

**12 GREAT WORKSHOP PROJECTS**

# WOODCRAFT® Projects, Techniques, and Products magazine

**Build your  
*Dream Bench*  
NOW!**

*Simple instructions  
show you how p.28*

**2 EASY  
VALENTINE  
GIFTS**

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- **Jointing Difficult Stock**
- **TLC for Your HVLP**

VOL. 6/NO. 33 FEB/MAR 10

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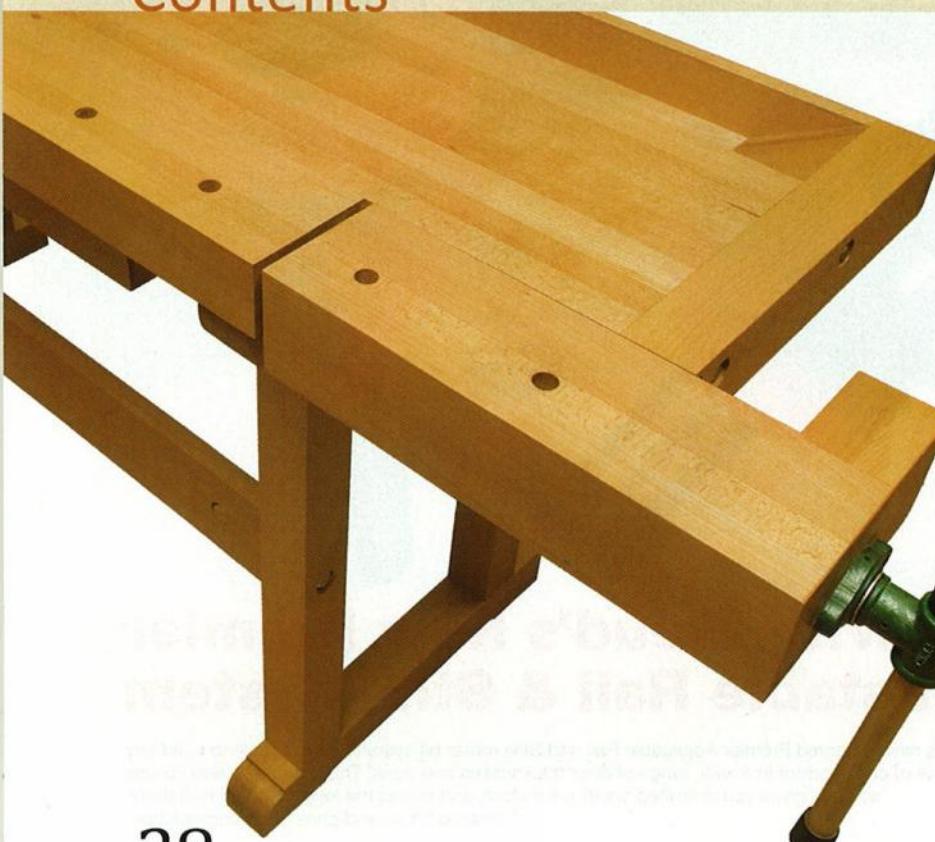


...with Optional Add-on Cutter

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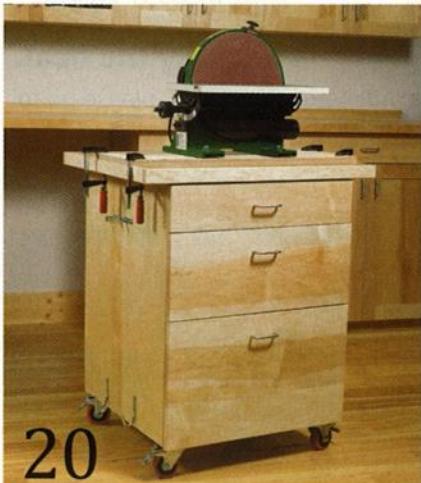
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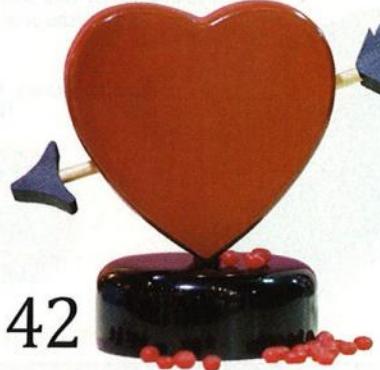
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### On the Cover

Builder Matthew Teague gives our Carlyle Lynch/Woodcraft workbench a test run. He plans to make a second one for himself.



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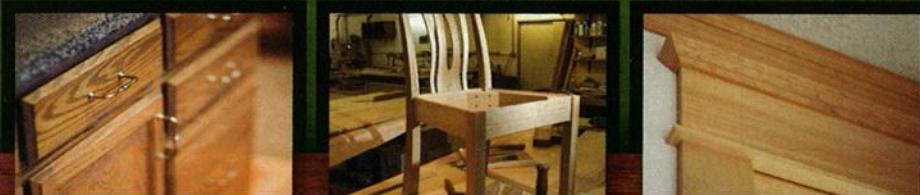
Turn wood into ambience when you shape and finish one or more of these homey accents. Full-sized profiles guarantee your success.



**60**

Cover photo: Matthew Teague

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For more information and details on the adhesives, visit [www.titebond.com/InstantBond](http://www.titebond.com/InstantBond)

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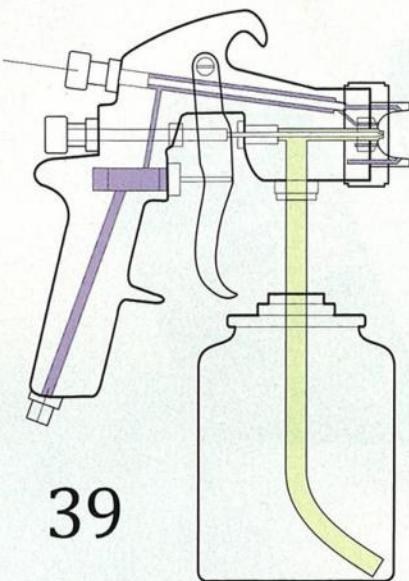
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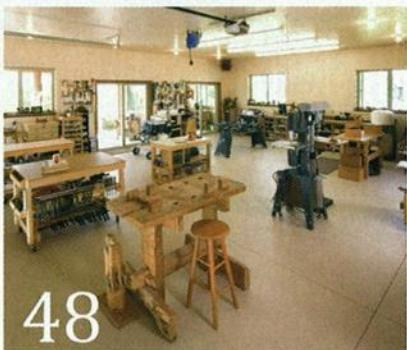
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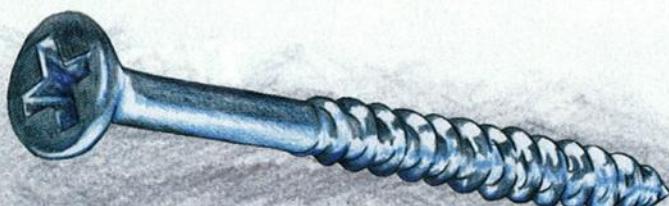
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## A workbench with impressive roots

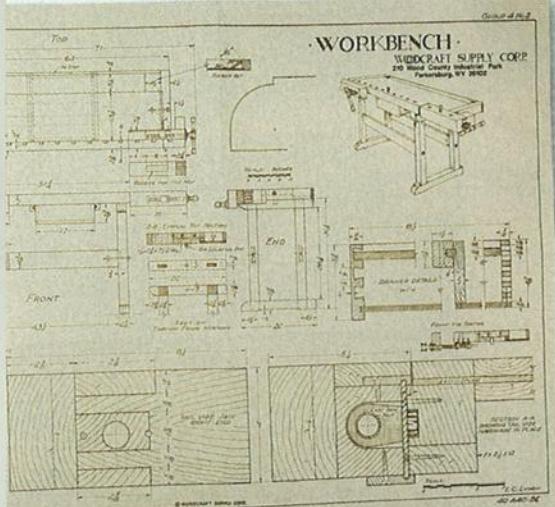
**E**very July we get together to plan out *Woodcraft Magazine* for the following year. We spend two exhaustive days mixing and matching a variety of stories while creating six full-bodied issues aimed at meeting your woodworking needs and interests. This year, when selecting our workshop projects, it came to our attention that our parent company, Woodcraft Supply, LLC, owns the rights to an exquisite workbench plan by one Carlyle Lynch, a 20th-century craftsman best known for his detailed measured drawings of period furniture pieces that originated in Colonial Virginia and North Carolina. Some of you may have seen his drawings for a Chippendale table or a Windsor chair—just two of over 100 classic furniture plans.

In an instant, we seized the prize from our archives like a treasure hunter gloms on to New World gold. With just a few

minor tweaks to update the design and a comprehensive set of step-by-step building instructions, photos, and drawings, we now proudly offer the plan to you (see page 28) for what could become the centerpiece of your shop.

In the short time we've had the bench in our shop, we've enjoyed its size and stout nature due to the density of the chosen wood, beech, and its mortise-and-tenon joinery. Nor are we alone in this thought. Says bench builder Matthew

Teague of Nashville, Tennessee, "The best thing about it is that it provides everything any woodworker would need, while occupying a modest footprint." He went on to say he was building one for his shop. Note to Matthew: me too.



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Safety First! Working wood can be dangerous. Always make shop safety your first priority by reading and following the recommendations of your owner's manuals, using appropriate guards and safety devices, and maintaining all your tools properly. Use adequate sight and hearing protection. Please note that for purposes of illustrative clarity, guards and other safety devices may be removed from tools shown in photographs and illustrations in this publication and others.

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# News & Views

By Sharon Hambrick



Wiley's CNC-carved cherry mirror

## Chip-carving shortcut

Wiley Siepel of Franklin, Tennessee, admired our chip-carved mirror (April/May 09), but admitted, "every time I try to carve anything, I end up with sutures and bloody wood."

Instead, Wiley opted for what he can do well: build and program CNC machines. Using the three-axis CNC router he built over a nine-month period and the full-sized magazine template, Wiley carved the mirror shown here in about 10 minutes—"with apologies to Wayne Barton and all the other talented carvers."

Wiley then gave the mirror a sun bath and an oil finish.

## Pendulum cradle times two

Joe Newell of Dayton, Tennessee, wanted to make something special for his great-granddaughter, Haley. When he saw Ben Svec's Heirloom Pendulum Doll Cradle in the Oct/Nov 08 *Woodcraft Magazine*, he knew his search had ended. He built the cradle according to the magazine's how-to instructions, with one exception. "I added an engraved nameplate with Haley's name, my name, and the date," Joe explained. More recently, he made one more cradle for Grace, his second great-granddaughter.



Haley's heritage

## Woodcraft folks win big at fair

Marvin Ewing, employee and instructor at the Louisville, Kentucky, Woodcraft Store, claimed four prizes in the 2009 Kentucky State Fair, and customer Leroy Daub won two.

Ewing's spalted maple bowl won a blue ribbon in the turned wood category and Best of Show in Woodturning. His natural edge ambrosia-maple bowl captured the blue ribbon in the Miscellaneous Woodcraft and Best Entry in Woodwork categories.

Daub's carved cherry mask of a bearded man won the



Marvin Ewing with his natural edge maple bowl and awards.

blue ribbon category and Best in Show in Woodcarving.

Woodcraft of Louisville provided prizes and trophies.

## Musical chairs—and tables too

Inspired by the sounds his tapping fingers made on a picnic table, Tor Clausen of Olympia, Washington, created a line of musical furniture, including this coffee quartet table that sports a marimba, kalimba, bongo, zither, cymbal and claves. Learn more about Tor at [musicalfurnishings.com](http://musicalfurnishings.com).



More than just a pretty table

## Speak Up!

Voice your woodworking ideas or comments by writing to:  
News & Views • Woodcraft Magazine • P.O. Box 7020 • Parkersburg, WV 26102-7020  
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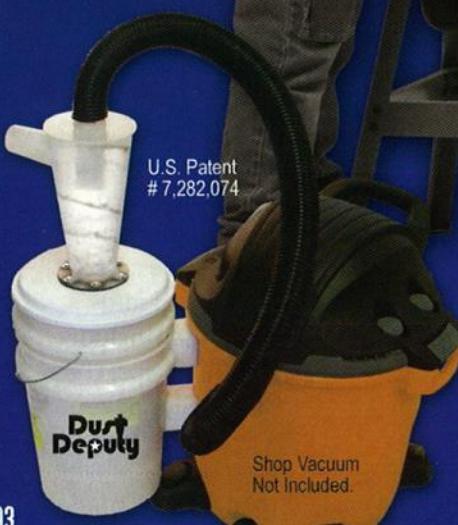
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## Diamonds are forever

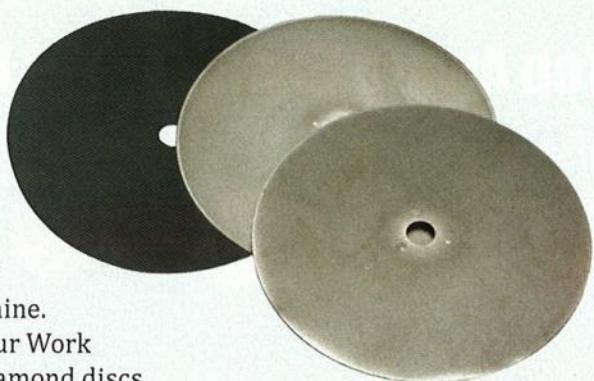
### DMT Work Sharp Kits

From the first time woodworkers tried sandpaper-on-glass sharpening, they've wrestled with the fact that most abrasives can't stand up long against steel. The Work Sharp's plate and guide design accelerates the effect. The consistent touch point quickly wears away a ring of abrasive, especially when using the coarsest grits. Worn paper encourages the user to press harder, which doesn't make sharpening any faster and overtaxes the machine.

Diamonds fix the problem... for good! Although the startup fee costs more than several

packs of sandpaper, the manufacturer claims that the discs will outlive the machine. I haven't burnt out our Work Sharp yet, but the diamond discs give the feel of using a fresh abrasive disc every time. In addition, the DMT plates attach to the glass discs with a unique magnetic mounting system. This quick-stick solution means that you won't need as many glass plates, and it really speeds up the sharpening process.

Two kits are available. The Sharpening Kit comes with two diamond discs (325 and



600 grit) and a mounting disc. The Honing Kit consists of one diamond disc (1200 grit), two ounces of 8000-grit diamond paste, a buffering disc (to use with the paste), and a mounting disc.

**DMT Sharpening Kit**  
#150669 \$94.99

**DMT Honing Kit**  
#150668 \$74.99

*Tester: Kent Harpool*

## Faster than rasps, smoother than files

### Iwasaki Carving Files

Files that cut fast and leave a smooth surface? Look closer to discover the trick. The teeth are milled and then chemically etched to super sharpness. That,

combined with a diagonal groove pattern, results in files that cut shavings like a plane, but with very little cutting resistance and little to no clogging.

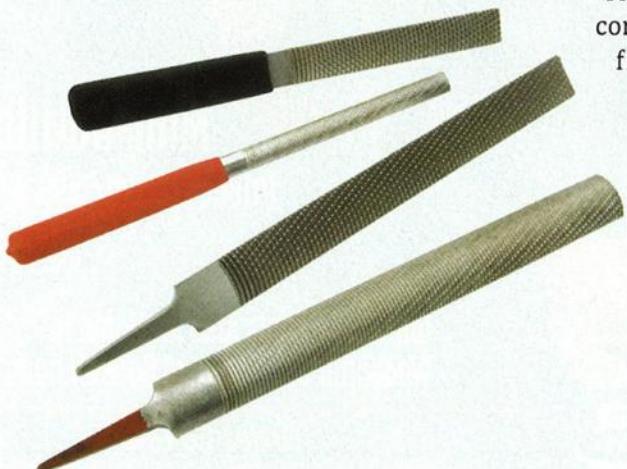
The high-tech files come in double-sided flat and single-sided half-round patterns, in three sizes. The small- and mid-sized files include cushion grips; the larger files have a tang end that fits into standard file handles. Don't let the smaller sizes fool you. These files don't

require the same long stroke to remove stock. All the files are safe-edged, which means you can use them to tweak a mortise or tenon or, like a float, fine-tune the bed of a wood plane, without digging into adjacent surfaces.

The files come in coarse, medium, and fine, which, to the uninitiated, makes about as much sense as comparing waterstones to sandpaper solely by grit numbers. I found the best balance with the medium files. Despite their speed, the resulting surface could be easily smoothed over with a light sanding.

#150554-67 \$17.99-37.99

*Tester: Ben Bice*



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# Hot New Tools & Accessories

## Machinist blocks made for wood

### Kreg Precision Router Table Setup Bars

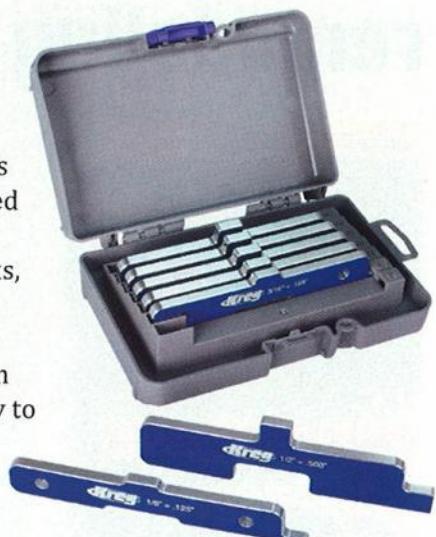
When gauge blocks migrated from metal shops to woodshops, woodworkers were amazed by the utility of such a simple design. Now, Kreg has redesigned the basic block set to make the blocks even more useful for woodworkers.

The difference is in the details. Compared to white-bread machinist blocks, the Kreg blocks feature three distinct measuring points: a notch for setting bit or blade height; a tab for checking the depth of cut; and a tongue that serves like a plus-sized feeler gauge. The bars' size and thickness make them easy to set on my tabletop, while the eye-catching color makes the type easy to read. Besides working well with my table saw and router table, I found these blocks to be quite handy at my drill press and plunge router.

Last but not least, the blocks come with a case and an insert to help ensure that all seven bars ( $\frac{1}{8}$ ",  $\frac{3}{16}$ ",  $\frac{1}{4}$ ",  $\frac{5}{16}$ ",  $\frac{3}{8}$ ",  $\frac{7}{16}$ " and  $\frac{1}{2}$ ") are returned at the end of the day.

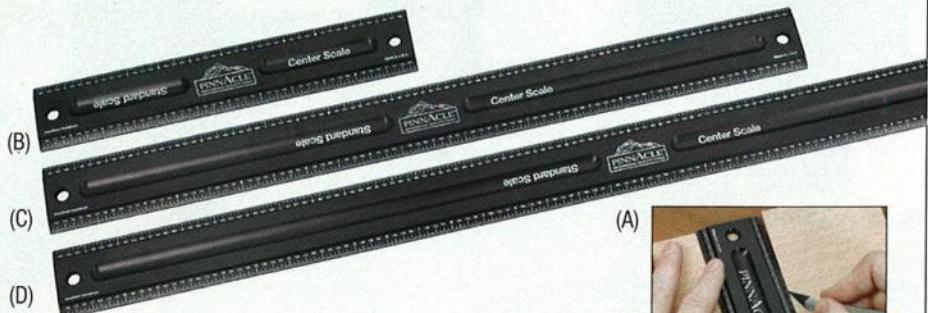
#150664 \$39.99

*Tester: Peter Collins*



Pinnacle is defined by Webster's as *the highest point of development or achievement*. The latest offering of marking and measuring tools that bears the Pinnacle® name has certainly lived up to this definition. Every detail of these Pinnacle® tools was engineered with one thing in mind: to provide woodworkers with tools that empower them. Pinnacle® tools are available exclusively at Woodcraft.

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## Workbench to go

### Vika Quickbench

Every woodshop deserves a full-fledged workbench—plus additional counter space for stock and machinery. For those times when you need more room or want to take your shop on the road, consider Quickbench. As the name suggests, Vika's folding creation is less sawhorse and more mini, modular workbench. Lightweight (23 lbs.) but sturdy (300 lbs. capacity), this portable workstation offers a 25 × 30" work surface, a three-outlet power strip, plus a full-width removable vise. Drop the folding

top, and the aluminum legged A-frame has a surprising 3,000 lb. capacity. And, like every portable horse, the bench folds up quickly and easily so you can carry it out when the job's done or stack it flat against the garage wall providing room to park your car.

Portable benches and sawhorses aren't new, but saddle two (or more) Quickbenches side by side and things get interesting. The interlocking tops let you combine horses to create a larger workstation. I found that the double-bench table worked



nicely as a temporary platform for benchtop tools, and when weather allows, as an outside sanding and finishing station.

#150313 \$89.99

*Tester: Kent Harpool*

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# Hot New Tools & Accessories

## Master sander

### Fein MultiMaster Sanding Pad Kit

While a following of devotees has established the MultiMaster as the ultimate multitasker, as a sander, it has come up short. The problem: the sanding heads were only suited for detail work. If painting or finishing, you'd still need a regular random-orbit sander. Fein's new 4½" diameter sanding pad changes that. Designed to mount to any MultiMaster, the head takes full advantage of the Multi's 21,000 oscillations per minute. Although it does not rotate like a regular random-orbital, the sanding action is as fast and similarly swirl-free.

This pad utilizes an 8-hole, hook-and-loop paper designed to work with the unit's dust-collection system. The Sanding Pad Kit includes: 4½" sanding pad and two each of the 60-grit, 80-grit, and 180-grit sanding discs.

#150652 \$34.99 *Tester: Andrew Bondi*



## Smarter hand sanders

### Festool Sanding Block Set and SYS Mini

Think all sanding blocks are created equal? Think again. The best blocks offer comfort, control, and make the most of the sandpaper that's stuck to them. Festool's blocks deliver

on all fronts. Designed to work with the same 150mm (6") diameter abrasives used by the Rotex and ETS sanders, the hand-powered blocks reduce the need for a second sandpaper

collection. By using torn, or lightly worn, discs they might even save you some money.

The three-piece hand-sanding set consists of a pair of pads (hard and soft), a square-shaped pad for sanding up to flat surfaces, and a mini systainer for storage. If you haven't been bit by the Festool bug and don't feel the need for a special case for your sanding supplies, the blocks can be purchased separately. A \$25 sanding block can quickly shift from luxury to shop necessity the first time you need to squeeze a little more life from a disc that's too worn to stick to your random-orbital.

#M0107 \$75.00

*Tester: Andrew Bondi*



Easy to Learn - Easy to Turn

## C-Y-O-B (Cut Your Own Blanks)

### Makita 14" Electric Chainsaw

Turners know that super stock can come from your own backyard, provided you have a saw to trim logs to size. In addition to helping find blanks in firewood, the small chainsaw can perform tasks beyond the reach of circular or reciprocating saws. This hand-sized corded saw has already built a reputation in woodworking and carpentry circles as an all-purpose tool for rough-cutting slabs, carving (chair seats, logs, even ice), even trimming and notching deck posts.

#150102 \$259.99

Tester: Joe Hurst-Wajszczuk



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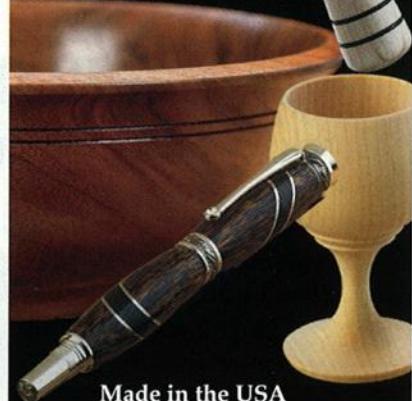


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# Tips & Tricks

## TOP TIP

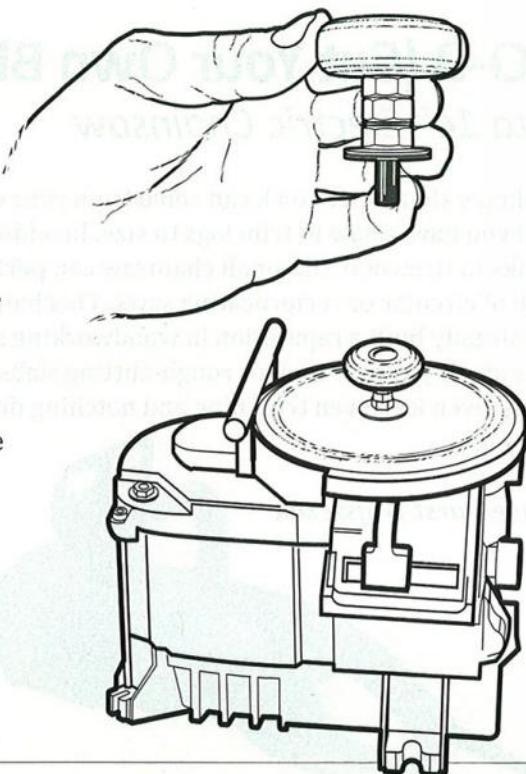
### Double-headed honer

Needing a way to hone the inner bevels of my carving gouges, I made a custom top knob strop for my Work Sharp 3000. The knob/strop is effective, easy to make, and does not interfere with access to the flat plate.

To make the strop, cut a 1"-thick stack of 2"-diameter discs from scrap cowhide, drill center holes in each one, and then thread onto a  $\frac{1}{4}$ "-20  $\times$  4" carriage bolt. Secure the discs to the bolt with a washer and nut, and then add a few extra nuts so that the exposed end of the bolt is the same length as the original top nut. Finally, round the edges of the leather on a belt or disc sander. (You can also shape the disc to strop V-shaped tools.)

Screw the strop onto the top of the wheel, charge it with your favorite honing compound, and you're set to hone outside and inside bevels at the same station.

—David Dabercoe, Sarasota, Florida



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### Sanding against the grain for a smoother finish

Pre-raising the grain before applying a water-based dye or topcoat is a good way to deal with the fibers that pop up when you add water, but if you're not careful, you could only press down the fibers you want to remove. My approach may sound unconventional, but it works.

After finish-sanding and wiping the surface with a wet sponge, wait until the surface dries. Now using your final grit, very lightly sand across the grain. Next, sand diagonally across the grain in one direction, and then in the other. This cross-grained sanding breaks away the fibers cleanly. Finish up by sanding parallel to the grain, using similar pressure to erase any cross-grained scratches.

—Peter Christian, Little Rock, Arkansas

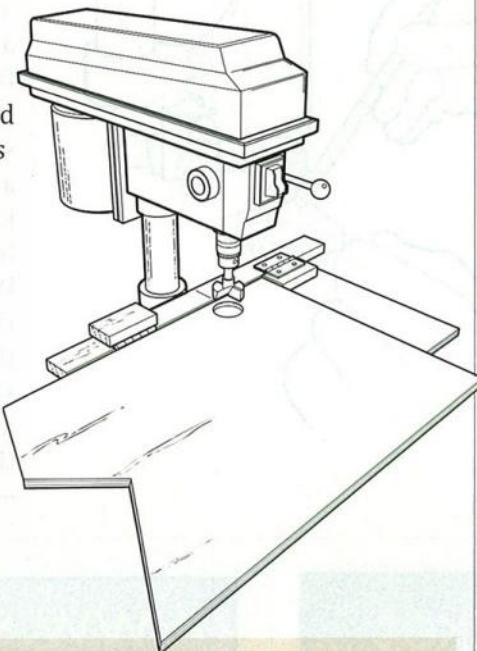
# See the Mark

## Twin-flip hinge gauge

Two hinges and four boards are all you need to make an easy-to-use, easily repeatable Euro-hinge drilling jig. Simply attach a fence to a scrapwood or plywood base, draw a reference line halfway across the fence, and then attach the two hinged stops the same distance from that line. (Depending on your doors and hardware, this distance can be anywhere from 3-6".) To use the jig, mark out your first door so that you can adjust the base to set the necessary edge clearance, and then set the bit depth. Flip down the first stop, butt one corner of the door against it, and drill your first hole. Next, flip the first stop up, and lower the

second stop. Drill the cup hinge hole on the adjacent corner.

—Paul Mueller, Chantilly, Virginia



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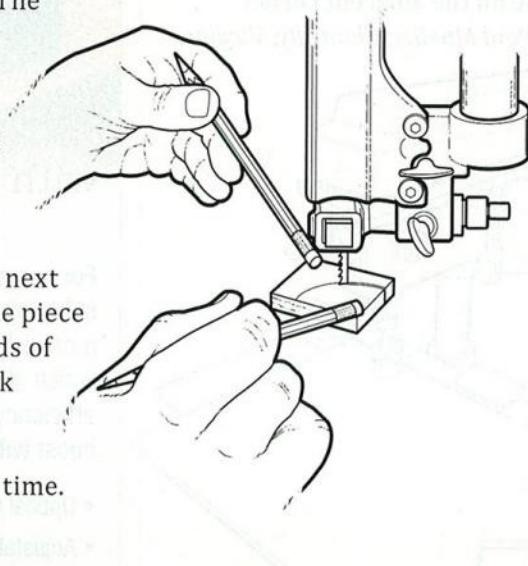
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# Tips & Tricks

## Safe bandsawing of small pieces

Equipped with a narrow blade, the bandsaw can easily cut small parts. The only problem is safely handling the pieces. It's best to saw them from larger pieces that can be gripped at a safe distance from the blade. When that's not possible, I find that the next best thing is to steer the piece using erasers at the ends of full-length pencils. Stick with new pencils with soft fresh erasers that haven't hardened over time.

—Mark Bentley,  
Napa, California



## Tenon trimming trick

When cutting tenons, it's easy to overcut a shoulder. To correct a small gap, assemble the joint, and then place a card scraper flat on the mortised piece.

Using the metal as a spacer, score around the tenon with a knife. Now disassemble the joint and use a chisel or plane to pare up to your scored line. When the joint's reassembled, the shaving or two removed from the fat edge should allow the shoulder to sit seamlessly on the joining piece without affecting the fit of any other parts.

—Mark Hall, Seneca, New York

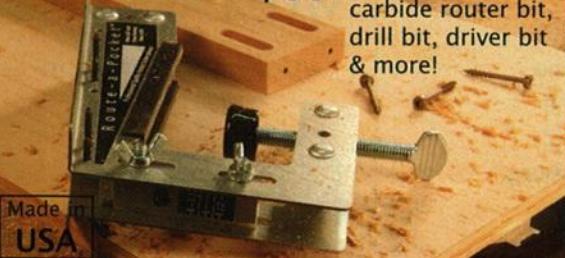
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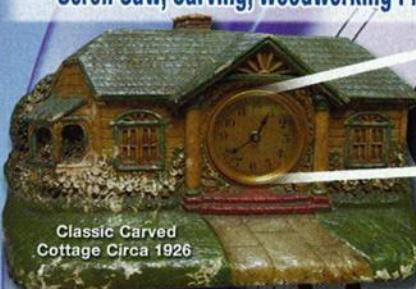
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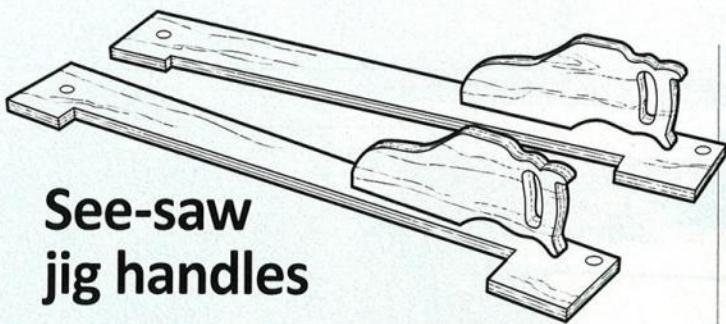
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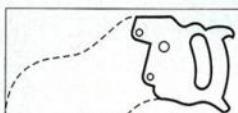


## See-saw jig handles

Jig handles are not unlike any other hand tool; the go-to shop companion must be comfortable and intuitive. Having experimented with dozens of different handle shapes and sizes, I found the perfect solution hanging on my wall: my favorite handsaw. I traced the handle onto a 1 1/4"-thick hardwood blank. (Use whatever scrap you have on hand, but I suggest starting with a blank that's a few inches longer and wider than you might need, so that you can adapt the handle for multiple jigs.)

After cutting the handle to rough shape, invest a little time shaping and sanding it, and you may find that the jig graduates from "one-time" use to "new best friend."

—Andy Rae, Asheville, North Carolina



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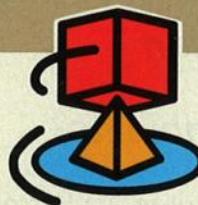
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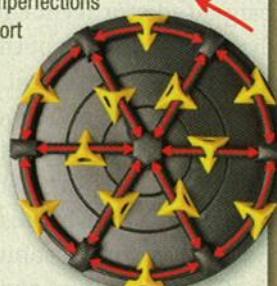
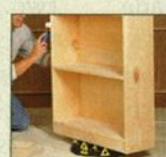
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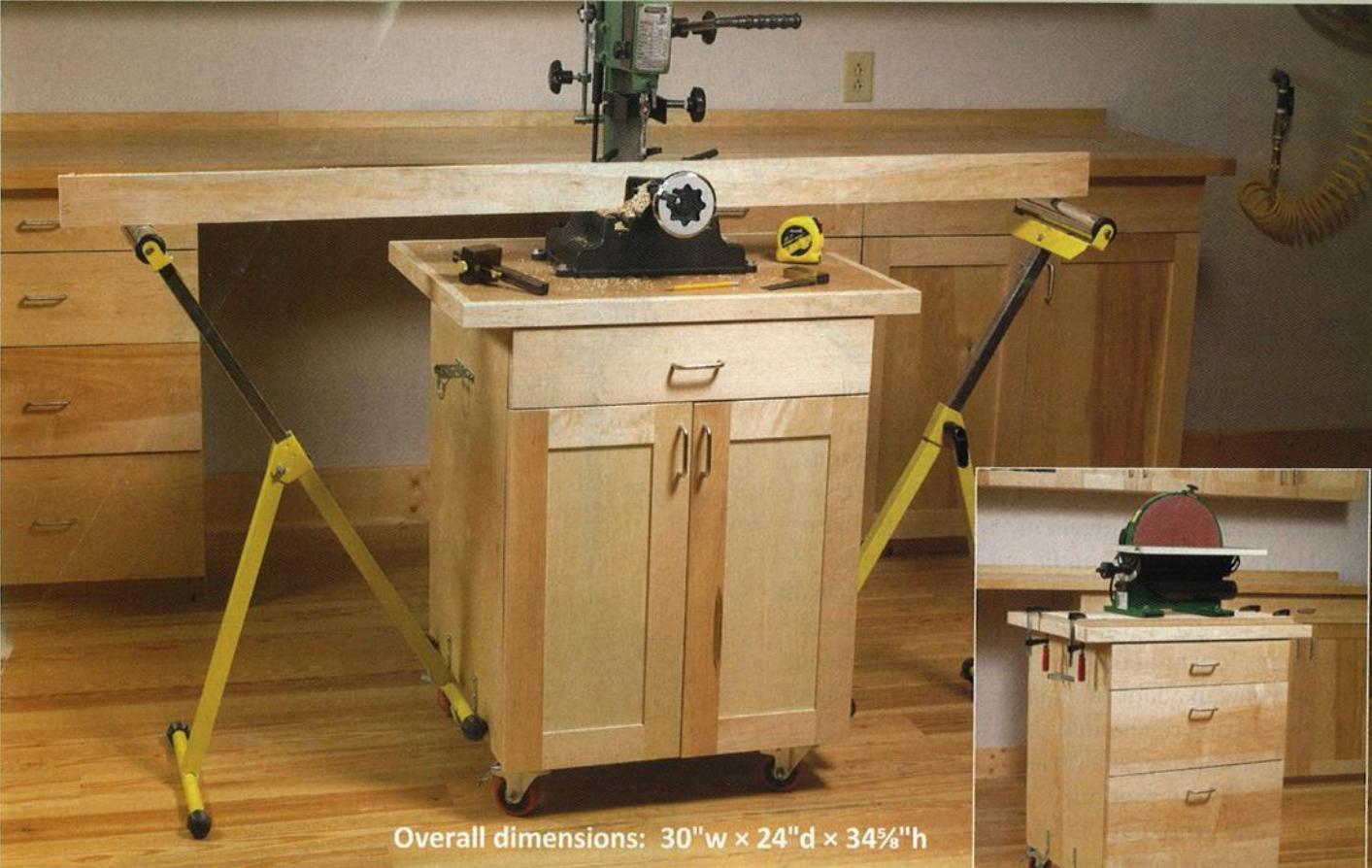
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# 3 Mobile Carts

*Create a dedicated workstation anywhere in your shop with one of these versatile cabinets.*

Designer: Ben Svec; Builder: Bill Sands; Writer: Jim Harrold

**D**o you have a benchtop power tool in need of a home? How about a grouping of hand tools and accessories begging for a designated storage location? Perhaps one or more of these carts can answer the call. Made either from birch plywood or inexpensive MDF, they offer you three choices: one drawer with cabinet space and shelves, three drawers, or a simple cabinet with shelves. Locking swivel casters let you move the carts where needed, and optional "outrigger" roller stands provide

handy infeed and outfeed support for long workpieces.

We'll walk through building the one-drawer cabinet shown above and include side notes and illustrations for the remaining two. The MDF case differs in that the construction uses Confirmat screws driven through the sides.

*Note: As shown above, these carts nicely integrate with the cabinet system featured in our June/July 09 issue. By using the metric shelf-pin jig system shown, you can create all the holes needed for installing the hinge*



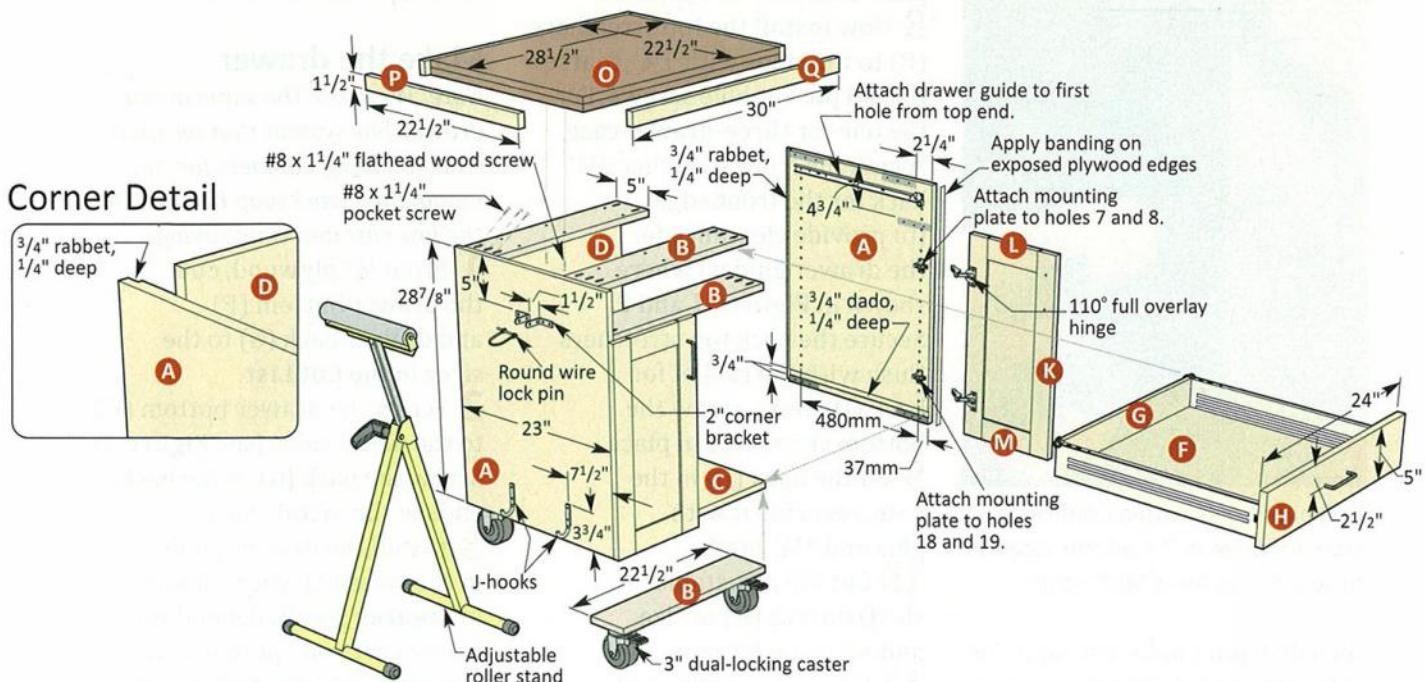
3" overhangs let you clamp down power tool bases.



Each cart neatly stores away in the nooks between 36"-high base cabinets.

*plates, the metal drawer glides, and shelf pins for supporting shelves, thereby saving time. See the **Convenience-Plus Buying Guide** for the needed template, bits, and hardware. You'll also want a metric tape measure.*

**Figure 1:** One-Drawer Cart Exploded View



## Build the cart case

- Cut the sides (A), stretchers (B), bottom/fixed shelf (C), and back (D) to the sizes in the **Cut List**. The cases with one drawer and three drawers have an extra stretcher for stiffening the case; the MDF case has a dadoed-in fixed shelf (C).
- Install a dado set in your table saw to cut the  $\frac{1}{4}$ "-deep dadoes in the sides for the bottom (C) where shown in **Figure 1**. (Dado the sides of the MDF cart for an additional fixed shelf (C), where shown on **Figure 4**, for additional reinforcement.) Note that the sides are mirror images (left and right). The bottom dadoes are located  $\frac{3}{4}$ " up from the bottom edges of sides (A) to make room for the bottom stretchers (B) onto which you'll secure casters. Adjust the fence and cut the dadoes in the sides.
- Install a sacrificial fence and cut the  $\frac{3}{4}$ " rabbets  $\frac{1}{4}$ " deep in the sides (A) for the back (D).

**4** Outfit your plunge router with a  $\frac{3}{8}$ " guide bushing and 5mm upcut spiral or straight bit. Using the 32mm shelf-pin jig indexed from the top end of sides (A), plunge-rout a row of  $\frac{1}{2}$ "-deep holes along the front edges where shown in **Figure 1**.

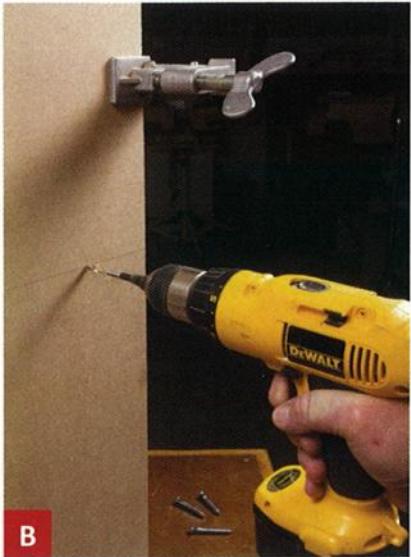
**5** Relocate the jig so the back row of holes measures 480mm from the front row. To do this, strike a parallel line 517mm from the front edges of the

sides. Again, indexing from the top edge, locate the jig's holes over the centerline and clamp it in place. Now, plunge-rout the holes as shown in **Photo A**.

**6** Drill three evenly spaced pocket holes at each end of the plywood stretchers (B). The one-drawer and three-drawer cases require five stretchers. (For the MDF cart, use Confirmat screws instead of pocket holes. Dry-fit the case assembly, and



**A**  
Plunge-rout the holes in the case sides using a metric shelf-pin jig clamped in place, a  $\frac{3}{8}$ " guide bushing, and a 5mm upcut spiral or straight bit.



B

Drill pilot holes with a Confirmat step bit; drive in 7 x 50mm screws to secure the fixed MDF shelf.

then drill pilot holes through the sides [A] and into the stretchers where shown in **Figure 4**.)

**7** Glue and fit the bottom (C) into the dadoes in sides (A) and clamp. Check for square. Similarly, for the case without drawers, fit the fixed shelf (C) in the dadoes shown in **Figure 4**.

With MDF, screw the shelf in place as shown in **Photo B**.

**8** Now install the top stretchers (B) to the sides with 1½" coarse-thread pocket-hole screws. For the one- or three-drawer case, recess the front stretcher 2¼" back for the front edge (to provide clearance for the drawer guides) where shown in **Figures 1** and **2**.

Secure the back top stretchers flush with the rabbet for back (D). Next, screw the bottom stretchers in place.

**9** Fit the back (D) in the case, securing it with glue and 1½" brads.

**10** Cut the adjustable shelf/shelves (E) to size and set aside for now.

**11** If building a plywood case, adhere self-adhesive edge-banding tape to all exposed edges of the case, cutting the pieces to length as you go. Use an iron to activate the adhesive. After the tape adhesive cools, remove the waste with a trimmer

or sharp chisel and sand lightly for crisp, clean corners.

## Make the drawer

*Note: We chose the same metal drawer box system that we used when building cabinets for the magazine's workshop because of the low cost and time savings.*

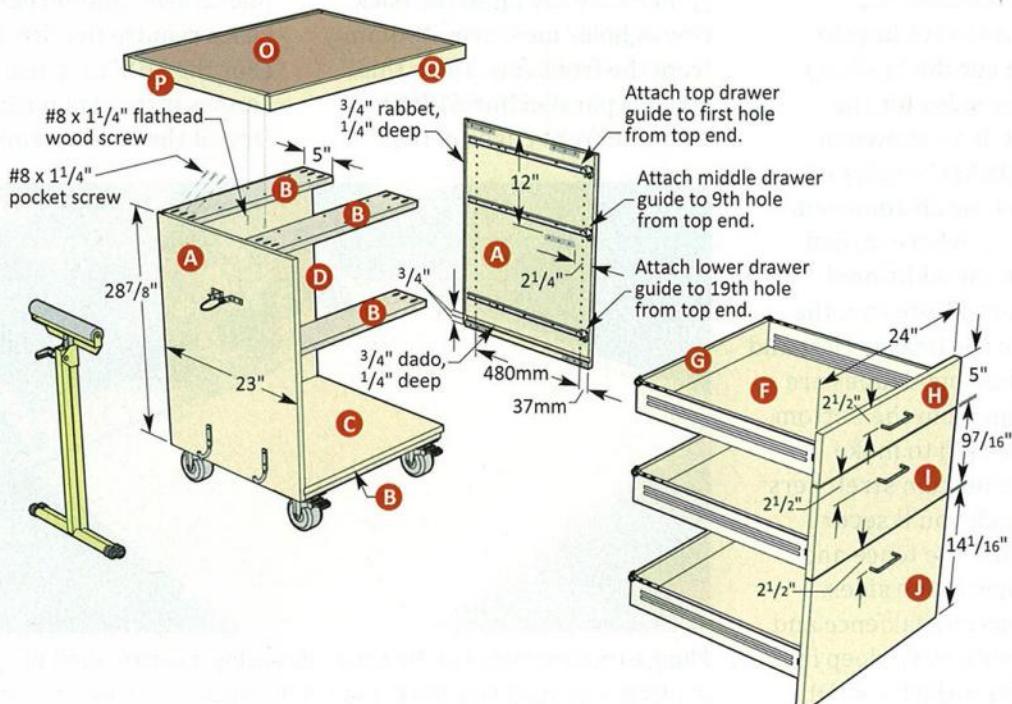
**1** From ½" plywood, cut the drawer bottom (F) and drawer back (G) to the sizes in the **Cut List**.

**2** Screw the drawer bottom (F) to the metal sides (see **Figure 3**). Screw the back (G) to the back ends of the metal sides.

**3** Install the drawer guides in the sides (A) where shown in **Figures 1** or **2**, depending on the cart you opt to make. Use 5mm x 13mm (½") screws driven through the guides and into the predrilled holes.

**4** For the plywood cases, cut the drawer fronts to size. (Widths are as follows: small drawer [H], 5"; medium drawer [I], 97/16"; and large drawer [J], 141/16").

**Figure 2:** Three-Drawer Cart Exploded View



Ease the edges with a  $\frac{1}{16}$ " radius round-over bit or sanding block.

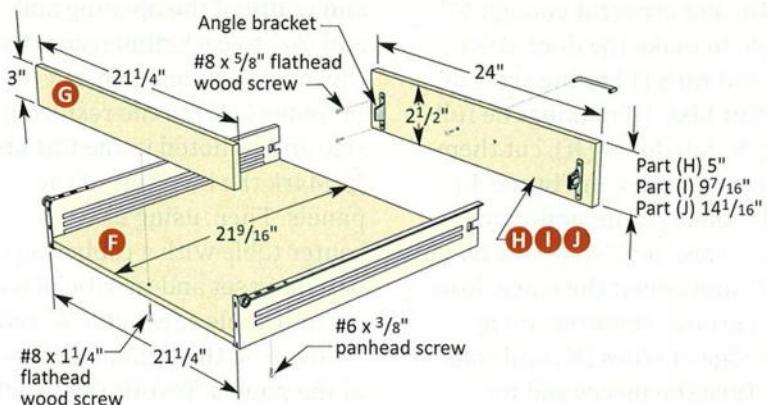
**5** Temporarily screw the drawer-front clips to the front ends of the metal drawer sides. Fit a partially assembled drawer in the case and center the drawer front (H) against it and the case, leaving a  $\frac{1}{8}$ " reveal at the case top edge. Ease the drawer out and mark the screw-hole locations for the clips on the drawer front. (If building the three-drawer cart, start with the lowest drawer, aligning the front with the case bottom edge. Space and install the remaining drawers  $\frac{1}{8}$ " apart.)

After marking, remove the clips from the drawer sides and drill pilot holes in the front. Now screw the clips to the front as shown in **Photo C**.

Slide the partial drawer in the case and test the fit.

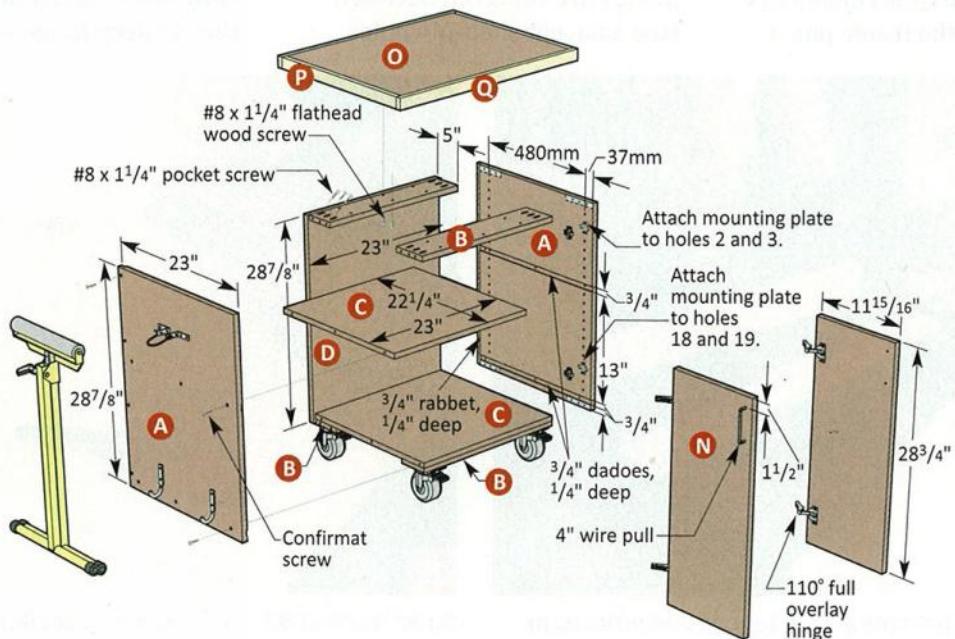
**6** Mark and drill the screw holes, and attach the pull on the drawer front (H, I, J) where shown in **Figures 1** and **2**. Locate the pulls where shown.

**Figure 3: Drawer Exploded View**



Drill pilot holes at the marked locations; then screw the clips to the drawer front. Screw the fronts to the box sides, adjusting it for an even reveal.

**Figure 4: Cart With Shelves Exploded View**



## Make the doors

**1** Rip and crosscut enough  $\frac{3}{4}$ " maple to make the door stiles (K) and rails (L) to the sizes in the **Cut List**. (If making the full-length slab doors (N), cut them to size as shown in **Figure 4**.)

**2** To make frame-and-panel doors, raise a  $\frac{1}{8}$ "-kerf saw blade to  $\frac{1}{4}$ " and adjust the fence. Now cut a groove centered along one edge of stiles (K) and rails (L). Turn the pieces end for end and make a second pass on each piece. Adjust the fence toward the blade and again make double passes until you achieve a centered  $\frac{1}{4}$ " groove.

**3** With the blade height at  $\frac{1}{4}$ ", and the fence set  $\frac{1}{4}$ " from the far edge of the blade, use a miter gauge to cut the end of a rail test piece and make multiple passes to create a  $\frac{1}{4}$ "-long stub tenon, flipping the piece to remove the waste from both sides. (See the **Joint Detail** in **Figure 5**.) Test-fit the tenon in a stile (L) groove. Adjust the settings as needed to achieve a tight fit in the groove and at the shoulder line.

**4** Now cut the stub tenons on the ends of the rails (L) and dry-fit and clamp the frame parts

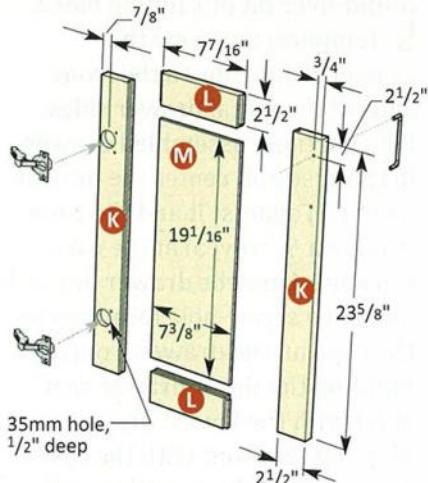
together. Measure the length and width of the opening and add  $\frac{7}{16}$ " to each dimension. Using this overall dimension, cut the  $\frac{1}{2}$ " panels (M) to the resulting size and as noted in the **Cut List**.

**5** Mark the best side of the panels. Then, using either a router table with a rabbeting bit or a dado set and sacrificial fence on your table saw, cut a  $\frac{1}{4}$ " rabbet  $\frac{1}{4}$ " deep on the unmarked face of the panels. Test-fit the panels in the frames, good side out. The panels should be flush with the inside face of the frames.

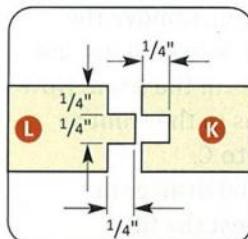
**6** Apply glue to the stub tenons and mating groove areas as shown in **Photo D**, assemble the doors, and clamp. Check for square. Once the glue dries, remove the clamps and break the door edges as you did with the drawer fronts.

**7** Lay the case on its side. Now, lay out the horizontal centerlines for the hinge locations by placing the doors alongside the case as shown in **Photo E** and where shown in **Figures 1** and **4**. Note that the 35mm cup holes for the  $110^\circ$  overlay hinges are centered between two adjacent shelf-pin holes.

**Figure 5: Door Exploded View**



## Joint Detail



**8** Using the DrillRite Hinge and Jig Bit kit, mark the locations of the hinge cup and screw holes on the doors, centering on the marked lines. Now with the accompanying 35mm Forstner bit, drill the cup holes  $\frac{1}{2}$ " deep (**Photo F**). Use an 8mm bit to drill the  $\frac{1}{2}$ "-deep hinge screw holes.



**D** Apply glue to the mating stub tenons and grooves in the rails and stiles, slip the panel in place, and clamp.



**E** Strike a line at  $90^\circ$  to the side's edge; flush the door to the case, and extend the line onto the stile.



F

Set up a stop at your drill press table, and then bore the holes for the hinge cups using a 35mm Forstner bit.

**9** Attach the cup hinges to the doors, the mounting plates to the matching holes in the case sides, and hang the doors. Adjust the hinges as needed to create an even  $\frac{1}{8}$ " reveal between the doors.

### Add a sturdy top and casters

*Note: One sheet of MDF makes three tops.*

**1** Trim off one-third of a sheet of MDF from one end. Cut it into two equal pieces that measure roughly  $24 \times 32$ ". Apply glue to the mating faces of both pieces and bond them together, aligning the factory edges. Clamp the pieces along the edges and corners and weight down the center to form the top (O).

**2** Once dry, remove the clamps and cut the top (O) oversize to 31" by running the factory edge along the table saw fence. Label the resulting "true" edge. Now, working off this edge and using a square along an adjacent edge, strike a 90° cutline across the length of the workpiece. Cut along the line with a straightedge and circular saw, creating a second clean edge that's

perpendicular to the first.

**3** Place the "true" edge along the table saw fence and cut top (O) to a final width of  $28\frac{1}{2}$ ".

**4** Cut two pieces of maple for the end banding (P) to  $\frac{3}{4} \times 1\frac{1}{8} \times 25$ ". Glue and clamp the pieces to the ends of top (O), flushing the

banding ends to the edge cut with the circular saw and proud of both faces by  $\frac{1}{16}$ ". Let the glue dry.

**5** With a flush-trim bit in a handheld router, flush the end banding (P) to the faces of the top (O).

**6** Placing the edge cut with the circular saw against the table saw fence, trim the workpiece to  $23\frac{1}{2}$ "-wide, creating a second "true" edge. Guiding this true edge against the fence, cut the circular-sawn edge to create a top with a final width of  $22\frac{1}{2}$ ".

**7** Cut the edge-banding pieces (Q) to 31" and glue and clamp them to the edges of the workpiece the same way you added the end-banding pieces (P). Cut the ends of the edge banding flush with the end banding, using a fine-tooth saw.

**8** Flush the proud edges of the edge banding (Q) with the top (O) using your router and a flush-trim bit.

**9** Chuck a  $\frac{1}{8}$ "-radius round-over bit in your router and ease all edges of the top assembly (O, P, Q).

**10** To attach the top to the case, place the top assembly (O, P, Q) on a work table with the

best face down. Drill six evenly spaced pilot holes in the case top stretchers (B). Now, with a helper, set the case upside down on the top assembly centered from end to end and flush with the case back. Now screw the base to the top with #8  $\times$   $1\frac{1}{2}$ " flathead wood screws.

**11** Install the casters on bottom stretchers (B) with  $\frac{5}{16} \times 1\frac{1}{2}$ " lag screws and washers. Set the cart on its wheels.

### Finish and add hardware

**1** Sand the cart to 220 grit. Apply finish. (On the birch and maple carts, we used a sealer, followed by two coats of water-based polyurethane. We painted the MDF cabinets with two coats of milk paint and one coat of water-based polyurethane.)

**2** Re-install the drawers and doors, and add the pulls. Where needed add the shelf pins and shelves (E).

**3** Install the J-hooks and 2" corner brackets for the roller work supports. Use a round wire lock pin to store the roller stands (**Photo G**). ■

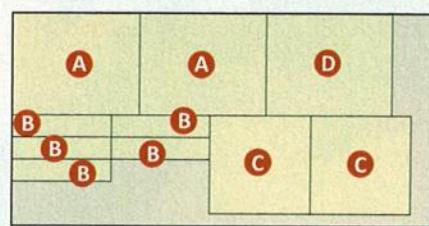


**G**  
Fit the stand's feet in the J-hooks, the legs between the L-brackets, and secure with wire lock pins.

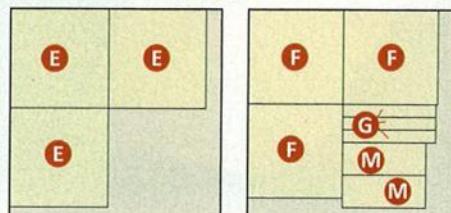
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<input type="checkbox"/> 6. Kreg Pocket-hole #8 Screw x $1\frac{1}{4}$ ", Coarse, 100 pack	142246	\$4.99
<input type="checkbox"/> 7. Edging, Birch, $\frac{1}{8}$ " x 50'	147424	\$15.99
<input type="checkbox"/> 8. Whiteside Round-over Bit, $\frac{1}{16}$ " R, $\frac{1}{8}$ " D, $\frac{1}{2}$ " CL ( $\frac{1}{4}$ " SH)	24B91	\$23.99
<input type="checkbox"/> 9. Metal Box System for Drawers, $3\frac{1}{2}$ " H x 22" L	149713	\$10.50
<input type="checkbox"/> 10. Danco Full Overlay Hinge, 110°, pair	149665	\$5.99
<input type="checkbox"/> 11. DrillRite Hinge and Jig Bit Kit, with 35mm Forstner Bit and marking template	143958	\$10.99
<input type="checkbox"/> 12. Brad Point Bit, 8mm	146617	\$4.99
<input type="checkbox"/> 13. Freud Flush-Trim Router Bit, $\frac{1}{2}$ " D, 1" CL ( $\frac{1}{2}$ " SH)	828733	\$18.49
<input type="checkbox"/> 14. Whiteside Round-over Bit, $\frac{1}{8}$ " R, $\frac{3}{4}$ " D, $\frac{1}{2}$ " CL ( $\frac{1}{4}$ " SH)	24B92	\$23.99
<input type="checkbox"/> 15. 3" Caster, Double Locking, Swiveling, $4\frac{1}{4}$ " Tall	141051	\$16.50
<input type="checkbox"/> 16. Lauréy Tech Pull, Satin Chrome, Straight Wire, 3"	836161	\$2.25
<input type="checkbox"/> 17. Shelf Pins, 5mm, 25 pack	27132	\$2.99
<input type="checkbox"/> 18. Adjustable Roller Stand	147185	\$26.99
Above items are available at Woodcraft stores, <a href="http://woodcraft.com">woodcraft.com</a> or by calling (800) 225-1153. Prices subject to change without notice.		
<input type="checkbox"/> 19. J-Hook, 3 $\frac{1}{2}$ " (Need 4 per cabinet)		
<input type="checkbox"/> 20. 2" Corner Bracket (Need 4 per cabinet)		
<input type="checkbox"/> 21. Round Wire Lock Pin, $\frac{1}{4}$ " x $2\frac{1}{4}$ " (Need 2 per cabinet)		
Above items are available at home centers		
<input type="checkbox"/> 22. Euro Square Drive Mounting Screws, 5mm Dia. x 11.5mm Length, Part #0512-ESS, pkg./100, \$5.18: Available from McFeely's, (800) 443-7937 or <a href="http://mcfeelys.com">mcfeelys.com</a> .		

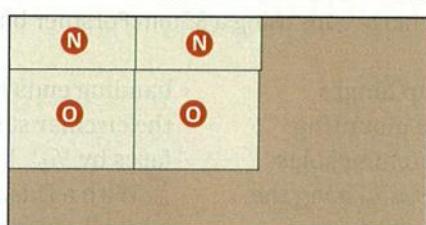
## Cutting Diagram



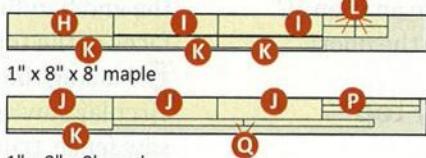
3/4" x 4' x 8' birch plywood



3/4" x 4' x 4' birch plywood 1/2" x 4' x 4' birch plywood



3/4" x 47" x 49" MDF



1" x 8" x 8' maple

1" x 8" x 8' maple

Mobile Shop Cart Cut List	Thickness	Width	Length	Qty.	Mat'l
<b>CASE</b>					
A Sides	$\frac{3}{4}$ "	23"	28 $\frac{1}{2}$ "	2	BP, MDF
B Stretchers	$\frac{3}{4}$ "	5"	22 $\frac{1}{2}$ "	4-5	BP, MDF
C Bottom/fixed shelf**	$\frac{3}{4}$ "	22 $\frac{1}{2}$ "	23"	2	BP, MDF
D Back	$\frac{3}{4}$ "	23"	28 $\frac{1}{2}$ "	1	BP, MDF
E Shelf	$\frac{3}{4}$ "	22 $\frac{1}{2}$ "	22 $\frac{1}{2}$ "	1-3	BP, MDF
<b>DRAWERS</b>					
F Bottom/s	$\frac{1}{2}$ "	21 $\frac{1}{4}$ "	21 $\frac{1}{16}$ "	1-3	BP, MDF
G Back	$\frac{1}{2}$ "	3"	21 $\frac{1}{4}$ "	1-3	BP, MDF
H Small front	$\frac{3}{4}$ "	5"	24"	1	M, MDF
I Medium front	$\frac{3}{4}$ "	9 $\frac{7}{16}$ "	24"	1	M, MDF
J Large front	$\frac{3}{4}$ "	14 $\frac{1}{16}$ "	24"	1	M, MDF
<b>DOORS (frame and panel)</b>					
K Stiles	$\frac{3}{4}$ "	2 $\frac{1}{2}$ "	23 $\frac{1}{2}$ "	4	M
L Rails	$\frac{3}{4}$ "	2 $\frac{1}{2}$ "	7 $\frac{1}{16}$ "	4	M
M Panels	$\frac{1}{2}$ "	7 $\frac{3}{8}$ "	19 $\frac{1}{16}$ "	2	BP
<b>DOORS (slab)</b>					
N Door	$\frac{3}{4}$ "	11 $\frac{15}{16}$ "	28 $\frac{1}{4}$ "	2	H
<b>TOP</b>					
O* Top (double layer of MDF)	1 $\frac{1}{4}$ "	22 $\frac{1}{2}$ "	28 $\frac{1}{2}$ "	1	MDF
P* End banding	$\frac{3}{4}$ "	1 $\frac{1}{2}$ "	22 $\frac{1}{2}$ "	2	M
Q* Front/back banding	$\frac{3}{4}$ "	1 $\frac{1}{2}$ "	30"	2	M

\*Indicates parts that are initially cut oversized. See instructions.

\*\*Only the cart with no drawers has a fixed shelf that fits into dadoes in sides (A).

Materials: BP=Birch Plywood, MDF=Medium Density Fiberboard, M=Maple

Hardware: J-hook, L-brackets (2 x 2"),  $\frac{1}{4}$ " x 24" round wire lock pin,  $\frac{3}{16}$ " x 1 $\frac{1}{2}$ " lag screws (16 per cart)



# WoodRiver®

## WoodRiver® Planes

Modeled after Stanley Tool's very best line, WoodRiver® planes feature the same heavy castings and fully machined frogs. This arrangement reduces chatter by supporting the blade and helps to reduce tear-out when planing highly figured wood. Lightly finished rosewood handles provide comfort and control. Soles and sides are machined flat and square within tightly held tolerances, ensuring these planes are as close to ready to use as can be made. Usually, just a light touch-up on the high-carbon Rc60-64 blades will enable you to go right to work.

No. 3  
150284



No. 4  
150285



No. 5  
150286

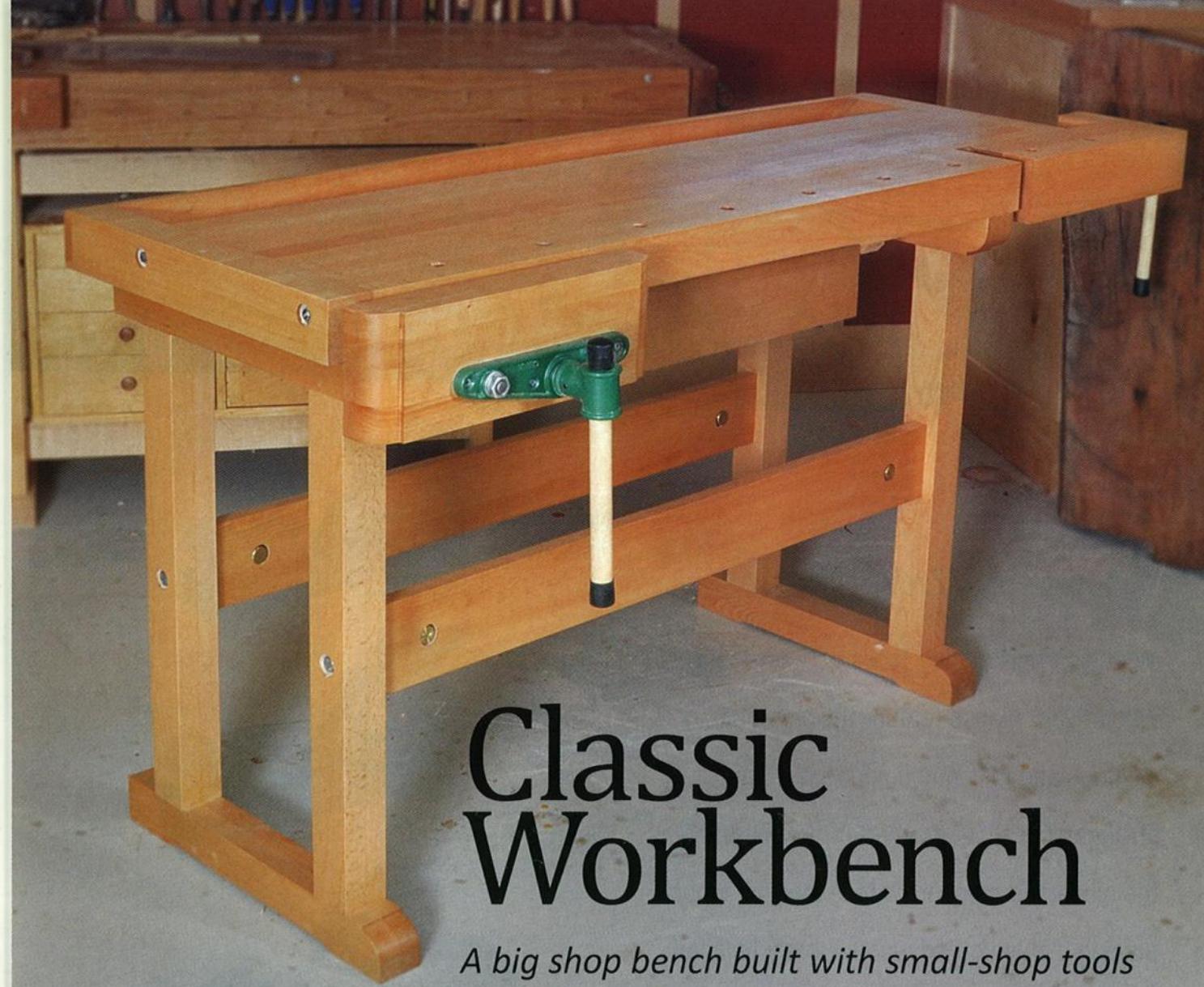


No. 6  
150287



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# Classic Workbench

*A big shop bench built with small-shop tools*

Builder/Writer: Matthew Teague

**Overall dimensions: 72 $\frac{1}{2}$ "w x 28 $\frac{5}{8}$ "d x 34 $\frac{1}{2}$ "h**

**W**hether you're a hand tool purist, a power tool junkie, or, like most of us, somewhere in between, chances are that you log more hours at your bench than any other workstation in the shop. Because the workbench serves as the cornerstone of a comfortable, efficient workshop, it's worth investing time to construct one that you'll use for a lifetime of woodworking.

When we found these plans in the Woodcraft archives, we knew we had discovered a true classic.

Designed decades ago by Carlyle Lynch, a renowned teacher, draftsman, and woodworker, this bench fits the needs of woodworkers from any era.

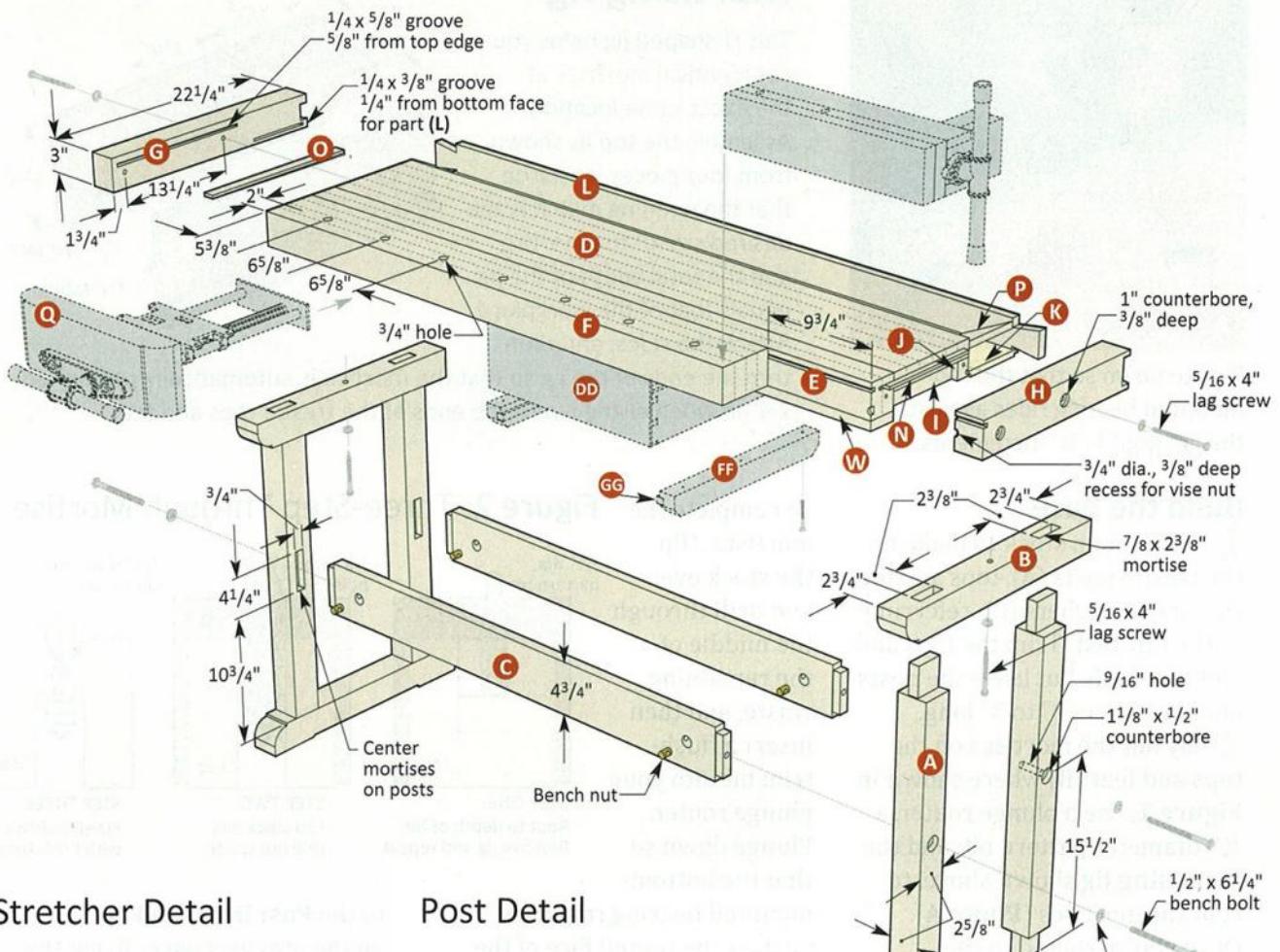
Lynch's midsized bench provides woodworkers what they need, without excess or over-ornamentation. Resting on a rock-solid base, the heavy-duty laminated wood top includes front and tail vises that hold stock of any shape or size for hand tool or machine work. The tool well and drawer

keep your most-used tools out of the way, yet close at hand.

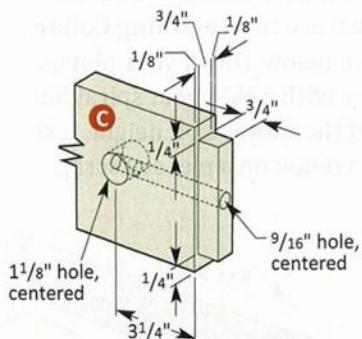
Our only departure from the original is the knockdown hardware in the base. We wanted to make sure that you can bring the bench to your next bigger shop.

*Note: It helps to have the bench hardware in hand before you begin building, especially the parts for the face and tail vise. For a complete list of materials and supplies, see the Convenience-Plus Buying Guide on page 38.*

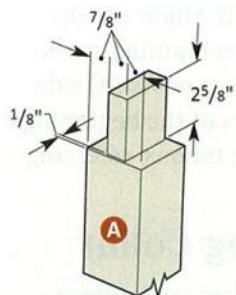
**Figure 1:** Workbench Exploded View



## Stretcher Detail



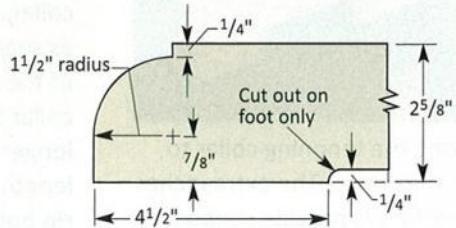
## Post Detail

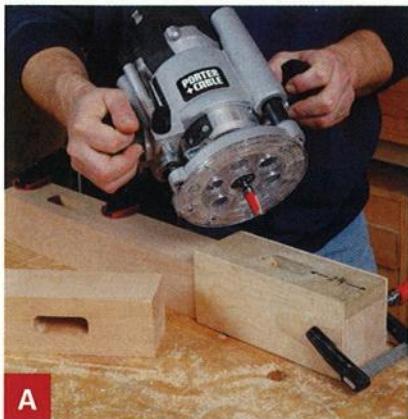


### **Material Tip**

It's easy to see why Lynch chose beech. This stable hardwood is not only heavy and dense, but also a real pleasure to work—the perfect choice for a workbench. (For more info, see "WoodSense" on page 76.) If you can find it, thicker 10/4 and 12/4 stock will trim construction time, but you can cut costs by laminating 8/4 stock. Can't find beech nearby? Substitute with hard maple or birch.

## Trestle Top and Foot Detail





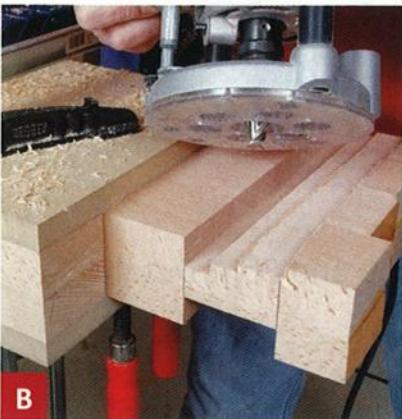
A

Plunge down so that the top-mounted bearing rides against the jig. Rout in  $\frac{1}{4}$ " increments.

## Build the base

**1** Mill enough stock to make up the trestle posts (A), tops and feet (B), and stretchers (C), referring to the **Cut List**. Trim the tops and feet to length, but leave the posts and stretchers 2" to 3" long.

**2** Lay out the mortises on the tops and feet (B) where shown in **Figure 1**. Use a plunge router, a  $\frac{1}{2}$ "-diameter pattern bit, and the **Mortising Jig** shown above, to rout the mortises (**Photo A**). Once you've routed to the maximum depth, as shown in the **Three-Step Through Mortise**, (**Figure 2**), remove the jig and plunge deeper, using the mortise to guide the bit's bearing.



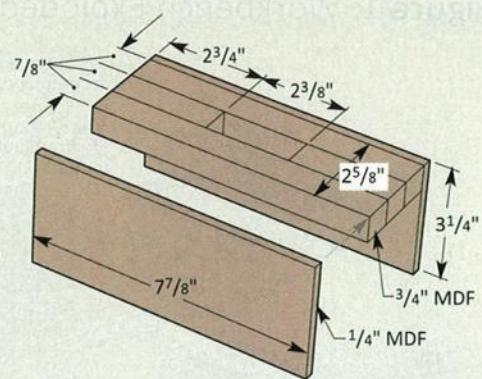
B

Rout along the tenoning collar to remove the waste. The extra inches at the post ends provide support to prevent the router from tipping.

## Mortising Jig

This U-shaped jig helps you cut identical mortises at the exact same location. Assemble the top as shown from four pieces, ensuring that the opening matches the desired size of the mortise and the total width of the jig equals that of the workpiece.

Attach the sides, and then trim the ends of the jig so that the mortise is automatically positioned  $2\frac{3}{4}$ " in when aligned with the ends of the trestle tops and feet.



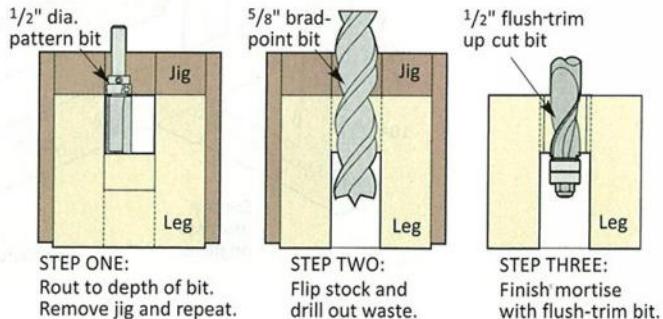
To complete the

mortises, flip the stock over and drill through the middle of the remaining waste, and then insert a flush-trim bit into your plunge router. Plunge down so that the bottom-

mounted bearing registers against the routed face of the mortise, and take light passes to remove the remaining stock.

**3** Clamp the four posts (A) side by side and lay out the beginnings and ends of the tenons, referring

**Figure 2: Three-Step Through Mortise**

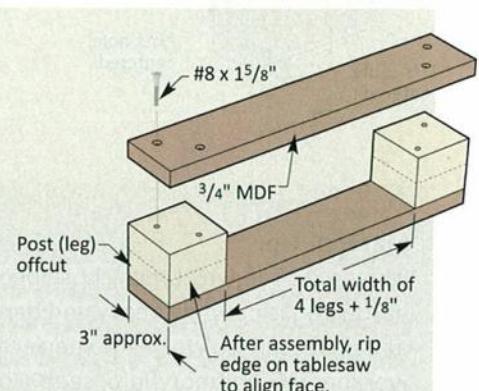


to the **Post Detail** in **Figure 1**, on the previous page. To cut the tenons, use the **Tenoning Collar**, shown below. Outfit your plunge router with a  $\frac{3}{8}$ " upcut spiral bit. To set the router's bit height, test-rout a tenon on a piece of scrap

## Tenoning Collar

Tenoning collars are routinely used for cutting breadboard ends, but this plus-sized version works equally well for thicker parts—like the trestle posts (A).

To make a perfectly fitting collar, we used the post offcuts as spacers. Adjust the length of the face strips so that the collar opening is about  $\frac{1}{8}$ " longer than the total width of the clamped-together posts. (The extra length makes it easier to adjust the jig.) Once the collar is assembled,



rip both edges to ensure the top and bottom align perfectly.

stock and test-fit it in the mortise. Now, fit the legs into the collar and position the collar so the router's base rides against it and the bit aligns with the shoulder line. Also ensure that the collar parallels the shoulder line. Clamp it in place.

**4** Rout the posts (A) in  $\frac{1}{4}$ "-deep increments, until you reach the desired tenon thickness as shown in **Photo B**. Repeat the same process on the other ends of the posts.

**5** Trim the posts (A) to final length. With a dado set in your table saw at  $\frac{1}{8}$ " high, and the posts on edge and against your miter gauge, cut the tenon shoulders.

**6** Using a file, round the corners on the tenons to match the plunge-routed mortises.

**7** Referring to the **Trestle Top and Foot Detail** (**Figure 1**), make a  $\frac{1}{4}$ " plywood pattern. Now use this template to lay out the end profiles on the trestle tops and feet (B). Bandsaw the ends and clean up the curves, sanding blocks, and files.

**8** Cut the  $\frac{1}{4}$ "-deep reliefs in the bottom of feet (B) at the jointer. To do this, clamp stops to the fence above the infeed and outfeed tables (**Photo C**).

Lower both tables in  $\frac{1}{16}$ " increments until you reach the final cut depth.

**9** Referring to **Figure 1** and the **Stretcher Detail** on page 29, lay out and then router-cut the mortises and tenons used to attach the stretchers (C) to the trestle assemblies, making a fresh mortising jig and tenoning collar to fit.

**10** Chuck a  $1\frac{1}{8}$ " Forstner bit into your drill press and drill the bench nut holes through the stretchers (C). (The stretcher's access holes are intentionally drilled  $\frac{1}{8}$ " oversize to make it easier to align the nuts and bolts.)



To cove the feet, place one end at the infeed stop, lower the other end onto the cutter, and move it forward until it hits the outfeed stop.

**11** Set the fence and stops to drill the  $1\frac{1}{8} \times \frac{1}{2}$ "-deep bolt head recesses on the outside faces of each post (A), where shown in **Figure 1**. Without moving the stops, chuck a  $\frac{1}{2}$ " bit and drill a clearance hole through each recess.

**12** Glue up the trestle leg assemblies (A, B) on a flat work surface. Measure the diagonals to make sure the assemblies are square.

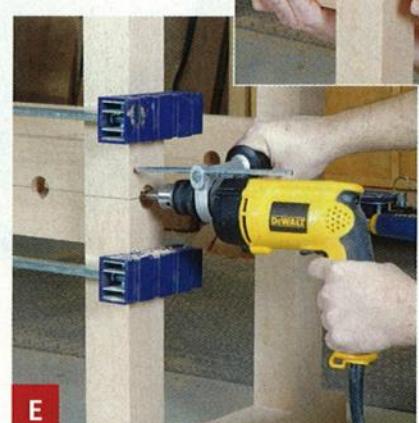
**13** After the glue has cured, dry-fit the stretchers (C) and clamp the base together, as shown in **Photo D**.

**14** Chuck a long  $\frac{1}{16}$ " bit into a drill and bore through the posts (A) and into the stretchers (C) (**Photo E**).

Add the bolts and nuts.

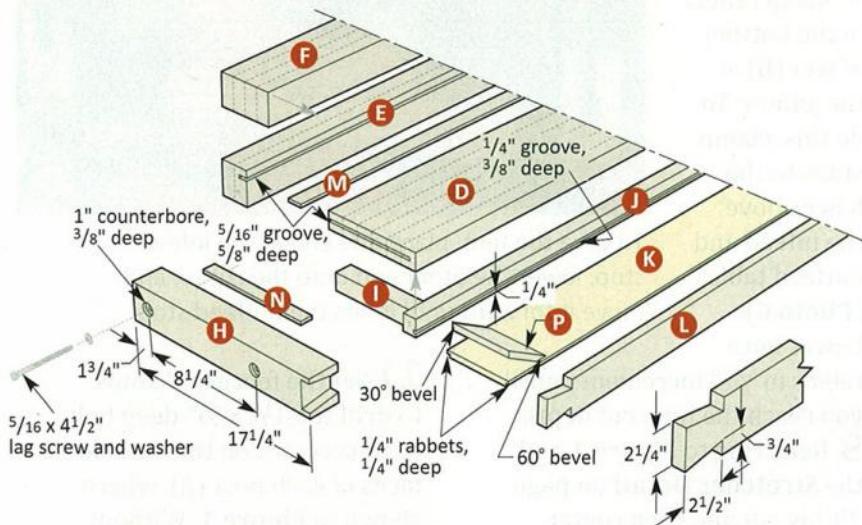


**D** Dry-fit the stretchers in the leg assemblies on a flat surface. Following this, clamp the assembly and drill the holes for the bench-bolt installation.



**E** Use the post clearance holes as drilling guides. Bench bolts tie the leg assemblies to the stretchers.

**Figure 3: Benchtop Detail (Rear View)**



F  
Apply glue onto mating faces with a 4" paint roller. Gluing up the benchtop in sections minimizes the frenzy associated with large assemblies.



G  
Apply clamps from the center out to the ends. Use the cauls to keep the assembly flat.

## Build the top

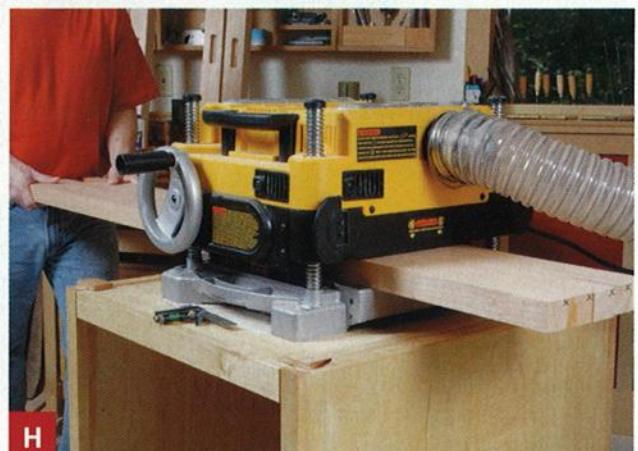
**1** Referring to the **Cut List**, mill enough stock to make the three top sections (D, E, F), the end battens (G, H), and the filler blocks (I, J). Leave your stock about  $\frac{1}{4}$ " oversize in thickness to allow for planing after glue-up. Using leftover material, make eight clamping cauls, roughly  $1\frac{3}{4} \times 2\frac{1}{4} \times 26"$ . Joint one edge, and then mark the jointed edge for use in subsequent glue-ups.

**2** Cut the tool well bottom (K) and mill the backboard (L).

**3** Rest the parts for the  $1\frac{1}{2}$ "-thick rear section (D) on a flat work surface and begin applying glue to the parts as shown in **Photo F**. Set the workpieces on four waxed cauls, position the four mating cauls on the opposite face, and attach the clamps. Use just enough clamping pressure to hold the cauls in place.

## Tip Alert

A sheet of  $\frac{3}{4}$ " melamine set on top of the finished base can serve as a functional and reliably flat assembly table. Best of all, glue won't stick to it.



H  
Planing the subassemblies that make up the benchtop quickly eliminates irregularities that may have occurred during glue-up.

**4** Starting at the center of the slab, apply a clamp across the width of the assembly. As you tighten the clamp across the width, tighten and relocate the cauls to keep the assembly flat. Continue adding more clamps across the width and gradually tightening the cauls as shown in **Photo G**.

**5** Glue up the 3"-thick center and front sections of the bench (E, F), using the same methods outlined in **Steps 3 and 4**.

**6** Face-laminate stock to make the long and short end battens (G, H).

**7** Plane the assembled rear section of the benchtop (D) to 1½", as shown in **Photo H**.

Plane the center and front sections (E and F) to 3½".

**8** Using a miter saw, cut the front right end of the front section (F) square. When deciding on the length of the cut, note that the square end of the shorter front section is offset in from the end of the longer section by at least 9¾" to allow for the tail vise.

**9** Equip your router with a ¼" slot-cutting bit and cut a 5/8" deep groove, 5/8" down from the top faces of the top rear front (D) and the matching face of the assembled center section (E) (**Photo I**).

**10** Join the front and center sections (E, F) together using clamps and cauls. (Any excess length can be trimmed off after glue-up.) Once the glue has cured, plane both assemblies and the end battens to the final thickness of 3".

**11** Mill the top spline (M) to match the groove. (Mill extra spline stock for the end battens (N and O). Dry-assemble the top (D, E, F), and then glue these parts together (**Photo J**).

**12** Using a circular saw and straightedge, trim the benchtop

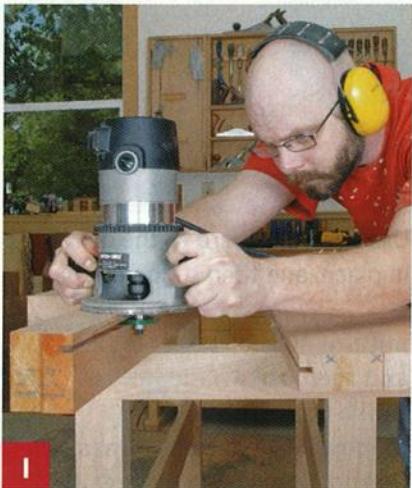
to length (**Photo K**). When trimming the tail vise end, make sure that the center (E)-to-front (F) offset is exactly 9¾", as shown in **Figure 1**, on page 29. Use a handsaw to finish the cut and trim the end with a hand plane.

**13** Using a router with a ¼" slot-cutting bit, cut a 5/8"-deep groove 5/8" down along both ends of the top assembly and along the inside faces of the end battens (G, H). Stop the grooves ¾" shy of the ends to prevent them from being seen after assembly. Trim the splines (N, O) to length.

**14** At the drill press, drill the 1 × 3/8"-deep counterbores and 5/16" clearance holes in the end battens (G, H) where shown in **Figure 1** for the lag screws used to attach them to the top assembly.

## Add the backboard and tool well

**1** Referring to **Tail Detail** in **Figure 3**, lay out the dovetailed ends on the backboard (L). Cut the shoulders using a



The router-cut grooves allow you to use a spline to align the top sections.



Inserting a spline between the top sections ensures that the parts do not shift during glue-up.

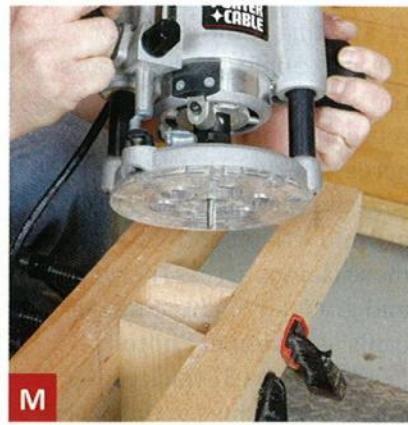


Saw against a guide to ensure a straight cut. A thin-kerf blade prevents the saw from stalling in the thick wood. Finish with a handsaw and plane.



L

Use the backboard as the dovetail pin template. Hold the piece in place, and then scribe the pins onto both battens.



M

Clamp support blocks onto the end battens to help steady the router as you rout away the pin waste.

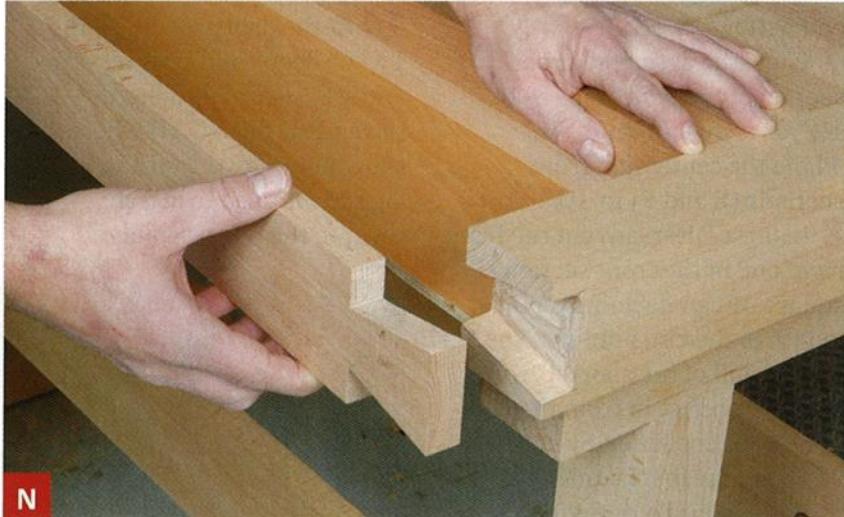
miter gauge at the table saw, and then use a bandsaw to finish the angled edges.

**2** Insert the batten splines (N, O) and clamp both battens (G, H) to the assembled top. Now lay the backboard (L) on top of both battens and scribe the pins, as shown in **Photo L**.

**3** Outfit your router with a straight bit and set the depth to the thickness of the backboard (L). Rout as close to the scribe line as you feel comfortable (**Photo M**), and then remove the remaining waste with a chisel.

**4** Lay the assembled top (D, E, F) face down on your work surface. Clamp both battens (G, H) in place. Trim the long filler block (J) to fit and attach it to the benchtop with 2" screws as seen in **Figure 3**. Dry-fit the backboard (L) onto the end battens. Using a router equipped with the  $\frac{1}{4}$ " slot-cutting bit, cut a  $\frac{3}{8}$ "-deep groove along the well-side edge of the filler block, the end battens, and the backboard to house the tool well bottom (K).

**5** Remove the backboard (L) and end battens (G, H). Now insert the tool well bottom (K) and then reinstall the end battens, using  $\frac{5}{16} \times 4\frac{1}{2}$ " lag



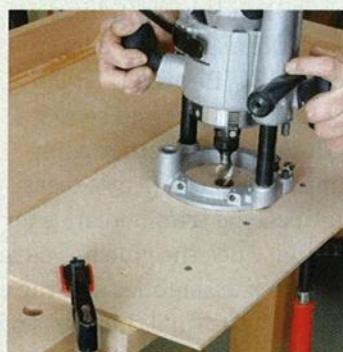
N

Test-fit the mating dovetail pieces together. Then apply glue and clamp the dovetailed backboard into the end battens.

## Two-Step Dog Holes

To prevent drill burnout, I started the dog holes with a plunge router and a  $\frac{3}{4}$ " upcut spiral bit, and then completed the holes with a Forstner bit. Begin by making a sturdy base like the one shown at right. Position the router over the first dog hole (refer to **Figure 1** for hole locations) and then screw the fence to the base so that the jig can slide along the front of your bench.

To rout holes, clamp the base to your top and then slowly lower the bit. Once all the dog holes have been routed, clamp a piece of scrap to the underside of your top (to prevent blow-out) and finish the holes with a cored drill.



screws. Apply glue to the tails on the backboard and fit it in place, as shown in **Photo N**.

**6** Bevel-cut and install the sweep out (P) at the end of the tool well. Rout and drill the dog holes now (see "Two-Step Dog Holes," page 34).

### Install the front vise

**1** Mill and glue up stock to make the front vise face (Q). Use the template you made for the trestle tops and feet (B) to draw the end profiles. Make the straight shoulder cut at the table saw, and then complete the profile at the bandsaw.

**2** Referring to **Figure 4** above, drill a  $1\frac{1}{8}$ " hole through the face (Q) for the vise screw and slide the vise in place. Locate the centerpoints for the  $\frac{7}{8}$ " rod holes, remove the vise, and drill these holes at your drill press.

**3** Slide the front vise face (Q) onto the rods and thread the nuts that hold it in place.

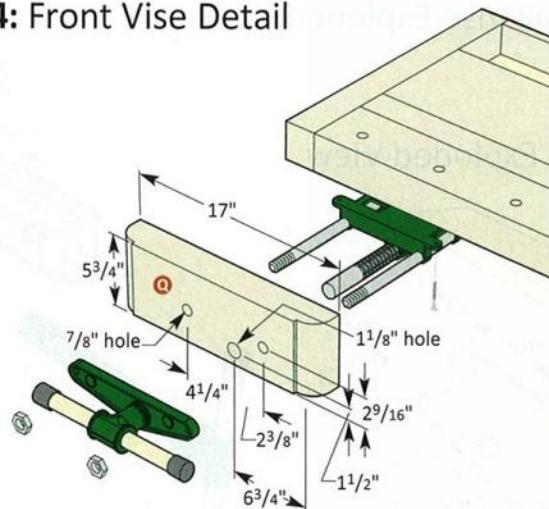
**4** With the top upside down, position the base of the vise so that the face (Q) is flush with the end of the top. Adjust the vise's base as needed, so that it does not interfere with the dog holes and then screw it to the top assembly (**Photo O**).

**5** Flip the top right side up and add the handle. Using cauls, as shown in **Photo P**, clamp the vise face (Q) flush to the top of the bench. Drive  $\#12 \times 1\frac{1}{4}$ " screws through the plate on the front of the vise and into the vise face.

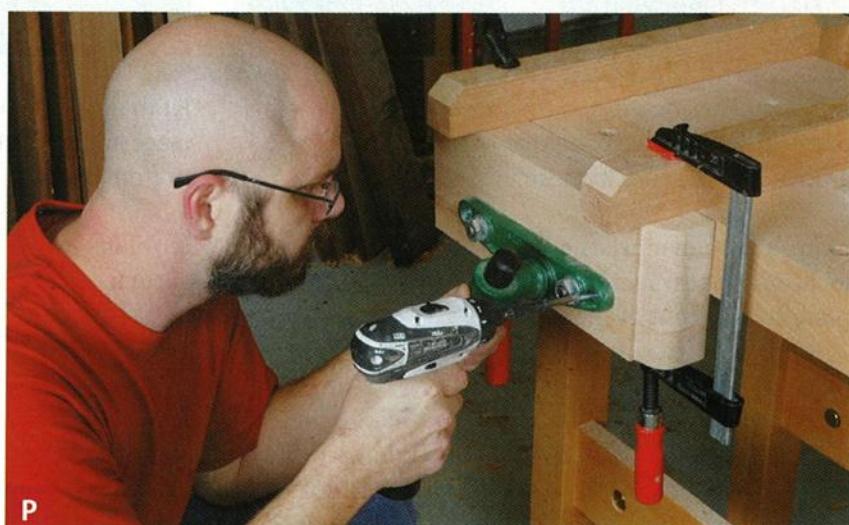
### Install the tail vise

**1** Use a slot-cutting bit to rout a  $\frac{5}{16}$ "-wide  $\times \frac{3}{8}$ "-deep groove in the front of the tail vise cutout,  $\frac{5}{16}$ " down from the top face of part (E) (**Figure 5**). Position the top plate in the groove, slide the main plate into the top face of the

**Figure 4: Front Vise Detail**



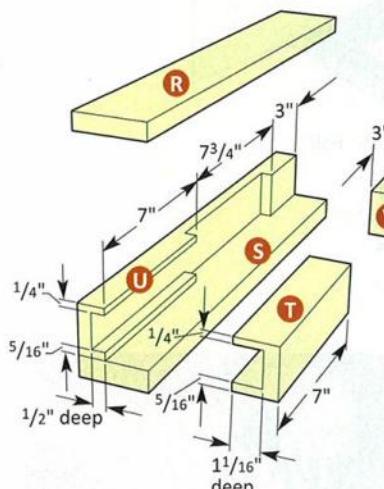
Drill the mounting holes, and then screw the front vise to the bench; adjust the location of the base so it does not interfere with the dog holes.



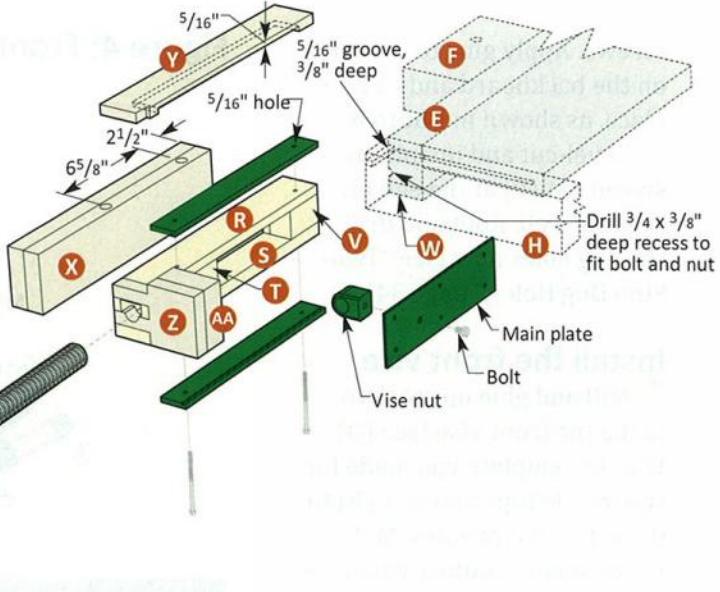
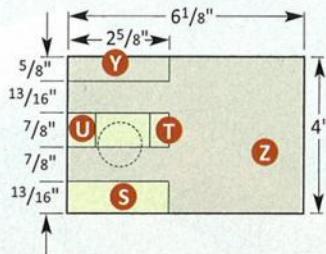
Use cauls to align the vise face with the top. Slightly oversized rod holes in the face provide the necessary wiggle room.

**Figure 5: Tail Vise Exploded View**

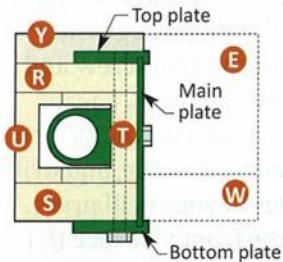
**Core Block Exploded View**



**Finger Joint Detail**



**Tail Vise Section View**



Attach the main plate and then test the fit of the metal top vise plate that rides in the groove to make sure it doesn't catch.

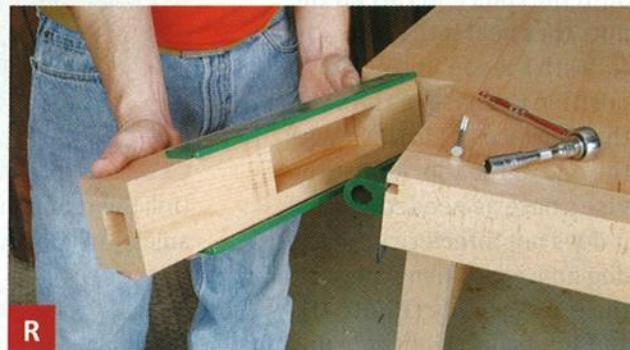
plate, and then mark the screw locations for attaching the main plate to the front of the bench.

Remove the top and main plate and mark the location of the bolt on the inside face of the main plate. Use a  $\frac{3}{4}$ " Forstner bit to drill a  $\frac{3}{8}$ "-deep recess to fit the bolt.

**2** Mill the parts that make up the core block (R, S, T, U,

V), the tail vise filler block (W), and tail vise return front and back (Z and AA), according to the **Cut List**.

**3** Using a table saw and dado blade, cut a  $1\frac{1}{16}$ "-deep groove along the inner core block (T). Lower the cutter height and cut a  $\frac{1}{2}$ "-deep  $\times$   $7\frac{3}{4}$ "-wide notch in the outer core block (U) to house the vise nut. Now



Fit the core block and vise hardware into place and check the action of the top and bottom plate on the main plate.

cut a  $\frac{1}{2}$ "-deep channel in the core block where shown in **Figure 5** for the vise screw.

**4** Glue the inner core filler (V) and the inner core block (T) to the outer core block (U). After the glue sets, remove the clamps and add the core block top and bottom (R, S).

**5** Attach the threaded vise nut to the plate with the bolt and

reinstall it onto the bench with two screws (**Photo Q**). Make sure that the edge of the main plate is parallel with the top of the bench. Add the plate filler block (W) behind the main plate.

**6** Set the top and bottom vise plates on the core block assembly, as shown in **Photo R**. Position the core block assembly against the main vise plate so that the plate grooves bottom out on the main plate. Now mark the location of the bolts used to attach the plates to the core block. Chuck a  $\frac{5}{16}$ " bit into your drill press and bore the core block assembly.

**7** Attach the top and bottom plates to the core block assembly with the supplied bolts, referring to **Figure 5**. Check the fit of the core block on the main plate. (This step can be fussy. To adjust the fit, you can run the core block across the jointer or insert shims under the plates.) Once the core block slides smoothly, remove it.

**8** Remove the top and bottom metal vise plates from the core block assembly. Referring to **Finger Joint Detail** (**Figure 5**), lay out the variably spaced finger joints on the end of the core block assembly. Using a table saw and dado cutter, cut the finger joints in the end of the core block. Scribe the fingers onto the tail return front (Z), and then cut the fingers to fit.

**9** Glue the tail return front (Z) to the core block assembly and then attach the tail return back (AA). Finally, drill a  $1\frac{1}{8}$ " hole through the fingers for the vise screw.

**10** Fasten the main plate to the top, using six #12 x 2" screws. Reinstall the top and bottom metal vise plates to the core block assembly and



Rout a recess in the top cap to fit over the top plate, notch the end to fit around the return, and then glue it in place.

slide it onto the main plate. Now attach the tail dog strip (X) with glue and clamps.

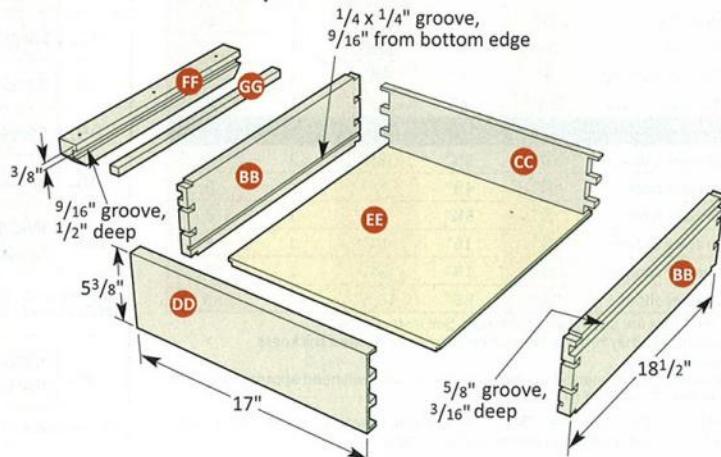
**11** Position the tail vise top cap (Y) in place, scribe a line where it offsets around the tail vise return (Z, AA), and make the cutout at the table saw. Next, transfer the measurements from the assembled vise to the top cap and mark the recess for the tail vise's top plate. With a router and a  $\frac{1}{4}$ " straight bit, cut a  $\frac{5}{16}$ "-deep recess in the bottom face of the top cap. Glue the top cap on the core block (**Photo S**).

## Building the storage drawer and finishing up

**1** Cut the drawer sides (BB), back (CC), front (DD), drawer runners (FF), and slides (GG) to size. Groove the inside faces of the drawer parts for the bottom (EE) where shown in **Figure 5** and then use a dovetail jig to cut the corner joints.

**2** Groove the drawer sides (BB) and drawer runners (FF) to accept the drawer slides (GG). Now assemble the drawer. Finally, rabbet the drawer bottom (EE) and slide it into

**Figure 6: Drawer Exploded View**



place. Attach the bottom to the back (CC) with a single screw.

**3** Attach the drawer runners (FF) to the underside of the top with 2½" long screws. (We centered our drawer between the vises, setting the runners 3¼" back from the top front edge.)

**4** Position the filler block (I) on the underside of the bench so that they do not interfere with dog holes or vises. Make sure that the spacing matches the center-to-center distance of the leg assemblies, and then attach them to the bottom face of the top with 2" long screws. Lay the top

on and then drill counterbored holes for 5/16" × 4" lag screws to attach the legs to the top.

**5** Apply two coats of Waterlox to seal the wood, followed by a light coat of paste wax. A bench won't stay showroom pretty for long, but the sealer will help it look its best and provide some protection against glue and stain. ■

Cut List		Thickness	Width	Length	Qty.	Mat'l
<b>BASE</b>						
A*	Trestle post	2¾"	2¾"	31½"*	4	B
B+	Trestle top and foot	2¾"	2¾"	22"	4	B
C*	Stretchers	1"	4¾"	45"**	2	B
<b>TOP</b>						
D*+	Top (rear section)	1½"	8¾"	59"*	1	B
E*+	Top (center section)	3"	2½"	59"*	1	B
F*+	Top (front section)	3"	5"	49¼"**	1	B
G*+	End batten	2½"	3"	22¼"	1	B
H*+	End batten (tail vise end)	2½"	3"	17¼"	1	B
I*	Filler block	1½"	1½"	7¼"	2	B
J*	Well filler block	1½"	1½"	59"*	1	B
K	Tool well bottom	½"	5¾"	59½"	1	P
L*	Backboard	¾"	3"	64"*	1	B
M	Top spline	¼"	1"	59"	1	B
N	Batten spline (tail vise end)	¼"	1"	9¾"	1	B
O	Batten spline (face vise end)	¼"	1"	14¾"	1	B
P	Sweep out	5¼"	5"	1	B	
<b>VISES</b>						
Q+	Front vise face	2¾"	5¾"	17¼"	1	B
R	Core block top	2¾"	¾"	16¾"	1	B
S	Core block bottom	2⅓"	1⅓"	17¼"	1	B
T	Inner core block	1⅓"	1⅓"	7"	1	B
U	Outer core block	1⅓"	1"	17¾"	1	B
V	Inner core filler block	1⅓"	1½"	3"	1	B
W	Plate filler block	1"	2"	12"	1	B
X+	Dog strip	2¾"	4"	17¾"	1	B
Y	Top cap	2¾"	¾"	17¾"	1	B
Z	Tail return front	1"	4"	6¾"	1	B
AA	Tail return back	1¼"	4"	3¾"	1	B
<b>DRAWER</b>						
BB	Drawer sides	¾"	5¾"	18¾"	2	B
CC	Drawer back	¾"	4½"	17"	1	B
DD	Drawer front	¾"	5¾"	17"	1	B
EE	Drawer bottom	½"	16"	18"	1	P
FF	Drawer runners	1½"	1¾"	18¾"	2	B
GG	Drawer slides	¾"	1½"	18 ¾"	2	B

\*Indicates parts that are cut initially oversized. See instructions.

+Indicates parts that may require lamination to achieve desired thickness.

See instructions.

Materials: B=Beech, P=Plywood To build the bench, you will need approximately 50 bd. ft. of 4/4 and 25 bd. ft. of 8/4 stock.

Supplies: (4) 5/16" × 4½" lag screws, (6) #12 × 1¼" flathead wood screws <vise to vise face>, (6) #8 × 2½" flathead wood screws <slides to top>

### About Our Builder/Writer

Matthew Teague writes and builds furniture in Nashville, Tennessee. The former managing editor of *Fine Woodworking* magazine is the author of *Projects for Your Shop* (The Taunton Press, 2005). When not at his workbench, Teague spends his time wrangling his three-year-old daughter, Ava Jean, and his new son, Locke.



### Convenience-PLUS BUYING GUIDE

	ITEM	WOODCRAFT#	PRICE
<input type="checkbox"/> 1.	Freud Pattern Bit, ½" D, 1" CL (¼" SH)	828738	\$22.99
<input type="checkbox"/> 2.	Whiteside Flush Trim Uptcut Spiral Bit, ½" D, 2"CL (½" SH)	817030	\$94.00
<input type="checkbox"/> 3.	Whiteside Solid Carbide Spiral Uptcut Bit, ¾" D, 1¼" CL (½" SH)	08K61	\$51.99
<input type="checkbox"/> 4.	Wood River Three Wing Slotting Cutter Set	147473	\$64.99
<input type="checkbox"/> 5.	Whiteside Straight Bit, Double Flute, ¼" D, 1" CL (½" SH)	812127	\$28.50
<input type="checkbox"/> 6.	Onsrud HSS ¾" Uptcut Spiral Bit	03K53	\$41.99
<input type="checkbox"/> 7.	Large Front Vise	144805	\$76.99
<input type="checkbox"/> 8.	Small End Vise Slide	144806	\$47.99
<input type="checkbox"/> 9.	Large Wooden Vise Handle	17E52	\$6.99
<input type="checkbox"/> 10.	Small Wooden Vise Handle	17E46	\$5.99
<input type="checkbox"/> 11.	Waterlox Original Sealer/Finish, 1qt.	37J21	\$26.99
Above items are available at Woodcraft stores, <a href="http://woodcraft.com">woodcraft.com</a> or by calling (800) 225-1153. Prices subject to change without notice.			
<input type="checkbox"/> 12.	Veritas Special Bench Bolts, Part # 05G07.01, \$29.50 (Set of 4)		
Above item available from Lee Valley, (800) 871-8158 or <a href="http://leevalley.com">leevalley.com</a> .			



# TLC for Your HVLP

*A simple 3-step program to save your waterborne-finish spray gun*

By Joe Hurst-Wajszczuk

The lesson typically costs a few good brushes, but woodworkers eventually learn that the success of the next finishing job rides on the cleaning regimen of the last. The same lesson applies to spray guns. A caked-up air nozzle or inlet will cause the best gun to sputter. And, as with a once-favorite brush, by the time you see the warning signs, it may be too late. Some

cured finishes are impossible to clean out. An after-the-fact fix may require replacement parts, a pricey rebuild, or a complete spray-gun replacement.

The good news is that prevention is cheap, easy, and quick. Using a cleaning kit (such as Woodcraft #147658) and a few other items, you can clean your gun in the time it takes to clean your favorite paintbrush.

## Waterbornes vs. Shellac & Lacquer

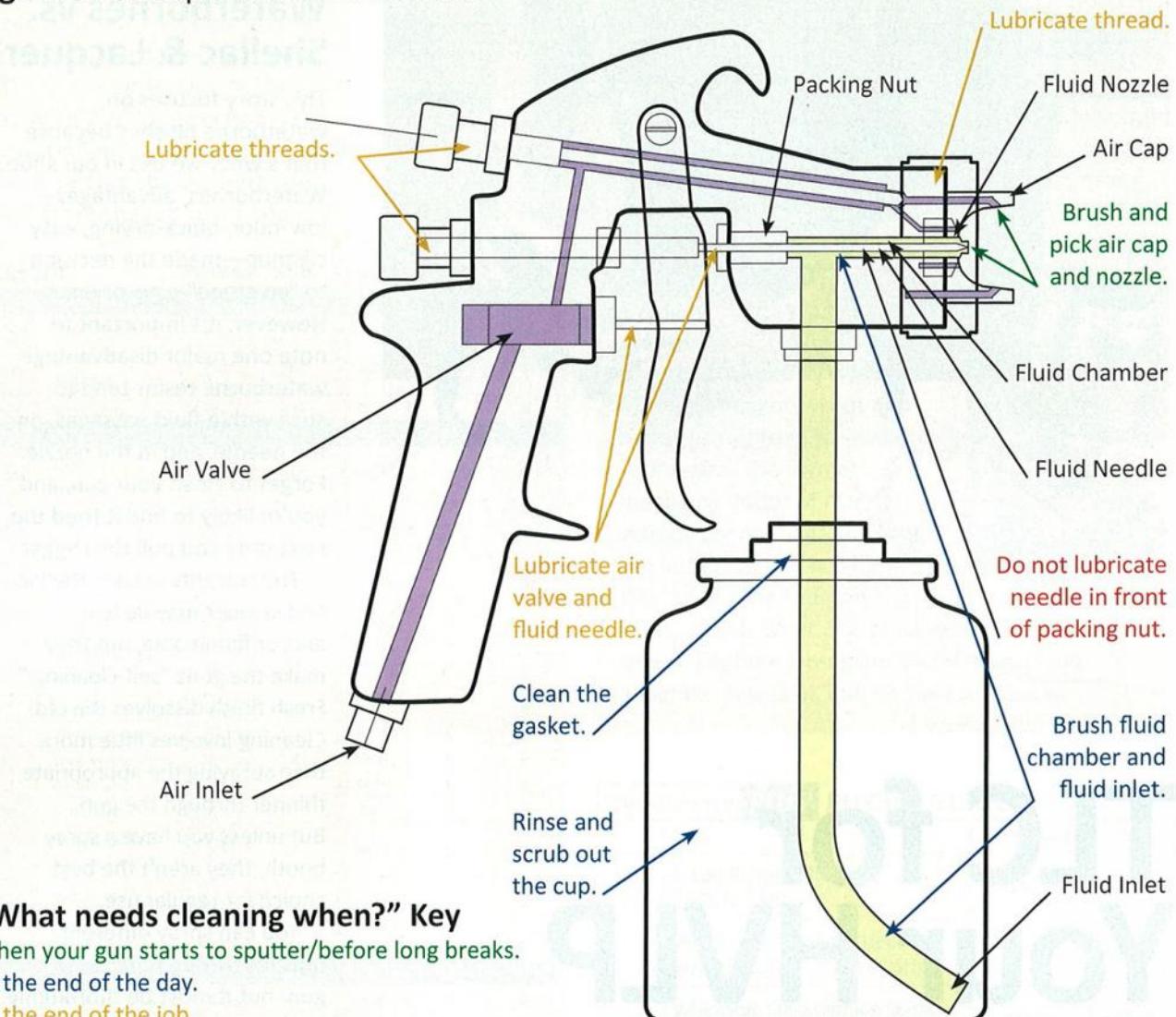
This story focuses on waterborne finishes because that's what we use in our shop. Waterbornes' advantages—low-odor, quick-drying, easy cleanup—made the decision to "go green" a no-brainer. However, it's important to note one major disadvantage: waterborne resins tend to stick within fluid passages, on the needle, and in the nozzle. Forget to clean your gun, and you're likely to find it fried the next time you pull the trigger.

The solvents used in shellac and lacquer may be toxic and/or flammable, but they make the guns "self-cleaning." Fresh finish dissolves the old. Cleaning involves little more than spraying the appropriate thinner through the gun. But unless you have a spray booth, they aren't the best choice for regular use.

You can spray different finishes through the same gun, but it must be thoroughly cleaned and dried to avoid contamination problems. An easier solution is to buy a second gun. We use a turbine-driven HVLP for waterbornes and a smaller compressor-driven HVLP gun for shellac and lacquer.

In this three-step program and cleaning guide (see **Figure 1**, page 40), we'll help you match the cleaning regimen to the job. Quick mid-project cleanups will mean sputter-free coats, a gun that's a cinch to clean at the end of the day, and smoother starts for future spray jobs.

**Figure 1: 3 Steps to a Cleaner Gun**



### "What needs cleaning when?" Key

When your gun starts to sputter/before long breaks.

At the end of the day.

At the end of the job.

## Three steps to peak performance

Your cleaning routine begins not at the end of the day, but as soon as your gun starts to sputter.

### Step 1: When in doubt, blow it out

At the first sign of trouble, wipe down the air cap with a rag. If that doesn't do the trick, try a cool clean rinse.

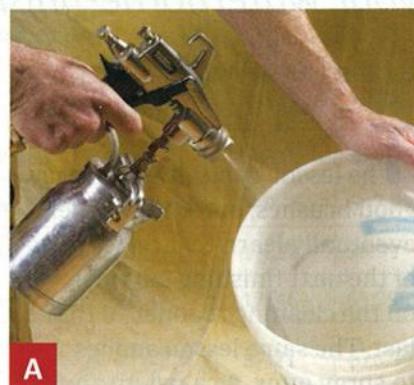
**Mid-job cleanup.** Replace your gun's cup with a clean cup filled with cool water. Spray the water into a catch bucket until the water runs clear (**Photo A**). Wipe down

the air cap, switch cups (shown in **Figure 1**), and you're back in business.

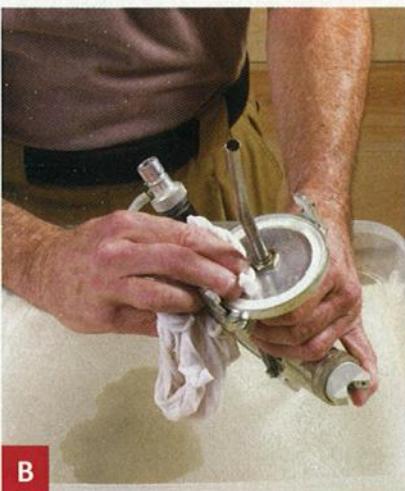
If your gun still sputters, check the air cap and fluid nozzle for clogs.

### End-of-day cleanup.

Repeat the step above, and then clean out your cup. Pour out any excess finish and then rinse it out with some soapy water. If the finish has started to stick to the inside, use a fine nonwoven abrasive; just be careful not to scratch through any Teflon coatings.



**A**  
Spray warm water until the water is clear. In addition to clearing clogs, flushing the gun will prevent the needle from clogging during lunch breaks.

**B**

The gasket seals the cup to the gun. Wiping debris off the gasket now is a lot more convenient than installing a replacement gasket later.

Give extra attention to the gasket between the cup and gun. Remove any finish buildup (**Photo B**) so that it does not affect the seal.

## Step 2: Break it down and brush it out

When you're done for the day, rinse out the gun and cup as before, and then reach for a brush. The goal is to scrub out the inner workings before the finish has a chance to cure.

Starting from the front of the gun, remove the air cap, fluid nozzle, and fluid needle. Let these parts soak in a soapy bath while you brush out the fluid inlet and fluid chamber with a round bristle brush (**Photo C**).

When cleaning the air cap and fluid nozzle, do as little as you can get away with. Start by brushing both parts, inside and out. Now inspect the holes. If they look clogged, you'll need to pick them out. Wooden toothpicks are handy because they can't damage the metal, but there's a chance the tip can break and clog the

**C**

Feed a round brush into the fluid inlet and then into the fluid chamber to snag any finish that might be sticking inside your gun.

orifice. The mini-brushes and metal picks supplied with the cleaning kit won't break; just be careful not to damage the metal orifices (**Photo D and Inset**).

Finally, wipe down the fluid needle. If there's any stubborn stuck-on finish, step up to lacquer thinner. Avoid using any abrasives that might ruin the tip.

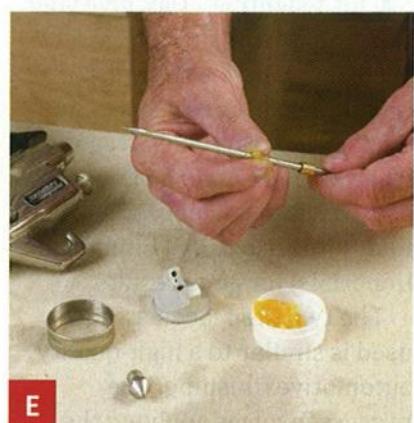
## Step 3: Use oil to fix sticks and leaks

You may not need to follow this step every time you clean your gun, but regular lubrication improves the seals and keeps parts from sticking.

A good rule of thumb is to apply a drop or two of oil into the needle packing nut after each use and to lubricate the threads whenever they begin to

**D**

Scrub the air cap holes with a small brush. The metal pick has side serrations designed to snag dried finish from the inside of the fluid nozzle.

**E**

Apply a light coat of grease or silicone-free oil on all threaded or moveable parts before reassembling the gun.

stick (or before putting your gun away for an extended period). To avoid the chance of finish contamination, avoid getting lubricant on the front-most part of the fluid needle (**Photo E**).

Make a habit of assembling your gun immediately after cleaning. Not only will this keep the parts together, but storing your gun fully assembled also protects the needle and tip from accidental damage and keeps dust and other potential contaminants from finding their way into the cup. ■

### Tip Alert

Lacquer thinner can help dissolve all dried finishes—including waterbornes—but use with caution. The solvent can damage rubber parts.

# Valentine Candy Dispenser

*Give a sweet  
to your sweetie.*

Designer/Builder/Writer: Robert J. Settich

This Valentine's Day, give your sweetheart this shelf-top sweet heart. With its mirror finish, this sleek sculpture begs to be touched and surrender a candy treat with every turn of the arrow. Fill the dispenser with Red Hots (also called Cinnamon Imperials) for good results.

The two-step lacquer finish used is similar to a high-quality automotive finishing. The process involves applying the paint followed by a clear lacquer topcoat, and then polishing the surface. If you haven't achieved a perfect showroom finish before, the small scale of this project makes it an ideal learning experience.

*Note: See the Convenience-Plus Buying Guide for supplies used in this project.*

## Make the heart front and back

- Cut a  $\frac{3}{4} \times 5\frac{1}{2} \times 12$ " maple blank for the front/back (A) as shown in **Figure 1**. (You need this length to trim planer snipe.) Joint the faces square to the edges.
- Next, set your table saw's rip fence to center the blade in the



**Overall dimensions:**  $7\frac{1}{8}" w \times 4" d \times 6" h$

thickness of the blank. Raise the blade 1" above the table and rip along both edges. Keep the same face of the blank against the fence for both cuts. Raise the blade for a cut 2" deep, and repeat the process (**Photo A**).

**3** Complete the resawing with your bandsaw, as shown in **Photo B**.

**4** Thickness-plane the two blanks to  $\frac{1}{4}$ " and crosscut each to  $5\frac{1}{2}$ " long.

**5** Make two photocopies of the **Full-Sized Pattern, Heart Core and Front/Back (Figure 2)** on page 44, and spray-adhere one to the front blank, aligning the wood grain with the arrows. Hold the other pattern to a window or light box and transfer

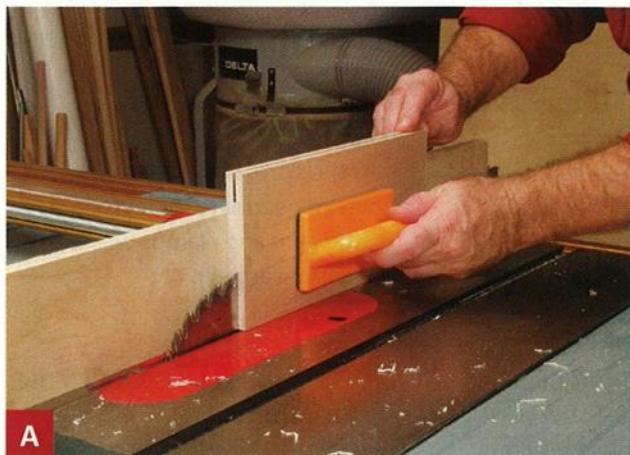
it to the back face of the pattern page, including the fill hole.

Adhere this "reverse" pattern to the back blank. Drill the 1" counterbore  $\frac{1}{8}$ " deep with a Forstner bit. Drill the 6mm hole through the blank for the rare-earth magnet. Finally, drill the  $\frac{1}{2}$ " fill hole through the blank. Epoxy the magnet into place.

**6** With the patterns in place for the front and back blanks



This core prototype shows the dispenser mechanism.



A

Resaw the blank on edge with a carefully controlled rip, using an auxiliary fence and pushblock.



B

Complete the resawing on your bandsaw, guiding on the table-sawn kerfs.

(A) saw along the dashed line, leaving a margin past the solid line. (You'll rout these pieces to final size after assembly to the core (B).) Strip off the patterns and set the blanks aside.

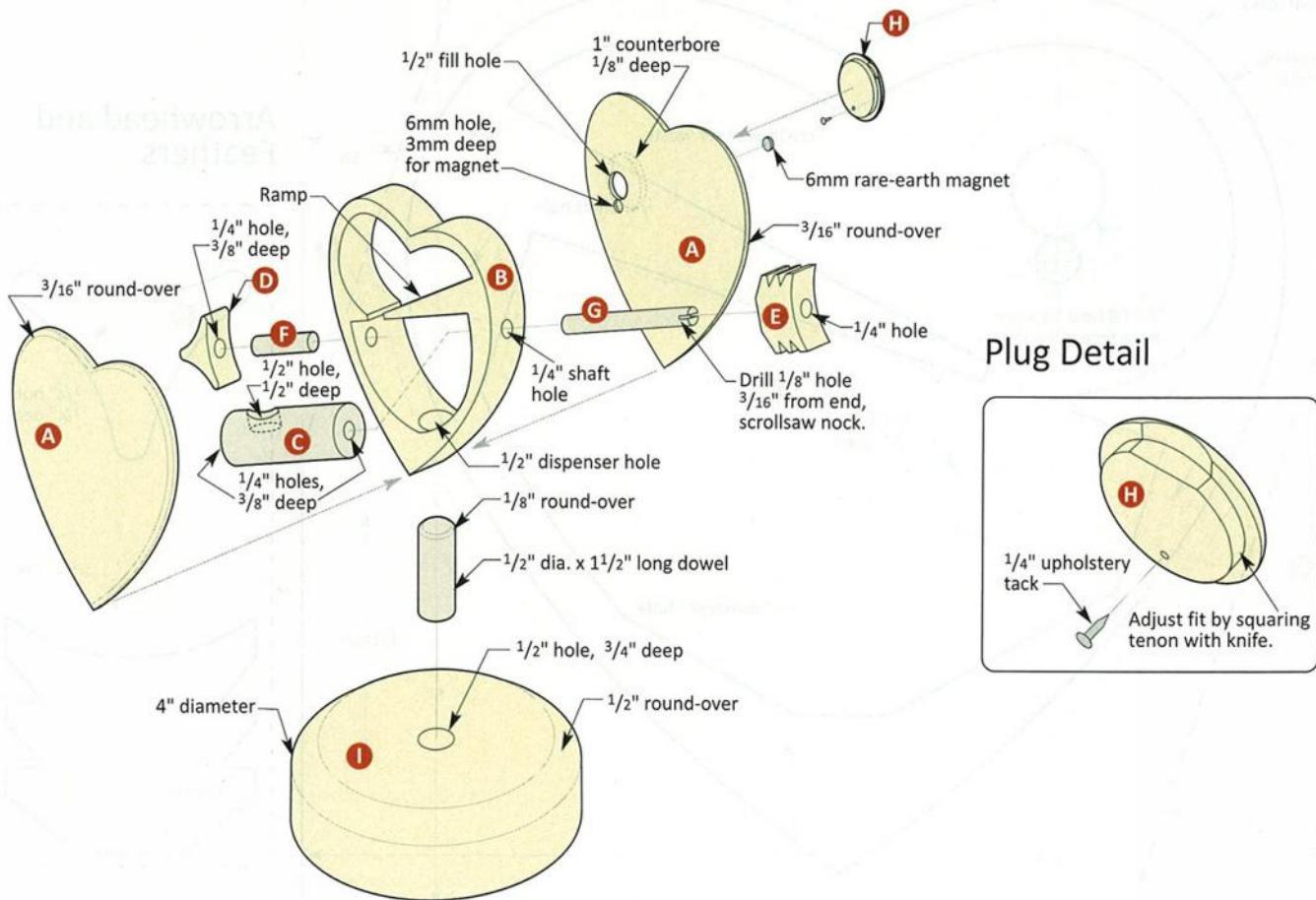
### Drill and shape the core

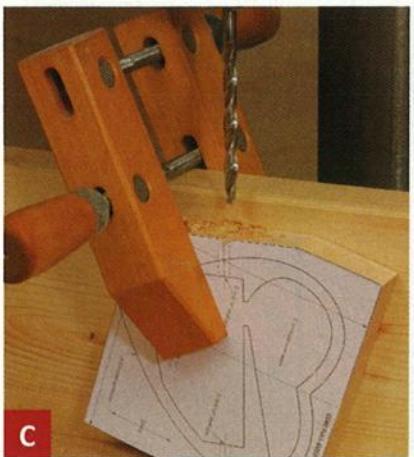
**1** Cut a  $\frac{3}{4} \times 5 \times 5\frac{1}{2}$ " maple blank for the core (B). Make a photocopy of the pattern in **Figure 2** on page 44 and adhere it to the blank.

**2** Set your miter saw to  $18^\circ$  and make the two cuts shown on the pattern.

**3** Extend the centerline of the upper and lower shaft holes to the edges of the

**Figure 1:** Candy Dispenser Exploded View





C

Carefully position the blank when drilling the two shaft holes to help ensure that they align.

blank. Measure to the center of the blank's thickness, and mark that centerpoint on the centerline you just drew.

**4** Chuck a  $\frac{1}{4}$ " brad-point bit into your drill press, and clamp a tall fence to your drill press table. Clamp the blank for core (B) to the fence, and drill as shown in **Photo C**. Repeat for the other shaft hole.

**5** Extend the centerline of the  $\frac{1}{2}$ "-dispenser hole to the edge of the blank, and mark its centerpoint. Using your drill press, drill this hole 1" deep.

**6** Bandsaw or scrollsaw just outside the solid line for the core (B). Sand to the line, removing any saw marks for a smooth and square edge.

**7** Drill a blade-start hole through core (B), and then remove the waste from the core's middle.

## Tip Alert

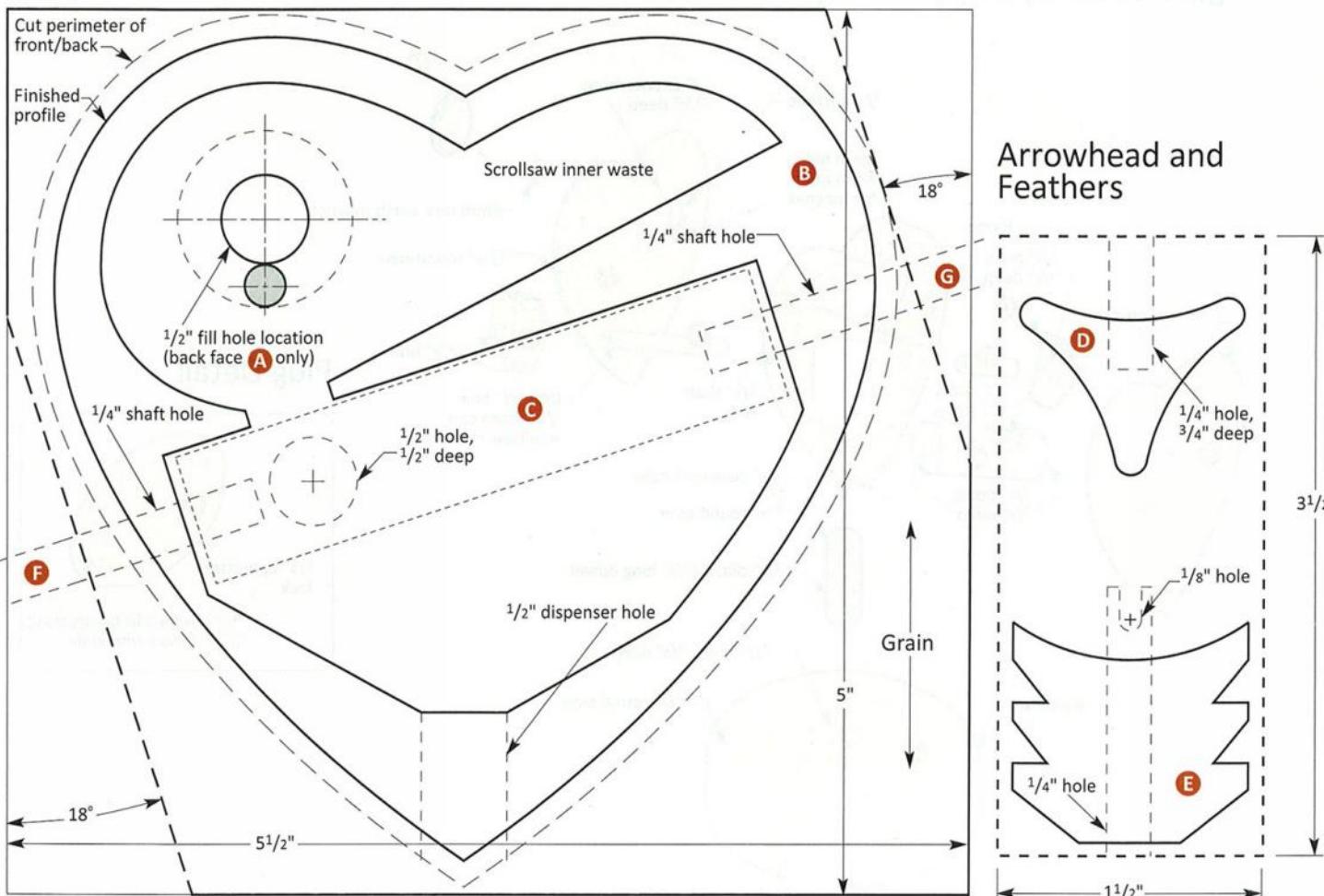
To cut out the waste with a bandsaw, cut along the grain line into the core. Drill a few extra holes to negotiate tight corners. A little glue and clamps will make the kerf disappear.

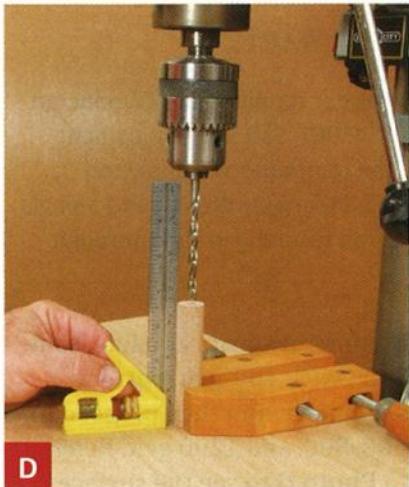
**8** Insert a  $\frac{1}{4}$ " dowel through the shaft holes to ensure that they align. If the dowel doesn't rotate freely, use a round file to remove wood that causes the binding.

## Make the arrow parts

**1** Cut the rotor (C) to length, checking for an easy fit into its location in the core (B). Mark on this dowel the edges of the

**Figure 2:** Full-Sized Patterns: Heart Core and Front/Back





D

Check that the rotor is square to the table before drilling the holes.

ramps from the upper candy storage bin. Cradling the rotor in a V-block on your drill press table, drill the  $\frac{1}{2}$ " hole  $\frac{1}{2}$ " deep where shown in **Figure 2**.

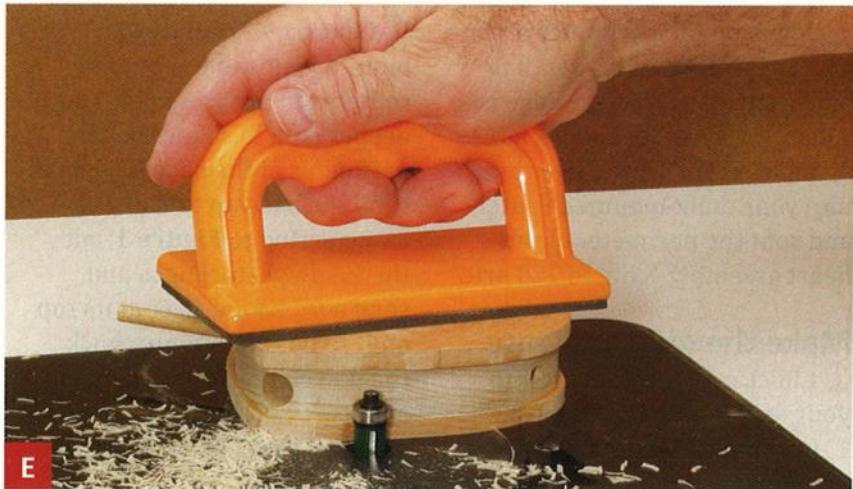
**2** Drill the holes in the ends of rotor (C). Use a handscrew clamp as shown in **Photo D** to hold the rotor for drilling.

**3** Make a copy of the arrowhead (D) and feathers (E) from **Figure 2** and adhere the copy to a  $\frac{1}{2} \times 1\frac{1}{2} \times 3\frac{1}{2}$ " maple blank. Transfer the centerlines of the holes to the ends of the blank, and drill the holes. Cut the arrowhead and feathers to shape and sand them to final smoothness.

**4** Cut the head shaft (F) and tail shaft (G) from a  $\frac{1}{4}$ " dowel rod. Form the nock at the end of the tail shaft by drilling a  $\frac{1}{8}$ " hole where shown in the patterns, and then use your scrollsaw to remove the waste. Touch up the nock with a needle file.

### Time for a test fit

**1** Place the rotor (C) inside the core (B), and then insert the head shaft (F) and tail shaft (G) into the ends of the rotor, as shown in the **Figure 2**. Rotate the assembly to check for any



E

Set the flush-trim bit so that the bearing does not dip into the shaft holes. Be extra careful when routing around the dispenser hole.

interference, and sand the rotor or core to remove problem areas. The long ramp area of the core can be fragile, so work carefully.

**2** Clamp faces (A) to core (B), and again turn the rotor to check for interference. Correct any problems and then disassemble. Rub the ends of the rotor with wax, and also wax the contact areas inside the core. Buff lightly with a soft cloth to remove any excess. Temporarily replace the head and tail shafts (F, G) with 2" lengths of scrap dowel.

*Note: During the next few steps, you'll occasionally need to remove a dowel from the rotor. Don't remove both at the same time, or you'll lose the rotor in the heart.*

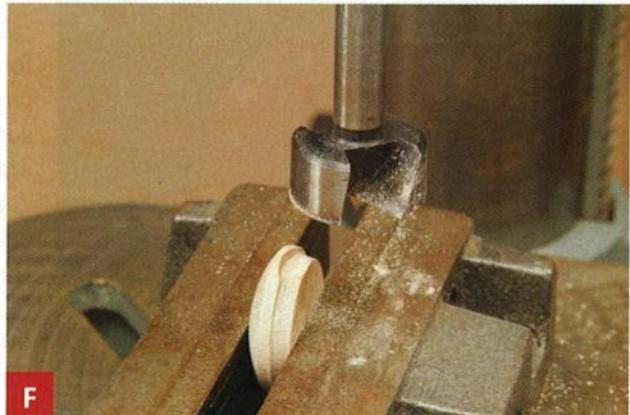
the rotor (C) to minimize the risk that squeeze-out will seize it or the temporary shafts.

Make sure that the entire perimeter of the front and back overhangs the core. (It's also a good idea to turn the rotor occasionally while the glue sets to ensure it doesn't stick.)

**2** Chuck a flush-trim bit into your table-mounted router, and trim the perimeter of the front/back (A) flush with core (B) as shown in **Photo E**. Set the height of the bit so that the bearing does not dip into the shaft holes. The bit won't reach into the sharp inside corner of the heart, so you'll need to trim this area with a chisel.

### Glue and trim the faces

**1** Glue the front/back (A) to core (B), making sure that the 1" counterbore on the back faces outward. Apply glue sparingly in the areas near



F

To hold the plug for drilling, use a drill press vise or a wood handscrew clamp.

- 3** Touch up the perimeter of the heart assembly with a sanding block, ensuring that the edge is square to the front and back (A).  
**4** Chuck a  $\frac{3}{16}$ " round-over bit into your table-mounted router, and rout the perimeter of the heart assembly. Sand to 220 grit.

### Make the plug and base

- 1** Chuck a 1" Forstner bit into your drill press, and clamp a 1" maple plug (H) to drill an arc into its edge as shown in **Photo F**. This arc provides space to get a fingernail under the plug to remove it.  
**2** Face-glue two pieces of  $\frac{3}{4} \times 4\frac{1}{2} \times 4\frac{1}{2}$ " maple to make a blank for the base (I). Unclamp after the glue dries, and, with a pencil and compass, draw a 4"-diameter circle on the blank. Bandsaw just to the waste side of the line.  
**3** Drill a  $\frac{1}{2}$ " hole  $\frac{3}{4}$ " deep at the centerpoint you used for drawing the circle. Drill a  $\frac{1}{2}$ " hole into a piece of scrap plywood, and insert a short length of  $\frac{1}{2}$ " dowel to make a jig for your disc sander. Advance the jig toward the abrasive until the base just touches the disc, and clamp it in place. With the disc spinning, slowly turn the base round as shown in **Photo G**.



**G**

Position your jig on your sander so that the disc's rotation pulls the base against the plywood.

- 4** Chuck a  $\frac{1}{2}$ " round-over bit into your table-mounted router, and progressively rout deeper cuts to shape the top perimeter of the base (I). Finish-sand the base up to 220 grit.

- 5** Referring to **Figure 1**, cut the  $\frac{1}{2}$ " dowel to length and sand a  $\frac{1}{8}$ " round-over at its top end. To do this, simply chuck the dowel into your drill press and use a sanding block. Don't glue the dowel in place yet.

### Create a high-gloss finish

- 1** Drill a  $\frac{1}{4}$ " hole in a scrap board, and insert one of the shaft dowels to support the heart for spraying and drying. Note that the dowel in the base is also red. Spray on the first color coat and lightly sand the heart and base with 220 grit to remove any nibs. Then wipe with a microfiber cloth to get rid of the dust. Lightly sand the second and subsequent color coats with 400 grit.  
**2** Mount the arrowhead (D) and feathers (E) to scrap dowels for their color coat. After painting, glue the arrowhead to head shaft (F) and feathers to tail shaft (G). Align the feathers and nock as shown in the opening photo (page 42). Mask the ends of the shafts that are glued into rotor (C).

- 3** Spray on three to four coats of clear lacquer. As before, sand with 400 grit and dust between coats. After the final coat, lightly rub the arrowhead and feathers (D, E) with 0000 steel wool for a flat finish.  
**4** Wet-sand the heart and base, using paraffin oil

### Tip Alert

Rubber sanding pads (Woodcraft #145961, \$10.50) help combat the temptation to apply too much sanding pressure to a single spot, resulting in sand-through.

or mineral spirits as a lubricant. Start with 400-grit wet/dry sandpaper, and then proceed to 600, 800, and 1200 grit. Refer to **Photo H** to see the surface you're aiming to achieve. Watch the sanding swarf to ensure that you haven't sanded through the clear coats to the color. If that occurs, clean the piece and apply more coats of clear lacquer.

**5** Sprinkle pumice onto a felt block moistened with paraffin oil and polish the surface with a light touch, as shown in **Photo I**. When the finish refuses to become glossier, repeat the process, using a fresh felt block with rottenstone. Finally, buff the finish with an unused dry side of a felt block. Two thin coats of paste wax will protect the finish and increase the gloss.

### Final assembly and taste test

- 1** Clean the heart's interior with a few blasts of compressed air.  
**2** Prepare to glue the arrow assemblies (D/F and E/G) into the rotor (C). Apply wax to the part of the shaft that contacts the core (B). Snip the cotton from the end of the swab, and use its "stick" to apply glue to the holes in the rotor. Insert the arrow assemblies, making sure that the surfaces of the arrow and feathers are in the same plane. Gently turn while the glue sets, so the assembly doesn't stick.  
**3** Referring to **Figure 1**, glue the dowel into the base.



H

Wipe away the oil to check your sanding progress. Aim for a uniform matte surface with no shiny spots.

#### 4 Test-fit the fill plug (H).

Referring to the **Plug Detail** accompanying **Figure 1**, you may need to use a knife to square the plug's tapered tenon so that it fits into the counterbore. Tap in a  $\frac{1}{4}$ " upholstery tack to mate with the magnet.

**5** Fill the heart by laying it on its front face, and pouring the candy through the fill hole. Replace the plug (H), and hold the heart upright while turning the arrow to dispense the candy.

The dispensing mechanism—like love itself—produces the best results with a light touch and a bit of finesse. If you encounter resistance when turning the arrow, reverse direction. To clear a tough jam, invert the heart and shake gently. Store the heart on its base. ■

#### About Our Builder/Designer

Robert J. Settich has written six books and scores of magazine articles on woodworking and home improvement topics. Many of these have featured his photography and original designs. Bob's latest book is *Built-Ins* (Taunton Press). He lives and works in Gladstone, Missouri.



I

As the mirror finish begins to glow, use lighter pressure and less abrasive.

<b>Candy Dispenser Cut List</b>		<b>Thickness</b>	<b>Width</b>	<b>Length</b>	<b>Qty.</b>	<b>Mat'l</b>
A*	Front/back	$\frac{3}{16}$ "	$4\frac{3}{4}$ "	$4\frac{1}{8}$ "	2	M
B*	Core	$\frac{3}{16}$ "	$4\frac{3}{4}$ "	$4\frac{1}{8}$ "	1	M
C	Rotor	$\frac{3}{16}$ "-dia.		$3\frac{1}{16}$ "	1	HD
D*	Arrowhead	$\frac{1}{2}$ "	$1\frac{1}{4}$ "	1"	1	M
E*	Feathers	$\frac{1}{2}$ "	$1\frac{1}{4}$ "	$1\frac{1}{4}$ "	1	M
F	Head shaft	$\frac{1}{4}$ "-dia.		$2\frac{1}{16}$ "	1	HD
G*	Feather shaft	$\frac{1}{4}$ "-dia.		$3\frac{1}{16}$ "	1	HD
H*	Plug	$\frac{7}{16}$ "	1"-dia. tenon, $1\frac{1}{8}$ "-dia. head		1	M
I*	Base	$1\frac{1}{2}$ "	$4\frac{1}{4}$ "-dia.		1	LM

\* Indicates parts that are cut initially oversized. See instructions.

Materials: M=Maple, HD=Hardwood dowel, LM=Laminated maple

#### Convenience-PLUS BUYING GUIDE

	ITEM	WOODCRAFT#	PRICE
<input type="checkbox"/> 1.	Rare-earth Magnets, 6mm diameter x 3mm thick, 10 pack	128473	\$5.99
<input type="checkbox"/> 2.	Weldwood Spray Adhesive, 16 oz. can	146046	\$9.99
<input type="checkbox"/> 3.	WoodRiver Flush-Trim Bit, $\frac{1}{2}$ " CD, 1" CL, ( $\frac{1}{2}$ " SH)	144138	\$16.79
<input type="checkbox"/> 4.	WoodRiver $\frac{3}{16}$ " Round-over Bit, $\frac{3}{16}$ " R, $\frac{3}{16}$ " D, ( $\frac{1}{4}$ " SH)	147245	\$18.99
<input type="checkbox"/> 5.	Buttons, Maple, 1"-diameter Tenon, 100 pack	17065	\$14.99
<input type="checkbox"/> 6.	Microfiber Reusable Polishing Cloth, 16 x 16"	146377	\$4.99
<input type="checkbox"/> 7.	Behlen Pumice, Fine (4F), 1 lb.	38C22	\$7.99
<input type="checkbox"/> 8.	Behlen Rottenstone, 1 lb.	38C31	\$7.99
<input type="checkbox"/> 9.	Behlen Paraffin Oil, 1 qt.	18X72	\$14.50
<input type="checkbox"/> 10.	Behlen Felt Rubbing Pad (2 needed)	38N41	\$12.99

Above items are available at Woodcraft stores, [woodcraft.com](http://woodcraft.com) or by calling (800) 225-1153. Prices subject to change without notice.

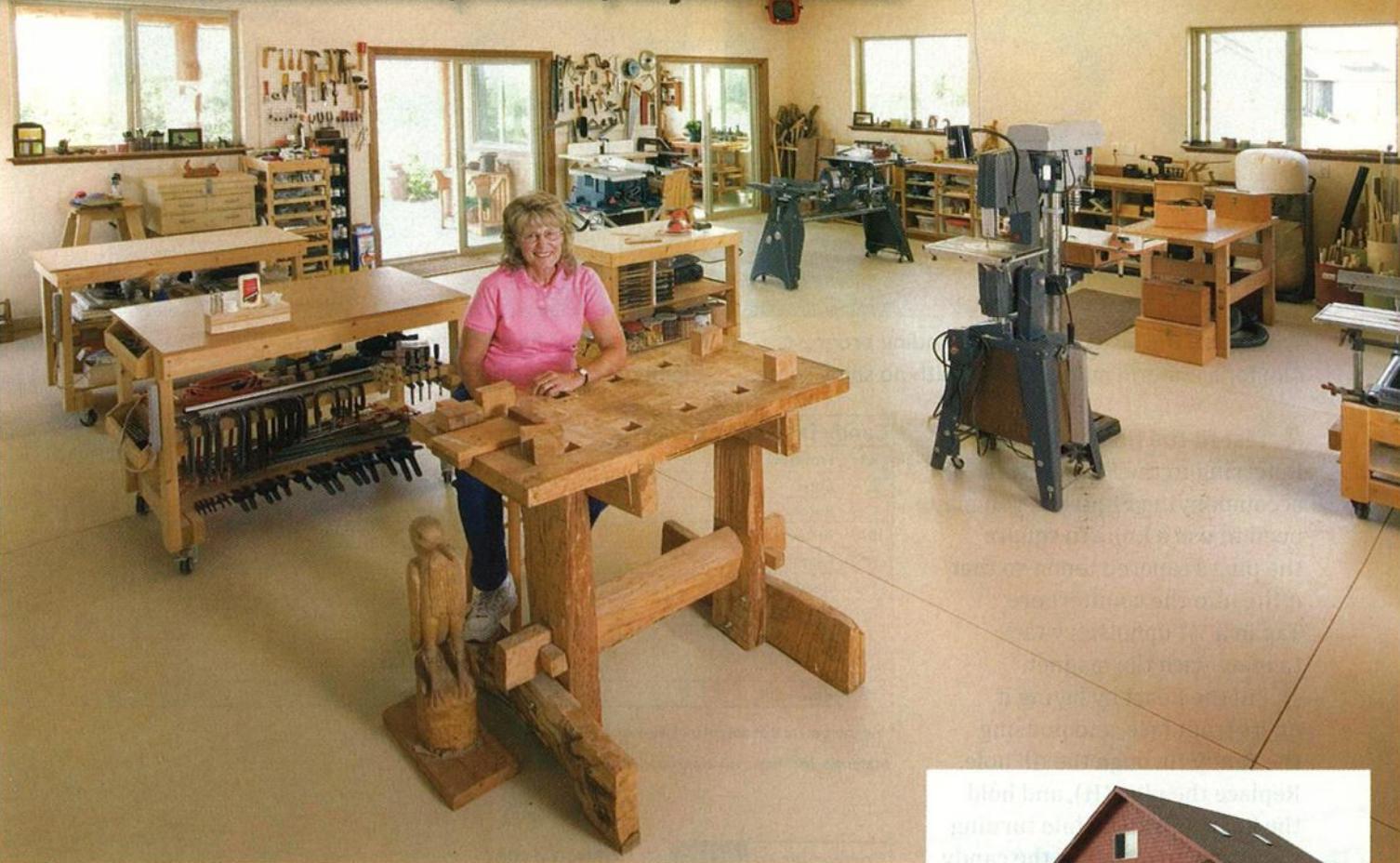
11. Rust-Oleum Spray Lacquer #1905830, Gloss Black, 11 oz.

12. Rust-Oleum Spray Lacquer #243826, Gloss Chinese Red, 11 oz.

13. Rust-Oleum Spray Lacquer #1904830, Gloss Clear, 11 oz.

Above items available at Home and Craft Centers and Hardware Stores.

# America's Top Shops



## Big-Sky Getaway

*Wide-open Montana workshop invites in the mountain view.*

By Robert J. Settich

**T**wo years ago, Nancy Ballance traded her Harley for a brand-new 1,000 square foot woodworking shop in Hamilton, Montana. And to make the swap even more improbable, Nancy didn't own a motorcycle at the time. Fact is, she never has.

It was the motorcycle Nancy planned to give herself for her 60th birthday. For over 30 years,

she reminded her husband, Larry, about the inevitability of the present: "I could see in his face that he wasn't sure that he believed it, but he thought maybe he did." The reminders became more frequent after the couple retired from the computer industry in California and moved to Montana four years ago. About that same time, Larry



Nancy and her husband, Larry, used an architectural software program to design a shop that's in harmony with its scenic location.

started talking about building a woodworking shop on part of their three-acre lot. The couple seemed to talk past each other for awhile until Larry—who is neither a motorcyclist nor a woodworker—crystallized an offer: "Give up the motorcycle and we'll build you the shop." Nancy thought for awhile and finally agreed. "It was

a good trade," she said. "It was the right thing to do."

Nancy and Larry's home and shop reside at about the north-south midpoint of the picturesque 100-mile long Bitterroot Valley. Every morning, the sun rises over the Sapphire Mountains, setting into the Bitterroots that serve as the border between western Montana and eastern Idaho. It's exactly the kind of wide open country that a Montana highway engineer, Bob Fletcher, had in mind when he composed a poem that Cole Porter bought for \$250 and turned into the song, "Don't Fence Me In."

Nancy and Larry collaborated on planning the shop, producing a design that brings the expansive mountain landscape indoors and then blurs the boundary between indoors and out. The generously-sized and abundant windows flood the shop with light and fresh air, while the attached greenhouse has a sliding-glass door that opens from the shop. A second slider leads from the shop to a patio where Nancy often



Nancy designed a series of silhouette girls enjoying a number of woodworking activities, including the operation of hand and power tools (off-limits in her own youth).

## The Workshop At A Glance

**Size:** Overall shop 32' x 34', including a 9' x 12' 6" finishing room, bathroom, and 5' x 8' alcove break room. Storage attic reached via a flight of steps.

Attached greenhouse, 7' 6" x 11'.

**Construction:** 2 x 6 exterior stud walls; blown-in R-19 insulation in walls, R-30 in ceiling, and R-38 in roof.

**Heating and cooling:** Ceiling-mounted 240V-, 5,000-watt electric heater (The Hot One by Cadet), providing 17,000 BTUs. Cooling not required.

**Lighting:** (8) 100-watt

incandescent bulbs, plus (3) 8'-long fluorescent fixtures with (4) 4'-long tubes in each one.

**Electrical:** 200-amp main panel, providing 240V to ceiling-mounted heater, plus 220V circuit for future use. 110V outlets located 42" above floor, and spaced 48" horizontally.

(9) 110V outlets in the ceiling. Two switched outlets for miter saw and dust collector.

**Dust Collection:** Portable ½-hp, 30-gal. Shopsmith unit that's wheeled from tool to tool.

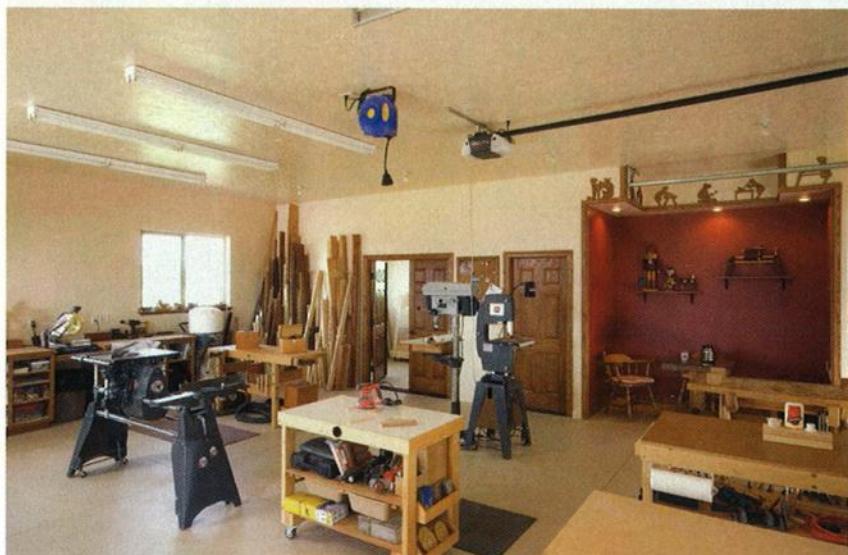
**Air compressor:** None

works. She enthuses, "It's a beautiful spot to sit and carve."

An entry door neighbors a double garage door. In fact, the shop has so many windows and doors that there's a real shortage of wall space that's uninterrupted from the concrete floor to the 10' ceiling. "In hindsight," Nancy admits, "I would have done just a single garage door, which would have given me more wall space."

Horizontal surfaces abound, with two workbenches, a downdraft sanding table, and two additional work tables. Her Shopsmith Mark V continues the horizontal lines, as do the long cabinets flanking the miter saw. In fact, the only three vertical elements in the shop are a drill press, bandsaw, and lumber rack.

The theme of openness continues throughout the shop. None of the storage cabinets



The finishing room, bathroom, and break alcove make up the shop's east wall. Note the special decorating touches in and around the alcove.

# America's Top Shops

or spaces below the work tables have doors, so Nancy can quickly locate the tools and supplies she needs.

Because she's typically advancing several projects at the same time, the 9 x 12' 6" finishing room helps her boost productivity. She no longer needs to wait for the finish to cure on one project before continuing work on another.

With all the open storage, dust collection is crucial. Nancy opted away from fixed ducting because she thought it would detract from the clean architecture of her shop. Instead, she employs hoses and a portable dust collector. Added to this effort is her shop-made downdraft sanding table—an effective problem solver. Nancy discovered that commercial versions cost plenty because they include a built-in motor and



Nancy's Shopsmith Mark V served as her main tool for over 30 years. Her scale model in wood—with its articulating parts—won her a ribbon at the Montana County Fair.

filtration system. With a stroke of design clarity, she whisked away that expense by installing a port

below the tabletop that connects to her dust collector. The table's open shelves store abrasives and finishing supplies (see page 52).

The shop also serves social and educational needs. As part of the design, Nancy included an alcove containing a table and chairs where family and the group of fledgling female woodworkers she mentors can relax and enjoy coffee or lunch together.



The leaping trout motif captured Nancy's heart during a Yellowstone vacation. She quickly sketched the idea to preserve it.

**About Nancy's Harley dream:** "It's one of those things that never quite goes out of your blood," she admits. "If somebody told me there's a revved up motorcycle just outside the door, I'd be on it in a second."

A handwritten signature in cursive ink that reads "Nancy Ballance".

# The Floor Plan

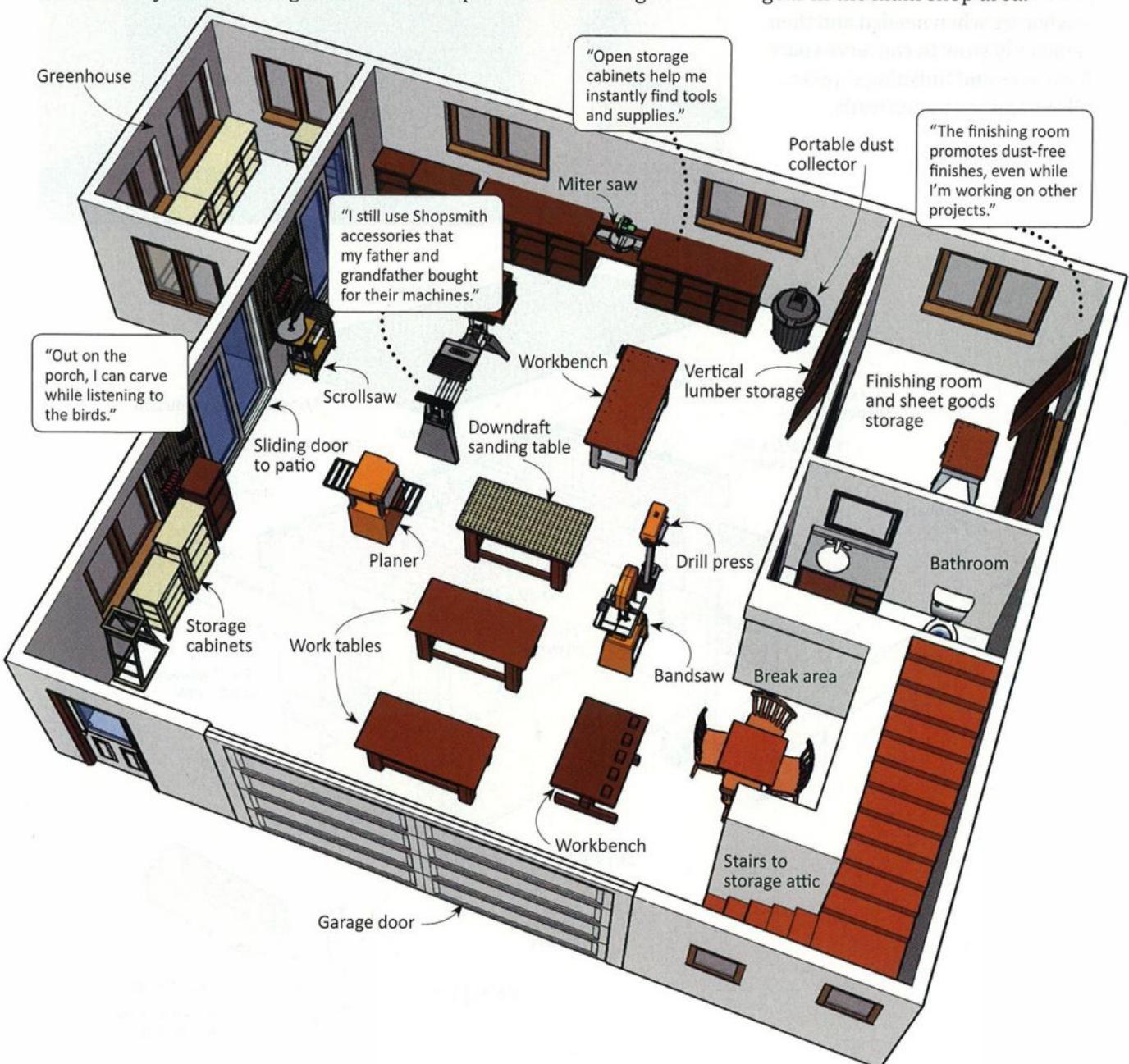
Many woodworking shops become so chock-full of stationary power tools that it's difficult to find the space to set down a coffee mug. But Nancy's shop abounds with open surfaces: two workbenches, two work tables, a sanding table, and a long counter that holds the miter saw. And that's before you count the table and four chairs where Nancy and friends gather

for coffee. Note in the alcove photo earlier how she feminized her shop with scrollsawn cutouts of a girl creatively engaged in woodworking.

But the openness doesn't mean the shop is light on woodworking tools and supplies. Hers is a full-function shop that's well-organized to keep the focus on woodworking. A double garage door opens wide to bring in

lumber, tools, and the mountain view. A sliding-glass door to the porch opens to a favorite place for carving and hand-sanding. Ample attic storage above, accessed by steps, serves both the shop and home.

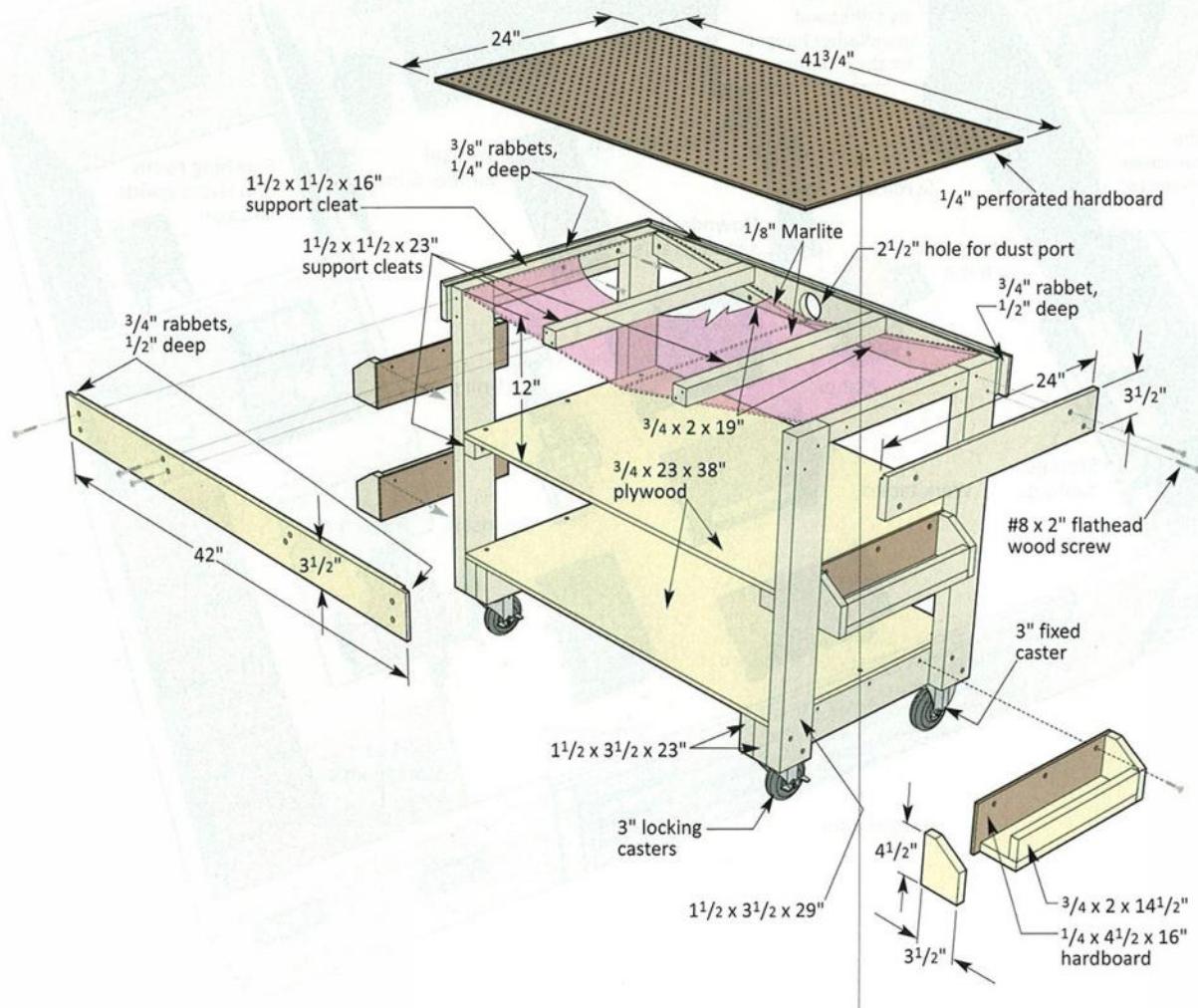
A dedicated finishing room with its double doors ensures dust-free surfaces, even when production swings into high gear in the main shop area.



## Smart ideas for the taking

### Downdraft sanding table

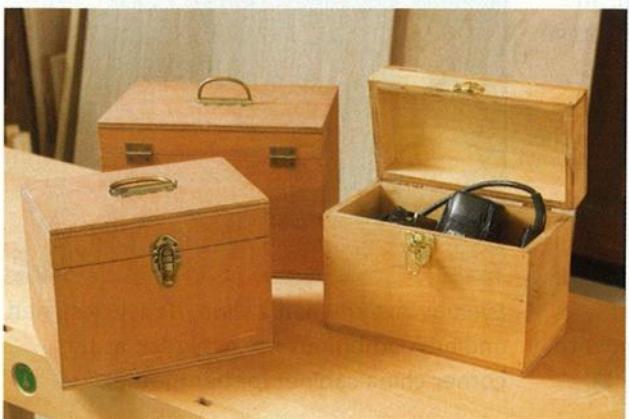
If your shop doesn't have room for this full-scale downdraft table, consider half-sizing the lengths of the top and base for a better fit. You could even omit the legs, creating a unit to place atop your workbench or sawhorses when needed and then compactly stow to conserve space. Abrasives and finishing supplies fill the shelves underneath.





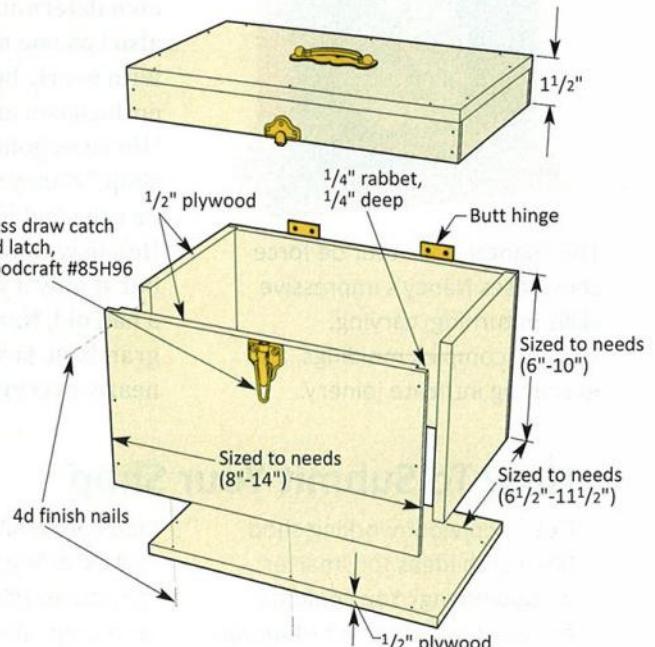
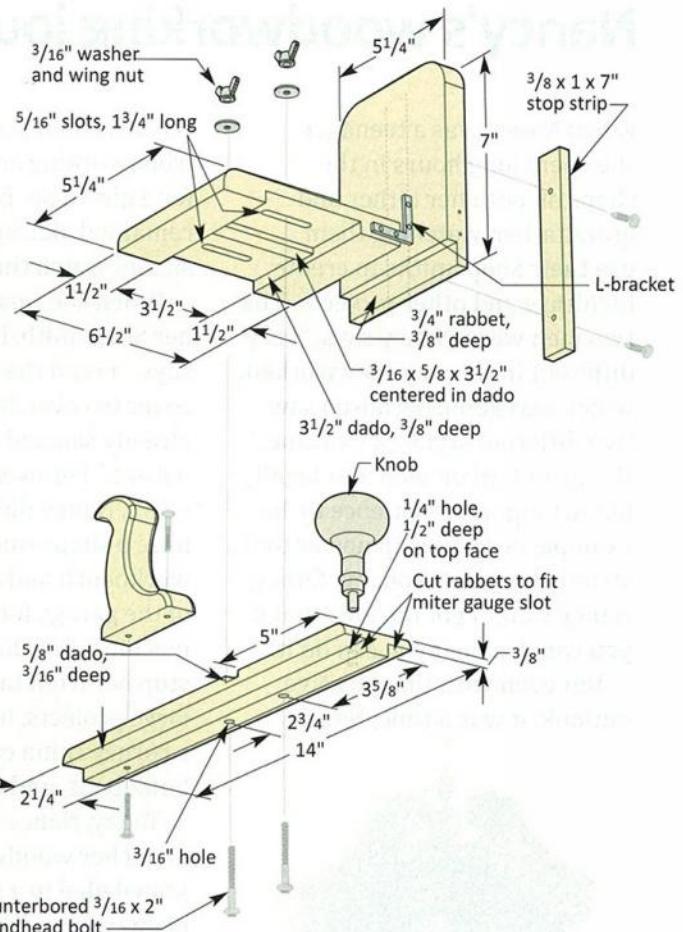
## Adjustable tenoning jig

Sure, you can buy a tenoning jig, but the handles are either lifeless plastic or cold steel. Build your own jig and you'll enjoy the lifetime satisfaction of gripping a pleasing wood knob and handle that you crafted yourself. An insignificant detail? Not for a wood lover.



## Power tool Boxes

Here's an open-and-shut case for portable power tool storage. First, glue and nail the four sides. Cut the top and bottom about  $\frac{1}{8}$ " oversize in both length and width. Then, after assembly, use a flush-trim bit in your router to rout away the excess for a perfect fit.



# Nancy's woodworking journey

When Nancy was a teenager, she spent long hours in the shops of both her father and grandfather, watching them use their Shopsmiths to create furniture and other projects. The two men were, Nancy says, "very different in the way they worked, which was good, because I saw two different styles of working." Her grandfather, who was legally blind, taught her patience by his example of setting up power tools strictly by feel. "From my father," Nancy said, "I got the idea that if you can dream it you can do it."

But even with that positive outlook, it was a time, Nancy

recalls, when people considered woodworking as "too dangerous for a girl to do. But the desire remained, because I would just sit and watch them work."

When she finally bought her Shopsmith, in 1977, Nancy says, "I read the manual from cover to cover, but everything already seemed second nature." For over 30 years, Nancy didn't even have a shop—merely a workbench and a corner of the garage for her machine. But that didn't stop her from tackling large projects, including a corner china cabinet, bunk beds, and more.

Today, Nancy passes along her woodworking knowledge to a group of eight women who have impressed her with their own determination. She also has one male protégé with nearly boundless enthusiasm and energy. "He loves going over to the shop," Nancy said, "and he can sand like crazy." He's new to woodworking, but at only a year and a half old, Nancy's grandson, Jack, is new to nearly everything. ■



This mantel clock tour de force showcases Nancy's impressive skills in turning, carving, shaping complex moldings, and executing intricate joinery.



Nancy's carved trout suspended in a stream bed captures the local color of Montana living.



Even before she had a shop, Nancy designed and built ambitious projects such as this corner China cabinet for her mother.

## How To Submit Your Shop

Got a top woodworking shop filled with ideas for smarter woodworking? You could be featured in *Woodcraft Magazine*

and earn a \$200 Woodcraft gift card. Send a short writeup, photos and/or sketches, and rough floor plan to:

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A large American flag is visible in the background, partially draped over the top right corner of the advertisement.

**"American Made for the  
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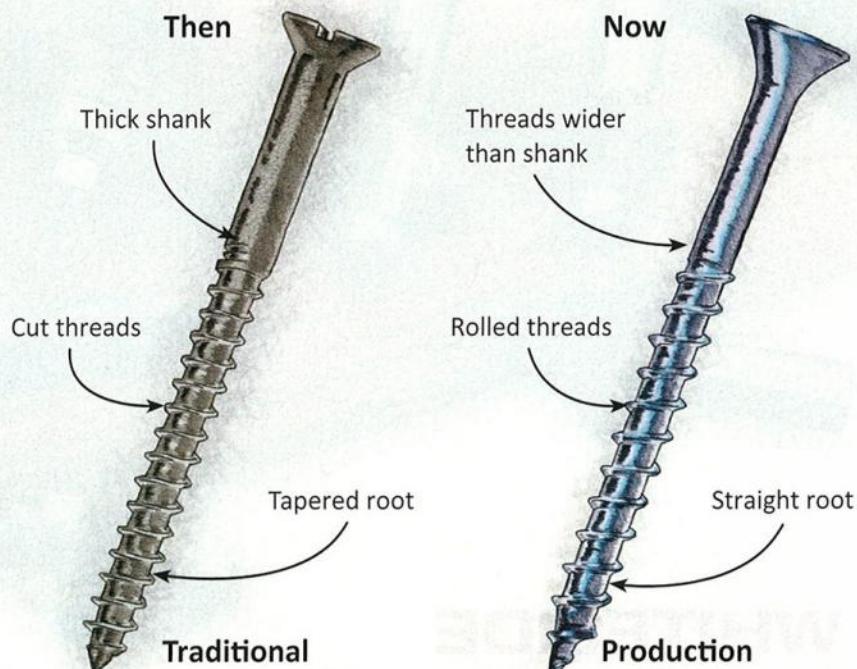
# Next-Generation Screw Guide

*There's a whole new twist on the latest fasteners.*

By Darin Lawrence

**H**aving worked in the fastener industry a dozen years, it's hard not to get upset when someone says there's nothing new in screws. On the one hand, they've got a point: the basic design remains unchanged. A 15th century craftsman wouldn't have any problems driving a 21st century screw. On the other hand, the science and technology behind this seemingly simple fastener could fill libraries.

One of the most significant changes centers on the creation of production screws, fasteners manufactured for specific tasks. Considering that the varieties number in the hundreds of thousands, it's easy to feel overwhelmed. The way to handle the info overload is to face the facts: production screws are made for production,



not necessarily small-shop woodworkers. But that doesn't mean you can't benefit from a trickle-down technology.

You don't need a store-sized collection of fasteners or an engineering degree to get the

job done right. What you need is the knowledge to pick and choose a manageable screw assortment for handling most woodworking tasks, plus a few specialty fasteners to tackle specific applications.

## Drywall Screws: Don't Screw with 'Em

Want an easy way to reduce slipping, bridging, and breaking? Ditch your drywall screws. The characteristics that make these screws good for hanging gypsum to softwood studs become major liabilities when jointing boards in the workshop.

### Drywall Screw

- Phillips recess slips (cams out) to prevent overtightening.
- Bugle head sinks into gypsum without tearing paper.
- Fully-threaded shank can cause bridging/jacking.
- Torsional strength to breaking – 25-32 in.-lbs.



### Production Screw

- Square recess resists bit slippage (cam out).
- 82° taper designed to match countersinks.
- Thicker shank resists breakage.
- Smooth shank lets threads draw top board tight.
- Torsional strength to breaking – 40-55 in.-lbs.

## Head recesses

You're not the first person to witness a traditional screw slip off the driver or strip out. Manufacturers have searched for a "slotted-head solution" since the 1860s. Slotted screws work well for reproductions and restorations, but newer recesses make driving easier.

Matching the recess(es) to the driver is critical for your screws, driver bits, and work.



**Slotted** – Prone to slipping and easily strips out. Not suitable for power drivers.



**Phillips** – More positive engagement than a slot, but still prone to stripping.



**Square** – Resistant to cam out and helps the screw stay on the driver.



**Combination** – Use a square-drive bit when you can, a Phillips when you must.



**Pozi** – Watch for the cross. A Phillips driver will eventually ream out the recess.

## Points

Some production screws sport tips and threads designed to reduce the need for pilot holes. In addition to saving time, these tips reduce the amount of torque needed to drive the screw and decrease the chance of splitting the wood.

Although helpful for certain instances, predrilling remains the best choice for fine woodworking. Pilot bits establish a precisely located hole and protect against jacking, splitting, and stripped heads.

## Metals and coatings

Platings and other coatings can offer a decorative touch and cheap insurance against stains and/or fastener failure that can happen when building outdoor projects or using acidic woods.

Although they cost more, corrosion-resistant metals offer the best defense, making them a smart investment for projects that need to withstand the elements.

### Corrosion-Resistant Metals

**Brass** – Soft and easy to strip. A carefully-sized pilot hole and pre-threading the hole with a steel screw minimizes stripping and breakage.



**Silicon Bronze** – The favorite for boat builders. Fasteners oxidize and darken to blend in with western red cedar and redwood.



**Stainless Steel** – The ultimate in corrosion resistance, but at a price. Stainless is expensive and softer than hardened steel screws.



### Unplated

**Steel** – May be treated with a "dry lube" coating to reduce driving torque and prevent in-transit corrosion. Suitable for interior use only.



### Black Oxide/Phosphate

"Controlled oxidation" designed to give fasteners a more decorative look. Minimal corrosion resistance.



### Plated

**Clear Zinc** – Silver color provides some corrosion resistance, but chosen over yellow because color matches common builder hardware.



**Yellow Zinc** – Provides better defense than clear, but color may not match some hardware. Use with acidic woods, such as oak, when plugging to prevent staining.



**Galvanized** – Ten times more corrosion resistant than zinc but can cause some staining with acidic woods. Coatings can chip.



### Sharp Point



### Single Auger



### Double Auger



### Serrated



**Epoxy Coated** – Twenty times more corrosion resistant than zinc. Colors blend with wood and composites. Can still cause some staining with acidic woods.



## Specialty screws for special situations

You don't need to blow next year's tool budget on a catalog's worth of fasteners. In addition to an assortment of #8 flathead screws, consider a second fastener case stocked

with specialists. Having these fasteners on hand will help you overcome some of the most common assembly and installation problems you might face in and out of your workshop.

### Tip Alert

As the thickness of the wood and/or fastener length increases, you can reduce the 1:3 screw length ratio down to 1:2.

### General Purpose Screws

Woodworkers don't always admit to tackling projects outside the workshop, but for jig building (and the occasional outside project), it helps to have a few general-purpose screws. The auger tip and self-sinking head can't compare with a predrilled, countersunk pilot hole, but it works well enough with pine and plywood. Stock up on clear or yellow zinc for interior work and epoxy coated or stainless steel for exterior work. Compared to the total cost of materials, not to mention your time, you'll find the price difference is inconsequential.



### Cabinet Hanging Screws

The big brother of the smaller washer head screws, the cabinet hanger has a large diameter shank to increase holding power and accommodate the shear force of heavy cabinets. The auger point drills through cabinet backs while deep threads and longer shanks resist pullout and ensure maximum engagement in softwood studs. Cabinet hanger heads are typically plated or painted to provide a finished look inside cabinets.



### Drawer Front Screws

Oversized washer head screws are designed for use with an oversized clearance hole in order to make adjustments, such as when mounting drawer faces to drawer boxes. The lower head profile reduces the chance of catching on the inside of the box. Ignore the 1:3 screw length rule. Select a length that provides good engagement but doesn't poke through the drawer front.



### Pocket-Hole Screws

Another descendent of the washer head, pocket-hole screws have thinner shanks and shorter thread lengths (compared to cabinet hanging screws) to engage the second piece only after clearing the first, minimizing the chance of jacking. The auger tip works like a pilot drill, reducing the likelihood of splitting or raising a chip between the two pieces.

Two basic head designs exist. The larger washer-style head distributes pressure and prevents overdriving. The pan head does the same when joining thinner ( $\frac{1}{2}$ " or less) materials, but the smaller head doesn't protrude past the pocket.



## Trim Head

Trim heads (or finishing screws) work like a finish nail but with a reverse switch. Capable of sinking into oak without a pilot hole, these thin-shanked fasteners attach trim, cabinet backs, even stair treads. You can drive the screws below the surface, like a finish nail. The square drive recess provides the positive bit engagement you can't get from a Phillips.

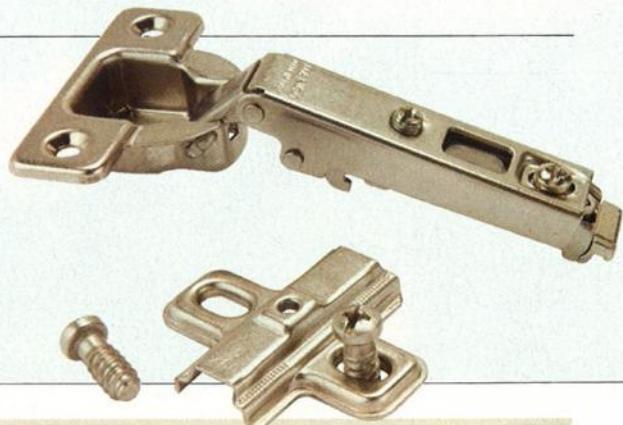


## Confirmat Style

Designed for processed wood substrates such as MDF and particleboard, the large diameter shoulder and shank provide extra strength and stiffness while the self-sinking head pulls panels tightly together without pulling through. The thread angle resists withdrawal and allows for reassembly without compromising joint integrity. Use the 7 x 50 mm screws with  $\frac{3}{4}$ " materials, and the 5 x 40mm with  $\frac{1}{2}$ " materials.

## Euro

Like Confirmats, Euros are designed around the poor holding power of processed wood substrates. Used primarily for cabinet hardware, the screws have large shanks and coarse threads to increase holding power and allow removal and reinsertion. They may look similar, but Pozi-Drive recesses resist cam out better than Phillips. ■



## Pilot Holes: Then & Now

Pilot bits defend against bridging, splitting and stripped heads, provided that you select the right pilot and use it correctly.

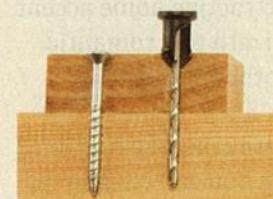
Traditional woodworking screws require tapered bits to match the root. To minimize splitting without affecting the holding strength, the pilot hole needs to match the screw's diameter and the penetration depth of the screw.

Drilling pilot holes for production screws isn't as fussy. Because of the uniform shanks and narrow shafts, you can get by with a straight pilot. Drill a clearance hole through the upper piece to prevent bridging; drill deeper to prevent splitting.

If you're using modern screws and still have tapered bits, it's time to make the switch. When used with a straight-root screw, the conical hole can sacrifice holding power.



Traditional Screw/  
Tapered Pilot



Production Screw/  
Straight Pilot

### About the Author

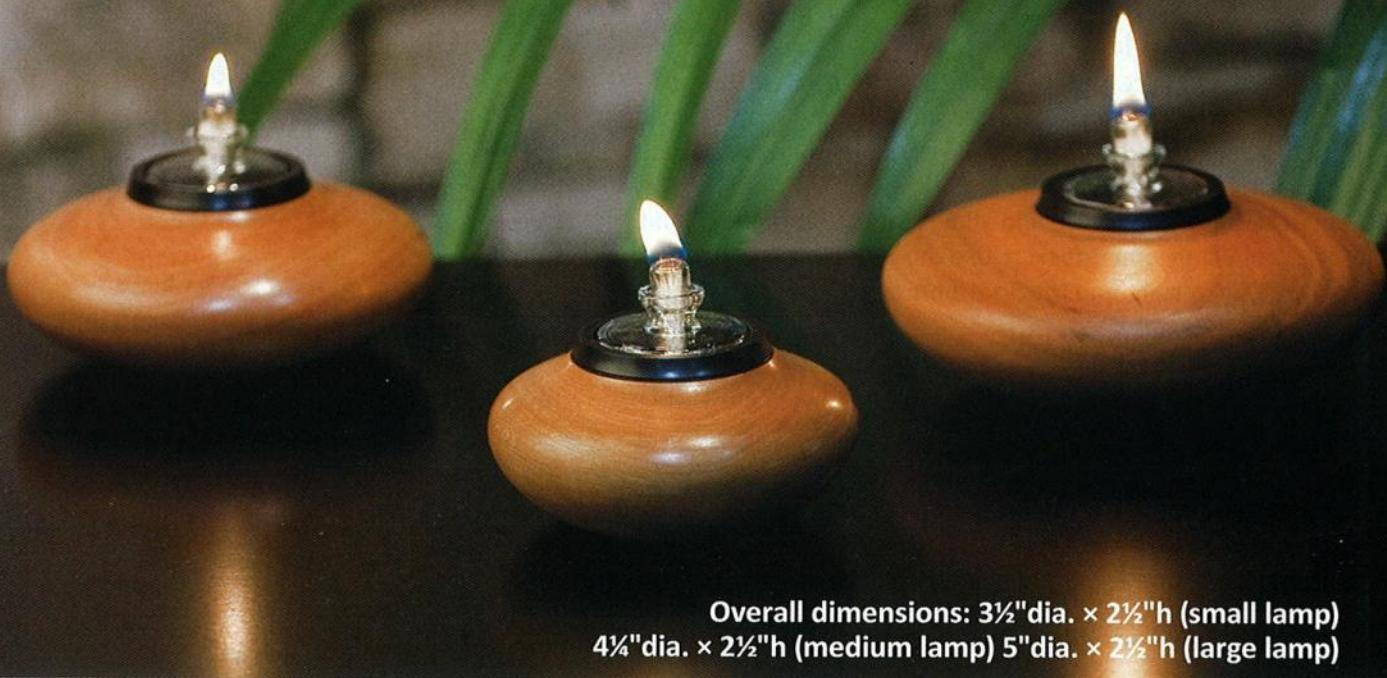
Before becoming technical director for McFeeley's, Darin Lawrence was a professional luthier for nine years. He now works as director of product development for Woodcraft.



# Golden-Glow Oil Lamps

Turn this trio and then ebonize the rim for a distinctive look.

Designers/Turners/Writers: Kip Christensen & Rex Burningham



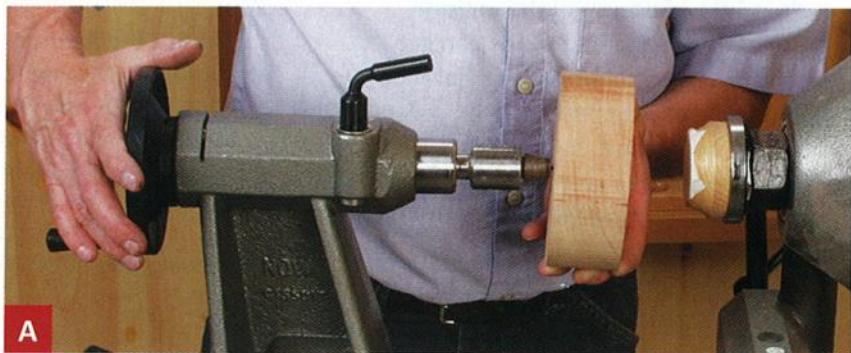
Overall dimensions: 3½"dia. × 2½" h (small lamp)  
4¼"dia. × 2½" h (medium lamp) 5"dia. × 2½" h (large lamp)

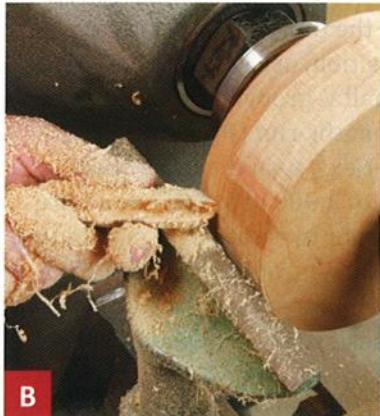
**T**hese complementary lamps make an attractive home accent, adding warmth to a romantic dinner or other occasion. We chose a 2 × 5 × 5" blank of dry cherry to prevent cracking and/or warping. You can change the wood species and sizes if desired. The good news: you can turn the entire trio in an afternoon. *Note: Have the oil bottle in hand before turning the lamp. Bottles with wicks (for a confetti-style lamp) and lamp oil are available at craft stores. You can also size the recess to fit common tea light candles, but include a glass cup to protect the wood from the flame. See the Convenience-Plus Buying Guide for the complete list of items needed to turn the lamps, as well as a DVD on the subject.*

## Turn the lamp blank

**1** To mount the turning blank to minimize waste, drill a hole in a 2 × 3"-diameter bandsawn waste block and thread the block onto a screw center faceplate. Set your lathe speed at 1,000 rpm and turn the outside end of the waste block to 2" diameter using a ½" bowl gouge. Finally, turn the face so it's flat and smooth.

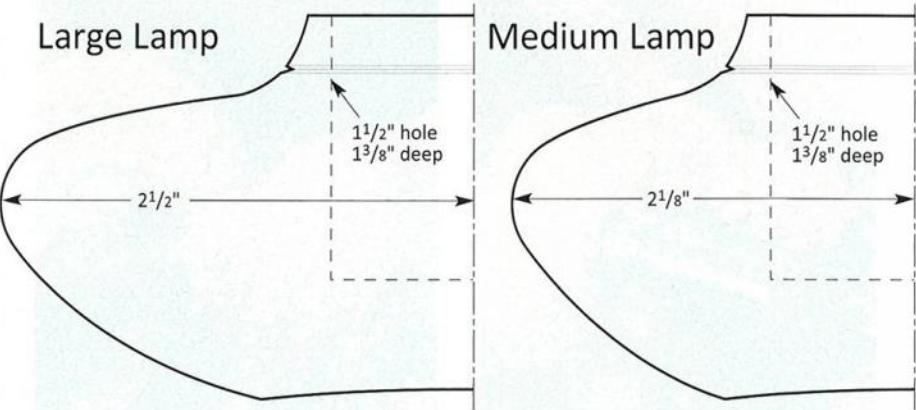
Now, attach double-faced tape to the face of the waste block and press the turning blank in position. Use the tailstock to center the blank and act as a clamp to help press the blank firmly against the block (**Photo A**). The tailstock should remain in place whenever possible throughout the process. If it's necessary to turn without





B

**Figure 1: Lamp Full-Sized Profiles**



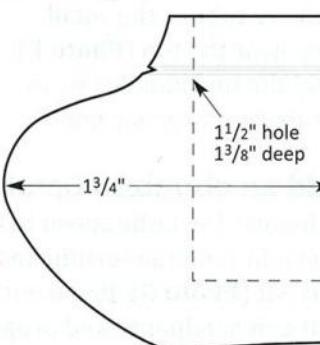
tailstock support, be sure to cut with only light pressure.

**2** With the lathe set to 1,000 rpm, use a  $\frac{1}{2}$ " bowl gouge to true up the edge of the lamp blank. For a clean, controlled cut, ride the bevel on the wood behind the cutting edge as shown in **Photo B**. Taking a light cut, push the gouge across the work.

**3** With the flute facing the wood, take a light scraping cut to true up the face of the blank, pulling the gouge from the center of the blank to the outside edge (**Photo C**).

**4** To drill the hole for the oil bottle, secure a  $1\frac{1}{2}$ " Forstner bit in a Jacob's chuck and mount it in the tailstock. Using the oil bottle as a guide, mark the depth to be drilled on the bit using

**Small Lamp**



**Cardboard Template**

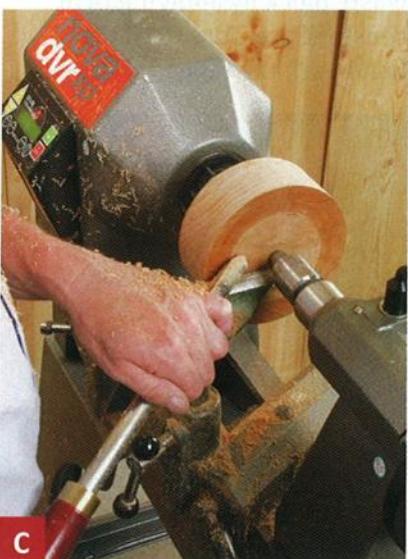
Note: To create turning templates, make copies of these full-sized profiles and spray-adhere them onto cardboard and cut to shape.

a felt-tip pen (**Photo D Inset**).

Now slide the tailstock forward until the drill bit is near the wood and lock it into position.

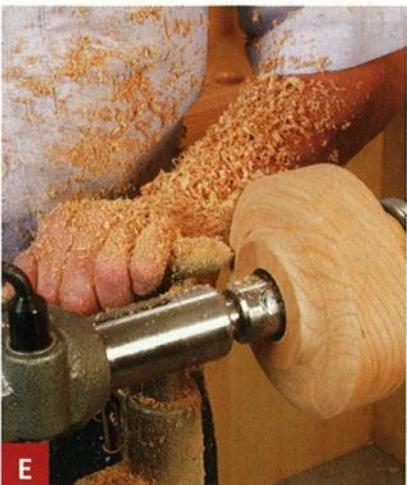
Reduce the lathe speed to 300 rpm and turn the tailstock handwheel to advance the drill

bit into the rotating wood (**Photo D**). Stop when the bit has reached the depth marked on the drill bit.



C

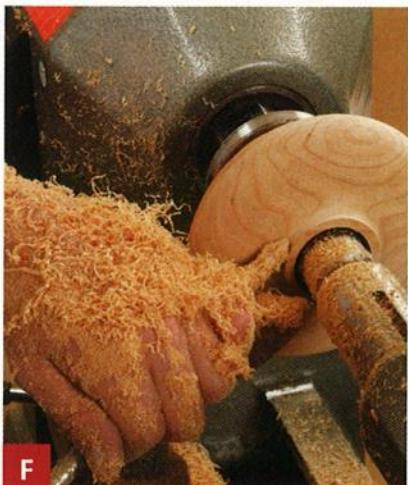


**E**

**5** Turn off the lathe and insert the oil bottle in the hole to check the hole depth. The hole should be about  $\frac{1}{8}$ " less than the height of the bottle below the neck. You can drill the hole deeper or turn a small amount of wood off the face of the blank to adjust the hole depth.

**6** Reset the lathe back to 1,000 rpm. With a  $\frac{1}{2}$ " bowl gouge, turn the rough shape of the oil lamp to within  $\frac{1}{8}$ " of final dimension, using the profile in **Figure 1** as a guide. **Photo E** shows the top section of the lamp being turned, using a fairly aggressive pull cut with a scraping action and with the flute turned toward the wood.

**7** Make final cleaning cuts to both halves with a  $\frac{3}{8}$ " spindle gouge using a light shearing

**F**

cut. The smaller gouge makes it easier to turn the small cove near the top (**Photo F**). Hold the tool handle low to create the shearing angle.

### Add an ebonized band

**1** Reduce the lathe speed to 800 rpm and sand the turning inside and out (**Photo G**). Begin with 120-grit sandpaper and progress to 180, 240, 320, and 400. (It is not necessary to sand the inside perfectly clean because it will be covered by the oil bottle.) Next, seal the wood inside the hole using two coats of sanding sealer. This reduces the possibility of dye bleeding through the pores from the inside of the hole to the outside surface of the lamp.

**2** With the lathe set at 1,000 rpm and the skew lying flat

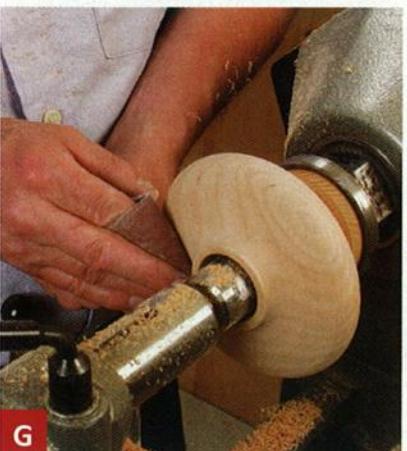
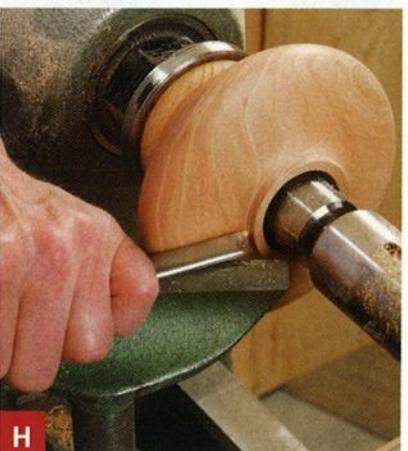
on the tool rest in a scraping position, use the toe to create a small V-groove about  $\frac{1}{4}$ " down from the rim (**Photo H**).

**3** Next, turn the lathe speed up to 2,000 rpm and use a wire burner to create a friction burn in the V-groove (**Photo I**). The burn line provides a well-defined black groove that establishes a clean line when adding the dye.

**4** To ebonize the rim, reduce the rpm to a slow speed (around 50 rpm) and use a black permanent marker or a cotton swab to apply black dye. A marker is easier to control on the outside (**Photo J**). Use a cotton swab to apply dye inside the hole.

**5** Spray a light coat of lacquer on the lamp, as shown in **Photo K**. (A spray lacquer is recommended because wipe-ons can dissolve the dye and cause it to bleed across the burn line.) Use the slowest lathe speed (30-50 rpm) to reduce the possibility of the lacquer running. Let the lacquer dry, sand lightly with 600-grit abrasive or buff with 0000 steel wool, and then spray on a second coat. Repeat this process at least three times.

**6** After the finish dries, remove the oil lamp from the waste block by applying firm constant pressure until the bond with the tape is released.

**G****H****I**

## Turn the lamp bottom

**1** To turn the bottom of the oil lamp you will need to mount the lamp on the headstock with the bottom face exposed. To do this, make a simple jam chuck by turning a  $\frac{1}{2}$ " long by  $1\frac{1}{2}$ "-diameter tenon on the face of a waste block (**Figure 2**) using a  $\frac{3}{8}$ " spindle gouge and 1,000 rpm lathe speed. The tenon should fit tightly inside the drilled hole.

**2** Fit the lamp over the tenon, bring the tail center with a cone point into position for support, and, using a  $\frac{3}{8}$ " spindle gouge, turn the bottom face to within  $\frac{1}{2}$ " of the tail center point. This surface should be slightly concave and produced with a shearing cut while rubbing the bevel on the wood (**Photo L**).

Next, remove the tailstock and, using a light touch, turn off the remaining wood at the center. Finally, sand the bottom to match the top.

**3** Using the same procedure followed earlier, apply lacquer to the bottom half of the lamp.

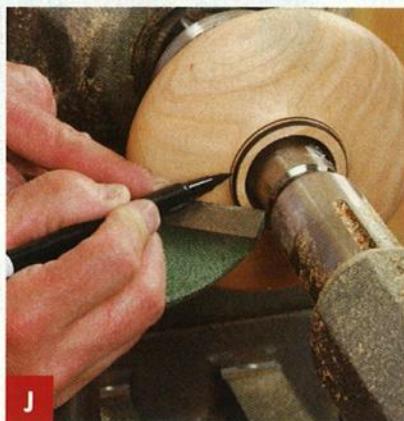
**4** The oil lamp can now be removed from the tenon chuck and the oil bottle set in place. ■

### Tip Alert

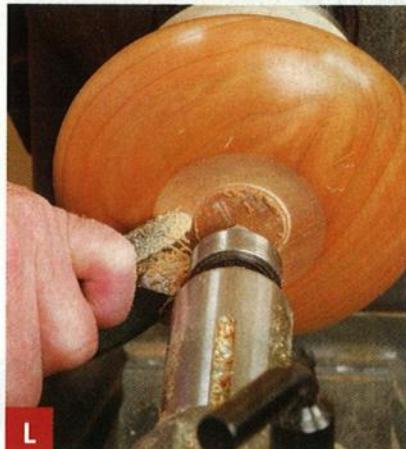
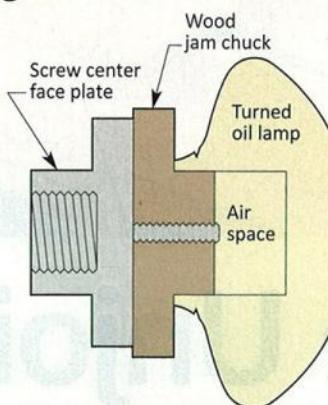
For a tighter fitting jam chuck, shim the tenon with one or more layers of masking tape .

#### About Our Turners

Rex Burningham and Kip Christensen have produced several instructional DVDs including *Woodturning Projects with Rex and Kip*, Volumes 1-4, and *Turning Pens with Kip and Rex*, Volumes 1-2. The DVDs are available at Woodcraft Supply.



**Figure 2: Jam Chuck**



#### Convenience-PLUS BUYING GUIDE

	ITEM	WOODCRAFT#	PRICE
<input type="checkbox"/> 1.	Double-faced Turning Tape, 1" x 36 yds.	15D25	\$20.99
<input type="checkbox"/> 2.	1 $\frac{1}{4}$ " Forstner Bit	125939	\$8.99
<input type="checkbox"/> 3.	#1 Morse Taper $\frac{1}{2}$ " Keyed Chuck OR #2 Morse Taper $\frac{1}{2}$ " Keyed Chuck	142552 142553	\$36.99 \$36.99
<input type="checkbox"/> 4.	Zinsser Bulls Eye SealCoat Universal Sanding Sealer, 1 qt.	823195	\$10.99
<input type="checkbox"/> 5.	Behlen's Solar-Lux Dye Stain, Black Jet, 1 pt.	18X11	\$12.50
<input type="checkbox"/> 6.	Watco Clear Lacquer Spray, Satin, 11 $\frac{1}{4}$ oz.	146950	\$7.50
<input type="checkbox"/> 7.	WoodRiver 60° Ball Bearing Live Tailstock Center #1 Morse Taper OR #2 Morse Taper	149169 149168	\$19.99 \$19.99
<input type="checkbox"/> 8.	Woodturning Projects with Rex and Kip DVD, Vol. 4 (Includes instructions for turning an oil lamp)	149380	\$19.95
Above items are available at Woodcraft stores, <a href="http://woodcraft.com">woodcraft.com</a> or by calling (800) 225-1153. Prices subject to change without notice.			
<input type="checkbox"/> 9.	KC Spindle Wire Burners, available from Learning Turning, set of three burners, \$10.49. Order at <a href="http://learningturning.com">learningturning.com</a> .		
<input type="checkbox"/> 10.	Permanent ink marker, black, available at office supply and craft stores.		
<input type="checkbox"/> 11.	Oil bottle with wick (for confetti lamp), available at craft stores.		



# Joint the Unjointables

*4 simple ways to work around your jointer*

By Jim Harrold

**B**efore starting any project, you first have to prepare your stock. You know the drill: flatten a face, plane to thickness, joint an edge, rip to width, joint the sawn edge, and, finally, cut to length. Since the first face and edge serve as reference for every other step, getting them right matters.

Typically, flattening and straightening is done at the jointer, but special cases come along. How, for instance, do you safely and successfully joint a board that measures a meager 12" in length, or one that's too wide for your planer, or a piece of wild-grained wood that tears as you machine it? Over the next few pages, you'll learn

techniques to rehabilitate these "unjointables" and turn shop clutter into shop projects.

## Face-joint big boards with a router

While face-jointing boards of average size poses no problem if you own a jointer and a planer, extra wide stock does. Sometimes you can't bear to rip the wide stock, such as a treasured piece of crotch walnut, into narrower widths to fit a 6" jointer. And you surely don't want to saw up a big slab set aside for a rustic bench.

For oversized stock, turn to your router, a dishing bowl bit, and a simple jig, like the one shown above.

This jig consists of a base and a bridge. To make the base you can screw into, simply clamp a piece of  $\frac{3}{4}$ " MDF or plywood to your benchtop. Place the workpiece on the base and



The flat bottom and radiused edges of this  $1\frac{1}{4}$ "-diameter bowl bit (Woodcraft #24B86) make it an efficient wide-board surfacer.

tack it down with a few screws angled through each end. Insert wedges between the workpiece and base to keep the stock from rocking while you're routing.

Make a pair of rails about 8" to 10" longer and  $\frac{1}{2}$ " wider than the thickness of the board you plan to surface. (Joint the rails straight because any inaccuracy will telegraph to the workpiece.) Attach a  $\frac{3}{4} \times 1$ " cleat to each rail. Now screw the rail assemblies to the base, leaving a 2" to 3" gap between the rails and workpiece so that the router bit can enter and exit the cut without chewing up the rails.

Finally, build the bridge. The bridge, which rides atop the rails, amounts to nothing more than an extra long router base. The overall length of the bridge needs to be twice the distance in between the rails. The width of the bridge is determined by the base size of your router. Use  $\frac{1}{2}$ " plywood for the bottom and screw on  $1 \times 3$ " hardwood rails to form the sides. This combination makes the bridge strong enough to resist any flexing.

To use the face-jointing jig, set your router bit to a depth of  $\frac{1}{8}$ " and methodically work back and forth, taking full-width cuts. Listen to your router and don't overtax it. It will take time but a flat-jointed face will begin to appear. Sand the resulting surface with a random-orbit sander.

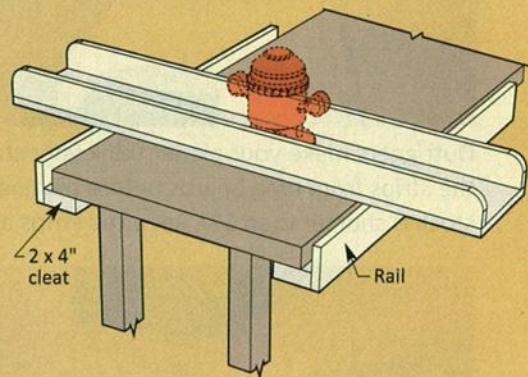
### Face-joint smaller boards with a planer

Outriggers are simply wood strips glued to the edges of the workpiece. With a wide board that exceeds the capacity of your jointer, the outriggers establish a flat reference face along the

## Flattening A Workbench

The rails-and-bridge surfacing technique can be easily adapted to flatten and/or restore the top of your workbench benchtop.

To set the rails, first screw a pair of  $2 \times 4$ " cleats to the bottom edges of the benchtop as shown. Next set the rails perfectly parallel to each other and to the bench. Start by leveling your workbench across its top. (If the benchtop is twisted, strike an average.) Next, screw one rail to its cleat and use clamps to temporarily hold the other in place. Using a level laid across the two rails, adjust the clamped rail until it sits level with the other. Do this in several locations and recheck. Once you positioned the clamped rail, screw it in place, remove the clamps, and start jointing the surface.



bottom, so that the cutterhead can flatten the top face. With short boards, the outriggers "stretch" the stock's length to safely feed it through a planer.

Make the outriggers out of  $\frac{3}{4}$ " hardwood stock sized  $\frac{1}{4}$ " taller than the thickness of the board to be jointed. For pieces of wood less than 12" in length, cut the outriggers 18" long to

prevent snipe at workpiece ends. To mount the outriggers, clean up the edge of the board with a hand plane, jointer, or table saw enough to make a passable glue joint. If necessary, position a few wood strips underneath the board to center it on the outriggers during glue-up (**Photo A**). This ensures that the outriggers are in full contact



Shim the workpiece so that the planer's infeed and outfeed rollers reference against the outriggers. Use a flat work surface to ensure that the strips are parallel.



B

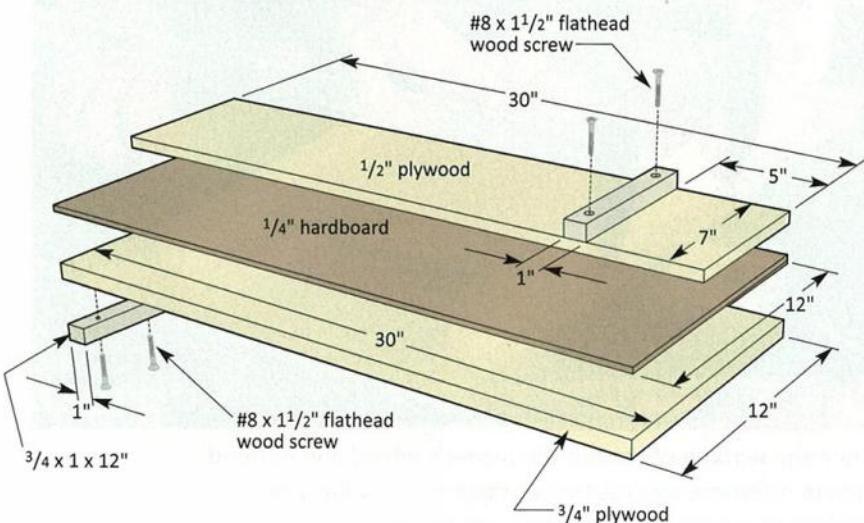
Outriggers make your planer think your stock is flatter than it is. Remove the strips from long boards before planing the opposite face. If the stock is shorter than 12", keep the strips attached to prevent kickback.



C

By keeping the plane perpendicular to the work, this long shooting boards does for edges what shorter shooters do for ends. Just make sure that the blade is square to the side.

**Figure 1: Shooting Board**



with the bed of the thickness planer and not a warped corner or bowed face of the board. (If the board is cupped, orient the cup upward for the same reason.) Most importantly, use a flat reference surface such as the cast-iron top of your table saw when gluing up to make sure that the outriggers are perfectly parallel.

Run the outrigger and board combination through the planer (**Photo B**), using light cuts, so the pressure of the feed rollers doesn't press down and distort the board. With longer stock, saw off the outriggers once you establish a jointed face, and plane the opposite face.

When face-jointing short boards, I remove the outriggers after planing the second face. At this point, the thin strips aren't working to keep the piece flat, but help prevent kickback and reduce snipe.

### Shoot the edges of short stock with a plane

Manufacturers warn against running stock less than 12" in length across a jointer. The end of a short board can unexpectedly tip into the cutterhead, causing a dangerous situation. Thankfully, you have a safe alternative—a hand plane.

One of the challenges of jointing with a hand plane is producing an edge that is consistently 90° to the face. The shooting board solves this challenge by maintaining that relationship. The plane rides on its side along the base of the jig as you hold the stock being jointed against a stop on the table board as shown in **Photo C**.

Of course you'll need to "arm" your shooting board with the properly sized hand plane. A rule of thumb is that a plane can joint a board that's two to two

and a half times the length of the sole. For the shooting board shown in **Figure 1**, I used a No. 5 because it has length and mass for smooth and accurate jointing.

### Edge-joint tough boards with a table saw

Sometimes my hand plane and jointer can't make the cut when they encounter tough, gnarly wood or a severely irregular edge. For those times, I rely on a table saw, a jointing sled, and the right saw blade as shown in **Photo D**.

A jointing sled works by holding the board tightly in place and allowing the table saw to cut a straight and accurate edge on the board as the edge of the sled registers off the saw's fence. To prevent splintering on the board's lower edge, set the table saw's fence so that the saw blade rips a whisper off the jointing sled. Once you establish the good edge, remove the board from the jig and the jig from the saw table, and then rip the remaining edge with the board's good edge running against the fence.

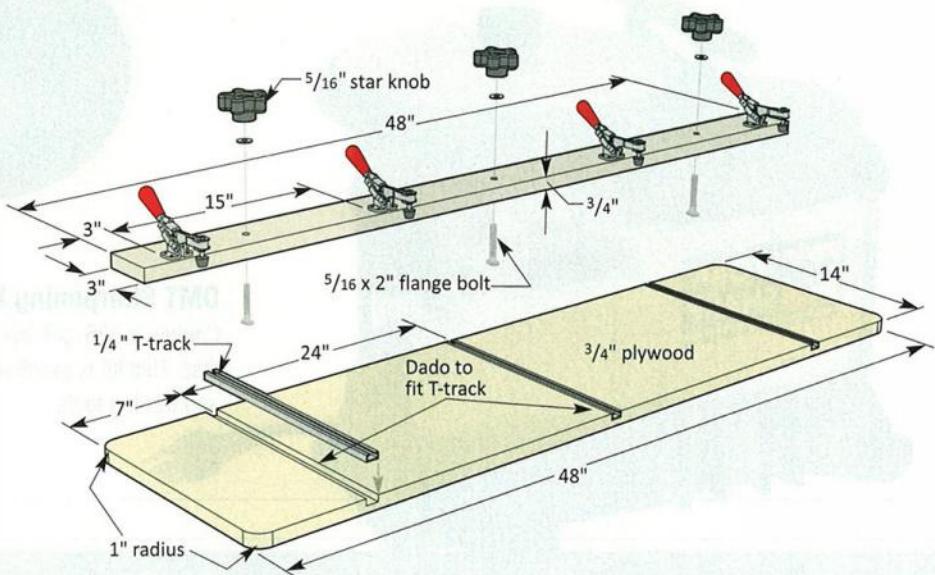
As shown in **Figure 2**, the jig consists of a carrier board, an adjustable fence, toggle-clamp hold-downs (#143933),  $\frac{5}{16}$ "-18 five-star knobs (#142224), and  $\frac{1}{4}$ " T-track (#149081). If you let the ends of the board extend past the jig ends, you can use the jig with boards measuring as long as 5'. The adjustable fence allows you to joint board widths up to 11" on the table saw.

With a well-adjusted saw, you'll be able to make a straight cut with any blade, but if you want a glue-up-ready edge, you'll need the right blade. A premium-quality combination blade such as the Forrest 40T Woodworker II ATB sawblade (#85N52) will do the trick quite nicely. ■



Use a jointing sled and your table saw to cut clean accurate edges on tough-grained boards, and, when needed, to remove wane.

**Figure 2: Table Saw Jointing Sled**



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# Problem-Solving Products

## Super-solid door frame cutter

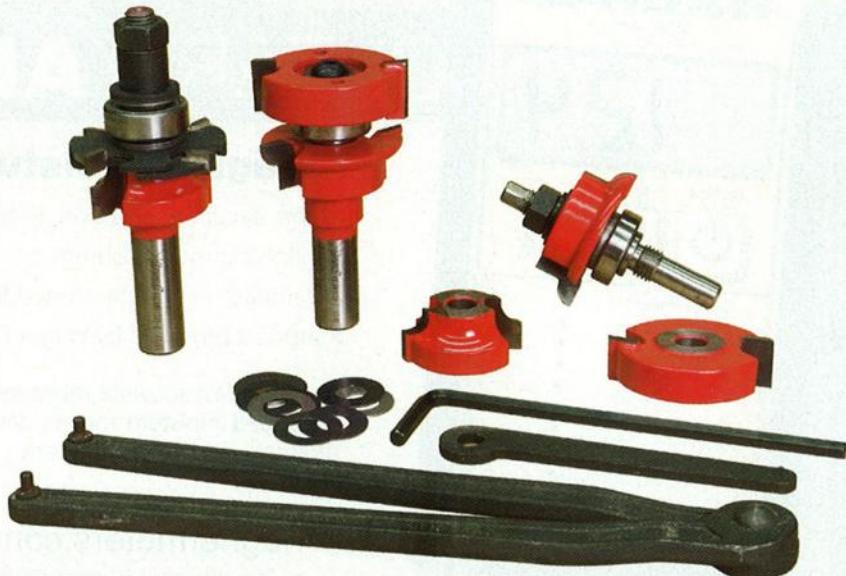
### Freud Premier Adjustable Rail-and-Stile Set

Freud's newest rail-and-stile bit sets not only cut standard cope-and-stick profiles, but also create full-length (or less) tenons. The key is the two-part rail bit. After cutting the ends of the rails, you remove the top section of the bit and continue using the cutter to increase the length of the tenon. But is it as simple as it sounds? I requested a set to find out.

#### The Setup and Trial Run

Freud's basic set consists of the rail-and-stile bits, plus wrenches and a set of shim washers. The bits will handle stock from  $\frac{5}{8}$ " to 1" thick. The shim washers enable you to adjust the groove width to match the thickness of your panel or mortising bit from about  $\frac{7}{32}$ " to  $\frac{3}{8}$ ".

I tried the standard cope-and-stick joint first in my table-mounted router, and then made test cuts in cherry



to produce stub tenons. Next, I set up the stile bit to match the rail configuration. The cuts were clean and mated nicely.

To create a long tenon, I installed shim washers in both bits to match my drill-press mortiser. After coping the ends

of my rail stock, making stub tenons, I removed the top half of the rail bit and, in  $\frac{1}{2}$ " increments, routed the stub into a  $1\frac{1}{4}$ "-long tenon. To rout the opposite face, I replaced the upper cutter, flipped the rail stock, and then lowered the bit until it was flush with the stub tenon. Using a backup block, I repeated the  $\frac{1}{2}$ " cuts until the end of the rail's tenon touched the fence. After cutting the tenon's haunch with a handsaw and the corresponding mortise on a stile, I tested the rail/stile fit. It proved airtight.

#### Best Applications

If you're content with  $\frac{3}{4}$ "-thick doors and glued-in plywood panels, you can get by with regular rail-and-stile bits, but if your woodworking includes solid  $\frac{7}{8}$ "-thick doors with floating raised panels, you need a longer tenon. The Freud set does both.



## Tester's Take

Cutting the tenons and mortises doubles the time it takes to make a standard frame door, but in some cases the strength makes the investment worthwhile. Weekend woodworkers interested in making such doors might start with the two- or three-bit set, and, if the need arises, buy additional matching cutters for installing panels or making thicker interior doors (up to 1¼"). Optional sets also can cut stub and long tenons.

**Round Profile #150675 \$119.99**

**Ogee Profile #150676 \$119.99**

**Bead Profile #150677 \$119.99**

**Bevel Profile #845352 \$119.99**

**Double-sided Profile Cutters**

#150678-#150681 \$95.99

**Glass Panel Door Cutter**

#150682 \$37.99

*Tester: Craig Bentzley*



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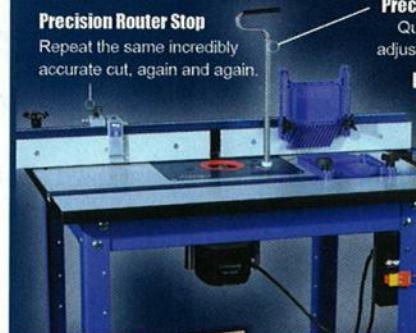


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## Rout perfect mortises and tenons

*Leigh Industry's Super Frame Mortise and Tenon Guide*

The mortise and tenon ranks as the strongest of all joints, but many woodworkers shun it because it's challenging to cut by hand or requires time-consuming setups when done on a mortising machine and table saw. Enter the new Leigh Super FMT (Frame Mortise and Tenon) Guide, which calls on your router to get the job done with high precision and in short order.

### The Setup

Out of the box the Super FMT's heavy-gauge steel jig frame and router sub-base come almost ready to go. Assembly consists of cutting and mounting a 5 x 24" baseboard to the jig frame for clamping to a bench and attaching the sub-base to your router. The instruction manual provides detail for attaching over 45 different routers, but guidance for additional routers can be obtained by contacting Leigh. Actual router mounting may take 30 minutes, but this is a one-time investment. Centering the router on the sub-base is absolutely critical for producing precision joinery, but using the supplied centering mandrel makes this process painless. You simply position the sliding stops tightly against the router base to "lock in" the router and prevent any lateral movement. The sliding stops also locate the router on the sub-base for speedy removal/reattachment without impacting accuracy. The jig uses one bit, one guide, and one setup for each

standard joint. Optional bits and guides are available for cutting mortises and tenons from  $\frac{1}{16}$ " wide x  $\frac{1}{8}$ " long to  $\frac{1}{2}$ " wide x 5" long.

### Trial Run

After setup, I cut perfectly fitting  $\frac{5}{16}$ " x  $\frac{1}{2}$ " mortise-and-tenon joints in minutes, all at one location. I next challenged the system by making eight  $\frac{3}{8}$  x  $1\frac{1}{2}$ " mortises and tenons. Here I determined the secrets for routing perfection. When making mortises, initially overlap the plunge holes, working from one mortise end to the other. Then pull the plunged bit through the holes to create clean, straight mortise walls. To make mortises deeper than  $\frac{1}{2}$ ", plunge-rout in increments, using your router's stops. Doing this prevents burning. To shape clean, crisp tenons, again work in increments for long tenons and initially make very shallow "climb" cuts (moving the router clockwise) to establish the shoulders. Always make test cuts and test-fit parts to ensure a flush, snug joint. Unlike other jigs, the Super FMT's precision adjustments are easy to make and dead-on accurate. By turning the left guide pin  $\frac{1}{8}$  of a turn



for a 0.001" adjustment you can literally "dial in" the perfect fit.

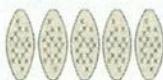
### Tester's Take

For the quality, versatility, and ease of use, the Super FMT represents a great value. If you've shied away from mortise-and-tenon joints, especially those with more than one tenon, or mitered mortise-and-tenon joints, you might rethink your position. For the woodworker who plans for a lot of mortise-and-tenon joints in his or her upcoming projects, this may be the time-saving ticket. For chip collection, consider the Vacuum Box as a must-have accessory.

**Super FMT #150724 \$399**

**Super FMT Vacuum Box #150725 \$49**

**Tester:  
Jody Garrett**



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A photograph showing the interior of a Woodcraft store. In the foreground, a large wooden door with the "WOODCRAFT" logo is open, leading into the store. Inside, a man in a white shirt and blue jeans stands behind a counter, smiling. The store is well-lit with overhead fluorescent lights and features wooden shelving units filled with various tools and supplies. A green overlay text on the right side of the image reads "Open the door to your own business!"  
An inset photograph showing two men in white shirts standing behind a workbench in a Woodcraft store. They are smiling and appear to be working on a project. The workbench is equipped with various power tools, including a yellow DeWalt sander. The background shows shelves stocked with tools and supplies.

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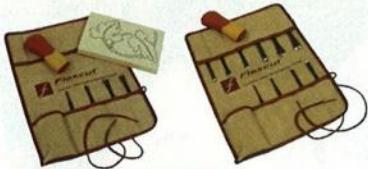


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## Next Issue's Highlights

Here's a sneak peek at the April/May issue of Woodcraft® Magazine.



Enjoy the great outdoors  
with this super-comfortable porch swing.



Paul Anthony provides the complete how-to  
for making a spot-on accurate crosscut sled.

### Projects

#### • Ever-Popular Porch Swing

This outdoor classic fits as well on your porch as it does on your lawn, thanks to the optional, easy-to-build A-frame.

#### • Collector's Box

Learn basic veneer work and lock installation, as well as mastering the setup for cope-and-stick bits, when you make this cherry and curly maple four-drawer box.

#### • Arts and Crafts Luminaries

Bring a touch of elegance to your outdoor lighting with these attractive tabletop accessories.

#### • Crosscut Sled

Add versatility and precision to your table saw with an easy-to-build fixture that no shop should be without.

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# Spotlight on beech

*America's most unappreciated hardwood?*

By Pete Stephano

In early America, beech forests blanketed much of what is now Indiana, Kentucky, Ohio, and central Michigan. But because the beech tree (*Fagus grandifolia*) favors rich soil, it fell to the pioneer's ax, beginning the land's transformation from forest to farm. The beech rates as unusual among North American tree species in that there's only one, unlike red oak with nearly a dozen kin. There are, however, nine more of the species around the world. For instance, European beech (*Fagus sylvatica*) ranks among the favored woods in France, Germany, and Great Britain. In China and Japan, *Fagus crenata* sees extensive use.

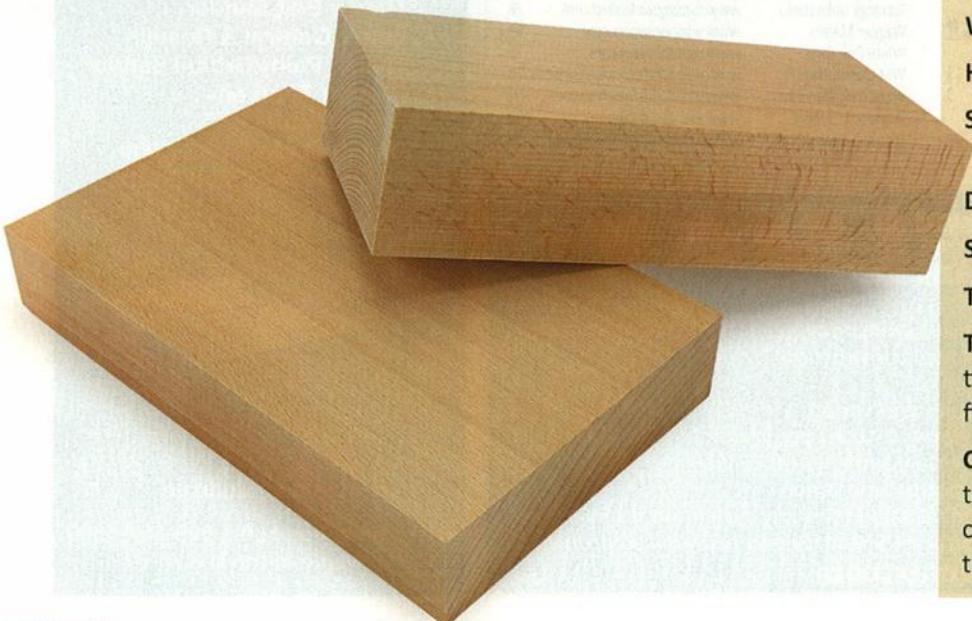
Woodworkers that know beech admire its durability, fine-textured straight and attractive grain, pliability, strength, and finishing ease. In the U.S., beech remains a commercially underutilized wood because without a prolonged drying process there's considerable degrade due to its relatively high shrinkage rate. As a result, most of the annual cut goes to paper mills.

## History in woodworking

Although English bodgers (chairmakers who use turned parts) took a liking to beech for Windsor chair legs, the wood was more often found on peasant feet as clogs. In Old-World kitchens

beech appeared as bowls, ladles, and spoons because it imparts no taste or odor. This trait led to its popularity for cooperage and crates. Strong and shock resistant, beech also became tool handles and brush backs.

Today's woodworker will find beech an attractive alternative for benchtops (see page 28), butcher block, and cutting boards, as well as cabinets, furniture (it easily steam-bends), and turnings. Although not as hard as maple, it will withstand abuse when employed as flooring. Because



## Beech Quick Take

**Cost - Moderate**

**Weight - Moderately heavy**

**Hardness - High**

**Stability - High**  
(when kiln-dried)

**Durability - High (indoors)**

**Strength - High**

**Toxicity - None**

**Tool type - Carbide-tipped power tools or finely honed hand tools**

**Common uses - Benchtops, tabletops, cabinets, chairs, cutting boards, flooring, treenware, and turnings**



beech actually becomes more slippery from the burnishing by other wood rubbing against it, it's ideal for drawer sides.

### Where the wood comes from

The vast beech forests are no longer, yet the tree remains plentiful in its range, often growing in pure stands with specimens to 100' tall and diameters to 4'. You'll find beech in the eastern third of the United States and adjacent Canadian provinces, with the greatest production from the central and Middle Atlantic States. Germany is a world source for European beech, as is China for the Asian variety.

### What you'll pay

You'll have to shop specialty wood suppliers for beech. Expect to pay about \$3.50 per board foot for Select & Better lumber. You may even find boards up to 12" wide, longer than 8', and in thicknesses up to 10/4 (2½").

Many of the same specialty wood suppliers that sell beech lumber also may offer flat cut and quartersawn veneer for \$3 to \$4 per square foot (Woodcraft #131389, three square foot veneer pack; #404153, 4 × 8' flat cut; and #404154, 4 × 8' quartersawn).

## Beech Finishing Tips

- Due to its light color and tight grain, beech can be easily colored with an aniline dye to resemble cherry, mahogany, or other fine-grained wood.
- Stained or unstained ray flecks or other figure in beech will really stand out after several coats of penetrating oil.

Beech ¾" plywood, at about \$100 a sheet, might well be of European or Asian origin, but you'll have difficulty seeing any difference between these and domestic beech.

Note: Imported "steamed beech" wood and veneer differ from unsteamed beech only in color. Steaming changes it from blonde/tan to an overall pinkish orange/tan.

### How to select the best stock

Beech sapwood resembles hard maple, but a shade or two darker, while the heartwood can vary from pink to reddish brown. Quartersawn boards display a great ray fleck. You may also find some curly, lace, or mottle figure, especially with European beech. So, as with other hardwoods, try to select boards of similar appearance. And it's important that you purchase only kiln-dried stock or you'll battle warp and twist.

### It's a fact that...

- Unlike most trees, beeches always retain their smooth bark. It will not grow over carvings, such as initials, and they remain forever.
- You'll find the largest beech tree in the U.S. near Ann Arundel, Maryland. It's only 112' tall, but has nearly an 8' diameter!

### Working beech in the shop

Beech is a hard, heavy wood that's more forgiving than hard maple regarding chipping and tear-out. However, it can burn if care isn't taken. Carbide cutting edges help with its hardness, but the wood is workable for the skilled with sharp hand tools due to its straight, tight grain. The following tactics will ensure success.

- **Ripping and routing.** The wood's density means ripping with a rip-profile or combo blade to reduce dust buildup and burning. Don't feed the wood too fast and use a splitter to prevent binding. When routing, take shallow passes to avoid burning.

- **Jointing.** Beech's grain is so even that direction may be hard to define in order to feed "downhill." If you can't determine it, set the table for a very light cut, then gradually increase the depth as needed if there's no tear-out.

- **Assembly.** All adhesives work well with beech.

- **Sanding.** The wood's straight, tight grain allows for easy sanding, yet its hardness means not skipping grits or you'll leave tiny surface scratches.

### Deciding on the right finish

Finishing beech is a woodworker's dream because it takes all stain types equally well and won't blotch like maple often does. The same holds true for finishes—they all work. ■

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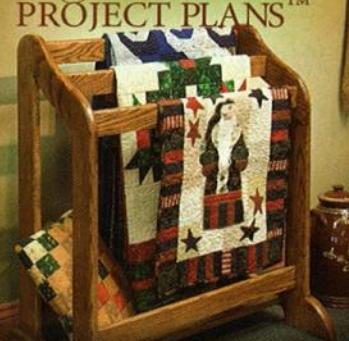


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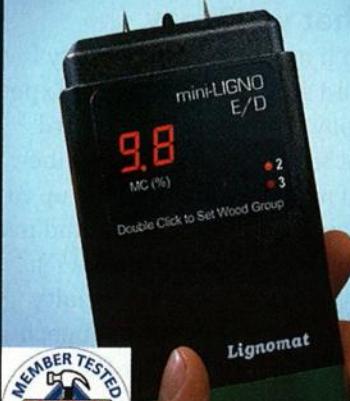
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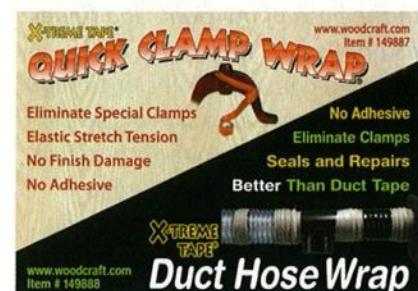
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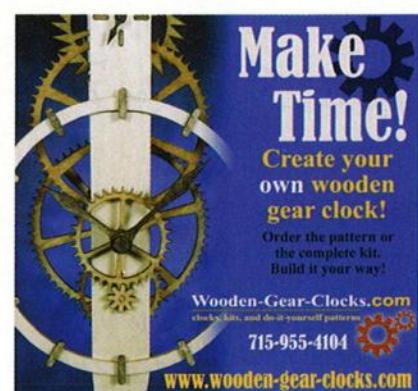
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# Workshop Mishaps

## What's the hurry?

### The story

*I fell way behind in building my wife's birthday present—a jewelry box. So even though the hour grew late and I had already put in a full day at work, plus several hours in my shop, I kept going to complete the dovetail slides.*

*The stop on my router table fence was about 2" from the dovetail bit.*

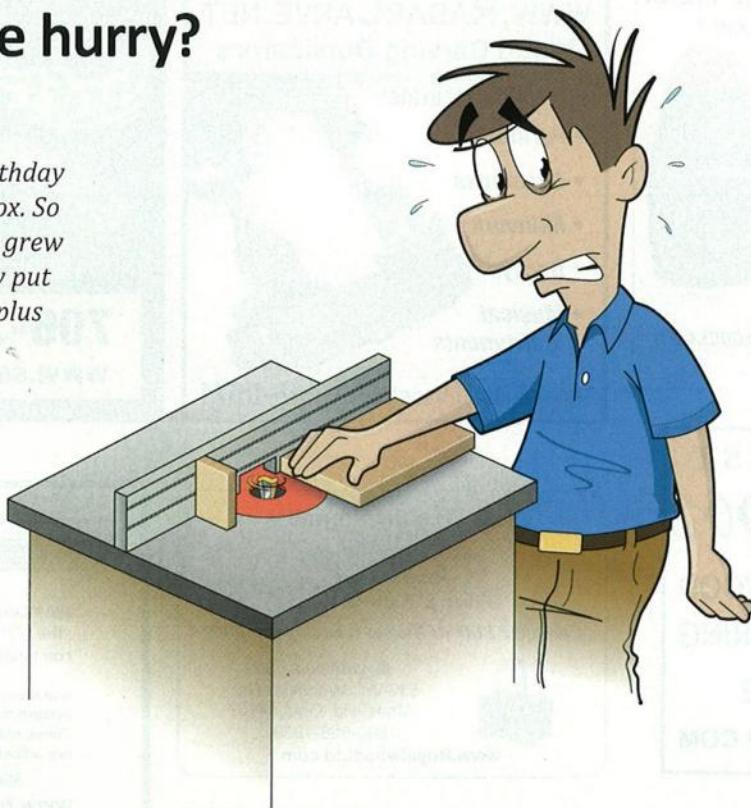
*Chips and dust quickly built up against the stop as I routed parts, so I frequently brushed them away.*

*One inattentive moment was all it took for the dovetail bit to open up a seven-stitch gash in the back of my right ring finger as I pulled my hand back after clearing chips. I was lucky, though, that the ascending side of the bit (the side rotating out of the fence gap) hit my finger, tending to push it away. If I had hit the side rotating into the fence gap, my finger could have been pulled in, resulting in a far worse injury.*



### The victim

Steve Gies wandered into the woodworking hobby shop at the naval base where he was stationed more than 20 years ago and found a lasting interest.



He now works as a senior instrumentation technician in the San Francisco Bay area, but when the workday ends, he heads for the well-equipped garage shop at his Petaluma home.

### Case analysis

Steve fell victim to several workshop dangers, resulting from get-it-done-itis. It sets in when a project deadline looms, and getting it done at any cost becomes the driving force. Steve was so intent on completing the jewelry box that he did not notice fatigue creeping up on him. Woodworking is usually an enjoyable pastime, but it can be just as stressful and fatiguing as any other work. And when your tools prove sharper than your mental state, accidents happen.

### Shop-smart strategies

Try these steps to work safely:

- Before cleaning debris from around a machine's cutter, hit the off button. Then protect fingers by using a shop vacuum's crevice tool to suck up the mess. Or flick away chips with an air-hose blowgun or bench brush.
- Establish and mark out a danger zone around your tool's cutter area.
- Add guards or shields around cutters that provide visibility but not interference.
- If building a project for a special occasion, create a realistic work schedule and to-do list and stick to it. Don't let machining events pile up at the end.
- Rehearse every machining operation so you know where your hands are every second. ■

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