, but you have to baby the feed rate.

With one exception, all the jointers we tested had motors made in China. Only the Bridgewood BW-8J came with a 1-1/2-hp U.S.-made motor (photo below). It was noticeably more powerful than the 1-1/2-hp imports but still did not quite equal the power of the imported 2-hp motors.

YORKCRAFT YC-8J, \$599

(WITH SEGMENTED
CARBIDE CUTTERHEAD,
\$1,004)

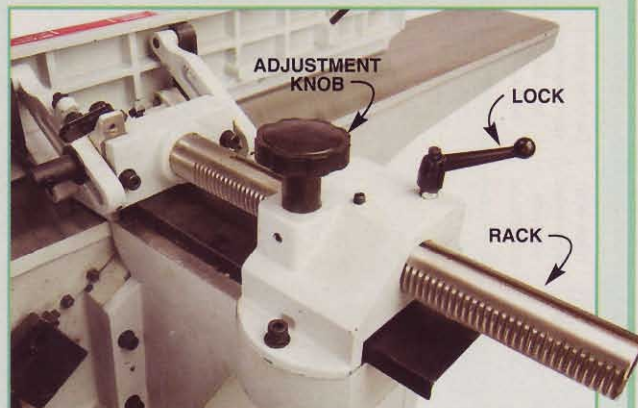
PROS

This jointer is packed with features and has the lowest price of all those we tested. Its most distinctive feature is a sturdy, built-in mobile base and rack-and-pinion fence adjustment. It also sports a long 72-in. table, a pedestal switch and built-in depth-of-cut stops that allow instant setting for a 1/8-in. deep or a very fine finish cut. The Yorkcraft offers a U.S.-made segmented carbide cutterhead with a true 10-degree shear cut (see Bridgewood Profile, page 54).



CONS

Compared with a standard fence, the rack-and-pinion fence takes up an additional 6 in. behind the jointer. The outfeed height-adjustment knob is small and awkward to use. A magnetic switch would be nice.



A rack-and-pinion fence offers smooth, knob-operated fence adjustments. The Yorkcraft YC-8J is the only jointer with this style of fence. A metal plate keeps the cutterhead and pulley covered in all fence positions.



A U.S.-made motor is found exclusively on the Bridgewood BW-8J jointer. Its 1-1/2-hp Baldor motor powered through heavy cuts better than the imported 1-1/2-hp motors we tested.

RECOMMENDATIONS

If you've got the room, it's hard to beat the **Powermatic PJ-882**. At 82 in., it has the longest overall table length of any model we tested, and an extra-long 44-in. infeed table, too. A hand-wheel for fence angle settings and a parallelogram bed design are just a couple of the unusual features on this jointer.

If you've got the money but not the room, take a look at the **Delta 37-365X DJ-20**. Delta put the extra bed length where it's needed most, on the infeed table, which is 43-1/2 in. The 31-1/4-in. outfeed table adds up to a space-saving overall length of 76-1/2 in.

Our top value recommendations include the **Grizzly G0500** and the **Yorkcraft YC-8J**. These are great machines with long beds and extra features that make them a real deal.

If your shop limits you to 120-volt machines, check out the **Bridgewood BW-8J**. It has a 1-1/2-hp American-made Baldor motor that outperformed all the imports in our test.

Overall, this is a great group of jointers. Every jointer we tested performed its duty well. It's really a question of weighing features with cost and the size of each machine to determine which one is best for you.

NEW MODELS AND FEATURES UPDATE

Grizzly recently introduced the G0586, a new 8-in. jointer. It features the same long fence and 2-hp motor that we like on the G0500, plus a pedestal switch and a handwheel adjustment for fence positions. The best news of all is the price tag: \$625.

General is also introducing a new model, which will replace the 80-200M1. The company is doing away with the pull-out extension rollers in favor of longer 75-in. tables. The table-height handwheels are now side-mounted for easier adjustments. There's also a handwheel for fence adjustments.

Jet has just introduced indexed, snap-in knives for its 6-in. jointers (see "Well-Equipped Shop," page 16).

Brand and model	Average street price	Price with segmented carbide cutterhead	Carbide insert replacement number and cost	Spring or jack-screw knife holder	Total bed length (in.)	Infeed table length (in.)	No. of knives x rpm = cuts/min.	HP and volts	Infeed table height adjustment	Fence size (in.)	Magnetic power switch	Pedestal switch	Contact
Bridgewood BW-8J	\$950	\$1,355	52 inserts @ \$2.75 ea.	Jack-screw	66	32-3/4	4 x 4,500 = 18,000	1.5 110/220	Handwheel	4 x 38	N	N	(800) 235-2100 www.wilkemach.com
Delta 37-365X DJ-20	\$1,670	NA	NA	Jack-screw	76-1/2	43-1/2	3 x 5,500 = 16,500	1.5 120/240	Lever	5 x 35	N	N	(800) 438-2486 www.deltawoodworking.com
General Int'l 80-200 M1	\$1,300	\$2,000	60 inserts @ \$4 ea.	Jack-screw	66	32-3/4	3 x 5,000 = 15,000	1.5 230	Handwheel	4 x 38	Y	N	(888) 949-1161 www.general.ca
Grizzly G0500 (G0543 with helical cutter)	\$875	\$1,295	40 inserts @ \$29 for a box of 10	Spring and jack-screw	75	37	4 x 5,500 = 22,000	2 110/220	Handwheel	4 x 38	Y	N	(800) 523-4777 www.grizzly.com
Jet JJ-8CS	\$1,100	NA	NA	Spring	66	32-3/4	3 x 5,500 = 16,500	2 230	Handwheel	4 x 38	Y	N	(800) 274-6848 www.jettools.com
Powermatic PJ-882	\$1,500	NA	NA	Jack-screw	82	44	3 x 7,000 = 21,000	2 230	Lever	4-3/4 x 38	Y	Y	(888) 274-6848 www.jettools.com
Seco SK-0008JT	\$995	NA	NA	Spring	66	32-3/4	4 x 4,500 = 18,000	2 110/220	Handwheel	4 x 38	Y	N	(888) 558-4628 www.seco-usa.com
Shop Fox W1684 (W1705 with helical cutter)	\$1,000	\$1,300	40 inserts @ \$29 for a box of 10	Jack-screw and spring	70	34-1/2	3 x 5,500 = 16,500 ¹	2 220	Handwheel	4-7/8 x 40	Y	Y	(800) 840-8420 www.shopfox.biz
Woodtek 907-064	\$920	\$1,200	54 inserts @ \$28 for a box of 10	Spring	66	32-3/4	3 x 4,500 = 13,500	1.5 115/230	Handwheel	4 x 38	N	N	(800) 645-9292 www.woodworker.com
Yorkcraft YC-8J	\$599	\$1,004	52 inserts @ \$2.75 ea.	Jack-screw	72	35-1/4	3 x 4,800 = 14,400	1.5 115/230	Lever	4-7/8 x 35	N	Y	(800) 235-2100 www.wilkemach.com

NA = not available ¹ W1705 with helical cutter, 4 x 5,500 = 22,000

Carbide Cutterheads for Jointers

Cut manufactured materials and make fewer knife changes

by Dave Munkittrick

The latest thing in jointers is the segmented carbide insert cutterhead. Instead of high-speed steel (HSS) knives, the cutterhead is peppered with an array of solid-carbide inserts (photo at right). During our 8-in. jointer tool test (see "Tool Test: 8-in. Jointers," page 52), we had a chance to compare these new cutterheads head-to-head with their straight-knife cousins. We like what we saw and now use some of them in our shop. They've received unanimous thumbs-up from all users. Carbide took over in a hurry when it was introduced on saw blades, router bits and shaper knives. I wouldn't be surprised to see the same trend occur with jointer and planer knives.

COST

At \$300 to \$400, segmented carbide cutterheads aren't inexpensive. But consider the cost of sharpening HSS knives (about \$15 a set) and the need for an extra set of knives to replace the ones being sharpened (about \$30). On average, the initial addi-



A segmented carbide cutterhead has 40 to 60 individual carbide inserts bolted onto it. Each insert has four sharp edges that can be rotated when one side becomes dull.

5 BIG ADVANTAGES

1. LONGEVITY

A single set of carbide inserts will outlast a conventional knife set by approximately 40 times. That's because each insert is made of solid carbide and has four cutting edges. Each edge will last up to 10 times longer than a typical HSS knife-edge. Multiply that number by the four edges on each insert and you get 40 conventional knife sharpenings built in to each set of carbide inserts. Remember that when you're weighing the extra cost of a segmented carbide cutterhead.

2. JOINTING MANUFACTURED MATERIALS

Carbide inserts allow you to joint manufactured materials, such as melamine and MDF, which would instantly dull HSS knives (photo at left). This is true of hard abrasive woods like teak, too.

3. EASY KNIFE CHANGES

With carbide inserts, knife changes are no longer such an onerous task (photo, page 62). No more fussing with knives that creep out of position as they're tightened down.

4. LESS NOISE

A segmented cutterhead runs noticeably quieter than a straight knife cutterhead. Anything that diminishes the noise pollution in the shop is a welcome addition.

5. QUALITY OF CUT

Carbide inserts will make clean cuts much longer than HSS knives will. We found that both carbide inserts and HSS knives make beautiful cuts when the knives are sharp. However, the performance curve drops off rapidly with the HSS knives simply because they dull more quickly.



Carbide cutters allow you to joint abrasive manufactured materials, such as plastic laminate, melamine, particleboard and MDF. These materials would destroy the edge on a set of HSS knives.

tional expense of a segmented carbide cutterhead is about the same as the cost for 20 HSS knife sharpenings, so you'll eventually recoup your investment on the carbide model. With a segmented cutterhead, you basically pay up front for sharpenings but you get to enjoy all the benefits of carbide right away.

Replacing the inserts after all four edges are dull will cost \$120 to \$200, depending on the number of inserts in the head and the cost of each insert (see "Tool Test: 8-in. Jointers" Chart, page 58).

CHANGING INSERTS

Rotating or changing the inserts is a somewhat tedious but straightforward task. You must be meticulously clean when changing or rotating inserts. Even a little sawdust under one insert can leave an uneven cut.

SEGMENTED CUTTERHEADS TAKE MORE POWER

I've noticed that the segmented cutterheads take more feed pressure and demand more horsepower from the jointer. According to Curt Wilke of Wilke Machinery, which distributes several brands of jointers, this is because the segmented cutterhead always has several inserts cutting at any given time. A standard straight knife has an impulse cutting action. Each knife takes its cut with a rest period between.



Changing carbide inserts is done less frequently and is less frustrating than with HSS straight knives. It still takes time, about a minute per insert, but with none of the headaches that come with setting straight knives. Just unbolt an insert, clean off any pitch, rotate the insert 90 degrees to a fresh edge and bolt it back into place. If you get a nick in the cutterhead, move a few of the nicked inserts to new locations. The cuts overlap and will clean up nicks in any individual insert.

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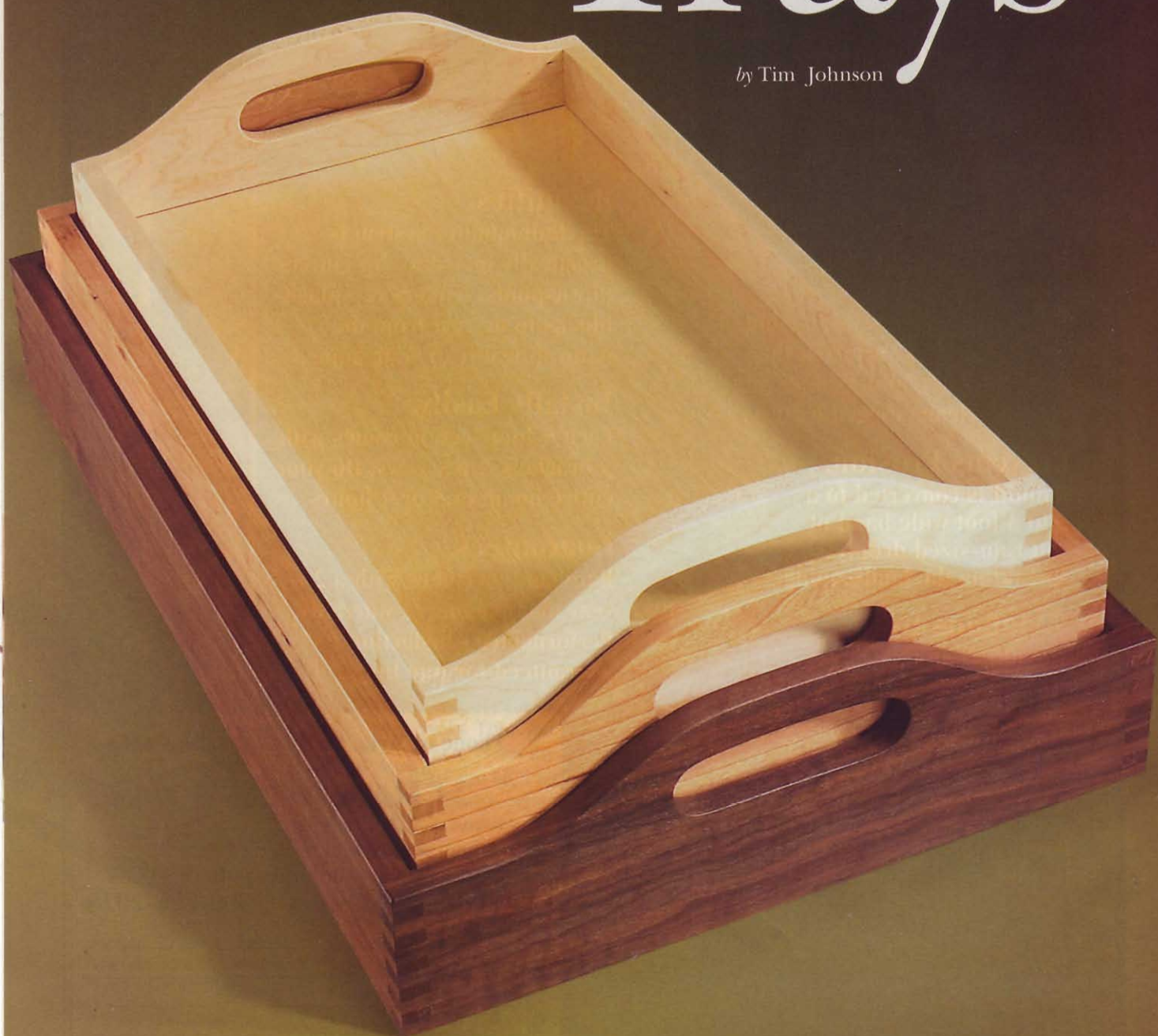
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Nesting Trays

by Tim Johnson



Eye-catching and practical, these handy carryalls are sure to please.

Here's your chance to cut lots of corners and still get great-looking results. These sturdy trays are easy to build, thanks to their simple box joints and template-routed curves. You don't need a super-equipped shop, just a tablesaw with a dado set, a router table and a drill press. You've probably saved enough scrap pieces from other projects to build the trays and the jigs, but even if you buy lumber and plywood, you can make this trio of trays for less than \$60.

CUT THE BOX JOINTS

1. Prepare your stock, including extra pieces for test-cutting. Cut blanks for the ends (A1, B1 and C1, Fig. A, page 67) and sides (A2, B2 and C2) to length, but leave them 1/8 in. oversize in width. All the ends must be squarely cut.

2. Arrange the pieces for each box and then mark the bottom edge of every one. When you cut the box joints, these marks will correctly orient the pieces in the jig.

3. Box-joint jigs index the workpiece for cutting sockets. (Photo 1). Cutting a series of sockets creates the pins. To make the joint, one piece has pins where the mating piece has sockets (see "Tablesaw Box Joints," page 69).

4. Cut test box joints to dial in a precise fit. This is fussy work, because the tolerances are tiny. The pieces should slide together without binding or rattling. The best jigs have built-in adjustment systems.

5. Cut all the box joints. On the end-piece blanks, cut sockets only as far as their curved profiles dictate. The side-piece blanks are oversize, so you'll have to make an extra pass to complete the top sockets.

ROUT THE ENDS

6. Use the end profile of the large tray (A1, Fig. C, page 67) as a pattern when you make the routing jig (Fig. B, page 67). First, transfer the curved edge profile to the jig's base. Then drill 1-in.-dia. holes with a Forstner bit to establish the ends of the handle hole. Finish rough-cutting the handle hole with a jigsaw. Then rough-cut the edge profile.

7. Smooth the edge profile using an oscillating spindle sander or a sanding drum in your drill press. Install a 3/4-in.-dia. spindle or drum to smooth the handle hole.

8. Use a large end-piece blank to position the jig's fence. Each end has six pins. Fasten the fence so the top pins are flush with the base's curved profile.

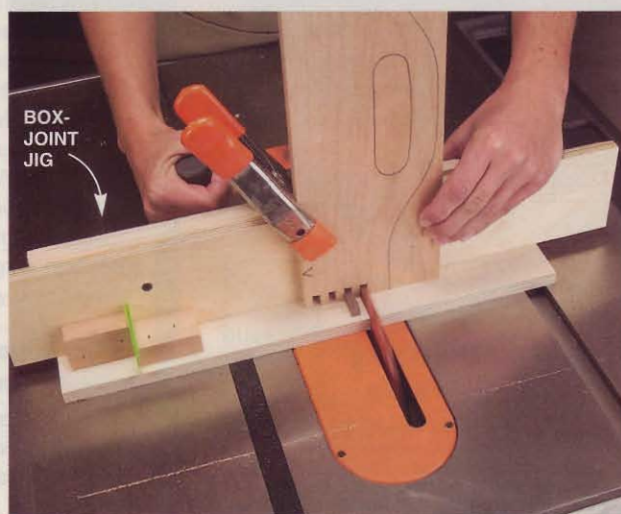
9. Install the stops after centering the large end-piece blank. Mount the toggle clamps (see Sources, page 67).

10. Draw edge profiles and handle holes on all the end blanks after installing them in the jig. Make spacers (W, X, Y and Z, Fig. B) to position the medium and small blanks.

11. Rough-saw all the curved profiles about 1/16 in. away from the pattern lines. To rough out the handle



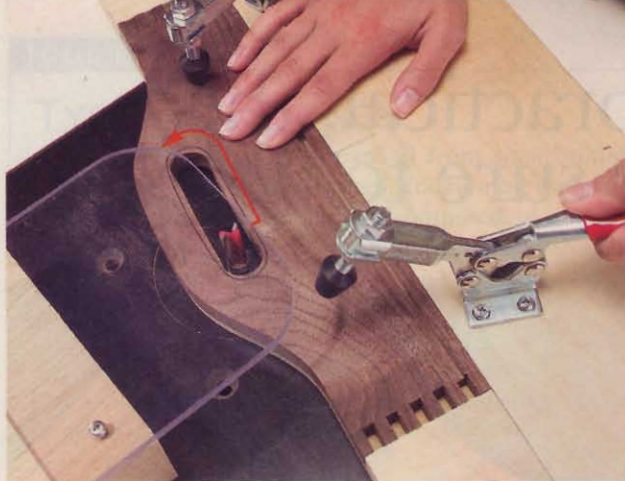
The ends of the trays match, so you can comfortably carry all three.



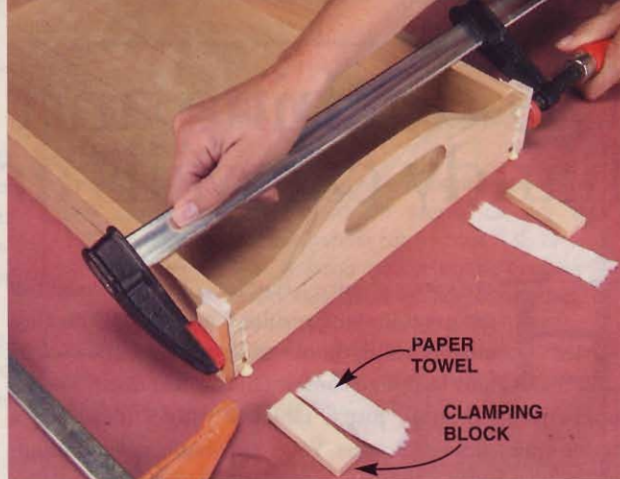
1 Great-looking box-joints are easy to make. I used a shop-made jig and my tablesaw, but these sturdy joints can also be cut on a router table or with a dovetailing jig.



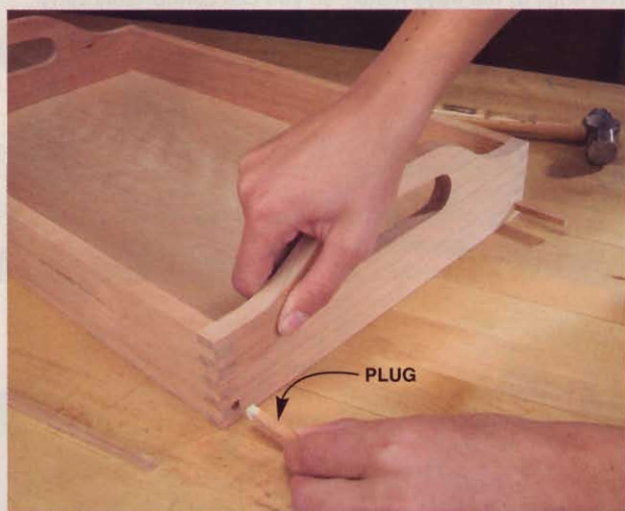
2 Rout the curved ends of all three boxes using the same jig (Fig. B, page 67). The large box's ends exactly fit the opening. Spacers center the ends of the medium and small boxes, so the profiles and handle holes all match.



3 Rout the handle holes after making sure the workpiece is securely held. With the router unplugged, center the bit inside the roughsawn opening. Hold the jig steady so the bit spins freely when you power up. Then rout counterclockwise.



4 Protect the end grain when you glue the tray together. Paper towels absorb squeezed-out glue, so it doesn't soak deeply into the wood. Because of the towels, the clamping blocks knock off easily after the glue has dried.



5 Fill holes left by the bottom grooves with end-grain plugs. Once cut and sanded flush, they'll match the end-grain pins.



6 Level the sides and ends with a block plane or by sanding.

holes, drill 7/8-in.-dia. holes and use a jigsaw to saw out the waste.

12. Rout the edge profiles with a top-bearing flush-trim bit (Photo 2). Then rout the handle holes (Photo 3).

ASSEMBLE THE TRAYS

13. Saw grooves for the plywood bottoms (A3, B3 and C3). On the side pieces, the grooves align with the top of the first pin (Fig. A). On the end pieces, they align with the top of the first socket. Because 1/4-in.-thick plywood is often undersize, you can't use a dado set. Use your regular blade and make two passes. Adjust the fence between passes to widen the groove.

14. Assemble the boxes without glue to make sure everything fits. Rip the sides to stand 1/32 in. above the ends.

15. Disassemble the boxes for sanding.

16. Glue the boxes together. Spread a thin layer of glue on all the pins and sockets. Use a brush and glue with an extended open time. Squeeze a thin bead of glue into the grooves for the bottoms, too.

17. Clamp each box using blocks to fully seat the joints

(Photo 4). Make sure the boxes are square.

18. After the glue has dried, remove the clamps and knock off the blocks. Dampen any paper that remains attached; after about a minute, it'll scrub right off. Check for any remaining glue—the moisture makes it turn a ghostly white color. Simply scrub the surface to remove it. Use a chisel to remove any glue inside the tray.

19. Cut plugs (D) and fill the holes in the ends of the trays (Photo 5).

20. True up the sides and ends (Photo 6).

SPRAY ON THE FINISH

21. Go over the boxes again with fine sandpaper; the grain will be raised in any area that has been wet. Slightly round all the sharp corners, especially those around the handle holes.

22. For small projects like this one, I prefer aerosol finishes. Spray on at least two light coats. Let the finish dry and sand lightly between each coat. Urethane finishes provide the best protection.

PROJECT REQUIREMENTS AT A GLANCE

Materials:

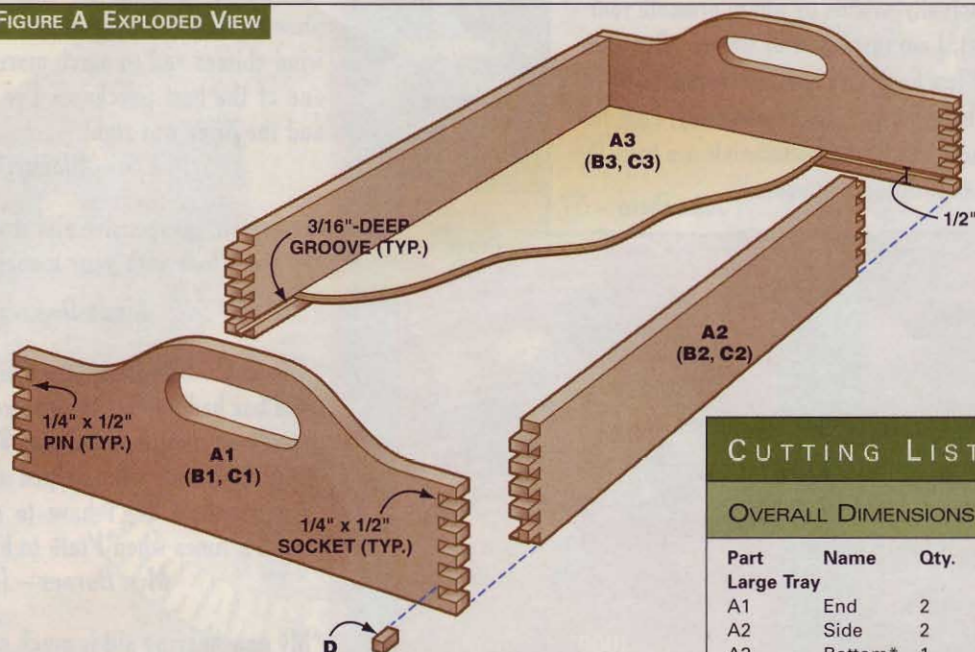
18 lineal ft. of 1/2-in.-thick x 5-in.-wide hardwood lumber
One-quarter sheet 1/4-in. hardwood plywood
One-half sheet 1/2-in. Baltic birch plywood (for jigs)
Wood glue

Tools:

Tablesaw, dado set, router table, drill press, jig saw, 3-in.-dia. and 3/4-in.-dia. sanding drums, 1-in.-dia. and 7/8-in.-dia. Forstner bits, 1/2-in. flush-trim router bit with top-mounted bearing, block plane, assorted clamps

Cost: About \$60

FIGURE A EXPLODED VIEW



CUTTING LIST

OVERALL DIMENSIONS: 4-1/4" x 13" x 20"

Part	Name	Qty.	Dimensions
Large Tray			
A1	End	2	1/2" x 4-1/4" x 13"
A2	Side	2	1/2" x 2-3/4" x 20"
A3	Bottom*	1	1/4" x 12-11/32" x 19-11/32"

Medium Tray			
B1	End	2	1/2" x 3-3/4" x 11-3/4"
B2	Side	2	1/2" x 2-1/4" x 18-3/4"
B3	Bottom*	1	1/4" x 11-3/32" x 18-3/32"

Small Tray			
C1	End	2	1/2" x 3-1/4" x 10-1/2"
C2	Side	2	1/2" x 1-3/4" x 17-1/2"
C3	Bottom*	1	1/4" x 9-27/32" x 16-27/32"

D	Plug	12	Cut to fit
---	------	----	------------

Routing Jig			
W	Medium end spacer	2	1/2" x 5/8" x 2-1/2"
X	Medium bottom spacer	1	1/2" x 1/2" x 11-3/4"
Y	Small end spacer	2	1/2" x 1-1/4" x 2-1/2"
Z	Small bottom spacer	1	1/2" x 1" x 10-1/2"

* Plywood

FIGURE B ROUTING JIG

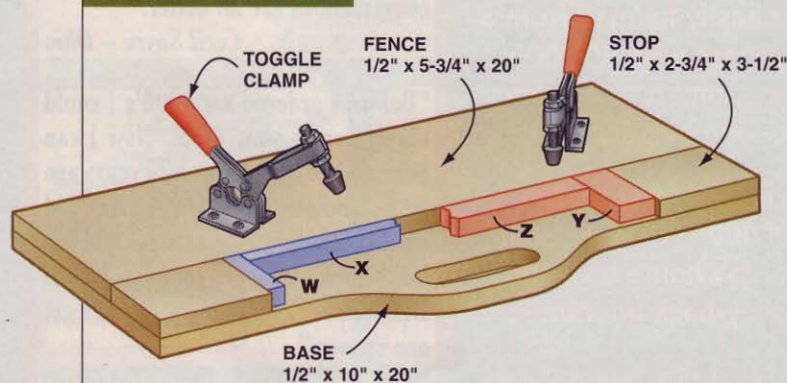
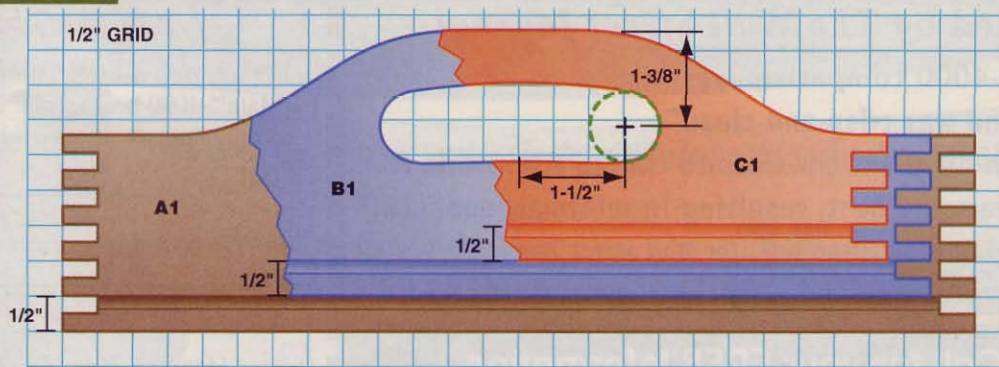


FIGURE C END PROFILES



Sources Highland Hardware, (800) 241-6748, www.highlandhardware.com 1/2-in. top-bearing flush-trim bit, #101461, \$24. Toggle clamp, 2-3/8-in. reach, #166105, \$7. Extended open-time wood glue, 1 pt., #165026, \$8.

Tablesaw Box Joints

A shop-made jig with micro-adjust guarantees perfect joints.

by Tim Johnson

Box joints are the savvy woodworker's alternative to dovetails. Strong, great-looking and quickly made, box joints are an especially good choice when you have a large number of items to produce. To make them, you need your tablesaw, a miter gauge, a dado set and a simple shop-made jig (Fig. A, page 70). I'll show you how to build the jig and use its micro-adjust system to dial in perfect-fitting box joints.

Box joints have alternating pins and sockets. To fit together, one piece has pins where the mating piece has sockets (Fig. B, page, 70). The challenge is to cut pins and sockets that are virtually the same size, with paper-thin tolerances for fitting the joint. Fortunately, the jig can make paper-thin adjustments. It also automatically positions both pieces so their pins and sockets are correctly offset.

DESIGN DETAILS

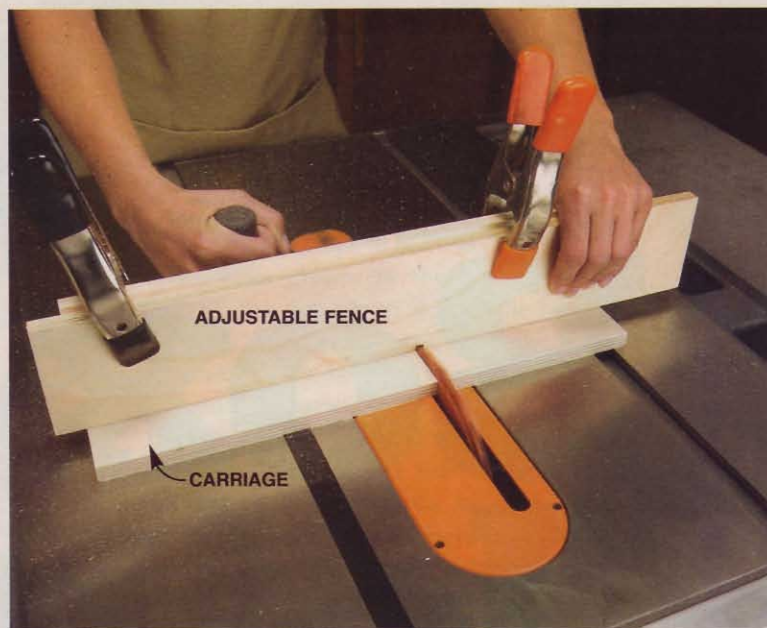
Pins and sockets can be wide or narrow to suit your project. To size them appropriately, you merely adjust the width

of the dado set. For example, to cut 1/4-in.-wide pins and sockets, use a 1/4-in.-wide dado set. The blade's height determines the length of the pins and sockets. This length matches the thickness of your box pieces. Flat-bottomed dados are a must for good-looking joints.

It's best to start with your box pieces oversize and trim them to final width after you cut and fit the joints. Box joints usually turn out to be wider than the sum of the pin and socket widths because of the fit-tolerance between each pin and socket. Starting oversize allows you to compensate.



1 Set the blade height using a piece from your project. Place the piece on the jig's carriage and raise the blade. A scrap piece held on top tells you when the blade is exactly even with the workpiece. Before moving on to the next step, make sure the miter gauge bar slides smoothly without any side-to-side play.



2 Clamp the adjustable fence temporarily to the carriage and cut a slot through both pieces. After cutting, thickness-plane a 12-in.-long piece to exactly fit the slots' width. Cut this piece into three keys. Trim one key to two-thirds the size of the slot's height.

FIGURE A BOX JOINT JIG

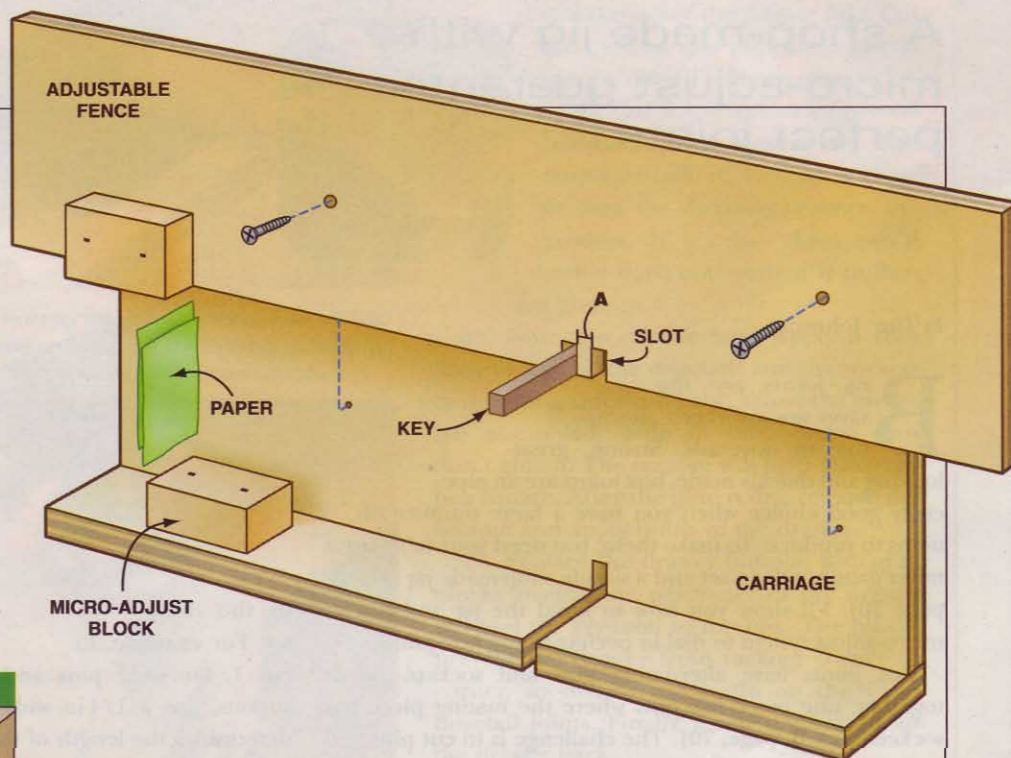
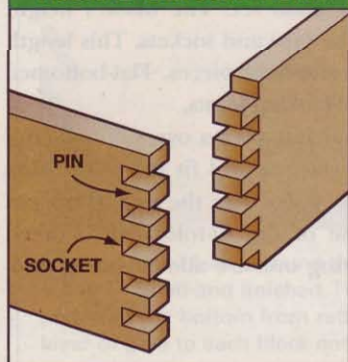


FIGURE B BOX JOINT DETAIL



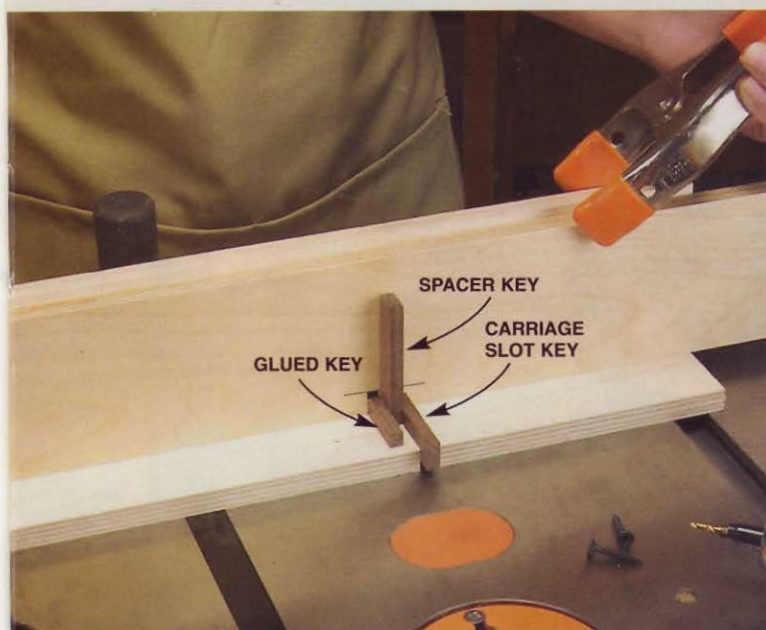
The jig has two parts. The carriage is attached to your miter gauge. The adjustable fence is attached to the carriage. One micro-adjust block is attached to each part. These blocks butt together, separated by two pieces of paper.

To cut a perfect joint, the key, the slot and the space between them (A) must all

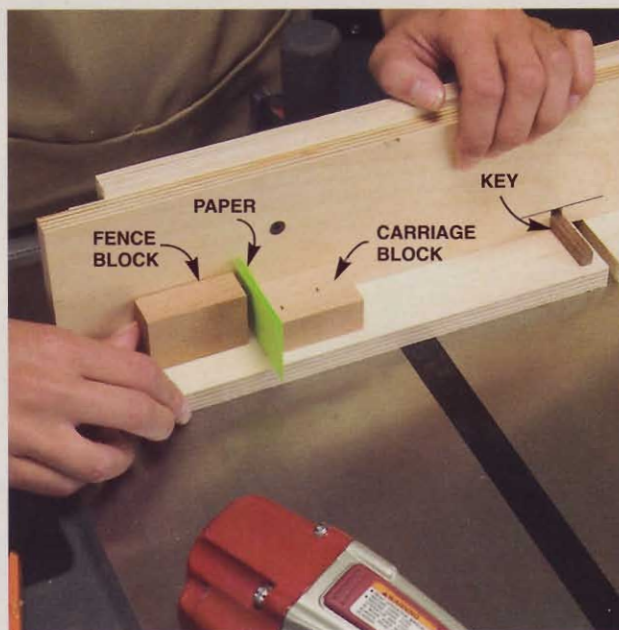
be the same width. Trim the key's height to fill about two-thirds of the slot.

After you've cut the slots and installed the key, the jig is dedicated to cutting pins and sockets of that one size.

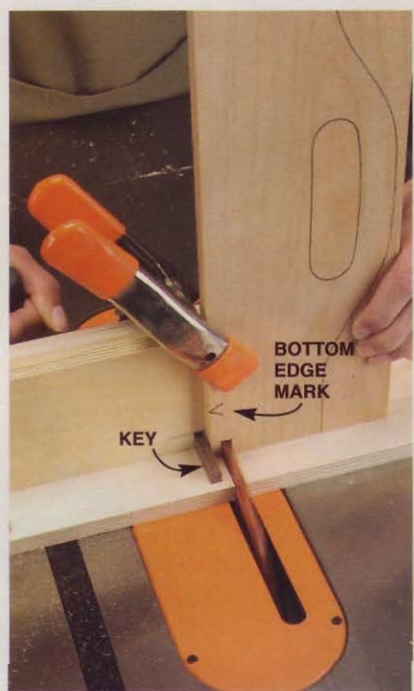
When using the jig, always orient the workpiece with its bottom edge facing the key.



3 Use three hardwood keys to position the adjustable fence on the carriage. Glue one key in the fence slot. Fit the second key in the carriage slot and sandwich the spacer key in between. Securely clamp the fence to the carriage while butting the three keys snugly together. Drill pilot holes and fasten the fence. Remove the clamps and the two temporary keys.



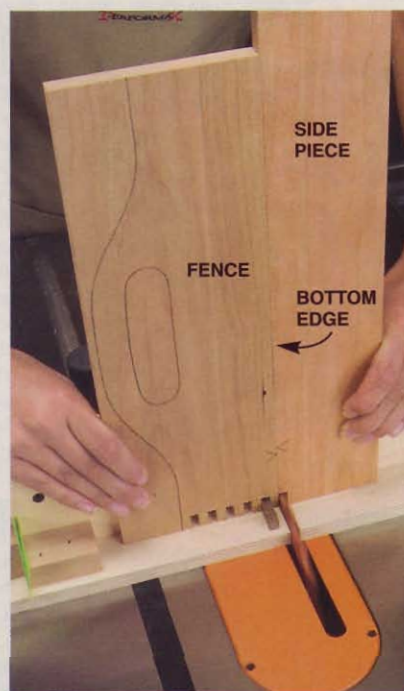
4 Micro-adjust blocks allow you to fine-tune the jig by paper-thin amounts. Attach one block to the carriage base. Butt the second block against the first, with two pieces of paper between them. Fasten this block to the adjustable fence. The space between the carriage block and the key must be wider than your workpiece.



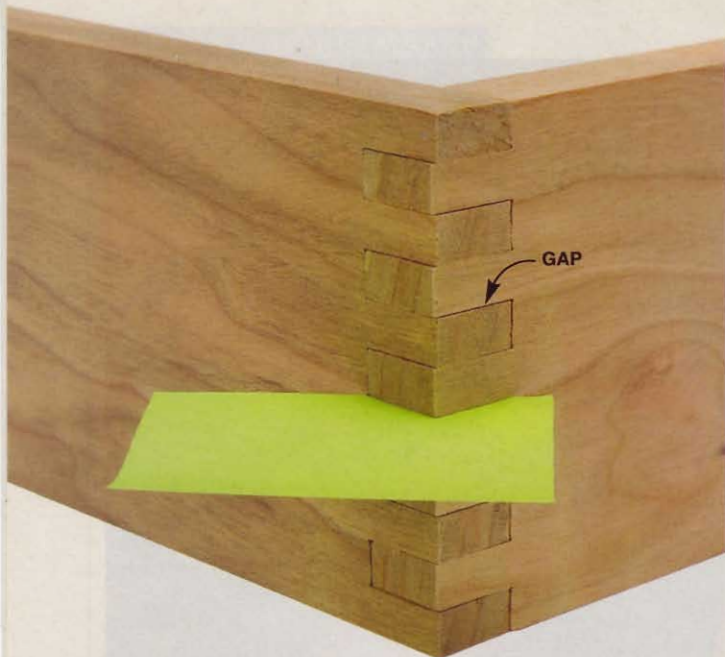
5 Cut and fit a test joint. Butt the bottom edge of your first workpiece against the key. Cutting the first socket creates a full pin at the bottom. I think box joints look best when the end pieces have full pins at the top and the bottom, so I always start with an end piece. Here I'm cutting sockets in an end piece from the "Nesting Trays" project shown on page 64.



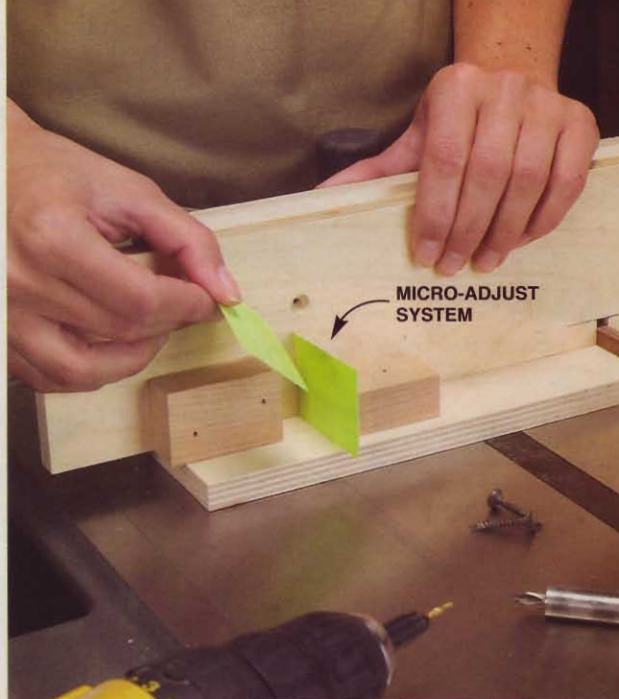
6 Cut the rest of the sockets by repositioning the workpiece. Hook the socket you've just cut over the key to cut the next socket, and so on. The key indexes the workpiece, so the sockets are evenly spaced and the pins are all the same width. Always make sure the end of the workpiece is firmly seated on the carriage before you cut.



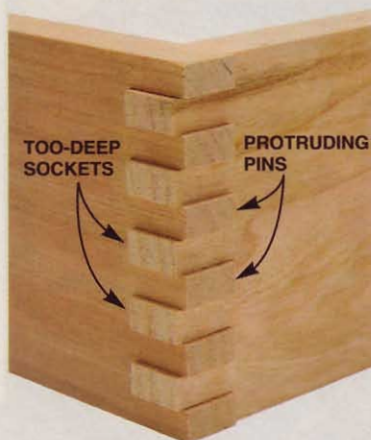
7 Cut sockets in a side piece. The setup is different, because the sides have sockets instead of pins on the top and bottom edges. Flip the end piece over and hook it on the key. It now acts as a fence to perfectly position the side piece. Orient the side piece so its bottom edge faces the end piece. Cut the first socket. Remove the end piece and cut the remaining sockets in the side piece.



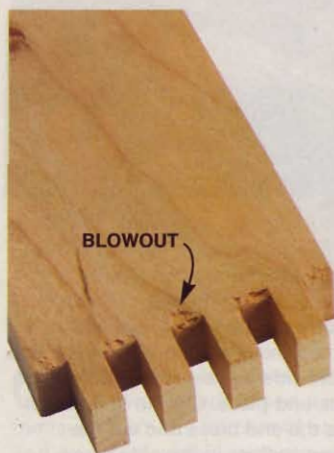
8 Test-fit the joint. The pins and sockets should slip together easily, without binding, but also without gaps. A dry fit that requires firm pressure is too tight; the pieces will be tough to assemble after glue is applied, because the glue causes slight swelling. The fit shown here is too loose by a paper thickness; glue won't swell the fibers enough to close these gaps.



9 Dial in a perfect fit with the micro-adjust system. First, remove the fence screws. If the joint is too tight, remove a piece of paper from between the blocks. If the joint is too loose, add a piece. Butt the blocks back together and clamp the adjustable fence to the carriage. Drill new pilot holes and reattach the fence. Remove the clamps, cut another test joint and check the fit.



10 Check the socket depth. The ends of your test joint should be flush. If the sockets are too deep, the pins will protrude. Protruding pins make the joint difficult to draw tightly together for gluing. Recessed pins indicate sockets that are too shallow. Recessed pins allow glue to puddle, making cleanup after gluing more difficult. Adjust the blade height as necessary.



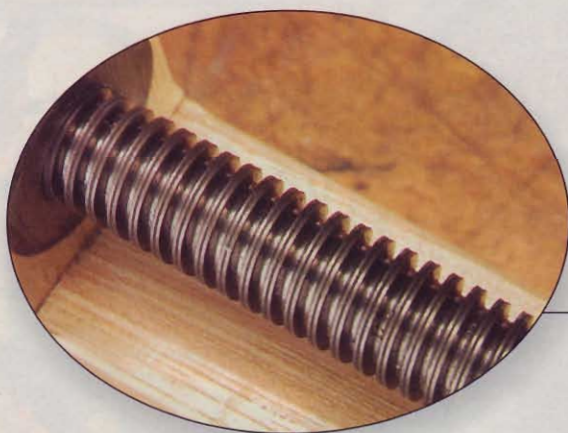
11 Beware of blow-out. Lowering the blade to make your joint flush creates a problem. It leaves the slot in your jig's fence too tall, so it won't fully support the back of the workpiece. When you cut the slots, the blade is likely to blow out the unsupported wood. On half of your box joints, this side will face out. This problem also occurs if you want to reuse your jig to make box joints in thinner stock.



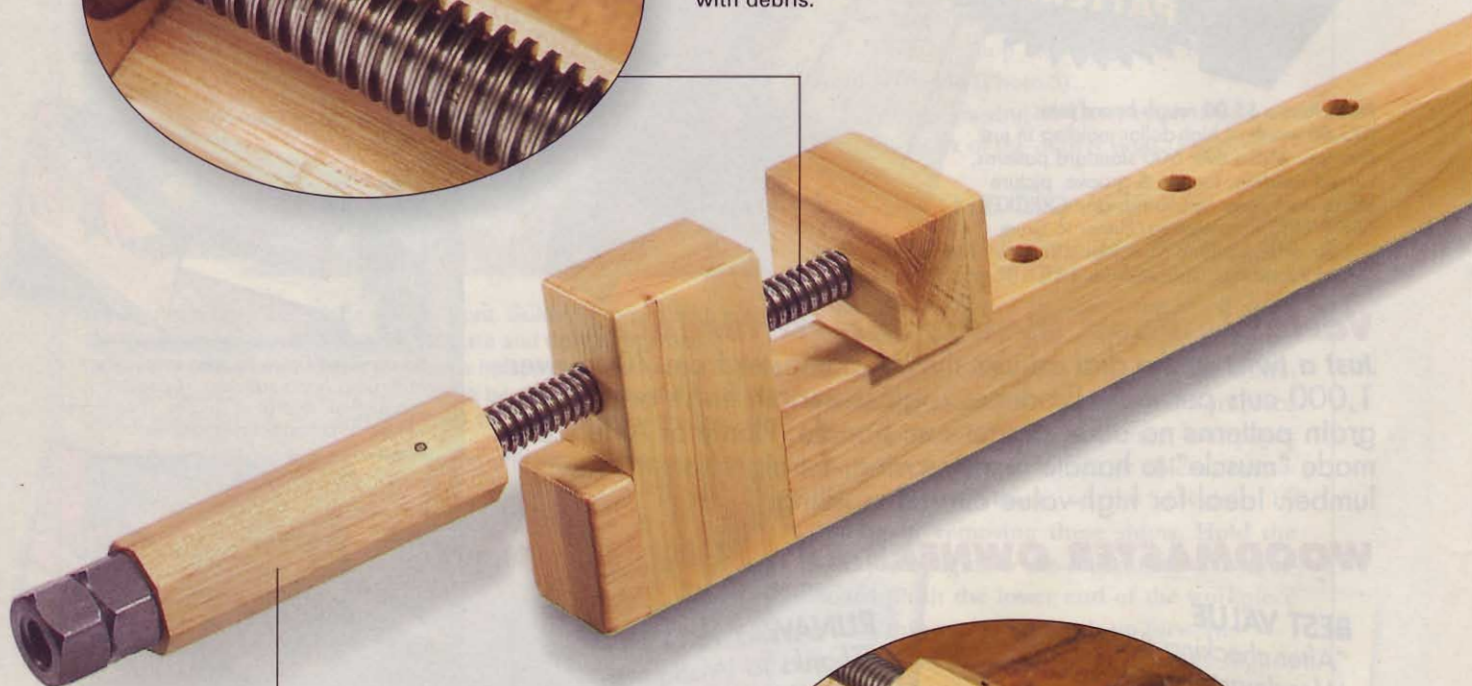
12 Install a subfence to prevent blowout. If you've lowered the blade, simply screw on a fresh board and cut a new slot. Before you fasten this fence, cut an oversize slot to fit over the key. Now your jig is tuned and ready to cut perfect-fitting box joints.

Wooden Bar Clamps

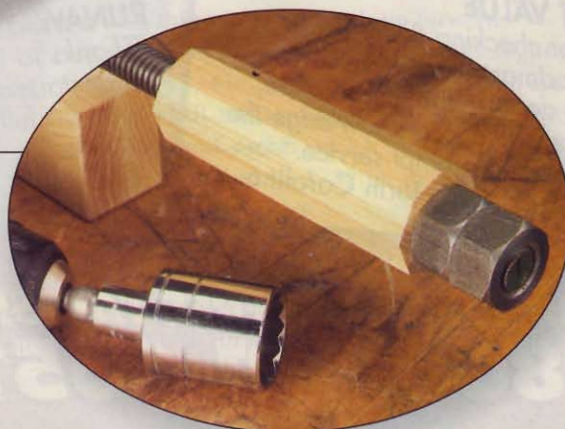
by Dave Olson

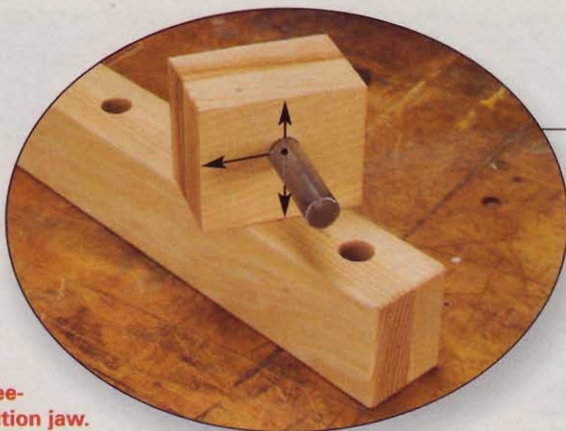


Durable Acme threads. Designed for use in vises and machine tools, Acme threads are wide-bodied for strength and steeply inclined to efficiently transfer clamping pressure. They're faster to adjust than standard V-threads, because they have fewer threads per inch. They're also less likely to clog with debris.



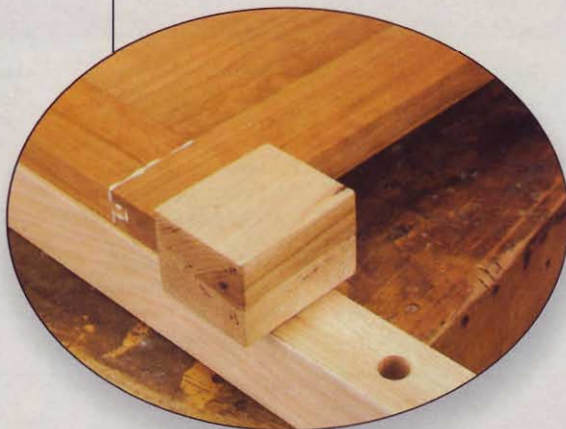
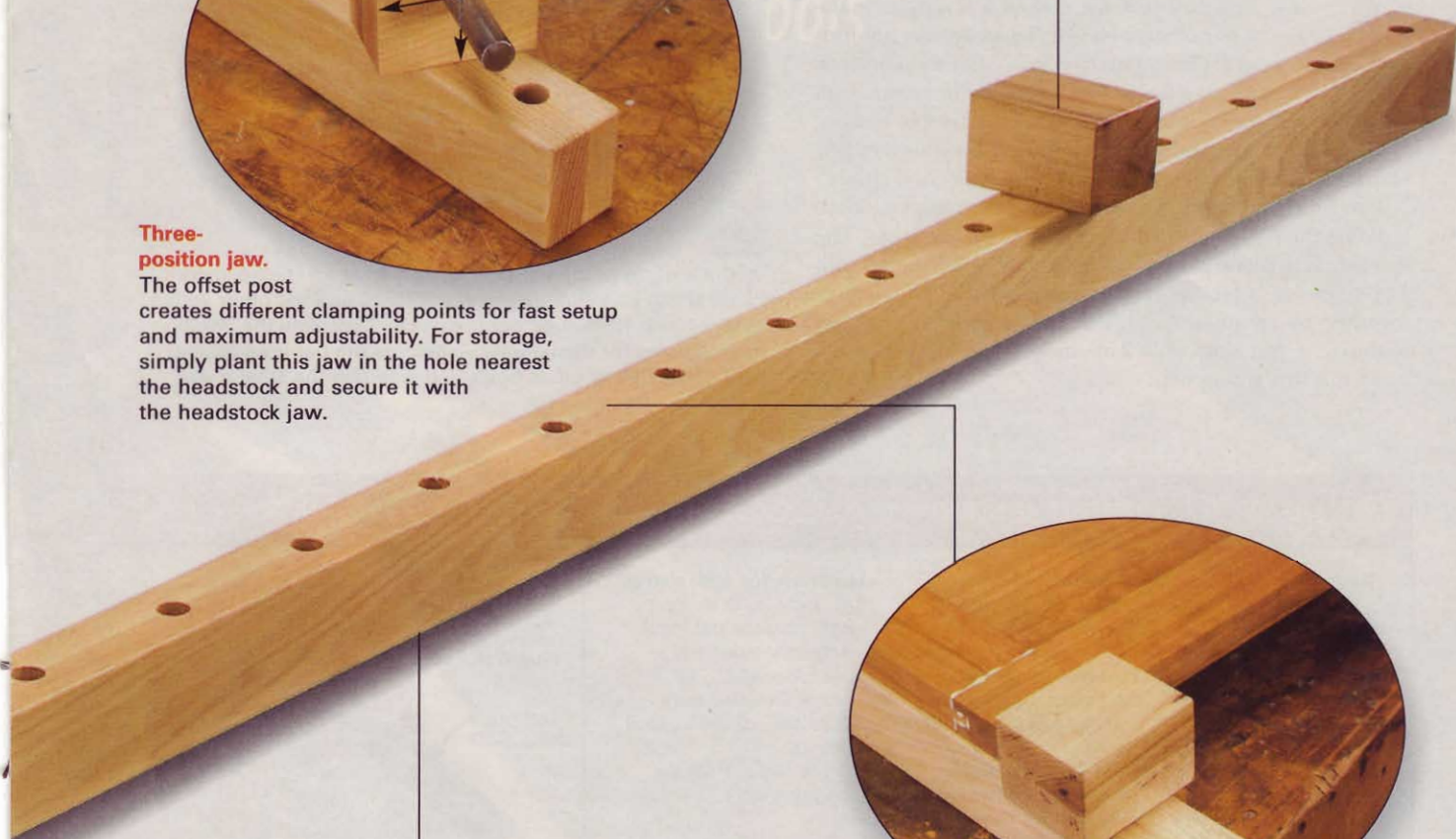
Versatile handle. It's easy to grip by hand and long enough for two-handed tightening. Locked nuts on the end accommodate a drill for speed or a wrench for extra torque.





Three-position jaw.

The offset post creates different clamping points for fast setup and maximum adjustability. For storage, simply plant this jaw in the hole nearest the headstock and secure it with the headstock jaw.



No black stains.

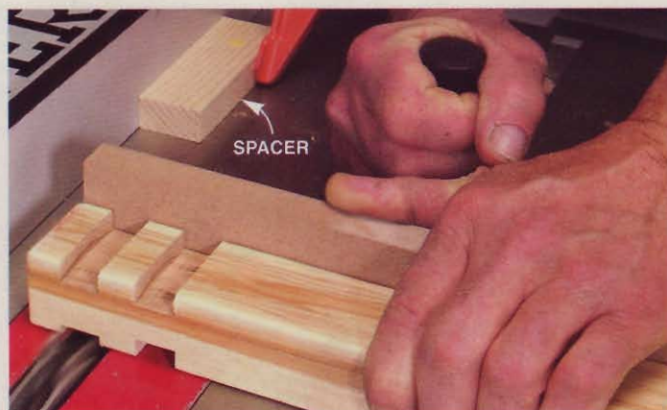
These wooden clamps won't mar your workpiece or leave unsightly stains, the way steel or iron bar clamps can. An easy-to-apply shellac and wax finish keeps glue from sticking.



Stable on any surface. Thanks to their flat-bottom design, these clamps won't tip over, even when they extend well beyond the edge of your bench. They also work great on sawhorses.

Shop-made clamps that deliver versatility and performance

I recommend making these clamps in multiples—then building them is efficient, and you'll have plenty to use. The first step is to plane your stock flat and square. I started with 1-in.-thick (4/4) lumber, so I had to plane and glue boards together to create the 1-1/2-in.-thick stock this project requires. If you start with 2-in.-thick (8/4) lumber, you'll avoid this first gluing step.



1 Cut dadoses in the bar (A, Fig. A, below) for the headstock. Establish one shoulder with the fence and the other with a spacer block. Then clear out the waste. Complete the bar by drilling holes for the bar jaw. Assemble the bar jaws (B, Fig. B, below) by drilling offset holes and inserting the steel rods.

FIGURE B BAR JAW

- Jointer
- Planer
- Tablesaw
- Vise
- Router table
- 45-degree chamfer router bit
- Drill press
- 5/8-, 33/64- and 1-1/4-in.-dia. drill bits
- Assorted clamps

4 bd. ft. of 4/4 rough-sawn hickory for each 49-in.-capacity clamp
Five-minute epoxy
Red automotive-grade thread locker

About \$11 for hardware only, \$22 for hardware and roughsawn hickory

5/8-in.-dia. x 12-in.-long
8-tpi (threads per inch)
Acme threaded rod
Four 5/8-in.-dia. 8-tpi
Acme threaded nuts
1/2-in.-dia. x 2-3/4-in.-long
drill rod
3/16-in.-dia. x 1-1/4-in.-
long drill rod

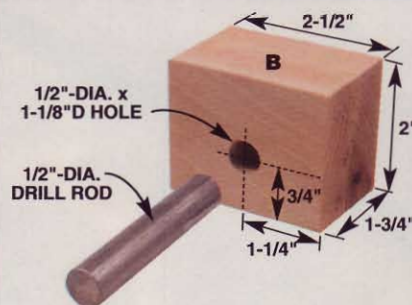
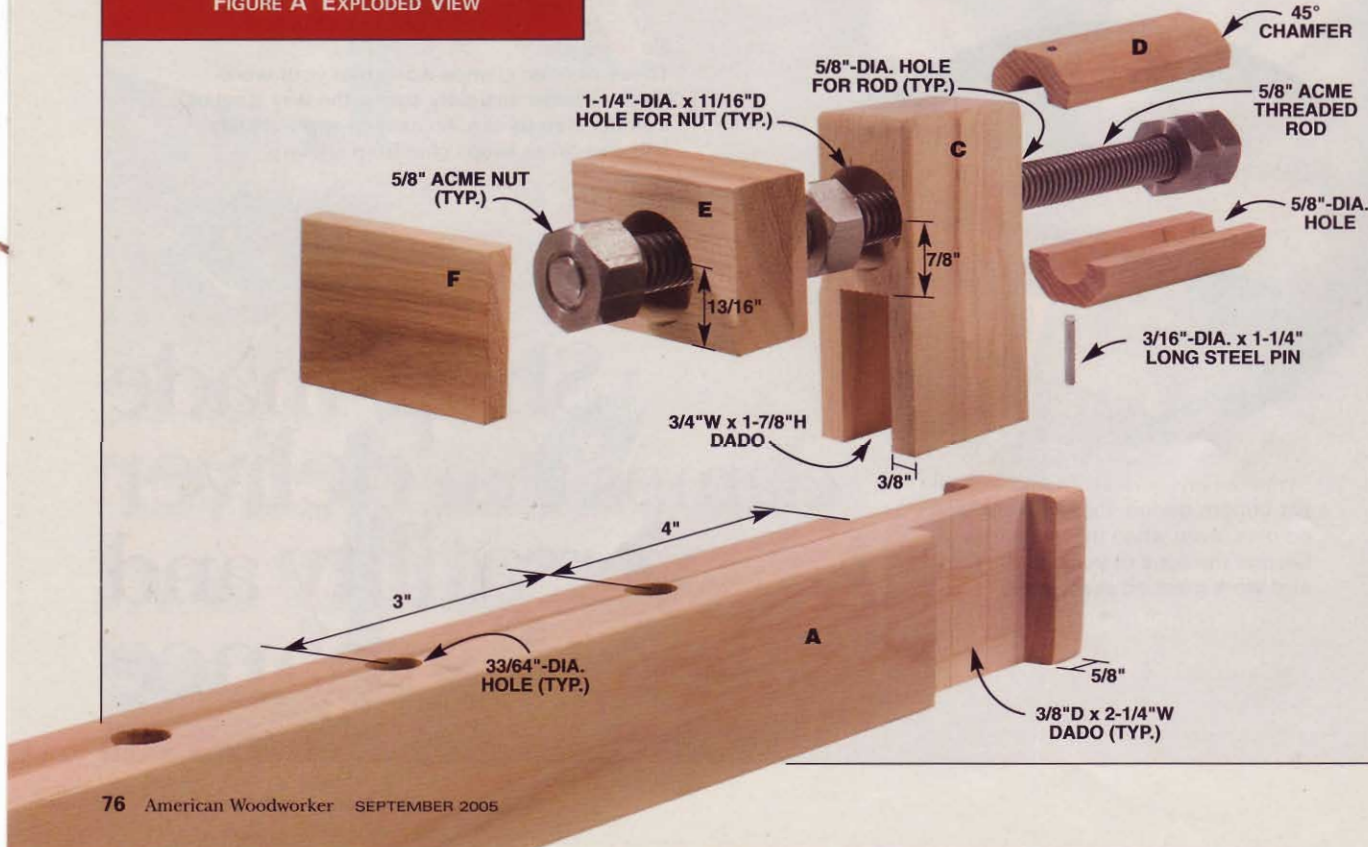
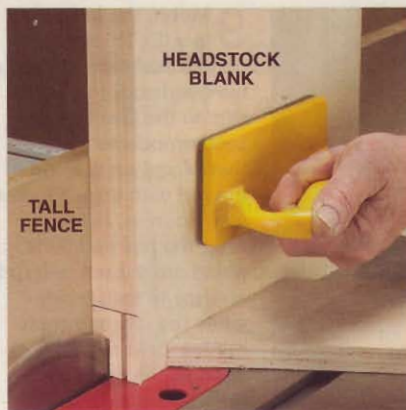
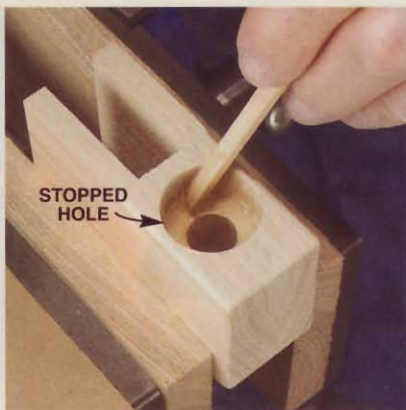


FIGURE A EXPLODED VIEW





2 Cut headstock pieces (C) from a large blank. First, cut the dado. Then saw the individual pieces. If your saw has less than 2 hp, use a regular blade to cut the long, deep dado. Install a tall fence and saw both cheeks. Adjust the fence and make additional cuts to remove the waste.



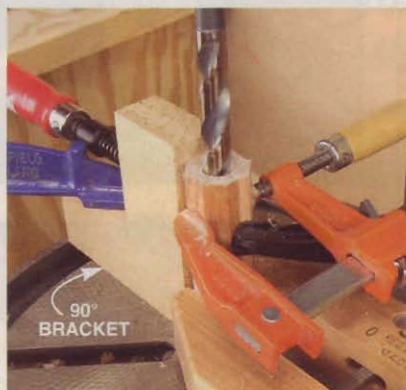
3 Spread five-minute epoxy around the base of the stopped hole to seat the headstock nut. Keep the epoxy away from the through hole. Insert a 12-in. length of rod with a nut threaded on the end. The rod centers the nut. Press the nut firmly against the bottom of the stopped hole.



4 Anchor the nut. Before the epoxy underneath hardens, dribble more epoxy around the outside. Let it seep in so it fills this area completely. Remove air bubbles by tamping with a small stick. After the epoxy has cured, remove the threaded rod and sand the surface flush.



5 Chamfer a long blank for the handles. Then cut it into 4-1/2-in. lengths to create half-handles (D). Two half-handles form one octagonal handle.



6 Drill out the handle's center without gluing the halves together. Later, you'll glue them around the rod. Use a bracket to make sure the halves are perpendicular to the table and parallel to the bit. To keep the bit from wandering, drill halfway from each end.



7 Glue the half-handles with epoxy. First, thoroughly clean a 12-in. length of threaded rod. Then tighten two nuts on one end with their faces aligned. Use enough epoxy to fill between the threads and onto the mating wood surfaces. Keep both half-handles butted against the nuts when you clamp.



For comfort and increased gripping power, wrap the handle like a tennis racket, using rubber cut from an inner tube. Simply stretch the rubber around the handle and tuck or tape the ends.



8 Pin the handle to the rod. Drill a 3/16-in.-dia. hole through the handle assembly. Then install the steel pin and peen both ends to secure it.

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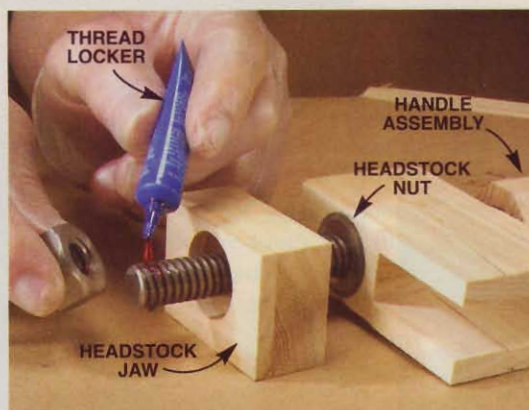
- All slides and contact surfaces are **machined** (rather than drawn or cast) to ensure absolute precision and flatness
- All guide surfaces are coated to ensure fluid motion and maximum life
- Every machine is inspected for dimensional accuracy and groove tolerance of .001"
- Guaranteed availability of spare parts for 10 years
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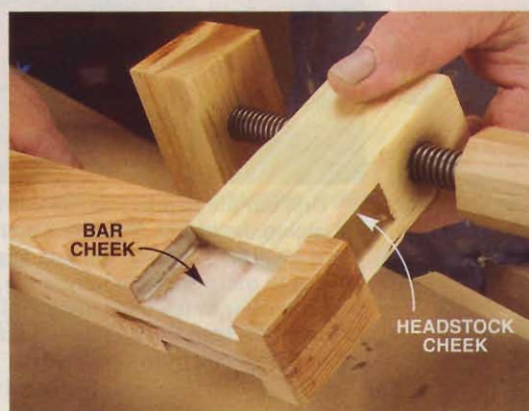
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9 Mount the headstock jaw (E). Thread the handle assembly through the headstock nut. Then slip on the jaw. The jaw accommodates a nut that's fixed on the end of the rod with thread locker (see Sources, below). After the jaw pad (F) is glued on, the nut and rod are free to spin inside while the jaw assembly moves forward and backward as the handle is turned.



10 Apply finish before gluing the headstock assembly to the bar. Tape the exposed glue-joint surfaces and metal parts before you spray. I sealed my clamps with shellac and then applied paste wax. A polyurethane finish would also keep glue from sticking, but it takes longer to dry.



11 Glue on the headstock assembly. Seat the joint first, with clamping pressure between the top of the headstock and the bottom of the bar. Then clamp the cheeks together. Your bar clamp shortage will be over as soon as the glue dries!

CUTTING LIST

OVERALL DIMENSIONS: 2-1/2"W x 4"H x 64-3/8"L (49" capacity)

Part	Name	Qty.	Dimensions
A	Bar	1	1-1/2" x 1-7/8" x 56"
B	Bar jaw	1	1-3/4" x 2" x 2-1/2"
C	Headstock	1	1-1/2" x 2-1/4" x 4"
D	Half-handle	2	5/8" x 1-1/4" x 4-1/2"
E	Headstock jaw	1	1-1/8" x 1-3/4" x 2-1/2"
F	Jaw pad	1	3/8" x 1-3/4" x 2-1/2"

Sources Enco, (800) 873-3626, www.use-enco.com 5/8-in.-dia. x 6-ft.-long 8-tpi Acme threaded rod, #FA408-0222, \$16. 5/8-in.-dia., 8-tpi Acme threaded nuts, #FA407-2202, \$1.75 ea. 1/2-in.-dia. x 3-ft.-long drill rod, #FA409-0029, \$4. 3/16-in.-dia. x 3-ft.-long drill rod, #409-0009, \$1. • Super Glue Corp., (800) 538-3091, www.pacertech.com Epoxy adhesive syringe, 1 oz., #SY-QS, \$3.20. • Permatex, (877) 376-2839, www.permatex.com Red automotive-grade thread locker, 0.2 oz., #24026, \$7.

These wooden bar clamps are based on a design submitted by Edwin Hackleman.

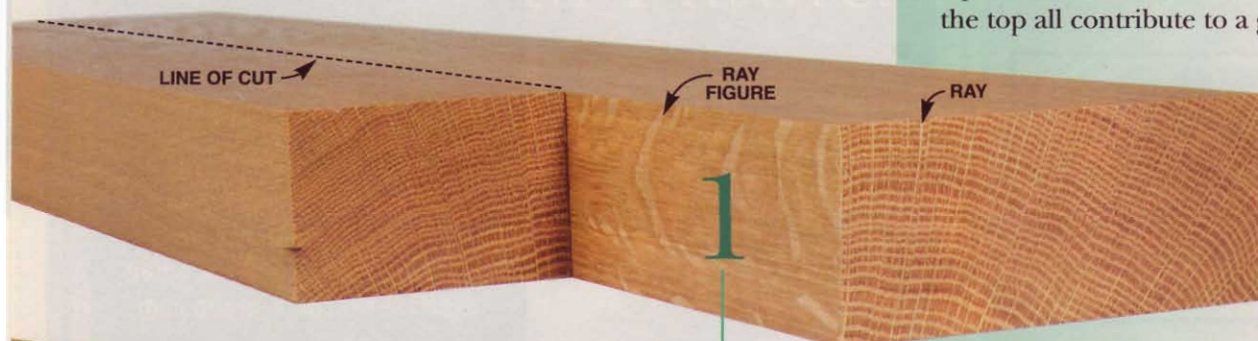
Circle No. 191

Quartersawn Oak

3 Tips To Unlock Its Beauty

by Tom Caspar

Boldly displaying spectacular quartersawn figure can turn an ordinary project into a blue-ribbon winner. Here are three ways a professional cuts oak so legs, panels and the top all contribute to a grand effect.



RIP QUARTERSAWN LEGS

With the right cut, you can make beautifully matching quartersawn legs from an ordinary 2-in.-thick board. The flake figure we look for in quartersawn oak comes from a tree's ray cells, which radiate like spokes in a wheel. Mark the spot on each end of your board where a saw cut will be parallel to the rays. Cut from mark to mark. Rip quartersawn veneer from another piece of the same board and glue it on the legs' plainsawn faces to complete the quartered look (see "Stickley-Style Chest," page 38).



EDGE A TOP

On many a piece of furniture, both the top and its front edge are prominent. Unfortunately, a beautiful quartersawn top has an ordinary-looking plainsawn edge. An easy solution is to cut your own quartersawn edging from the same lumber and glue it to the top's edge. The edging can be from 1/16 to 1/4 in. thick. Apply similar edging to drawer rails and dividers.



RESAW A PANEL

Quartersawn boards are rarely wide enough for a large panel, so in many cases you must glue boards together or resaw and book-match a single board. Here's a rule of thumb for resawing quartersawn oak: Look at the outside faces before you cut. If both sides have strong flake figure, the inside faces will have dramatic figure, too. If one outside face has weak figure, the inside faces probably won't be great. The best board to pick for resawing will have perpendicular growth rings (see inset photo).

ART DIRECTION: VERN JOHNSON • PHOTOGRAPHY: PATRICK HUNTER



Tips & Techniques for Fantastic Oak Finishes

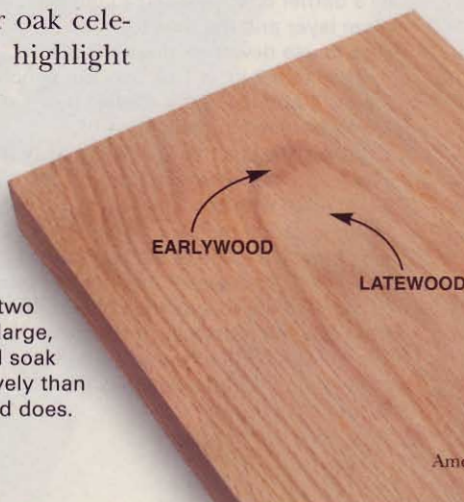
by Dave Munkittrick

Like a movie star, oak possesses natural good looks. Oak's distinctive grain pattern (see photo below) is what people are responding to when they say, "I love the look of oak." Unlike a movie star, however, oak is easy to work with—even during finishing. The best finishes for oak celebrate its grain. In this article, I'll highlight

some key finishing tips and techniques used to create the multilayered finishes that bring out the best in oak. Check out the recipes that make use of these techniques in "4 Proven Oak Finishes" on page 48.

EARLYWOOD AND LATEWOOD STAIN DIFFERENTLY

Finishing oak is like finishing two different woods at once. The large, visible pores in the earlywood soak up stain much more aggressively than the relatively smooth latewood does.





AVOID DISASTERS; MAKE SAMPLES FIRST

Always, always, always make samples before you begin to apply finish. Most finishing disasters can be avoided with this basic step. Making samples gives you the opportunity to tweak a recipe until you get the look you want. Be sure to make the samples out of scrap from the project you're finishing to get the most accurate preview of how the finish will look. Sand and finish the samples to the same level as your project and apply a topcoat.

Finally, accurately measure and record every step, including dye concentrations, mixture ratios, when to scuff-sand, number of topcoats, etc. There's nothing worse than hitting on the perfect look only to realize you don't know how you got there.

KEY TO A GOOD FINISH: PROPER SANDING

I sand oak to 220 grit. Although lots of people stop at 180 grit, I find going one more step really polishes the dense latewood and enhances its contrast with the coarse earlywood.



CREATE A GROUND COLOR WITH DYE

Many great oak finishes begin with a "ground color" dye, typically a yellow or reddish brown. The ground color establishes the finish's predominate undertone. Apply the dye liberally to bare wood with a brush or spray bottle. Blot up any excess with a clean rag. Even when thinned to manufacturers' recommendations, dyes produce very strong colors. To avoid too strong a color or problems with lap marks, I recommend thinning the dye 50 percent beyond the bottle directions. You can always add a second or even third application of dye for a darker look, but it's a lot harder to go from dark to light.

Tip: I use a spray bottle to mist the wood with water before I put on the dye. The damp wood takes the stain more evenly than dry wood.



ADD A BARRIER COAT OF SHELLAC

Shellac sealer brings the dyed oak to life. At the same time, it creates a barrier that prevents dyes or stains from bleeding into the next layer of finish. The barrier coat also creates distinct, well-defined layers that really add depth and beauty. Shellac is also used as a barrier coat between a colored glaze layer and the final topcoat. Be sure to use dewaxed shellac that's thinned to a 2-lb. cut. (A 2-lb. cut simply means 2 pounds of dry shellac flakes were dissolved in one gallon of alcohol.) This is a thin mix that's easy to brush and, because it's dewaxed, it's compatible with any topcoat. If you buy ready-mixed in the can, be careful: There are also cans of shellac labeled as a "finish and sealer" that use a more concentrated 3-lb. cut and contain wax. Read the label carefully. It should say something like "universal sanding sealer" and "100-percent wax-free formula."



SCUFF-SAND CAREFULLY

Scuff-sand with 280- or 320-grit paper between coats of shellac and varnish. A light touch is all that's needed. Care must be taken not to sand through one layer of finish into the next.

I typically scuff-sand after each coat of shellac. The sanding removes dust nibs and leaves a scratch pattern for the next coat to grip.

Tip: Scuff-sand the dye coat on quartersawn oak to make the ray fleck really pop. Because the rays are so dense, the dye tends to sit on the surface where a light sanding can easily remove it. This makes the rays lighter than the surrounding wood.



GLAZE DEEPENS THE GRAIN CONTRAST

A glaze layer is the secret ingredient to a great oak finish. A dark glaze emphasizes oak's beautiful strong grain. Glaze is nothing more than a thick stain applied over a sealed surface. Apply the glaze with a stiff brush across the grain (see inset photo). This helps push the pigment deep into the wood's pores. The glaze is removed with a pair of rags. The glaze left in the open pores of the earlywood turns it very dark. At the same time, the sealed latewood takes up

very little stain. The result accentuates the natural contrast in oak's grain. You can control the color strength on the latewood by either wiping the wood clean or leaving a little glaze behind. Use one rag to pick up the bulk of the stain. When it becomes saturated, it will leave a thin layer of color behind. Use the dry rag to clean up stain in corners or molding profiles. If the glaze ends up too dark or dries too quickly, don't panic; just wipe the surface with a rag soaked with mineral spirits and start over.



Tip: Cut the bristles of a disposable brush in half. The short, stiff bristles make it easy to scoop the thick gel out of the can and push the stain deep into the wood's open pores.

TOPCOATING PROTECTS THE COLOR

A protective topcoat adds depth and durability. Typical topcoats are oil-based or water-based varnish or lacquer. They protect the finish you've labored so diligently to create, as well as the wood beneath it. Be sure to seal the glaze layer before a topcoat is applied. Dewaxed shellac is the perfect sealer because it's compatible with any topcoat you choose.



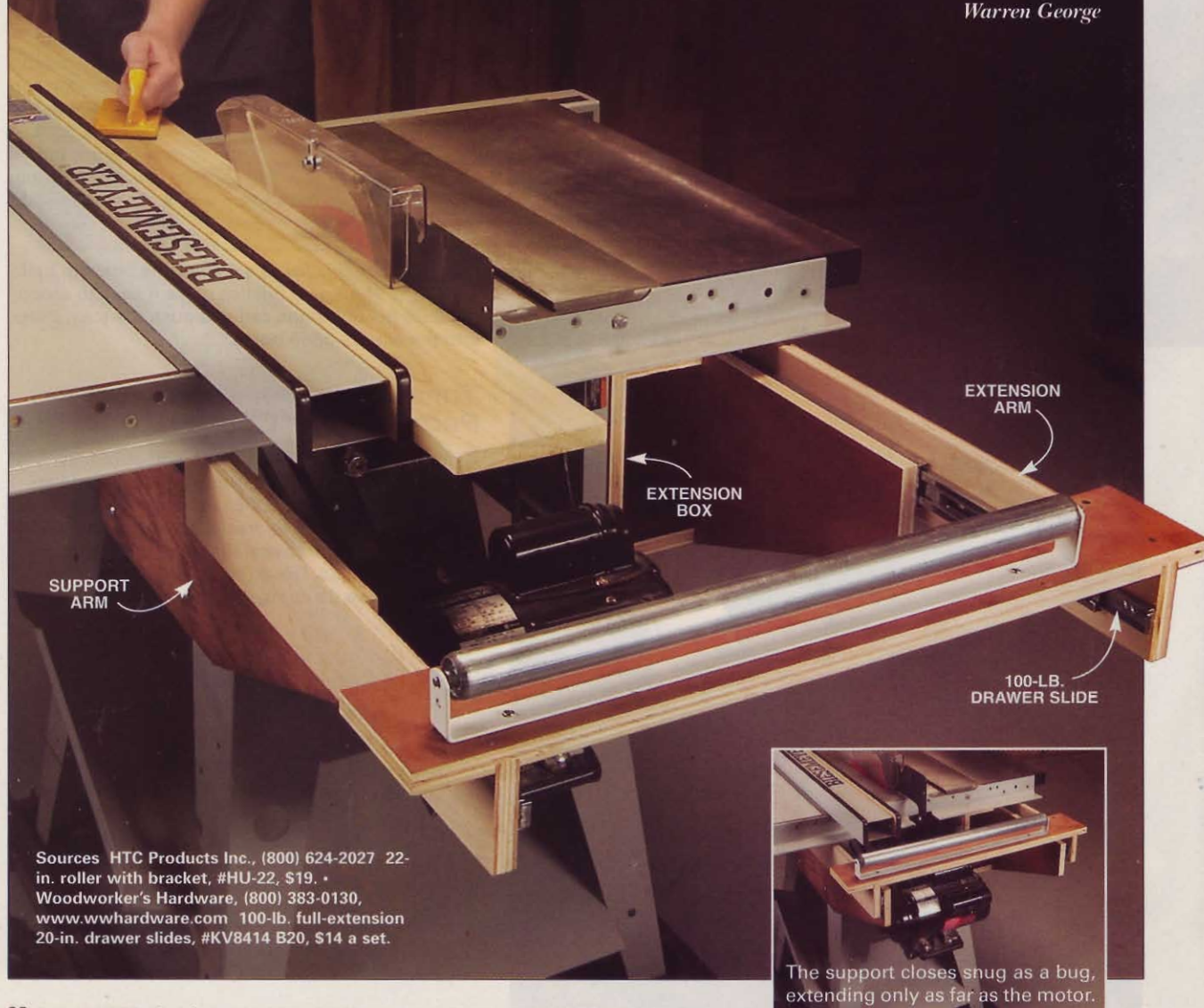
edited by Tim Johnson

DRAWER-SLIDE OUTFEED TABLE

In my garage shop, large tools have to be mobile and storable, so I attached this collapsing outfeed support to my saw. It slides on 100-lb. full-extension drawer slides. Extended, the roller sits 36 in. behind the blade, so I can rip boards as long as 6 ft. I can clamp the arms in any position to support shorter boards. Closed, the roller rests 16 in. behind the blade, so it doesn't interfere with the blade guard assembly or with the miter gauge bar during crosscuts.

The support is built like an inside-out drawer. First I bolted support arms onto the saw's cabinet. I had to extend the left arm to allow tilting the motor. Then I installed the drawer slides and the extension arms. On my saw, 20-in. slides were the longest that would fit. I fastened the extension arms securely with a wide board to minimize racking. I mounted the roller on top, centered behind the blade. To position everything correctly during construction, I clamped the roller flush with the saw table.

Warren George



Sources HTC Products Inc., (800) 624-2027 22-in. roller with bracket, #HU-22, \$19. • Woodworker's Hardware, (800) 383-0130, www.wwhardware.com 100-lb. full-extension 20-in. drawer slides, #KV8414 B20, \$14 a set.

The support closes snug as a bug, extending only as far as the motor.

RAFTER LIGHT



This hanger puts light right where I want it, without the hassle of a space-hogging floor stand. After adjusting the height, I simply hook the hanger over the rafter like an umbrella handle. I attached a T-block to make sure the clamp light can't slip off and a \$4 Velcro strip to keep the cord away from the lamp body. The clamp light cost \$10 at a home center. When I loosen the bracket to adjust the height, a lag bolt keeps it aligned. For storage, I slide the lamp end near the bracket, wrap the cord with the Velcro and hang the assembly under the peaked roof of my garage.

Jerry Hammond

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Circle No. 10



edited by Tim Johnson

GOGGLE-EYED

While cutting pieces for a dresser, I leaned an 8-ft. white oak board against my workbench. I knew it would be safer to lay the board down, but I had planned to leave it upright only for a minute. Then I got a phone call and forgot about the leaning board.

Later, while kneeling to retrieve my dado set from inside the bench, I inadvertently knocked a scrap piece into the leaning oak board, causing it to slide toward me. I looked up just in time for the board to whack me squarely in the face. Luckily, I was wearing my safety goggles. Instead of a nasty cut, I ended up with impact marks from the goggles. Fortunately, only my pride hurt when my friends asked about my new raccoon-eye look.

Mark Nagel



If you have a woodworking blunder that you're willing to share, send it to us. You'll receive \$100 for each one we print. Send it to **AW Oops!**, American Woodworker, 2915 Commers Drive, Suite 700, Eagan, MN 55121, or e-mail to oops@readersdigest.com. Submissions can't be returned and become our property upon acceptance and payment. We may edit submissions and use them in all print and electronic media.

WINDSHIELD WOES

The beautiful mahogany boards I'd just purchased were way too long to fit inside my compact pickup's bed. I didn't want to cut them shorter, so I decided to slide them over the tailgate and through the cab window to rest one edge on the dashboard.

Just as I got home, it began to rain. To keep my precious boards from getting soaked, I quickly backed into the garage. Unfortunately, I miscalculated how far the boards extended beyond the tailgate. I sure wish I had included windshield-glass replacement on my auto insurance policy!

David Olson