

WOODCRAFT[®]

Projects, Techniques, and Products *magazine*

Build this

Arts & Crafts TV Cabinet *p.36*

MORE PROJECTS

- **Knock-Down
Desk**
- **Asian Vase**
- **Mortising
Jig**

PLUS...

- **Sharpening
Tips from
Tommy Mac**

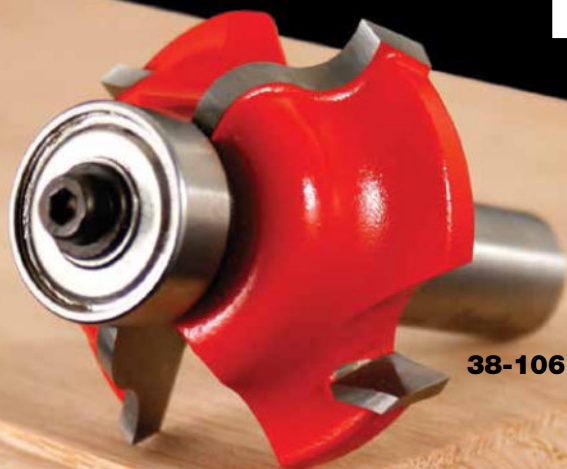
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- **Mastering
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28 Ulu Knife and Chopping Block

Mount the blade in a one-piece handle, then use an ingenious dishing jig to hollow out the cutting block with your router. This small project will have a big impact in any kitchen.



50 Build a Knockout Knock-Down Desk

Choose your favorite top for this portable workstation. The elegant, five-piece base is remarkably strong but requires no fasteners to go together. Nancy Hiller demonstrates how to create your own version with interlocking joints.

60 Asian-Inspired Vase

Raid your scrap box for some choice pieces to make distinctive tabletop accents that celebrate natural beauty. This weekend project combines cut and cold-formed curves to hold a tiny test tube vase.



36 Arts & Crafts Entertainment Center

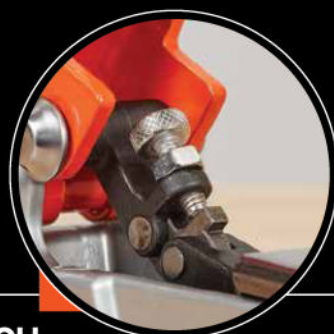
No woodworker should settle for a store-bought TV stand. Ken Burton's cherry cabinet is fit for the finest electronic entertainment you can buy. His construction instruction includes cloud lift details, corbels and traditional mortise-and-tenon joinery.



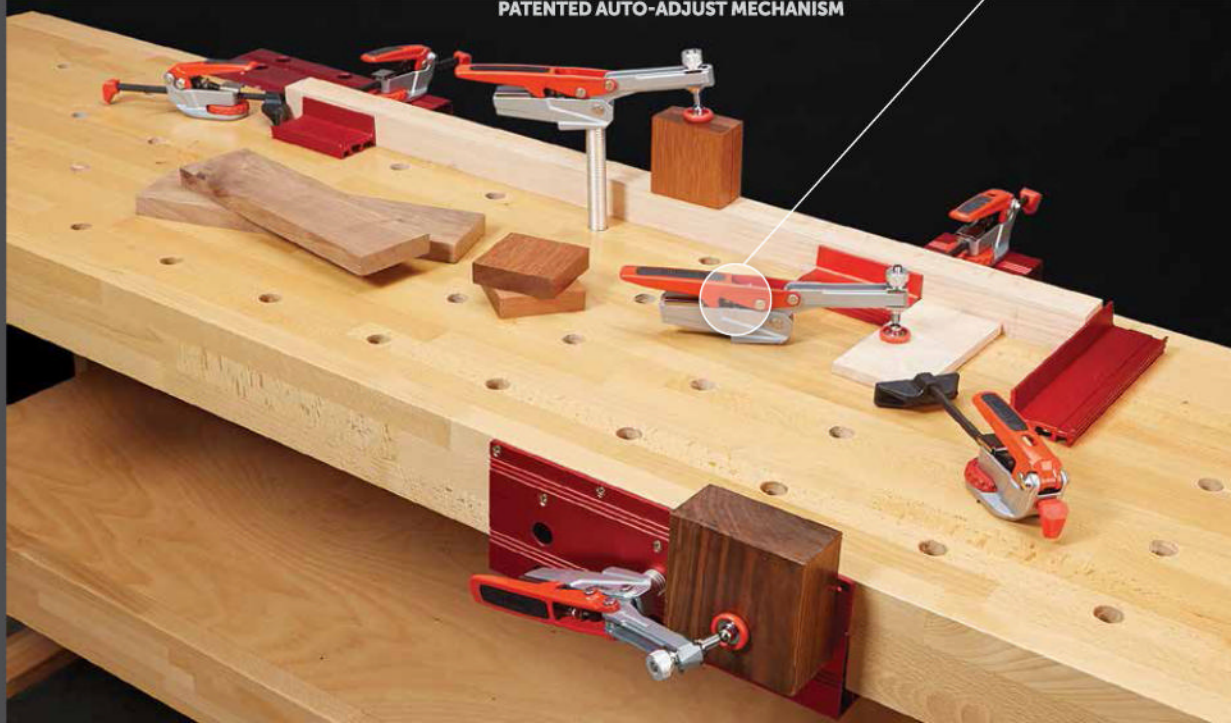
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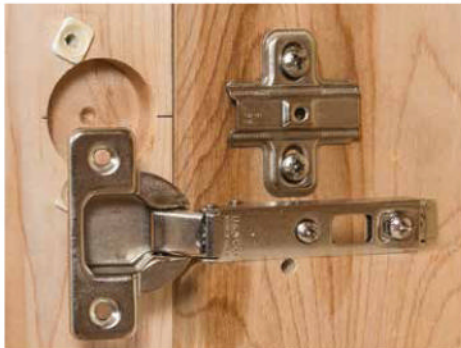
24 Sharpen a Scraper... and Put It To Work

Can a thin steel rectangle transform the way you work wood? You bet! Master woodworker Andy Rae will put you on the path to fine, controlled shaving.



32 Shelving Hardware for Lumber Storage

Put some wall space to work with steel standards and brackets capable of holding hundreds of pounds. Compare the features of four different systems to find what's right for your shop.



44 Try Cup Hinges for Your Next Cabinets

They may be hidden behind closed doors, but these hinges have very noticeable benefits. Learn how to choose, install, and adjust them.

56 K.I.S.S. Mortising Jig

Edge clamps, T-track and stacked plywood construction make a versatile jig for plunge-routed mortising.



66 Joinery Class: Dovetail Lap Joint

Learn how to use hand tools to create a joint that's strong, attractive and useful in a variety of furniture-making projects.

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Record Power 12-Piece Carving Chisel Set, with Educational Booklet & DVD

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72 Tips from *Tommy Mac*

Sharpening With Diamond Stones



76 Buyer's Guide



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Contributors



Based in Bloomington, IN, **Nancy Hiller** (KD Desk, p. 50) often travels to Chicago and East Coast locations for custom-made furniture and cabinetry

commissions. Early training in England exposed Nancy to traditional hand-tool techniques and to the Arts and Crafts style that continues to inspire her work today. Her designs also draw on the spare lines and functional forms found in Mid-Century Modern architecture. In her spare time, Nancy writes about homes, kitchen history and inspiring people. Examples of Nancy's work and writing have appeared in numerous magazines, including *Fine Homebuilding*, *Old House Journal*, and *American Bungalow*. See more of Nancy's work at www.nrhillerdesign.com.



Ken Burton has been working with wood for more than 30 years and writing about it nearly as long. Check out his website at www.wrwoodworks.com. Ken teaches woodworking classes at Peters Valley Craft Center in Layton, New Jersey, and at Yestermorrow Design/Build School in Warren, Vermont.



Robert J. Settich is a woodworker who has written seven books, including *The Hardware Handbook*, available on his website: PlansUnlimited.com. He's also authored hundreds of articles, appearing in virtually every leading woodworking magazine in the United States. In his writing, videos and seminars, Bob emphasizes jigs and innovative procedures that subtract uncertainty from woodworking and add speed to successful results.

On the Web



Desk deconstruction! Check out a short video that shows how Nancy Hiller's Knock-Down desk actually knocks down quickly for transport or storage.



Staff blogs. Get the details on how a roll-out vinyl floor holds up in a workshop. Get a look at the most beautiful hand-tool cabinet we've ever seen—a true Temple of Tools!



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- Cutting capacity/throat: 13½"
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- Precision-ground cast iron table with wings measures: 40" W x 27" D
- Table height: 34"
- Footprint: 20" L x 21½" W
- Arbor: 5/8" • Arbor speed: 3850 RPM
- Capacity @ 90°: 3⅞"
- Capacity @ 45°: 2⅞"
- Rip capacity: 30" right, 12" left
- Overall size: 60" W x 40" H x 36" D
- Approx. shipping weight: 416 lbs.



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- Motor: 3 HP, 240V, single-phase, TEFC, 3450 RPM, 15A
- Precision-ground cast iron table size: 9" x 72½"
- Cutterhead knives: 4 HSS, 8" x ¾" x 1/8"
- Cutterhead speed: 4800 RPM
- Cutterhead diameter: 3"
- Max. depth of cut: 1/8"
- Max. rabbeting depth: 1/2"
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- Amps: 20A at 110V, 10A at 220V
- Precision-ground cast iron table size: 17" x 17" x 1½" thick
- Table tilt: 10° left, 45° right
- Floor-to-table height: 37½"
- Cutting capacity/throat: 16¼" left
- Blade size: 131½" long
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- Feed rate: 16 and 30 FPM
- Cutterhead diameter: 3"
- Number of knives: 3 • Knife size: 15" x 1" x 1/8"
- Cutterhead speed: 4800 RPM
- Power feed rollers: solid serrated steel
- Table size: 15" x 20"
- Overall dimensions: 32½" wide x 45½" high x 42" deep
- Approx. shipping weight: 675 lbs.



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10" LEFT-TILTING SUPER HEAVY-DUTY TABLE SAW WITH RIVING KNIFE

- Motor: 3 HP, 240V, single-phase, 14A, 3450 RPM
- Cutting capacity: 8" L, 26" R
- Max. depth of cut @ 90°: 3"
- Max. depth of cut @ 45°: 2⅞"
- Table size (with 2 solid extension wings attached): 40" W x 27" D
- Base dimension: 20½" x 20½"
- Approx. shipping weight: 508 lbs.



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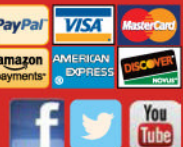
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Sleep can be elusive when I'm on the road to attend a trade show or collaborate with a woodworker on an upcoming article. What I see on TV during these sleepless periods convinces me that Americans are obsessed with self improvement. You know what I'm talking about: infomercials for military-style exercise programs, anti-aging creams, diet plans and more.

There's still no miracle cure for sloppy woodworking. Becoming a better woodworker requires practice and plenty of good information about tools and techniques. That's why we're here. Our core staff may be small in number—see the team

picture below—but our ambitions are great. We want to be your best source for woodworking information and inspiration.

Check out our new look, and our new website

As you look through this issue, you'll notice that we're devoting more space to visuals and less space to text. Yes, we're paying attention to that cliché about a picture being worth a thousand words. Another thing you'll notice is that instead of labeling parts A, B, C ... we're actually calling them by their proper names and providing important dimensions right on the drawing.

To avoid confusion (and bad woodworking practice), we won't give a finished dimension when a part must be cut to fit.

Buyer's Guide details are now consolidated in one place (page 76), to make room in every feature for more photos and drawings.

This issue marks the return of Tommy MacDonald to the magazine (Tommy's Tips, page 72). The star of *Rough Cut* has plenty of good advice to offer, and you can expect a steady dose of tips in future issues. We're also looking forward to articles from Scott Phillips, co-host (with his wife Suzy) of *The American Woodshop*. It's great to have these woodworking celebrities onboard as regular contributors.

To go along with our new, improved magazine, we've also got a new website. You'll find a large selection of searchable content, easy access to mainstream topics, plus videos and blogs. Make sure to become a member so you can post your comments and join the ongoing conversation in the Woodcraft woodworking community.

—Tim Snyder



The magazine team. In the world of woodworking publications, you won't find a more dedicated crew. From L to R: Chad McClung, Shayne Hiles, Paul Anthony, Joe Hurst, Kim McLaughlin, Vic Lombard, Kiah Harpool, Gary Lombard, Tim Snyder.

WOODCRAFT

magazine

www.woodcraftmagazine.com
Oct/Nov 2015 Vol. 11, Issue 67

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Advertising Sales Manager: Vic Lombard
Circulation Support: Kim McLaughlin
Advertising/Office manager: Kiah Harpool
Circulation: Circulation Specialists, Inc.

Subscriptions (U.S. and Canada)
\$19.97 for one year; Single copy, \$6.99
customer_service@woodcraftmagazine.com
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Woodcraft Magazine (ISSN: 1553.2461, USPS 024-953) is published in January, March, May, July, September and November and printed in the United States Postage paid at Parkersburg, WV, and at additional mailing offices. Copyright 2014 by Woodcraft

Supply, LLC. All rights reserved. POSTMASTER: Send address changes to *Woodcraft Magazine*, P.O. Box 7020, Parkersburg, WV 26102-7020. Canada Post: Publications Mail Agreement #40612608 Canada Returns to be sent to Pitney Bowes, P.O. Box 25542, London, ON N6C 6B2

Safety First! Working wood can be dangerous. Always make shop safety your first priority by reading and following the recommendations of your machine 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.



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Shop Issue Feedback

More projects, please!

I loved the quarter table in your June/July edition, and I look forward to building it this coming winter, but I admit that I am disappointed in the last issue. The shop projects are very nice, but isn't the whole idea to make items that we bring OUT of the workshop, into the living room, dining room, bedroom, kid's rooms, and yard?

In the future, I hope you will give us fewer plans for items in the workshop and more for the rest of the house!

—Peter Grunthal, via email

Editor-in-chief Tim Snyder replies: We hear your project preferences loud and clear. While we still plan to publish shop-improvement projects—like the mortising jig in this issue—you won't be seeing an "all-shop" issue again for a long time. Keep the faith; we've got some special projects in the pipeline! Good luck in the workshop, and everywhere else, too.

Just between us junkmen

I'd like to thank Andy Rae for his "Oddball Aids for Woodworking." For the past few decades I have collected the items he mentioned and hundreds more. My wife and kids like to poke fun, saying "you will

never use this stuff." This article has completely vindicated me.

—Gary Pace,
St. Joseph, Missouri

Andy replies: It's nice to know I've helped justify your collection of potential workshop gems. The story was but the tip of a very large iceberg. I've squirreled away many odd items that may never see the light of day. But should the day come, I'm covered. Sounds like you are, too! Keep up the good work.



Go to woodcraftmagazine.com and click "Articles" to read the complete "Oddball Aids" article online and share your own trashy treasures.

More about the floor

I am considering PVC flooring for my shop and would like to know more about Chad's experience in using this flooring in his garage workshop. My main worry is with moving heavy machine on mobile bases. Will the wheels snag or tear the flooring? Any other concerns?

—Jim Ritch, Dahlonge, Georgia

I haven't had any problems parking cars or rolling my heavy machinery around on the PVC floor. As for durability, most drips and spills clean right up.

In terms of comfort and cleanliness, PVC beats painted concrete. The floor is comfortable to stand on for long periods of time, and it has great traction, even when wet. I'm particularly impressed by how easily it is to clean with vac or broom. —CM



Tool news

Clamping giant Pony Tools, Inc. announced the acquisition of carbide-tip turning tool company Easy Wood Tools (EWT). EWT's founder and owner, Craig Jackson, has become the vice president of research and development at Pony Tools.

Don't worry about any shortage of your favorite turning tools. According to Jackson, "When you call our office, you will still be hearing the same voices, working with the same people, and your orders will be processed with the same care and dedication."

Without mentioning specifics, Jackson's response hinted at some "new, top-quality products" in the near future. Stay tuned.



How to reach us.

Email editor@woodcraftmagazine.com, or write to Woodcraft Magazine, 4420 Emerson Ave., Suite A, Box 7020, Parkersburg, WV, 26102-7020. Please include your full name, address, and phone number. Published letters are edited for length and clarity.

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A smart way to start carving

Many woodworking projects can benefit from carved details. But getting started as a carver can be challenging. What tools are required, and what basic techniques should you practice? Well-known carver Mike Davies has collaborated with Record Tools to overcome these barriers.

The Record 12-piece Carving Chisel Set that Davies helped to develop can truly be considered a “no-excuses” package for anyone who has hesitated to get into carving. The selection of gouges and chisels provides you with a wide range of carving capabilities. Unlike some “starter” tools, these are premium quality, full-size, lifetime tools that a professional woodworker would be glad to own.

The wood handles are comfortable in the hand but also substantial enough for mallet work. Unlike many edged hand tools that require honing before they can be used, these tools are ready to work. A dozen top-notch carving tools for \$140 is a good value. But the deal gets even better when you consider the carving course that's also included. Davies has created a *Foundation Skills* DVD and booklet based on his popular *Carving by the Numbers* program. This expert instruction provides an enjoyable introduction to carving.

Record has two other products that are worth considering if you're serious about carving. The fully

articulated Carver's Vise excels at holding small and medium-sized blanks in optimum position for carving. The vise will mount on a workbench up to 4" thick. Once you've screwed your workpiece to the mounting plate, you'll be able to spin it 360° and also pivot the attached rod to tilt your carving angle. A single lever locks both adjustments firmly in place.

A good mallet is also essential for many chiseling and shaping jobs. Record's 15 oz. Carver's Mallet has the heft and size to handle delicate carving as well as heavier shaping and roughing work. Made from beech, it matches up well with the 12 tools in the carving set. —Tim Snyder

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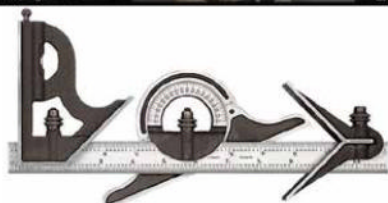


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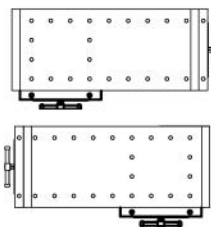
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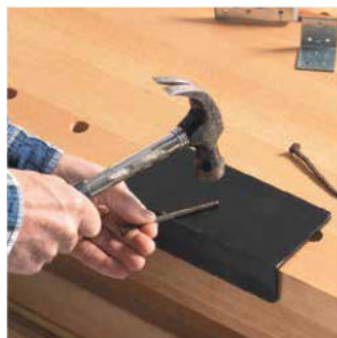
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Tips & Tricks

TOP TIP

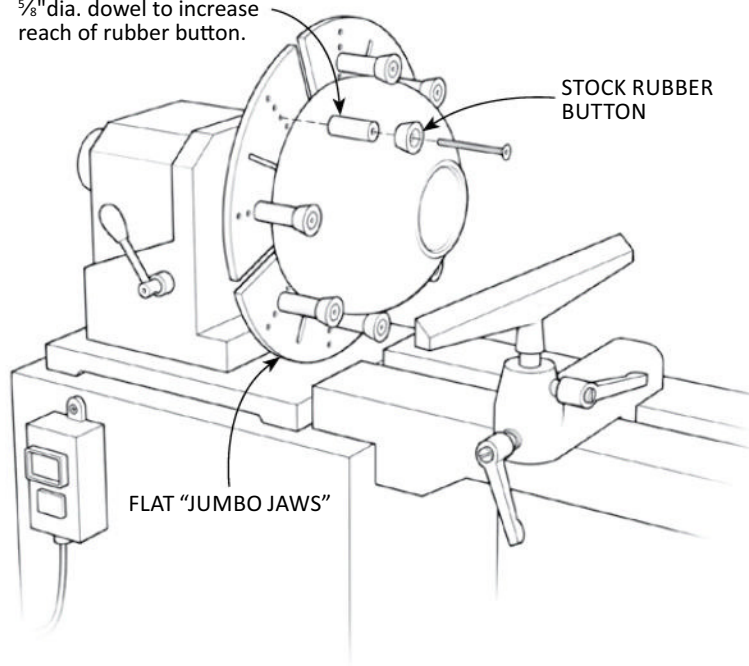
Jumbo Jaw standoffs

Like many turners, I use adjustable, flat-plate “Jumbo Jaws” to hold a bowl inverted for the final turning of its foot. However, I find that if the rim of a bowl tapers inward, the grip of the rubber buttons against the work can be compromised. My solution is to mount the buttons on “standoffs” I make from $\frac{5}{8}$ "-dia. dowel rod. The increased reach makes all the difference.

The standoffs can be made to any suitable length, and bored through their axis using a drill chuck on the lathe. For stability, make sure the ends are cut perfectly perpendicular to the length of the dowel. Replace the stock button machine screws with longer versions from the hardware store.

—Eugene H. Schlaman,
Charlotte, North Carolina

Make standoff from $\frac{5}{8}$ " dia. dowel to increase reach of rubber button.



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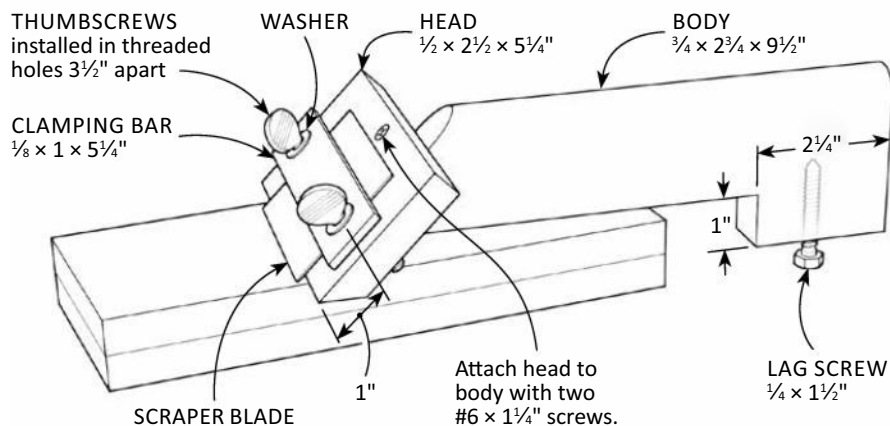
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Scraper sharpening jig

Years ago, I discovered the capabilities of a cabinet scraper (like the Stanley #80). This steel-bodied tool, with its “gull wing” handles and 45° beveled blade, is great for smoothing large surfaces without dishing them as a card scraper might. And it will make fine cuts if the blade is sharpened well. Unfortunately, the short blade doesn’t suit most commercial honing jigs, so I made my own from hardwood scraps.

The head of the jig is mounted at 45° to the body, matching the



blade’s bevel angle. A clamping strap made of 1/8"-thick scrap steel holds the blade to the head, secured by thumbscrews. A lag screw at the base of the jig can be adjusted in or out to fine tune the sharpening angle. To use the jig, I simply clamp the blade in place, projecting out a bit from

the edge of the head, and then sight the angle of the blade on the stone using a 45° triangle. A bit of work on a 1000-grit stone, followed by an 8000-grit stone, produces amazing results once the burr is turned.
—Philip Houck, Boston, Massachusetts

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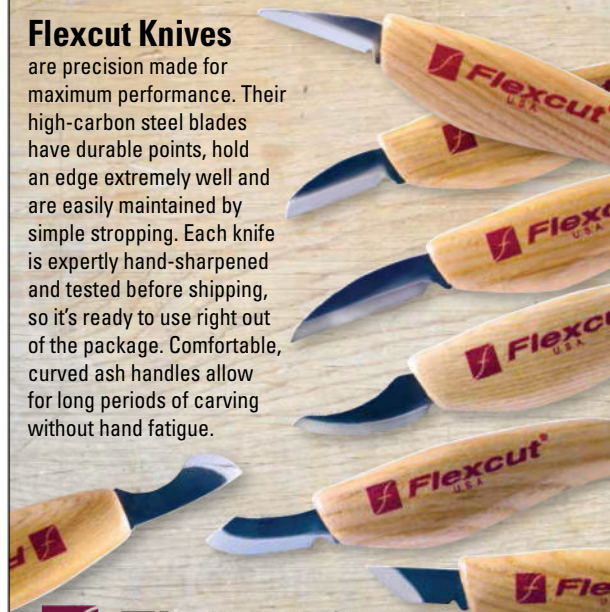
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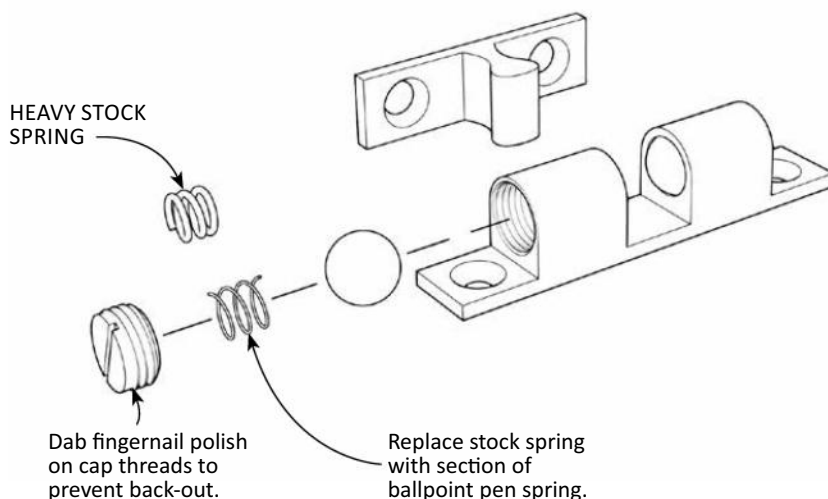
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Brass ball catch upgrade

I like to use brass ball catches for fine furniture because they're classy looking, secure, and they can be mounted in a variety of orientations. However, I've experienced two problems with them. The first is that their springs are so stout that you really have to tug on the door to open it. (Even adjusting the spring caps outward doesn't help.) To fix the problem, I replace the stock springs with ballpoint pen springs cut to about the same

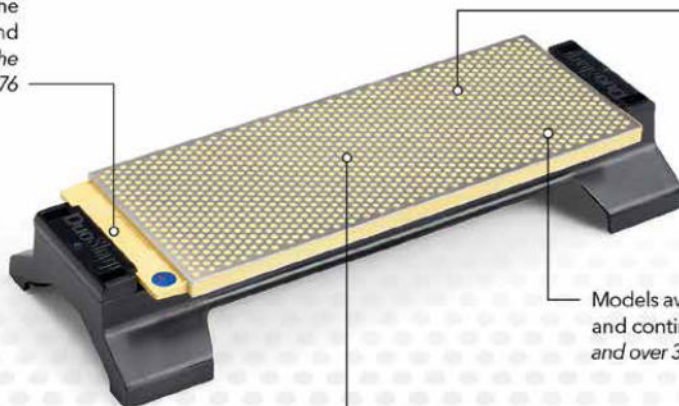


length. The second issue with these catches is that, when mounted vertically, the bottom spring cap can back itself out from repeated use, ejecting the spring and ball. The solution? Unscrew the cap, apply a dab of fingernail polish to the threads, and reinsert while wet.
—Paul Anthony, senior editor



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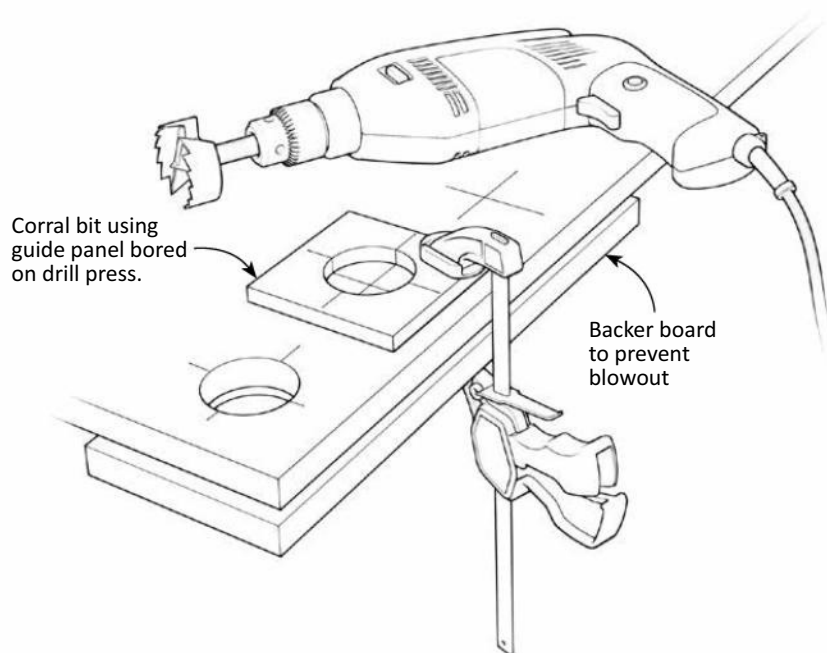
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Handheld drilling with a Forstner or multi-spur bit can be a skittish operation. However, sometimes it's necessary when a panel is just too big or cumbersome to place on the drill press table. In those cases, simply make a small guide panel at the drill press, using the desired diameter bit to drill the hole. Then clamp or screw the guide panel to your workpiece.

The guide panel doesn't need to be much thicker than 1/2" or so. To allow precise targeting of a centerpoint, extend long crosshairs outward from the initial guide panel centerpoint, and then carry those lines down across the edges of the hole afterward. That way, you can align them with long crosshairs laid out on your workpiece.

—Mike Johns, St. Louis, Missouri



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Sharpen a Scraper...

Turn a hook and watch the shavings fly

By Andy Rae



When smoothing wood, I reach for a rectangle of steel called a card scraper. Despite its humble appearance, a card scraper is remarkably versatile at refining surfaces. It will remove hardened glue, smooth and level difficult woods and exposed joints, and smooth a finish. Its small size makes it more maneuverable than a plane for reaching into tight spots, so you can preserve your supply of sandpaper. A scraper does it better, faster and without annoying dust.

Scrapers come in all sorts of shapes and sizes, including curved and profiled. Some can be used in specially designed planes and scraper holders. But my daily scraper is the card scraper, either thin (0.020-0.025") or thick (0.30-.0.040") depending on the job at hand. Thinner scrapers excel at delicate work, where light cuts and

and Put It To Work

finesse are required. Thicker scrapers are best for heavier work: smoothing tabletops, removing milling marks, and the like. For most applications, the scraping work is done by a small hook along the working edge. With a little practice, you can use this tool to produce tiny shavings, even on hard and figured woods that show tearout when worked with a plane.

Scrapers require sharpening to work properly, and I'll show you how this can be done with a few basic tools. You'll need a mill file, a block of wood, medium and fine honing stones, and a round burnisher (a length of polished, hardened steel). For rough work, such as removing cured glue or cleaning grimy wood, a few strokes on a file will prepare you for scraping. For finer work, you'll want to polish the edges to a mirror shine and then burnish four small hooked edges.

Scraper job description



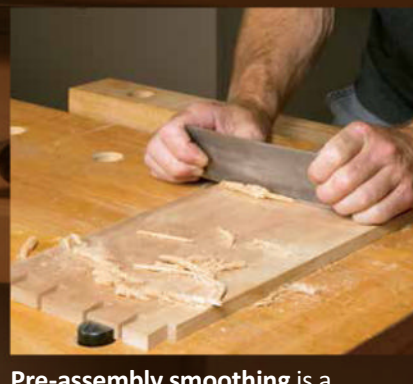
Smoothing figured wood is the perfect scraper assignment because planing the workpiece can cause tearout.



Leveling between coats enables you to remove drips and other surface irregularities in order to build a beautiful multi-coat finish.



Removing hardened glue and other rough work is best done with a scraper that's simply filed square—no honing or burnishing required.



Pre-assembly smoothing is a scraper's specialty on drawer sides and other parts that won't be easily accessible as a project nears completion.

Getting edges straight and square is the first step

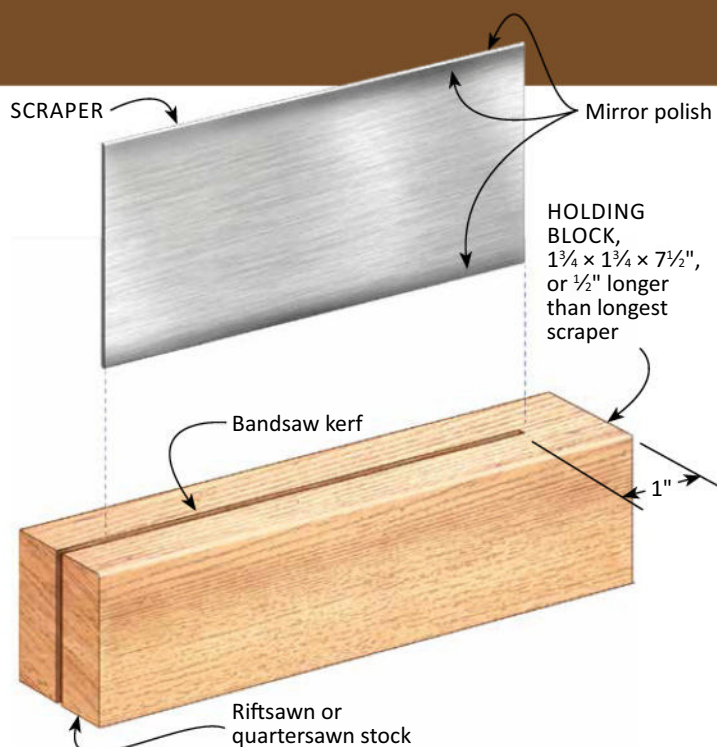
On new or old scrapers, I use a file to establish straight and square edges and to remove any nicks or old burrs. Next, I hone the faces and edges on a 1200-grit waterstone using a simple kerfed block of wood. Then I create a mirror shine by polishing the same surfaces on an 8000-grit stone (similar-grade oilstones work, too), again using the block of wood. Total filing and honing time: About four minutes.



File it square. Lay a 10" mill file against a stop, hold the scraper on edge and as square to the file as you can. Then draw the scraper towards you with four or five strokes. Stop when the edge reflects tiny file marks and a uniform shiny gray color from end to end.



Hone the edge. A flat, square block with a vertical kerf makes an effective holding tool for honing the edge (see drawing). Slip the scraper into the kerf, and press down while rubbing the block back and forth about six times. Move the block over the entire stone to prevent grooving.



Smooth the face. Hone both faces along all each long edge on a 1200-grit stone until the sheen is even. Use a wood block as shown to exert even pressure while moving the steel back and forth. Lighten your pressure on the last few strokes, and check the face: You should see an even, dull-gray strip about 1/2" wide along the face.



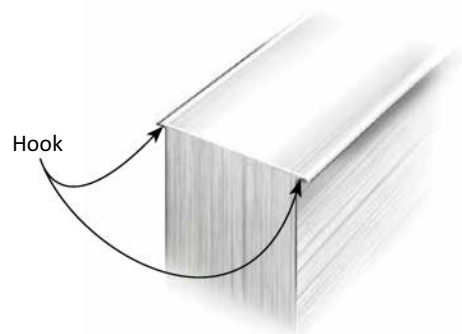
Ready for burnishing. Look for a mirror sheen about 1/4" wide along each long edge.

Burnishing creates a tiny hook you can detect with your finger



The tiny arc of steel on a scraper's edge, called the hook, is what does all the shaving. Don't try to maximize the size of the hook—a smaller hook will provide the best performance and a longer-lasting edge. The two steps shown here shouldn't

take more than about 20 seconds, then you're ready to scrape! When the hook dulls, you can restore the hook once or twice by re-burnishing. When you can only produce dust rather than tiny shavings, it's time to resharpen.



Burnish flat. A good burnisher has a polished, mirror-bright finish. Rub a little oil on the rod, and keep it flat on the scraper and slightly angled, as shown. Press downward while pushing or pulling to coax the small burr outward and to consolidate the edge.



Pull the hook. Hold the scraper slightly off the edge of a work surface, and angle the burnisher 1° to 3°. Using light pressure, give the edge just two or three strokes to form the hook. Pull towards you in an upward sweeping motion, letting the burnisher move off one corner; then push to the opposite corner.



The payoff: Super-fine shavings and superb control. Hand technique makes a difference: For an aggressive shaving, bow the scraper slightly away from you, tilt it forward 1° or 2° past 90°, and push. Firm strokes generate heat; don't rubber tips (from office supply stores) to keep thumbs cool. Reverse the procedure for a pull cut. For fine shavings, use little or no bow and angle the scraper 45° or more. Scrape with the direction of the grain, but when you can't, such as when smoothing crotch figure or other difficult woods, no worries. Lighten your pressure and take smaller shavings. No edge tool leaves a smoother finish—with zero tearout!

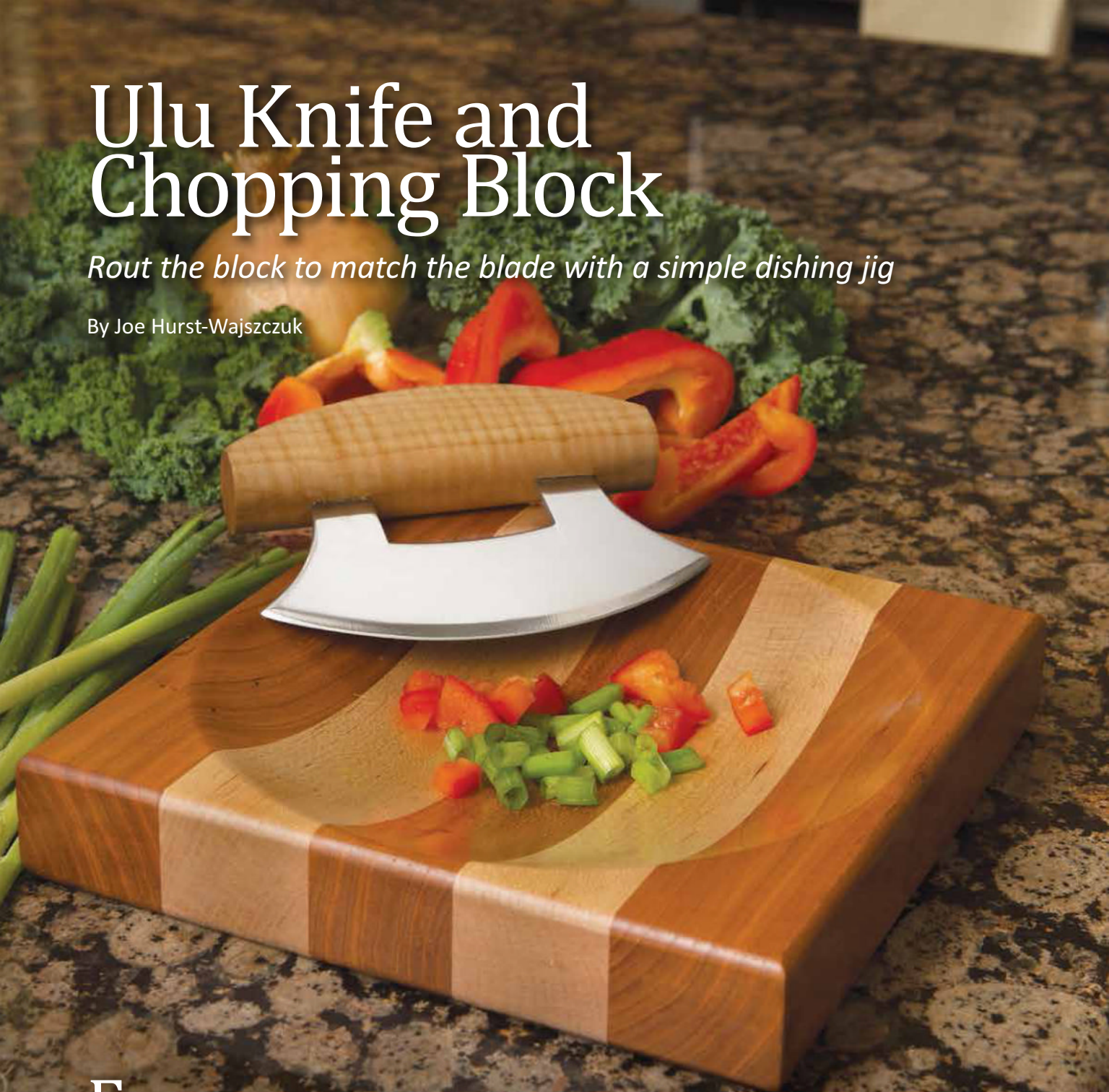
Tip

If one edge shaves and the opposite edge doesn't, chances are the edge wasn't square before polishing. Make sure the honing block's kerf is dead-square to the bottom of the block.

Ulu Knife and Chopping Block

Rout the block to match the blade with a simple dishing jig

By Joe Hurst-Wajszczuk



Full disclosure: I collect kitchen knives the same way I do hand tools in my workshop. I bought the ulu knife kit because I was hooked by the shape of the blade. I'm a little surprised that my ulu has become my go-to knife for slicing and dicing.

Designed by the Inuits, this little knife has been used for everything from skinning game, to haircuts, to trimming snow blocks for igloos. Seal isn't a regular part of my daily diet, but I've found that this curved blade excels at dicing vegetables and herbs, and trims meat as well as my pricier

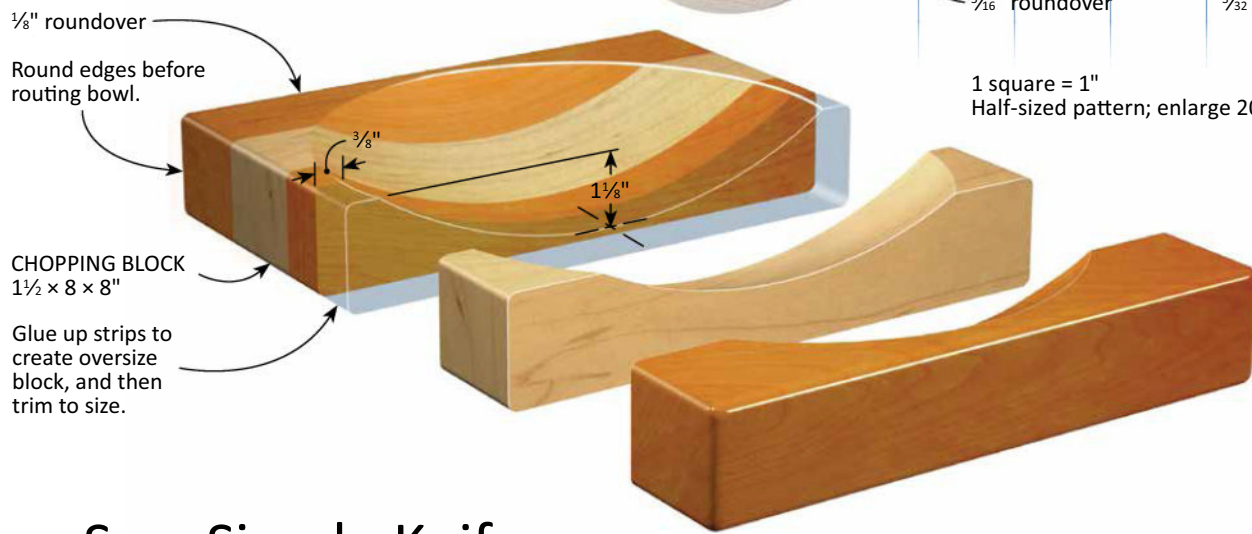
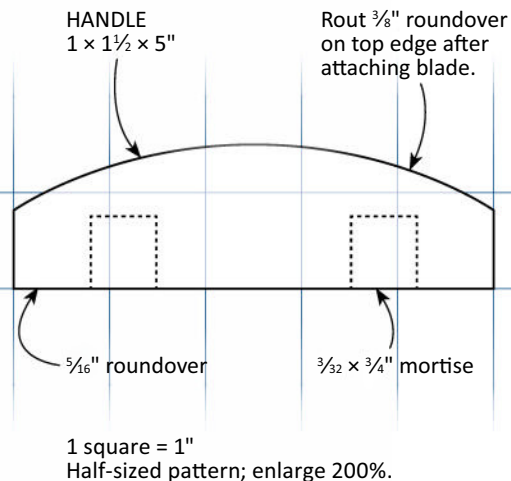
chef's knife. The handle's position above the blade provides a significant mechanical advantage when chopping hard vegetables and frozen foods.

To make full use of my new knife, I made a double-sided cutting board to match the blade. The concave face keeps finely-chopped ingredients from spilling over the countertop. The flat side serves for slicing meats and cheeses.

The knife/block pair is a great excuse to raid your scrap bin. With help from a few simple jigs, you can make this combo in few hours.

Different curves for blade and board

To allow the knife to pivot, the diameter of the block's concavity is greater than the blade's arc. The 12"-dia. routed dish works well with Woodcraft's 4½"-radius knife.



Saw-Simple Knife

Instead of sandwiching the two tangs between matching wood scales, I plunge-cut the slots with a multi-tool and ⅜"-wide blade. After layout, I drilled a series of holes, set my saw guide, and sawed out the waste. I then used a jigsaw blade to clean out the slot and work up to my line. When the tangs fit, glue them in place with epoxy. Temporarily mounting the exposed blade in a holder saves time (as possibly fingers) as you complete the knife.



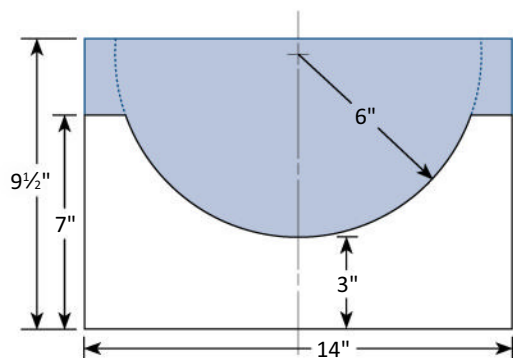
Taking the plunge. Set shims under the guide and make two plunge cuts. A countersunk magnet keeps the blade from jumping off the guide.



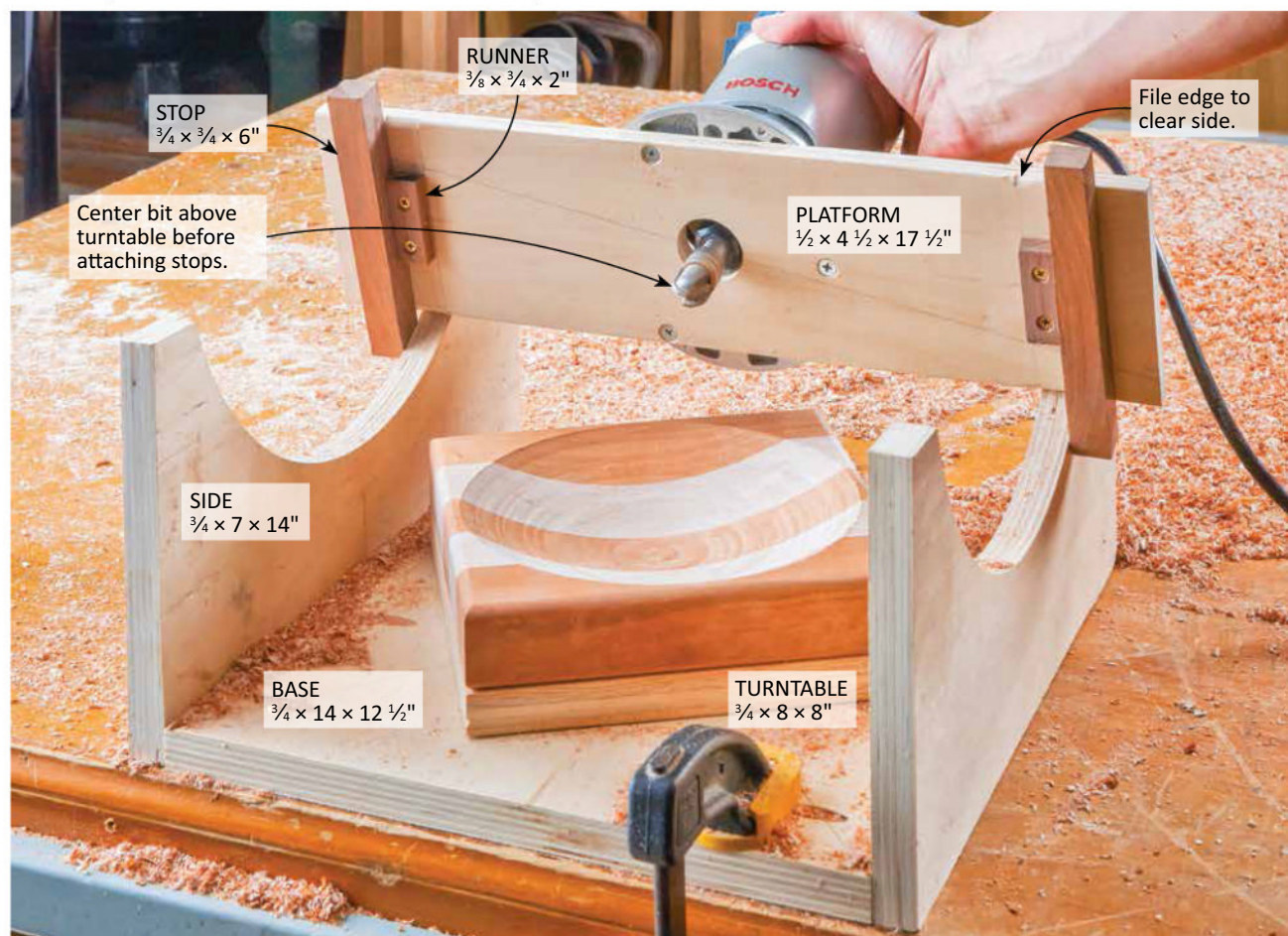
Route this way. Clamp the blade between ¾"-thick MDF shields to create a holder for routing the handle. Keep the scrap in place when sanding and finishing.

Make a dishing jig to rout the block

Turning the concavity might be faster, but this jig makes routing a perfectly-sized dish nearly fool-proof. The turntable rotates on a $\frac{5}{16}$ "-dia. dowel that's glued into the base. Attaching sandpaper to the turntable prevents the block from spinning should the bit catch the block. Use double-stick tape or pin nails to affix the block to the turntable. The short runners and notched platform allow the router to ride the curve more closely.



One jig makes another. Cutting the dishing jig's arced sides with a trammel ensures that the sides are smooth and symmetrical. Rout the arc in $\frac{1}{4}$ " increments. Tack the sides to a backer so that the parts don't shift at the end of the cut.



Doing the dishing. This jig creates a $7 \frac{1}{4} \times 1 \frac{1}{8}$ "-deep cavity in $1 \frac{1}{2}$ " thick block. I used a bowl bit, but any roundnose bit will suffice. To control chatter, use a $\frac{1}{2}$ "-shank bit and set the speed to 13,000 RPM. To reach the very bottom of the dish, I set bit lower in the collet and finished up with super light passes.

Routing in the round

Rout the recess from the outside in. To do this, position the platform so that the bit clears the block, adjust the bit for $\frac{1}{8}$ "-deep cut, and then pivot the platform until the bit's bottom edge makes contact. Rotate the turntable 360° before shifting the platform. To minimize cleanup, overlap your passes. After routing, use the jig to hold the block while you clean up scallops left by the bit.



Tilt and spin. Aiming the router bit away directs chips away from you and keeps your fingers a safe distance from the bit. If the block starts spinning, disengage the bit by tilting the platform.



Smooth it out. Use a curved scraper to shave off any high spots. A wedge-shaped block keeps the turntable from spinning.



Sand then seal. A multitool equipped with a sanding pad, followed by a mop sander, quickly erase remaining tool marks. Finish-sand through 320 grit, and then seal with your favorite cutting board finish.

Shelving hardware

Get your wood supply organized with a sturdy steel system that mounts on the wall

By Tim Snyder

Managing the lumber supply can be a challenge in any woodshop, but it's a problem worth solving. Otherwise, you end up misplacing boards and working around wood that's stealing valuable floor space. Offcuts and other short pieces can often reside in boxes or barrels, but what about your longer stock? While shop-made lumber racks have always been popular, this storage assignment can also be handled by heavy-duty hardware.

The shelving systems featured here have what it takes to quickly put a bare wall to work, providing sturdy racks that will help keep your boards in order. Choosing the system that's right for your shop will depend on the wall space you have available, your budget, and how much flexibility you need from the system. All of these systems feature steel standards (aka uprights) that must be anchored securely to the wall and brackets (shelf supports) that lock in place on the standards. The systems are easily expandable; you simply add more standards and brackets.



WoodRiver HD Shelf System, \$89.99

Capacity: 3 shelves; 400 lbs. max. per shelf.

Installation & use:

Don't let the small size of this system put you off. It has some useful features. Use a single set of uprights and brackets if you have limited wall space. Need more storage? No problem. Uprights can interlock to make taller racks, as shown above. Cotter pin holes in the uprights enable you to adjust bracket height in 6" increments. I like the fact that the brackets are angled slightly upward, a feature that will help

prevent narrow boards and warped stock from falling off the rack. But the system's most useful feature is likely to be bracket pivoting ability. In just a few seconds, you can lift a bracket off its cotter pin support and pivot the bracket back against the wall, where the cotter pin will hold it in place. If you need temporary clearance in your shop for furniture, tools or other stuff, you can essentially "fold" all or part of your lumber rack against the wall.

for lumber storage

Components:

2 uprights,
1½" dia. × 44" long.

6 brackets,
12" long

4 spacers

6 cotter pins

Basic standard-and-bracket systems are simple, strong and easy to install

With these systems, you get a basic shelving module that includes two uprights and the shelf supports to go with them. Only one bracket length is available for each system, but a 12" shelf provides plenty of capacity for most lumber. If you're looking for a fast, easy storage solution, these kits don't disappoint. Open the box, grab a level and your cordless driver, and put your wall to work. See the Buyer's Guide on page 76 for ordering information.

Portamate 6-Shelf Wood Rack, \$74.99

Capacity:

6 shelves; 110 lbs. max. per shelf.

Installation & use:

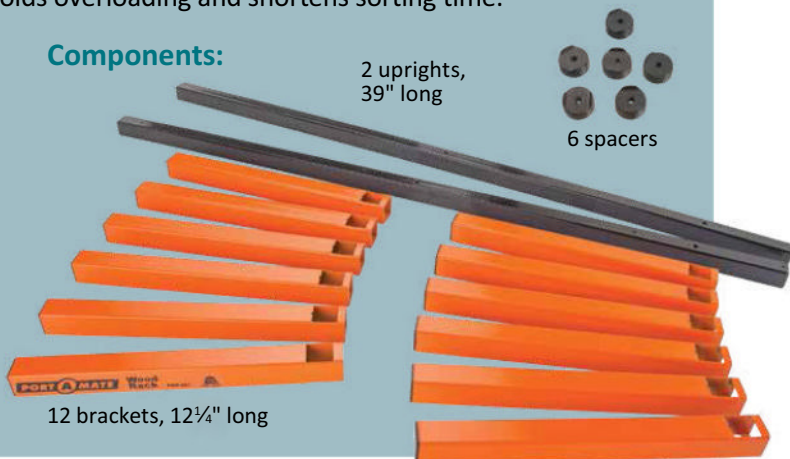
Interested in maximum shelf space for minimum dollars? If so, look no farther. The Portamate system is definitely a no-frills design, with fixed, equally spaced positions for brackets. But you're getting six separate shelving levels for your lumber. While you could delete one shelving level to create a taller stack space, this might not be a good idea considering the 110 lb. weight limit for each shelf. Portamate's approach to wood storage makes sense: closely spaced shelves that hold a limited lumber supply on each level. This storage strategy avoids overloading and shortens sorting time.

Components:

2 uprights,
39" long

6 spacers

12 brackets, 12¼" long



Slotted standards offer adjustability & workbench capability

For storage you can customize to suit your needs, these two systems let you order a la carte. Thanks to a good selection of components, you get the flexibility to handle all kinds of lumber storage, and more.

Standards come in a different lengths, and their slotted design makes it easy to position support brackets exactly where you want them. Bracket choices are equally impressive, ranging from 10" to 18" for one system

and 10" to 20" for another. Yes, those larger brackets have the length and strength to support a tabletop—a great option if you need another work surface but don't want to build or buy a workbench.



Low-profile lumber storage system,
\$230 (as shown)

Capacity:
300 lbs. max. per shelf



Installation & use:

Components in this system have a different look and feel. Everything is made from $\frac{3}{16}$ "-thick steel that has a thick, rough, galvanized coating. With its rugged design and rust-resistant treatment, this shelving would probably outlast others in outdoor conditions. The entire system has a low-profile design. Standards extend just $\frac{1}{2}$ " from the wall, and brackets have a shallow, U-shaped form. The 14" and 18" brackets can support a work surface if you want to go that route. To make a taller storage rack, you can interlock shorter standards. There's one installation quirk worth noting: You'll need $\frac{1}{4}$ " or $\frac{3}{8}$ "-dia. lag screws and washers to install brackets because of oversize holes where the screws need to fit (inset photo, above).

Components:



Standards
24", \$15.25
55", \$29.50

Brackets
10", \$9.99
14", \$12.50
18", \$18.50

Heavy-duty galvanized shelving system, \$86 (as shown)

Capacity:

300 lbs. max. per shelf

Installation & use:

This system wins the prize for versatility, mainly because you've got the largest selection of standards and brackets. Several years ago, I installed a storage rack/workbench combination using this system, supporting a 22"-deep, 8'-long countertop on the 20" brackets. As shown in the photo at right, longer brackets gain extra support by means of diagonal braces that clip into standard slots—a nice feature. The hefty standards jut out from the wall about an inch, so there's some loss of space before you get to the shelf supports. But the system earns extra points for ease of installation, thanks to hanger bars that can be installed horizontally on the wall to provide a mounting tab for the standards. If you mount the hanger bars level across the wall (making sure to fasten into solid masonry or wood framing), your standards can be spaced anywhere along the hangers – they don't need to be individually set to the same height. Plan on driving two more mounting screws lower down in each standard to keep it plumb and secure.



Components:

Standards
24", \$7.75
48", \$10.25
72", \$16.99

40" Hanger
bar, \$6.50

10", \$5.50

14", \$7.19

20" supported
bracket, \$11.50

Don't forget the fasteners

None of these systems include fasteners for mounting standards on the wall. But you won't have trouble finding lag screws or heavy-duty wood screws for installation. In a wood-framed wall, at least half the fastener's total length should extend into the framing. For installation

on a masonry wall, make sure to use masonry anchors with a load rating that's comparable to what your storage system is rated to hold (see the capacity details given for each system). The spacing between each standard can be anywhere between 4' and 6', but it's smart to stay closer to 4' so that short or thin boards don't sag.

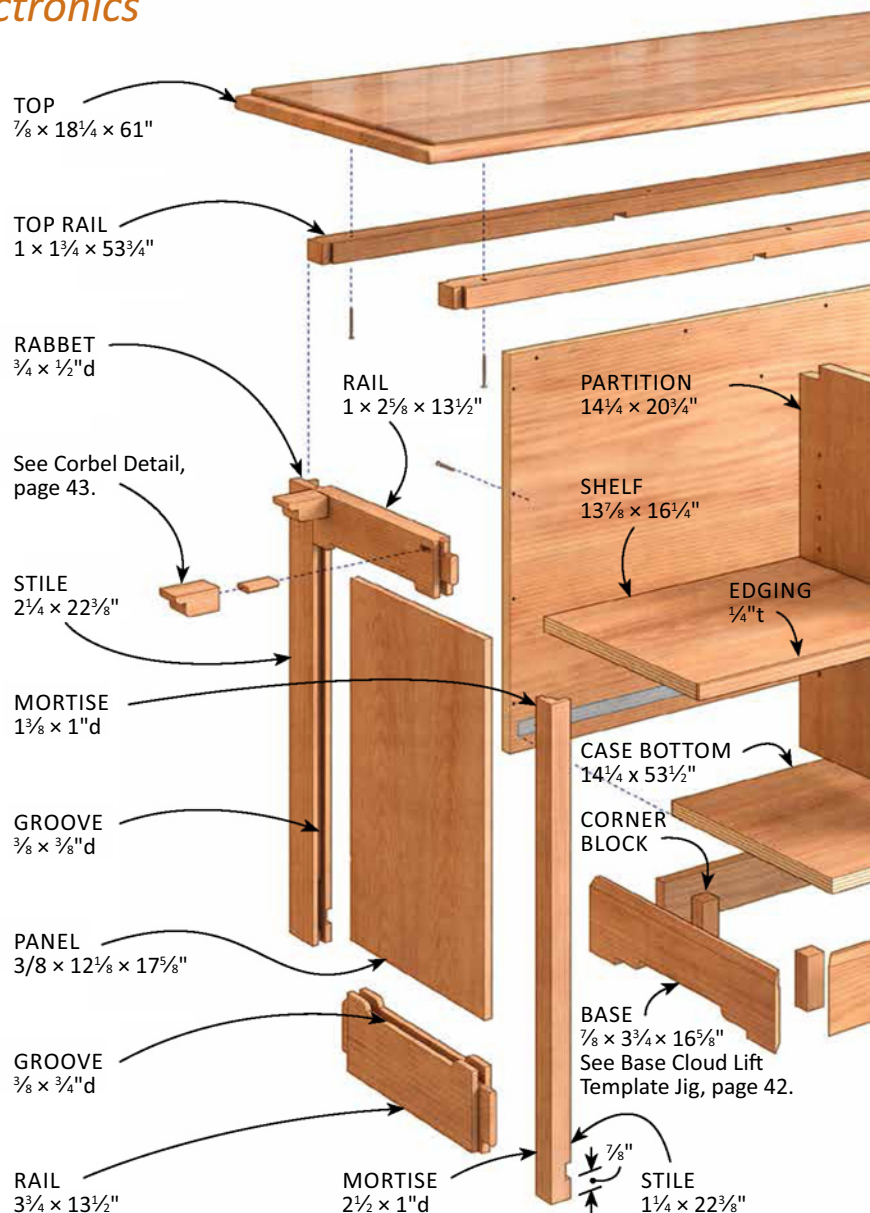
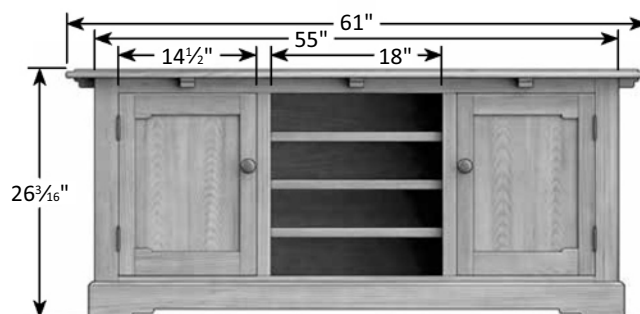
Arts & Crafts Entertainment

Hand-crafted cabinetry is the perfect companion for high-tech electronics

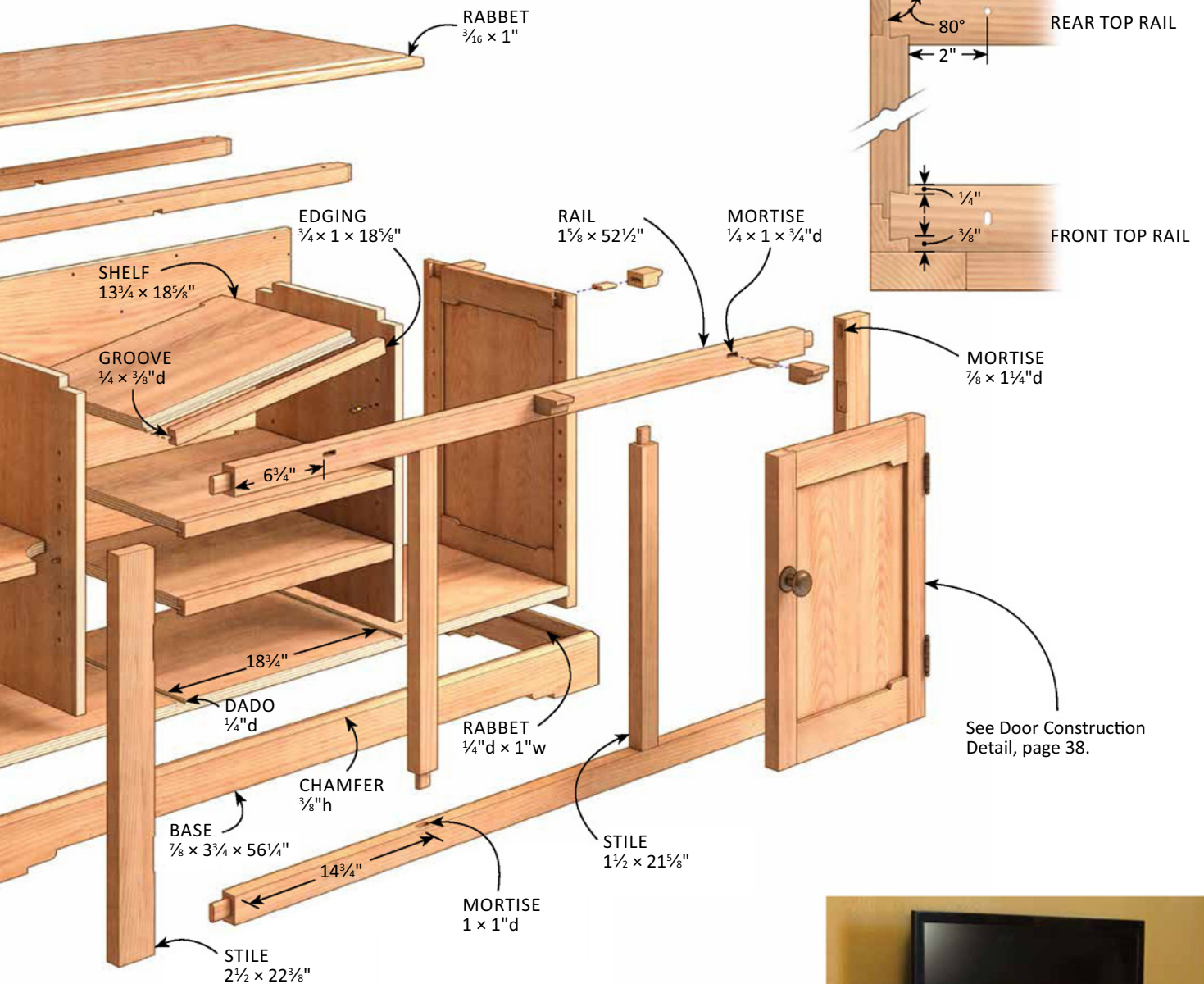
By Ken Burton

As a woodworker and furniture designer, I have a lot of fun playing with furniture styles and adapting them to the needs of 21st Century living while trying to remain true to the “rules” of the genre. This cherry TV cabinet is a good example of challenges one comes across. Its design echos the work of the brothers Charles and Henry Greene, two architects who worked in Pasadena, California in the very early part of the 20th century. They are known for designing Craftsman-style houses and all of the furnishings therein. Along with furniture by Gustav Stickley, their work has become synonymous with the Arts and Crafts style. But as the flat screen TV didn't come about until long after Greene and Greene departed this world, they didn't leave us any examples of what an Arts and Crafts entertainment center should look like.

To create this piece, I started by picking up on one of the Greene's key design elements—the cloud lift—and incorporated it into a cabinet with dimensions appropriate for good TV watching. This simple detail, along with small corbel brackets under the top, and the frame-and-panel construction combine to make a piece of furniture with its roots in the 20th century but its functionality firmly based in the 21st.



ment Center



Order of Work

- Make the panels.
- Make the case frame parts.
- Cut the cloud lifts.
- Glue up side panels & face frame.
- Assemble the case.
- Make & install the doors.
- Install shelves & base.
- Install corbels & top.

A case on a base. The case consists of a $\frac{3}{4}$ " cherry plywood bottom, back, dividers, and shelves, flanked by solid cherry frame-and-panel sides. The assembly sits in a rabbet in the base, and is capped with a solid wood top. All solid wood parts are 1" thick unless otherwise noted. All mortises (except the corbels') are $\frac{3}{8}$ " wide, and inset $\frac{1}{2}$ " from the end of their stiles.



Cut the panels from your best-looking boards

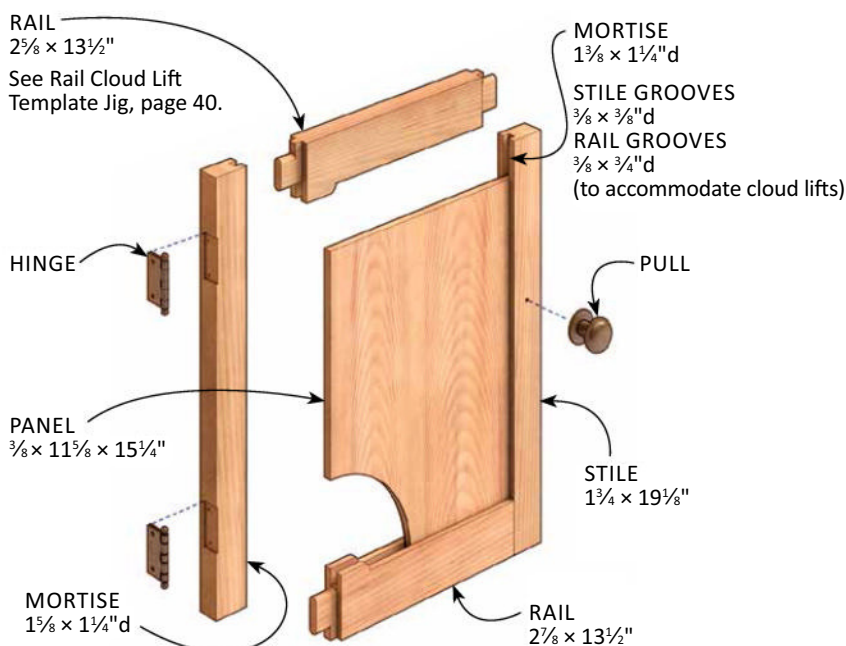


Select your nicest pieces for the top, the door panels, and the side panels. Edge glue the boards for the top, and then set them aside to thoroughly dry while you start work on the case. The doors and case sides are assembled with frame-and-panel construction—a time honored method of making strong, stable components. I resawed the material for the panels from 5/4 stock, and bookmatched the pieces as shown below. For boards up to about 6½" wide, I resaw on the table saw as I find it faster than using the bandsaw.

Safe sawing in steps. When I resaw on the table saw, I do the job in several passes. Start with the blade about 1½" high. Cut from both sides, then raise the blade and cut again. For all passes, keep the same face against the fence. If the blade can't quite cut all the way through, finish the job with a handsaw.



Door Construction Detail



Bookmatching



Beauty in balance. For the bookmatched door panels, I chose boards that had similar cathedral grain patterns. This way the two doors would appear matched as well as the panels themselves being bookmatched.

Cut mortises and tenons in case frame members

After making the panels, turn your attention to making the frames that hold the side panels. (You'll make the door frames later.) Start by cutting the stiles and rails to size. Then cut the grooves on the tablesaw using a dado head set up for a $\frac{3}{8}$ "-wide cut. Note that the rail grooves are $\frac{3}{4}$ " deep, while those in the stiles are only $\frac{3}{8}$ " deep. Next, cut the mortises in the stiles. I use a shop-made mortising jig that works hand-in-hand with a plunge router, and is designed for cutting both edge and end mortises. (See p. 56 to learn how to make and use this jig.)

Jigged precision. Wooden edge guides bolted to a custom router sub-base maintain the lateral position of the mortise while the jig's stops control its length. Set the depth stop on the router to limit the mortise depth. Resting the stile on a spacer locates it at the right height as you clamp it in the jig.



Shoulders, then cheeks. After cutting the tenon shoulders with the rails fed "on the flat" using the miter gauge, saw the tenon cheeks by feeding the rails on end. Here, a simple, two-piece plywood tenoning jig carries the workpiece.



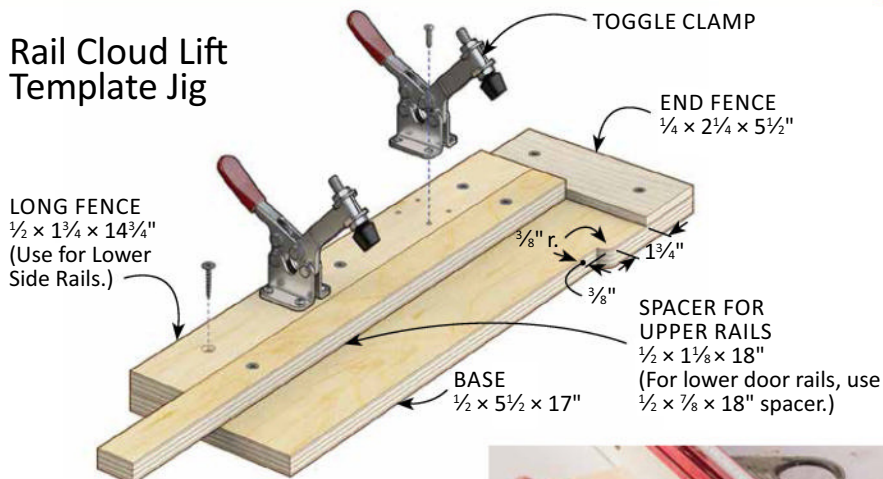
Getting a haunch. Sawing with a dado head, and using the rip fence as a stop, cut the haunch on the outer edge of each tenon. Precisely match the haunch length to the depth of the groove in order to fill in the groove at the end of the stile.

Use a template to rout the cloud lifts

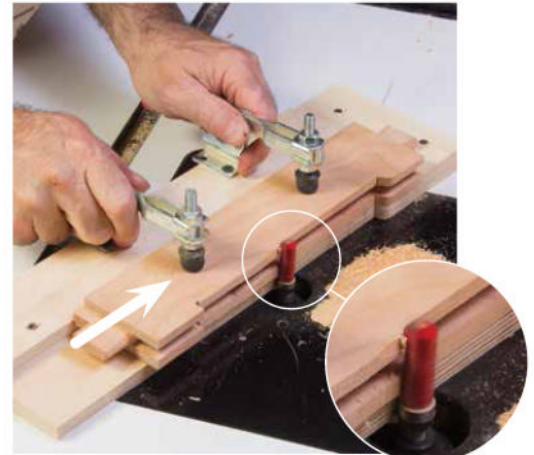
Before assembling the frames, shape the cloud lift details on the rails. These are cut with the help of a plywood template jig and a pattern bit in a table-mounted router. Note

that the template is one-ended. To use it, load the workpiece in and shape one end. Then flip the piece, reclamp it, and cut the other end.

Rail Cloud Lift Template Jig



Going straight. To make the jig, table-route the $\frac{3}{8}$ " offset section of the template base using a $\frac{3}{4}$ "-dia. straight bit. Start at the cloud "heel", and stop before the piece falls into the opening. Then saw that section off.



Cloud cuts. After using the template to trace the cloud lift shape onto a rail, bandsaw away most of the waste. Then clamp the rail to the jig, and press it against the bit's bearing while feeding right to left.

Glue up the side panels and face frame

Cut the face frame pieces to size. Then lay out and rout the mortises, and saw their mating tenons.

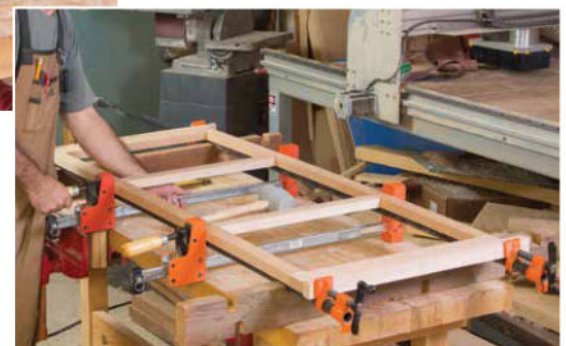
Sand the panels and any frame edges that will be difficult to work after assembly, and then dry clamp everything to make sure it all goes together as intended.

Unless you have a mini-router that will allow access after case assembly (which I do), you may want to rout the hinge mortises in the face frame before gluing it up.



Face frame glue-up. A pair of notched 2x4 clamp supports facilitates large glue-ups by holding long clamps in position and providing clearance for the crosswise clamps.

Side panel glue-up. Sand and prefinish the side panels before installing them in their frames. Check the glued-up frames for square by measuring their diagonals under clamp pressure.



Make the partitions and bottom, then assemble the case

Saw the $\frac{3}{4}$ " cherry plywood bottom and partitions to size. Cut dados across the bottom to locate the partitions, and dados in the end frames to accept the bottom. Rather than fussing the width of my dado head to match the thickness of the plywood, I set it so it's about $\frac{1}{8}$ " narrower. After making the first pass of each similarly offset dado, I bump the rip fence over a touch to widen each dado for a perfect fit on the second pass.

Fit the top rails. With the top rails cut to size, saw a wide dovetail on each end. Locate each dovetail in place atop its side assembly, and scribe around it to lay out its socket. Saw and chisel away the waste to create the mating sockets. Dado the rails and notch the partitions where they join.



Clamping rehearsal. Dry-fit the case to practice your assembly sequence, check your fits, and pre-set your clamps. Screw the case bottom and the top rails to the partitions, clamping everything else. Rest the case on your 2x4 clamp supports to provide clearance for the clamp heads.

Make and hang the doors

Measure the door openings and then cut the door rails and stiles to suit. Aim to make the doors an exact fit in their openings. (You'll trim them for opening clearance after they are glued up.) Then join, shape, and assemble the door frame parts the same way you made the side frames. Note that the door rails have a cloud lift on one end only, and the mortises are deeper than those on the side frames.

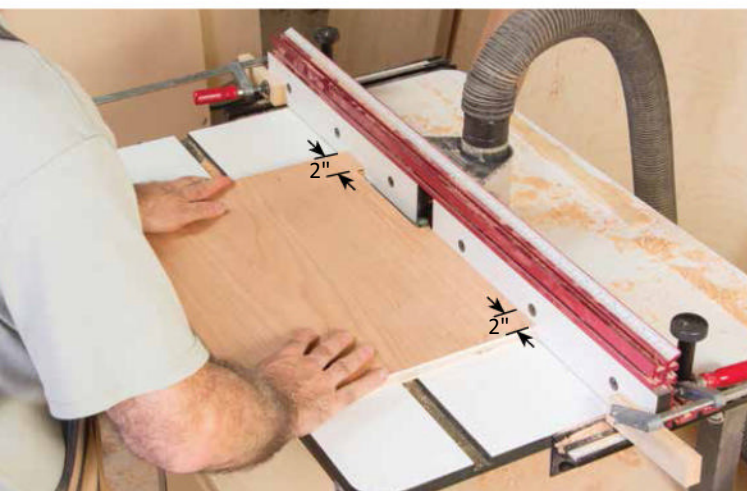
You may be wondering why I don't advise you to make the door frames at the same time as the side frames. It's simply because, in this imperfect world, it's usually best to make doors fit the actual opening you end up with instead of the ideal opening you had planned for.

Fit and hang the doors. Mortise the face frame for the hinges (if you haven't already), and trim the doors to allow about $\frac{1}{16}$ " of clearance on all sides of their openings—the thickness of a nickel. Use a knife to transfer the hinge mortise location from the face frame to the door. Then mortise the door and install it.

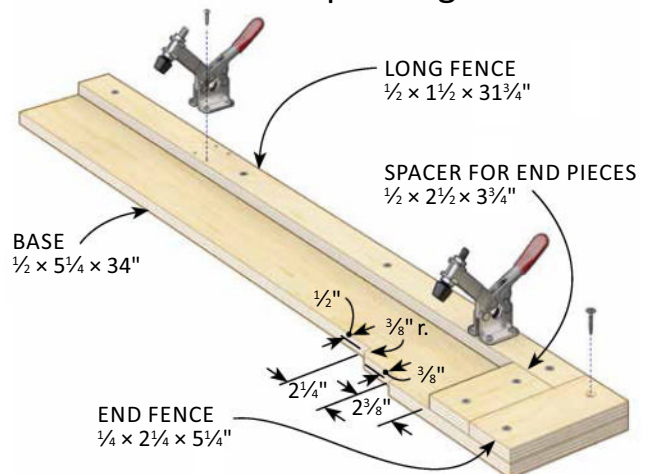


Add the shelves and install the base

Drill the partitions and the side frames for shelf support pins. Cut the front and side base pieces to size, then make the jig at right, and use it to cut the cloud lifts, using the router table as you did previously. Rabbet the rear top edge of the base pieces, miter their front corners, and glue the pieces to the case, reinforcing the miters with glue blocks.



Base Cloud Lift Template Jig



Make way for wires. Notch the rear edges of the center shelves in much the same way you trimmed the cloud lift template (page 40). Clamp stops to the fence to control the length of the notches, which provide clearance for electronic component wiring. Complete the shelves by applying edging as shown in the drawing on page 37.

Cap it off with the corbels and top

Bandsaw the corbels to shape. When sanding them afterward, pay particular attention to keeping the corner at the intersection of the rabbets flat. Rout the mortises in the corbels and their mating mortises in the case, and glue the corbels in place using shop-made “loose tenons.”

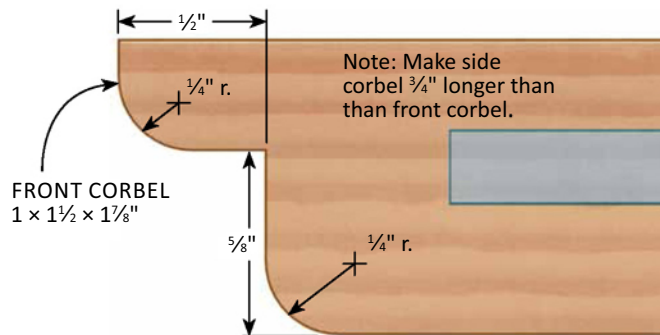
Shape the edges of the top as shown below, and then screw it to the top rails. Be sure to slot the holes in the front rail to allow the piece to expand and contract.

Cut the case back to size and screw it in place. Finally, cut the rear base piece to size. Attach it to the underside of the case and reinforce the corners with glue blocks.



Corbel mortises. You can mortise the corbels for their loose tenons using the mortising jig. Rout the mating mortises in the case using an edge guide and stop blocks to control the cuts.

Corbel Detail



Profiling the edge. Rout a $\frac{3}{16} \times 1$ " rabbet across the front and side edges of the top, and shape the outer edges with a $\frac{3}{16}$ " round-over bit. Radius the uppermost edge with a shoulder plane, as shown. Clean up using a sanding block with sandpaper taped only to the face, leaving “safe” edges without abrasive.

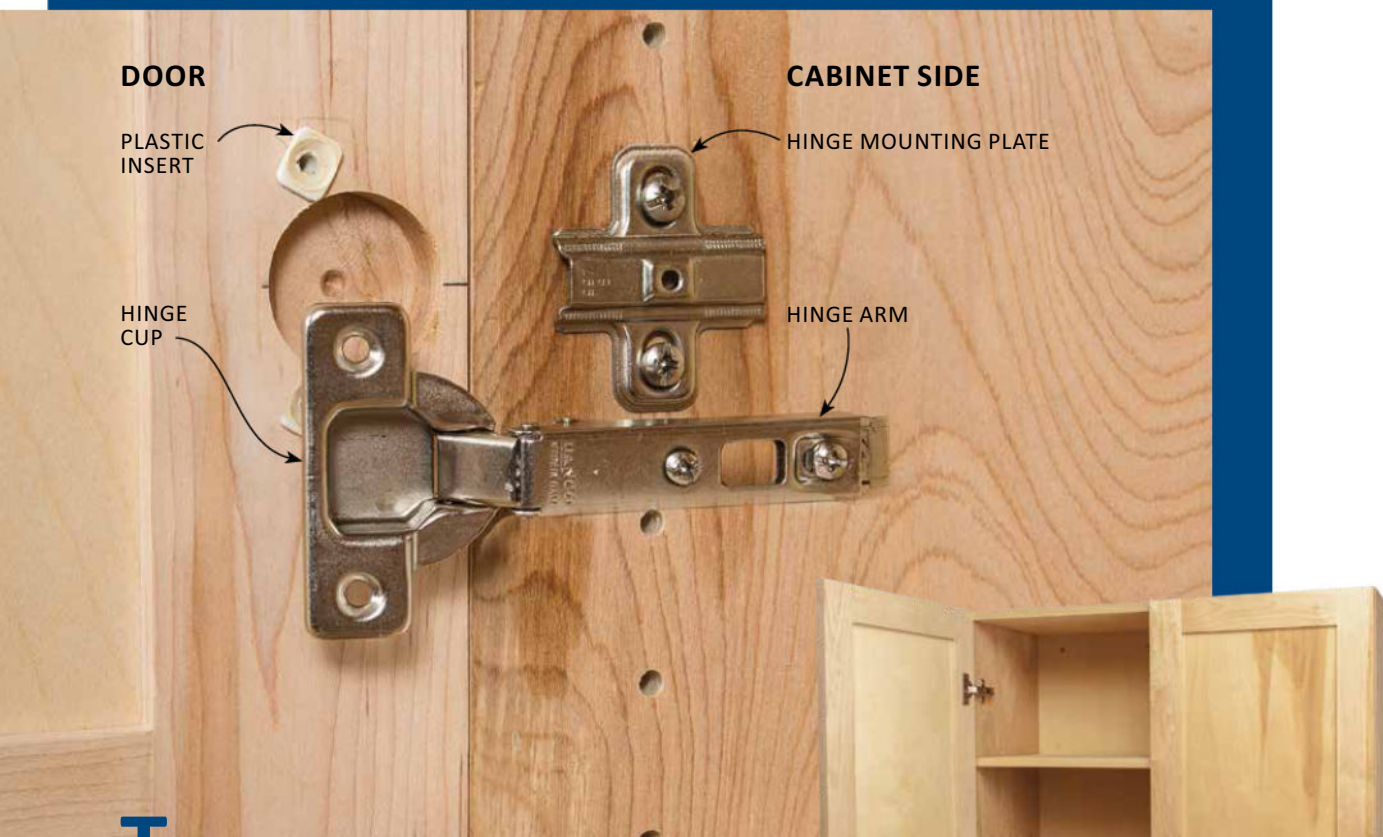
Finishing Advice

My cabinet is finished with three coats of wiping varnish. This darkens cherry slightly to begin with, and doesn't interfere with the wood's natural aging process that causes it to deepen in color over time. I'd much rather be a little patient and let this happen rather than trying to accelerate the process with a stain, especially since cherry tends to blotch when stained.

Try cup hinges for your next cabinets

Learn how to choose, install, and adjust these engineered marvels

By Robert J. Settich



They are known by many different names: Euro hinges, cup hinges, 32mm hinges, hidden hinges, and other aliases. Like secret agents, these fascinating bits of hardware do their work quietly and without drawing any attention to themselves. Instead, they keep the accent on your cabinet.

In addition to near-invisibility, the hinges also feature easy installation and perhaps most importantly, the ability to move each door into perfect position. This is a quantum leap beyond traditional cabinet hinges that permanently lock in the door's alignment—or lack thereof—upon installation. The translation: by giving you the ability to perfectly straighten doors and produce consistent reveals, you'll appear to be a much better cabinetmaker.

The beauty of hidden hardware.

Whether you're building a single cabinet or an entire wall's-worth, concealed cup hinges enable you to create a sleek composition of doors and drawer fronts. The hinge has a 35mm-dia. cup that mounts in the door, creating a recess for the hinge mechanism when the door is closed. The hinge arm snaps into place on a mounting plate fastened to the cabinet side or face frame.

Easy door alignment

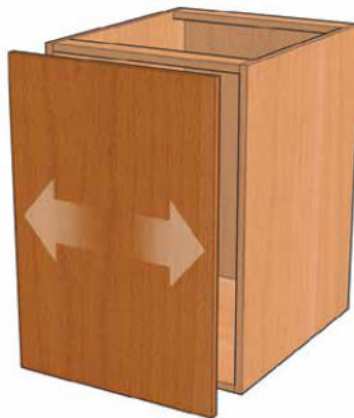
Most cup hinges are designed so that the position of the door can be adjusted simply by turning screws on either the hinge arm or the mounting plate—a big advantage over other cabinet hinges.

Cup hinges for frameless cabinets typically provide three-way adjustment, as shown here. Cup hinges for face frames typically provide lateral (side-to-side) and vertical adjustment.

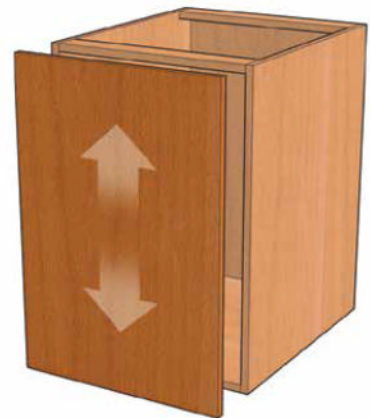
In & Out Adjustment



Side-to-Side Adjustment



Up & Down Adjustment



The 32 millimeter cabinet system

32 millimeter cabinetry appeared in Europe at the conclusion of World War II, when the need for massive amounts of reconstruction collided with severe shortages of materials. Eliminating face frames from cabinets saved time, expense, and lumber, while also simplifying cabinet construction. For even greater efficiency, manufacturers adopted a universal spacing of 32 millimeters for the 5mm-dia. holes in cabinet sides. In both base and wall cabinets, these holes don't just hold shelf support pins; they also correspond to installation screw spacing for cup hinge mounting plates and drawer slides. Production-style cabinetry usually involves the insertion of plastic dowels into predrilled holes, rather than driving hardware installation screws directly into the case side.

All the advantages that got the 32 millimeter cabinet system started still apply today, with even more compatible hardware to choose from. If you haven't given this cabinetry style a try, consider doing so on your next project.



The hole story. 5mm-dia. holes, spaced 32mm apart, are compatible with shelf support pins and installation screws for cup hinges and drawer slides.

Choosing cup hinges: You'll get it right if you can answer 4 questions

The intricate structure of a cup hinge is a world away from the simple anatomy of a butt hinge. This can make selecting cup hinges intimidating. But there's good news here. Major manufacturers like Salice, Blum, Grass, and Amerock have come

up with cup hinges for just about any application you can imagine. To find the right hinges for your project, get the answers to the questions below, then consider any special features that may also figure in your cabinet design.

1. Frameless or face-frame cabinets?

Cup hinges originated in order to streamline the manufacture and installation of frameless cabinetry, so it's not surprising that you'll find the widest selection of hinges suited to the this cabinetry style. But competition among cabinet manufacturers created a demand for Euro hinges compatible with other cabinetry styles, including face frame cabinets. A cup hinge designed for a frameless cabinet will include a baseplate that mounts on the side of the cabinet. A face frame cup hinge usually mounts on the face frame. Some face frame cup hinges attach to a separate plate that's screwed to the face frame. Other versions are single-piece units that include a faceplate flange.



FACE FRAME
Hinges mount to the frame.

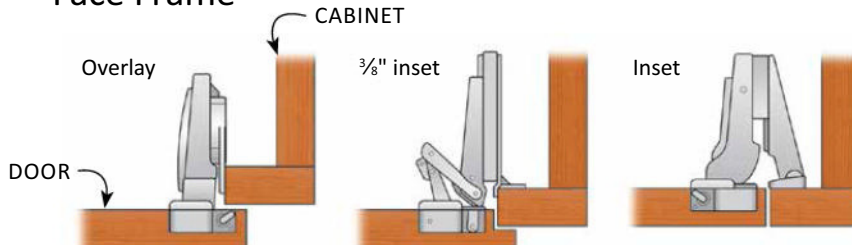


FRAMELESS
Hinges mount to the cabinet interior.

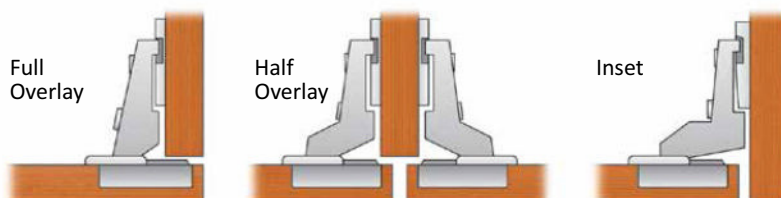
2. Overlay or inset doors?

Euro hinges popularized the look of overlay doors and drawer fronts—a sleek composition of rectangles that covers cabinetry casework and displays even gaps between each door and drawer. The adjustability of cup hinges makes it possible to get all the doors in a bank of cabinets perfectly aligned. If this is the look you're after, you'll need to order overlay-style cup hinges. But if your preference is for inset doors, you have two choices. You can pack out the side of the cabinet flush with the inside edge of the face frame, and use an inset-style cup hinge designed for frameless cabinets. Or you can buy a specialized inset hinge designed to mount on the face frame (see drawings).

Face Frame



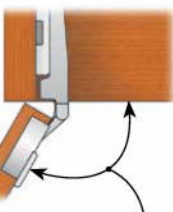
Frameless



3.What door opening angle is right?

Opening angles for most cup hinges range from 105° to 120°, which will suit many applications. However, there may be cases when you want a door to open much wider: to provide easier access, for example, into a deep corner cabinet. In that case, you can find hinges that swing up to 170° (Woodcraft 142855, \$18.99/pr.). But other times, you may want to limit the opening angle so that a door swinging toward a wall won't bang into it. In these situations, you want to find a hinge that can be paired with an optional restriction plate. This modification will solve the problem by reducing the opening angle to less than 90°. All hinges along the edge of a door should have the same opening angle.

Full Overlay

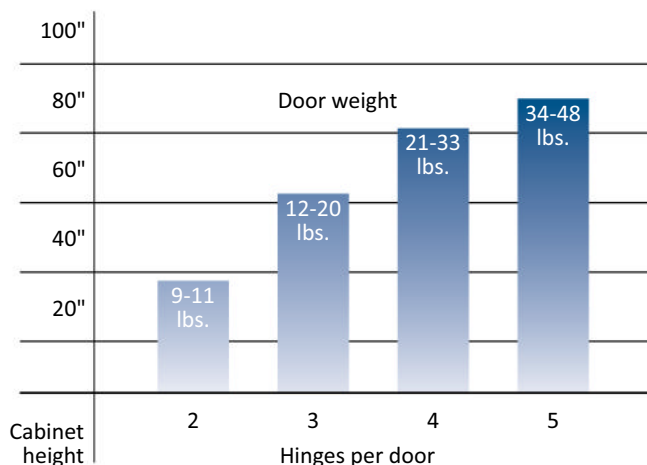


120° opening

4.How many hinges per door?

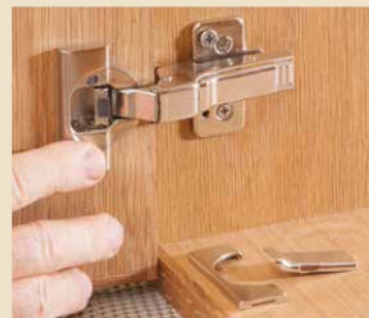
Most average-size cabinet doors will swing very happily from a single pair of hinges. But when you upscale the door's size or weight, those hinges may start complaining or even fail. You can easily solve the problem by installing additional hinges to share the burden. The chart represents general guidelines based on average hinges. Weigh the completed door plus any supplemental loads, such as a spice rack you plan to attach to the inside of the door. If your door's height or weight lands in a borderline area, round up and add a hinge.

Choosing the Number of Hinges



Special features to consider

- **Cover caps.** Available for some but not all cup hinges, cover caps will conceal most—or even all—of the hinge's attachment and adjustment screws to give your project a sleek look. While this isn't a priority in ordinary cabinet applications, it's definitely an upgrade to consider on curio cabinets and other situations where your hardware has high visibility.



- **Plastic dowels or inserts.** Standard hinge installation screws work well in solid stock and plywood, but these fasteners lose strength in medium density fiberboard (MDF) or particleboard. If your cabinet doors or cases are made from these materials, you may want to choose hinges that include barbed plastic inserts that fit in predrilled holes. Tightening the installation screw pushes each dowel against the wall of the hole for a firm grip.



- **Soft-close hinges or pistons.** Cabinet doors that slam can rattle both your nerves and your carefully-crafted woodworking project. Avoid these problems with soft-close technology such as Blumotion from Blum. This feature can be built into the hinge cup, as with the 110° partial overlay hinge (Woodcraft #152742). If your project has small or light doors, you can easily switch off the soft close mechanism on one hinge. If you want to upgrade existing cabinets to soft close without swapping out the hinges, consider a retrofit Blumotion solution (Woodcraft #147965). You usually need only one of these piston devices per door, though large or heavy doors may require a pair.



Installing cup hinges: Three steps and you're done.

1. Drill the cup holes

The metal cup in a Euro hinge needs to fit in a 35mm-dia. hole drilled in the cabinet door. Precision is important, so make sure you have a sharp, 35mm Forstner bit and an accurate technique for locating each cup hinge hole. Hole spacing is not based on a centerpoint but on the distance from the rim of the hole to the door's edge. Unless you're building cabinets according to the pure 32mm cabinet system, vertical hinge placement is up to you. On a typical cabinet, I usually locate hinge cup holes 3" from the top and bottom of the door.



Jigged offset. A jig makes quick, accurate work of laying out cup hole centerpoints the proper offset from the edge of a door. This Drill-Rite jig is designed for hinges with a 5mm offset. (You can also use it to mark the screw locations for certain hinges.) Other commercial jigs are available for different offsets, or you can make your own.



Fence offset. Alternatively, you can set your drill press fence to create the proper hinge offset by registering a door against the fence. As a setup spacer, use a drill bit whose diameter matches the specified hinge offset, placing it between the fence and the edge of the 35mm Forstner bit that will drill the cup holes.



Stops add speed. Mounted on T-track atop the drill press fence, a pair of Swing Stops eliminates the need to measure and mark. Sliding the door under the unused stop swings it out of the way. A production setup like this is smart when you have more than a few doors to hang.

Line 'em up. Before drilling holes for cup attachment screws, make sure that each hinge arm is perpendicular to the door's edge. If the rear edge of the cup is square to the arm, you can use a straightedge to align multiple hinges at once. Drill pilot holes with a self-centering Vix bit.



2. Mount the plates

Hinge arms clip onto mounting plates that are screwed to cabinet sides. Each plate has two installation screws that must be set back an exact distance from the cabinet edge and aligned vertically with hinge arms. Perfect plate position demands careful layout and accurate predrilling of screw holes.

Mask, then mark. Cover the layout area with masking tape to protect the wood and better show layout lines. Set the blade on your combination square to match centers for installation screws, then mark your lines.



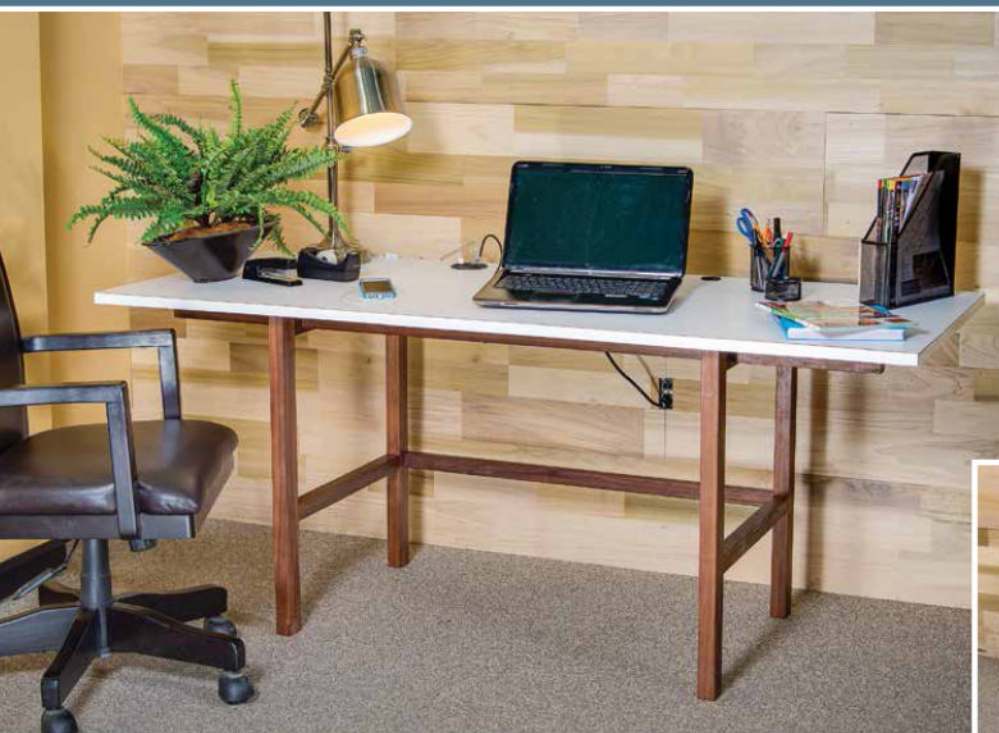
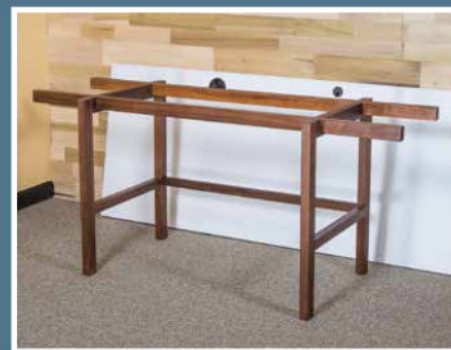
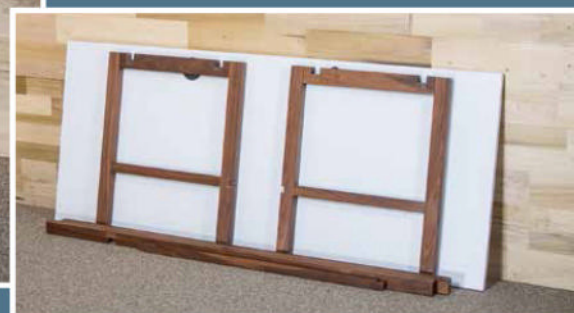
Shim the door. After attaching the mounting plates to the hinge arms, place the door against the case, shimming it upward to produce the desired overlay at the case bottom. Align the mounting plate holes with the screw centerlines, then drill pilot holes with a self-centering bit. Strip away the tape, and screw the plates in place.

3. Finesse the fit

Your newly installed door is likely to be a bit askew, but here's where cup hinges really shine. The adjustment screws on the hinge allow you to fine-tune the door's position on the cabinet case. With some cup hinges, the mounting plate can be shifted up or down to make vertical adjustments. In other types, the plate remains fixed, and all adjustments are made by turning screws on the hinge arm assembly. If your screws have a Pozi head, use a Pozi driver to avoid damaging screw heads.



Build a Knockout Knock-Down Desk



An elegant, five-piece base stores compactly and assembles easily with interlocking joints.

By Nancy R. Hiller

Style that travels well. Made from walnut, the base owes its strength and portability to well-made lap joints.

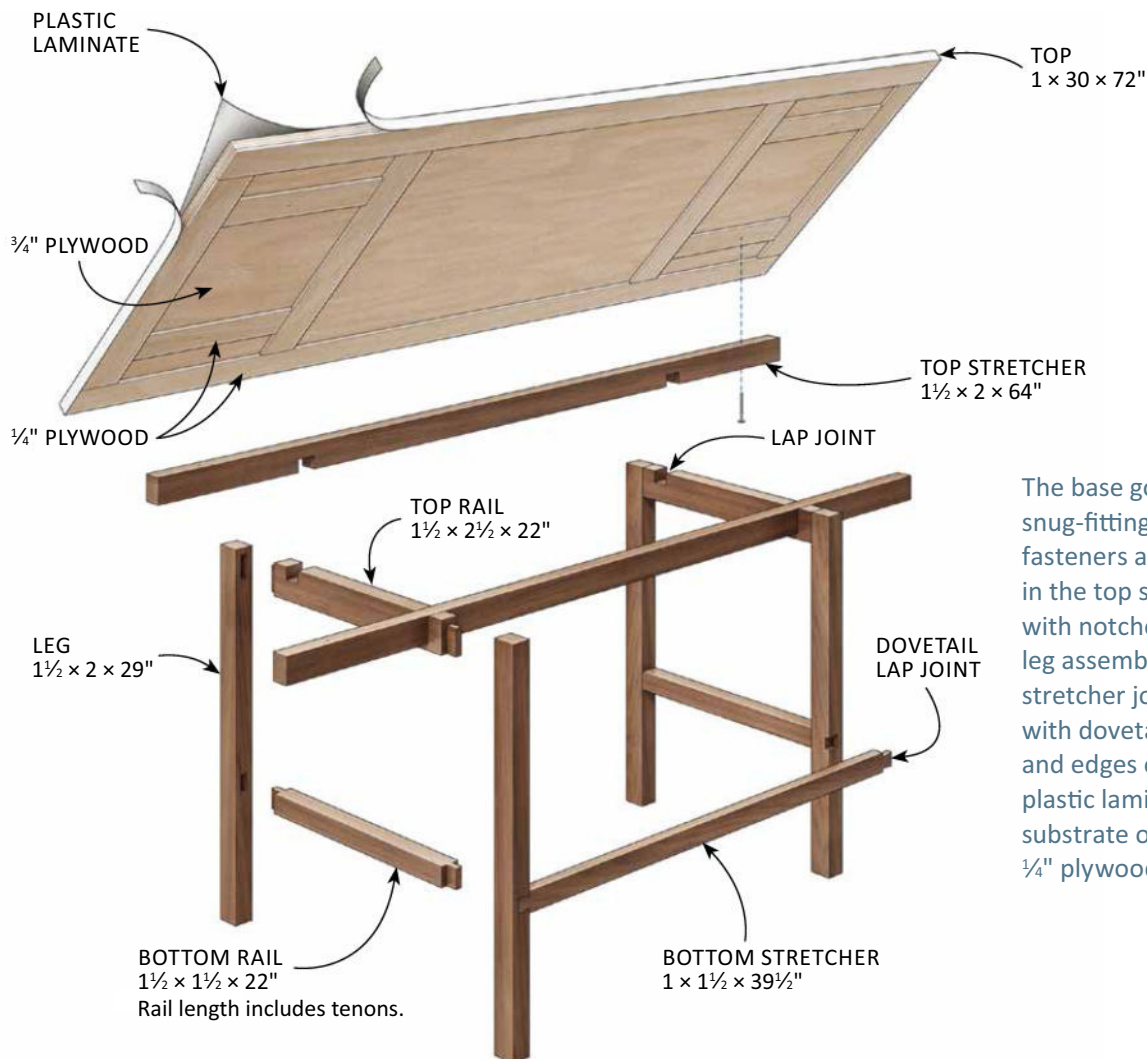
When a friend learned that she'd be moving to Connecticut, via a year of research at Princeton University, it was clear that she would need an easily transportable desk. She asked me to design one with a simple Danish Modern feel, a spare, functional style that became a popular genre of Mid-Century Modern design. The desk I came up with combines clean, contemporary lines with traditional joinery. It's extremely sturdy when assembled but surprisingly easy to take

apart for moving—exactly the features my friend wanted. The key to this combination of strength and convenience is precise, interlocking joinery.

As shown in the photos and drawing, the base breaks down into five parts: a pair of leg assemblies and three stretchers. While the leg assemblies are constructed with traditional mortise-and-tenon joints, the stretchers are simply pressure-fit into place. Lap joints can be extremely strong if they're well made.

The desktop can be made of anything practical: solid wood, a veneered panel, or plywood covered with plastic laminate. The last option is what we used for the desk shown here, and I ordered standard white Formica for a true Mid-Century Modern vibe. The base is built from black walnut for contrast. The desktop is fastened to the base using four 2½" washer-head screws that are driven in counterbored holes near the end of each top stretcher.

Leg Assemblies, Stretchers and Top



The base goes together with snug-fitting lap joints—no fasteners are required. Notches in the top stretchers interlock with notches in the top rails of leg assemblies. A single bottom stretcher joins the rear legs with dovetail lap joints. The top and edges of the desktop are plastic laminate, applied to a substrate of 3/4" plywood and 1/4" plywood backing strips.

Basic construction sequence

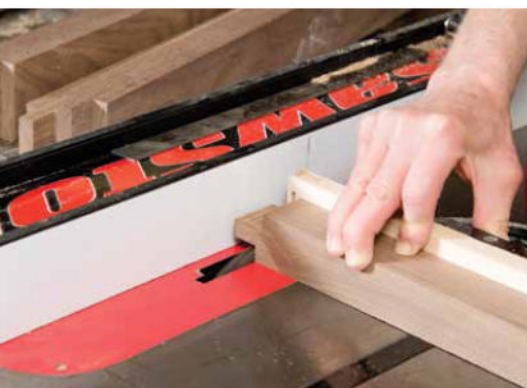
- Build leg assemblies.
- Cut stretchers and lap joints.
- Make the desktop.
- Fasten the top to the stretchers.

Fast, precise layout. Clamp the legs squarely together to quickly and accurately lay out the mortises. Eliminate some measuring by marking directly against a lower rail that is held square to the legs at the mortise location.



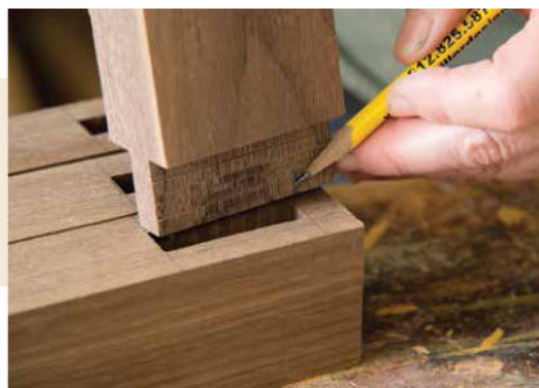
Leg assemblies go together with mortise-and-tenon joints

I rely on my mortising machine for cutting mortises, but you could also do this work with a plunge router, and use a chisel to square each mortise end. I transfer the mortise thickness to the rail ends with a marking gauge. Then I set up a stack dado in my tablesaw to cut the tenons. Rather than risk making tenons too thin, I usually allow for a small amount of paring with the chisel to get tight-fitting joints.

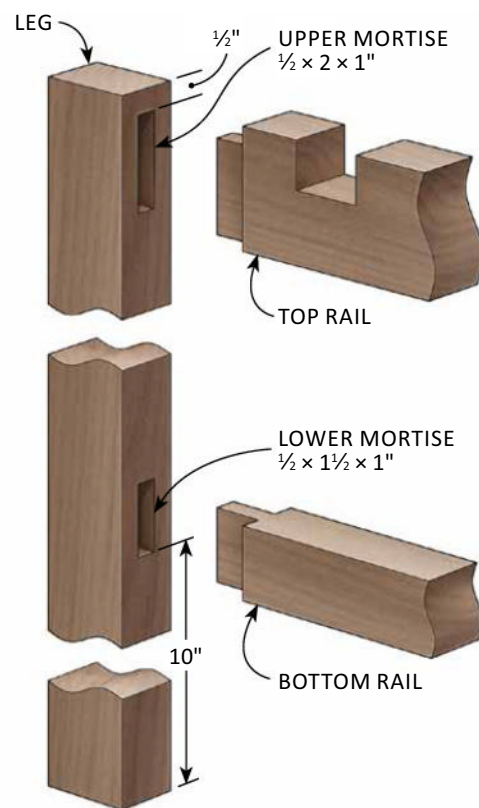


Make multiple passes. Guide each rail against the miter gauge, and use the tablesaw's fence as a stop when cutting tenons. Several passes through the stack dado complete each cheek cut. The fence also aligns top rail shoulder cuts.

Mark shoulder cuts. Hold the top rail tenon over its mortise to lay out the shoulder cutline.



Leg & Rail Joinery Details



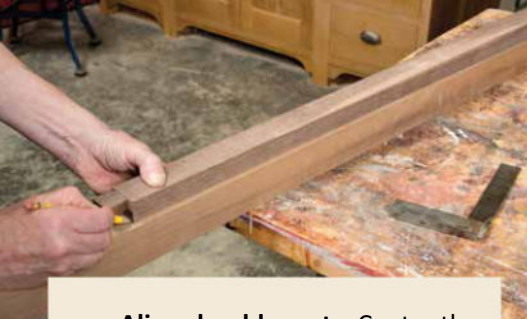
Compare diagonals. Test for square as each leg assembly gets clamped together. If diagonal measurements aren't identical, rack the assembly slightly until they are.



Tap together. It's smart to test-fit all joints before final assembly. You're ready for glue-up when joints need to be tapped together with a rubber mallet.



Stretchers join leg assemblies with two kinds of lap joints



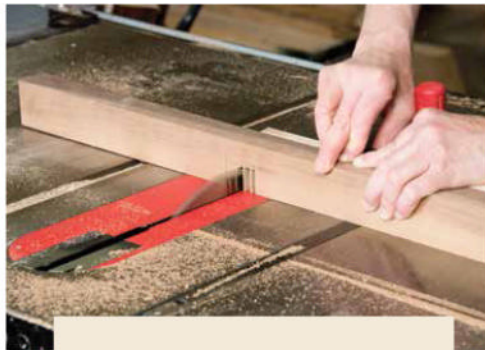
Align shoulder cuts. Center the completed bottom stretcher on each top stretcher, then mark the inner shoulders of top stretcher lap joints. Position top stretchers where they will lap over leg assemblies to complete your lap joint layout.

The lap joints that connect the three stretchers to the leg assemblies need to be snug, in order for the fully assembled base to provide a solid work platform. That's why I final-sand the leg assemblies and stretchers before cutting these joints. Any significant sanding after completing the joints can loosen the fit.

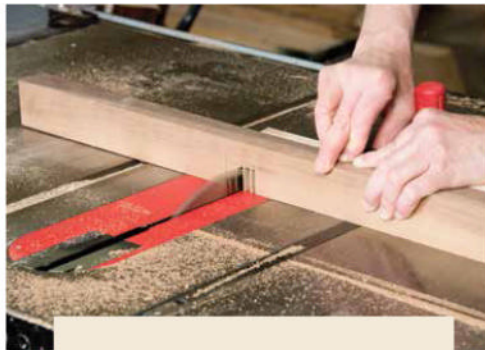
This part of the project involves both hand-cut and machine-cut joints. I do the handwork first, making the dovetail lap joint that connects the bottom stretcher to the rear legs. For complete step-by-step details on making this joint, see "Joinery Class" (page 66). Whether I'm cutting joints by hand or machine, accurate results depend on exacting layout work. With lap joints, I never measure and mark. Instead, I align the parts exactly as they will intersect and mark against the intersecting edges with a sharp pencil or my marking knife.



Aim for a mallet fit. Test-fit and pare the joint until it can go together with a few light taps from a rubber mallet.

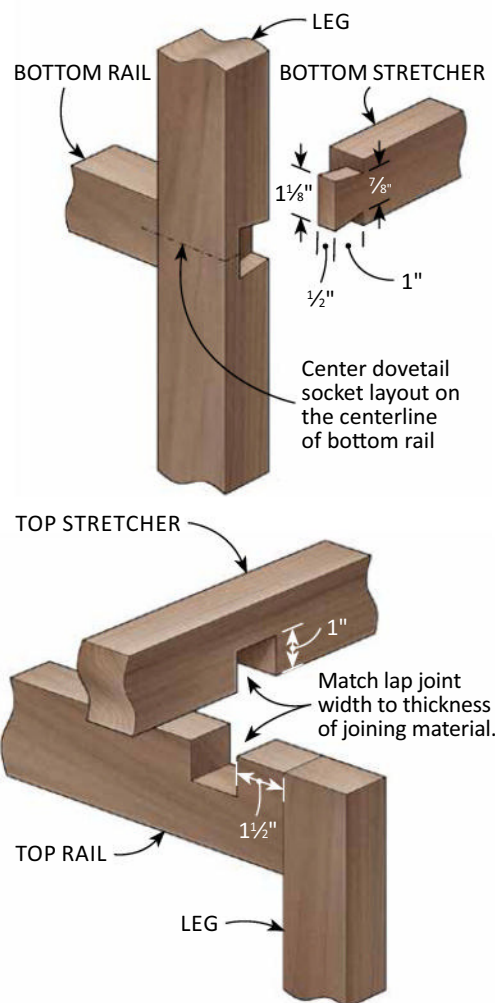


Eyeball the alignment. The laps in top rails can be cut just like those in the stretchers, guiding the workpiece against the miter gauge. Get the two shoulder cuts exact, then quickly cut between them. Test the fit of each joint, and shave off a little extra if necessary.



Cut kerfs, then chisel clean. Because of the cutting depth and precision required, I forego the stack dado and kerf out the waste for each lap joint with a finish-cutting blade. With the stretcher held against the miter gauge, I cut just inside the layout lines and clean up the bottom of the joint with a chisel.

Lap Joint Details



Plastic laminate makes a durable, attractive work surface

This desk could have a solid wood top, but plastic laminate (often referred to as Formica) is in keeping with the Mid-Century Modern style that inspired the spare, functional design. If you go with laminate,

use $\frac{3}{4}$ "-thick, cabinet-grade plywood as the substrate; it's stronger and lighter than particleboard or MDF.

I glued and nailed 2"-wide strips of $\frac{1}{4}$ "-thick plywood along the outside edges of the

panel to give the top thicker proportions. I also installed $\frac{1}{4}$ "-thick strips where the top rests on the leg assemblies and as backing at the ends of the stretchers. These details are shown in the drawing on page 51.

Tips for installing plastic laminate

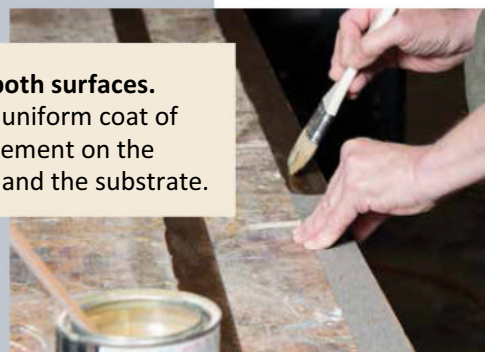
- Get surfaces smooth and clean before glueup.
- Cut laminate carefully. Allow about $\frac{1}{4}$ " of overhang around the substrate. Use a laminate-cutting blade and make sure to support the thin material close to the blade, to minimize chatter during the cut.
- Apply a thin, even layer of adhesive to both surfaces. A small brush works well on laminate strips and substrate edges. A straight length of scrap laminate is a good spreader on large, flat surfaces. Smooth away ridges and thick spots.
- Never join laminate to substrate when the adhesive is still wet. Wait for the glue to dry; it shouldn't come away on your finger.

- Do edges first. Attach and flush-trim two parallel edges of the desktop, then the remaining edges, then the top.

2. Roll it on. When the adhesive is dry to the touch, press an edge in place and roll it flat using a roller tool.



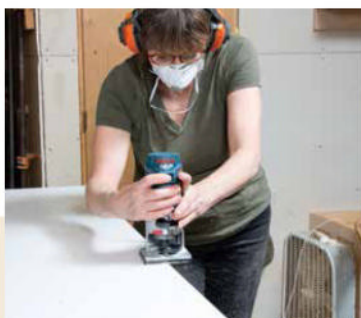
1. Coat both surfaces. Spread a uniform coat of contact cement on the laminate and the substrate.



3. Trim all around. With a flush-trim bit in a trim router, remove the excess laminate along both long edges and at the ends.



4. Align over dowels. Use $\frac{1}{4}$ " dowels to separate both tacky surfaces while aligning the laminate to overhang the plywood evenly. Dowels can be spaced about 12" apart. Remove one dowel near the center, and press the laminate in place with a roller. Remove adjacent dowels, and roll down the laminate, working toward the ends. Give the top a thorough rolling before you flush-trim with the router.



5. Join base to top. Drive four $2\frac{1}{2}$ " washer-head screws in counterbored holes. Locate holes 4" from top stretcher ends.



Manage messy wires with desktop grommets

Today's assortment of office equipment can easily create an unsightly mess of wires and cables. Desktop grommets can help you tame the tangle. If you're a woodworker, you probably have what it takes to install grommets in desktops and countertops made from wood, plastic laminate, or solid surface material.

Your first task will be to select the size, style, and color (or finish) of your grommets. Woodcraft stocks a good basic selection of grommets; go online for more. The simplest grommets are small circles of plastic designed to fit in 1½"-dia.

holes. For extra convenience, you might want to consider an "active" grommet that incorporates an electrical outlet, along with one or more USB ports (see photo at right).



Size, shape, finish & function. Desktop grommets are available to suit a variety of aesthetic and practical applications.

When installing grommets, don't be fooled by the flange

No matter what size or style, a desktop grommet usually has a liner that fits inside the opening and a flanged top edge that's designed to cover the opening. You could cut a grommet opening with a jigsaw, but this leaves a

rough, uneven edge that will look terrible should the grommet be misplaced. Then there's the risk that the grommet flange might not completely cover the opening. For best results, cut grommet holes with bits rather than blades.



Drill small grommet holes with a Forstner bit. Masking tape helps to reduce the chance of chipping brittle plastic laminate. If possible, clamp a piece of scrap against the underside of the desktop to ensure a clean exit for the bit.

Route perfect circles with a baseplate jig. To make clean, accurate holes for larger grommets, a pivot pin in the router baseplate creates an easy-to-use circle-cutting jig. If you don't want to make your own version, consider buying the Jasper baseplate jig, which will cut circles from 1" to 7½"-dia., in increments of ⅛" (inset photo).

The Jasper baseplate jig is designed for use with a plunge router and a solid carbide, ¼"-dia. upcut bit. Adjust the router's depth stops to complete the hole with a series of ¼"-deep passes. Before you start, make sure to mount a temporary backer block on the underside of the desktop with double-stick tape.



K.I.S.S. Mortising Jig

Edge clamps put pressure where it's needed most

By Ken Burton

I've built hundreds of jigs over the years, and my "keep it simple..." design ethic often means that a jig gets tossed when the job's done. A "keeper" jig must not only be accurate; it also has to be easy to use, even after spending months on a shelf. This mortising jig meets my "keeper" requirements nicely.

Made from plywood, T-track hardware, and a few Bessey edge clamps, my jig fixes a workpiece against a sturdy fence for plunge-routing edge or end mortises. The broad top of the fence provides a stable platform for the router base. Adjustable stops on the T-track set the length for your mortises. By extending the jig's plywood base beyond both fences, I created "feet" for clamping the jig to a workbench. Although the photos show me using an oversize auxiliary base on my router, the jig will work with any mid-size router equipped with a standard edge guide.

Simple and strong. Removing the locking screw from a Bessey edge clamp permits the metal tab to hook around a cleat. If clamps are needed for other uses, they can be freed from the jig by unscrewing the clamping block from the base. Faceting the clamp handles (I used my belt sander) makes them easier to slide out of the jig.



Make the jig, then make it work for you

The fence and clamp bar are laminated from strips of $\frac{3}{4}$ " and $\frac{1}{2}$ " birch plywood. To ensure straight, square inner faces, I cut the strips $\frac{1}{8}$ " oversize, and then trimmed the working faces flat after assembly. To make matching dados for the clamp-holding cleats, cut a single dado in a larger piece of plywood, then cut out individual

dadoed strips. Gluing and screwing the strips together is faster than using clamps. Attach the upper fence to the base so that its inner face is flush with one edge of the base cutout. When screwing the clamp bar to the base, use a spacer to keep this part parallel with the fence.

Edge Mortising in 3 Steps

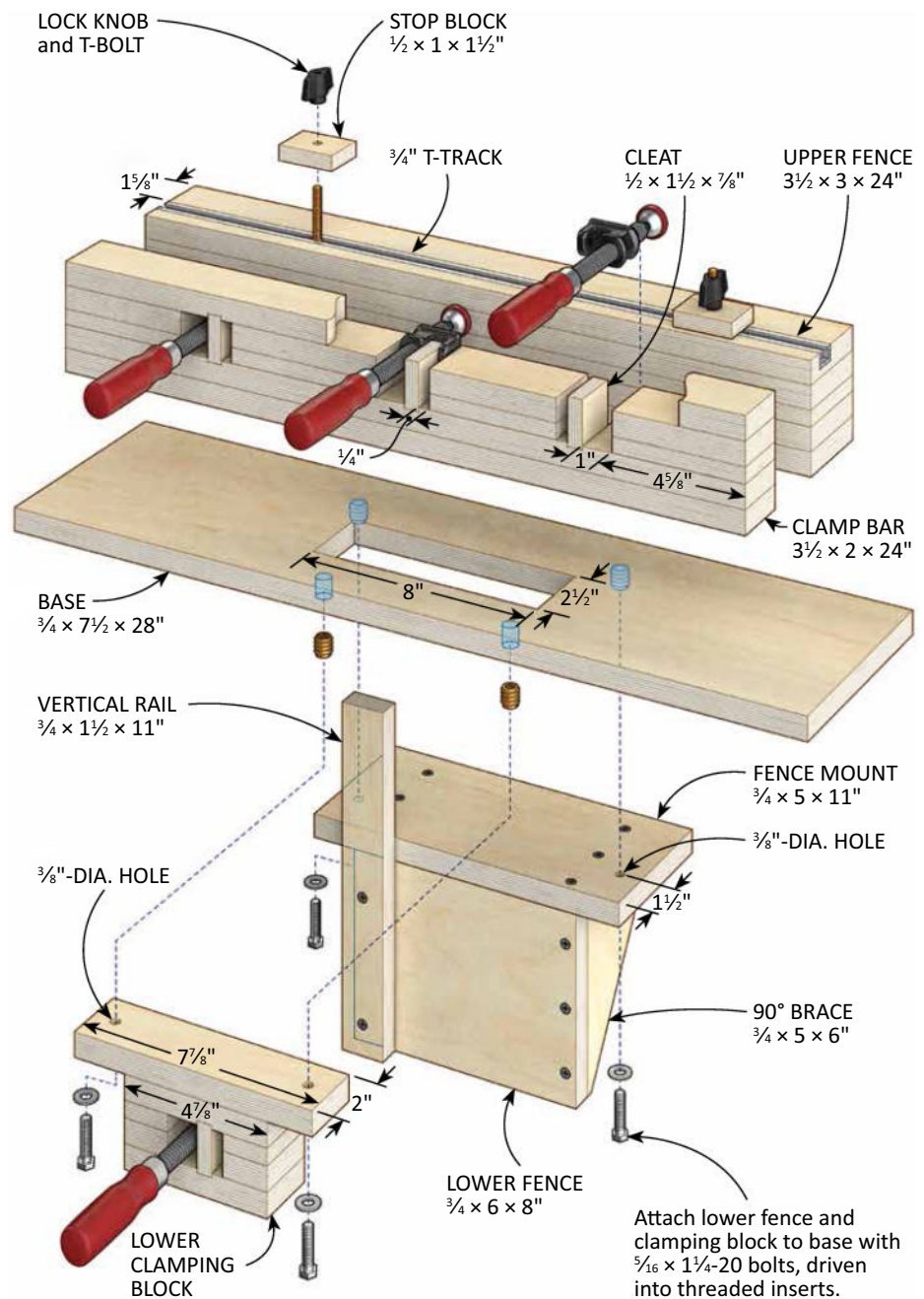
1. Clamp the workpiece in the jig. Make sure that the mortise layout is roughly centered and the workpiece top edge is flush with the top of the fence. To save time for identical mortises, cut a spacer to rest under the workpiece, and mark the end of the workpiece on the inside face of the fence.

2. Adjust edge guide & stop blocks. Place the router on the fence, and adjust the router's edge guide to register against the fence and center the router bit inside your mortise layout. Adjust the stop blocks to set the location and length of your mortise.

3. Plunge-rout in stages. Adjust the plunge depth to rout the full depth of the mortise in a series of shallow (about $\frac{1}{4}$ "-deep) cuts. Rout from right to left so that the bit's rotation pulls the guide toward the fence. Raise the bit at the end of each pass, then rotate the depth stop turret to set up the next cut.

Tip

To ensure that the mortises line up, mark a "clamp side" on each piece and make sure that that face is properly oriented on your jig when mortising.



Add a fence and clamp for end mortising

Like the jig's upper elements, the lower fence and lower clamping block are glued and screwed together. When making and attaching these parts, pay attention to two critical details: 1) The broad working face of the lower fence should be flush with the inner face of the upper fence; and 2) The vertical rail should be perpendicular to

the top face of the upper fence. The lower fence and lower clamping block are secured to the jig's base with $\frac{5}{16}$ " hex-head bolts that are driven into threaded inserts (see drawing, previous page). I made the attachment holes about $\frac{1}{8}$ " oversize to ensure proper positioning of the two lower parts.



Bolt these to the base. Align the lower and upper fences when tightening the bolts.



Set, slide, cinch. Set your stock against the vertical rail, slide the top end flush with the upper fence, cinch both clamps, and you're ready to rout.

End Mortising

After bolting the fence and clamp mount to the base, cantilever the jig off your bench as shown in the photo at right. From here, end mortising isn't much different than edge mortising: Lay out a mortise on the end of your first piece, clamp it against the rail, set your stops, adjust your router, and take the plunge. (Note: To direct more clamping pressure to narrow pieces, set a wider piece of scrap between the clamp and workpiece.)

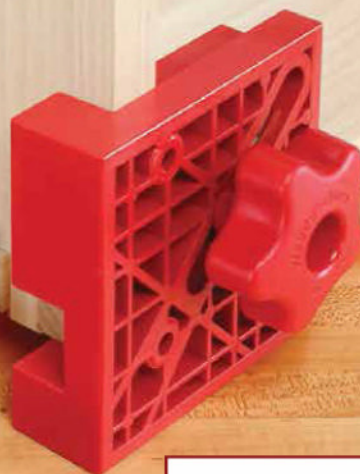


Easy repeatability. With stopblocks locked in place on the T-track and the workpiece held fast against the vertical fence, the jig is set for quickly routing end mortises in multiple rails.

Assemble Projects THE EASY WAY



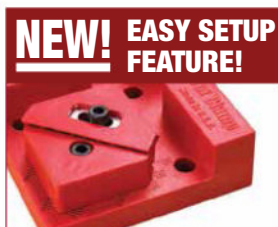
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Asian-Inspired Vase

A simple accent to give armchair nature lovers a breath of fresh air.

By Marlen Kemmet

This project combines some unlikely ingredients—a glass test tube and some scrap lumber—to create a celebration of natural beauty that makes a great tabletop display. Inspiration came from the Asian art of flower arrangement, a “less is more” philosophy that favors individual sprigs and blooms over big bouquets. Incorporating curves, arcs, and rounded

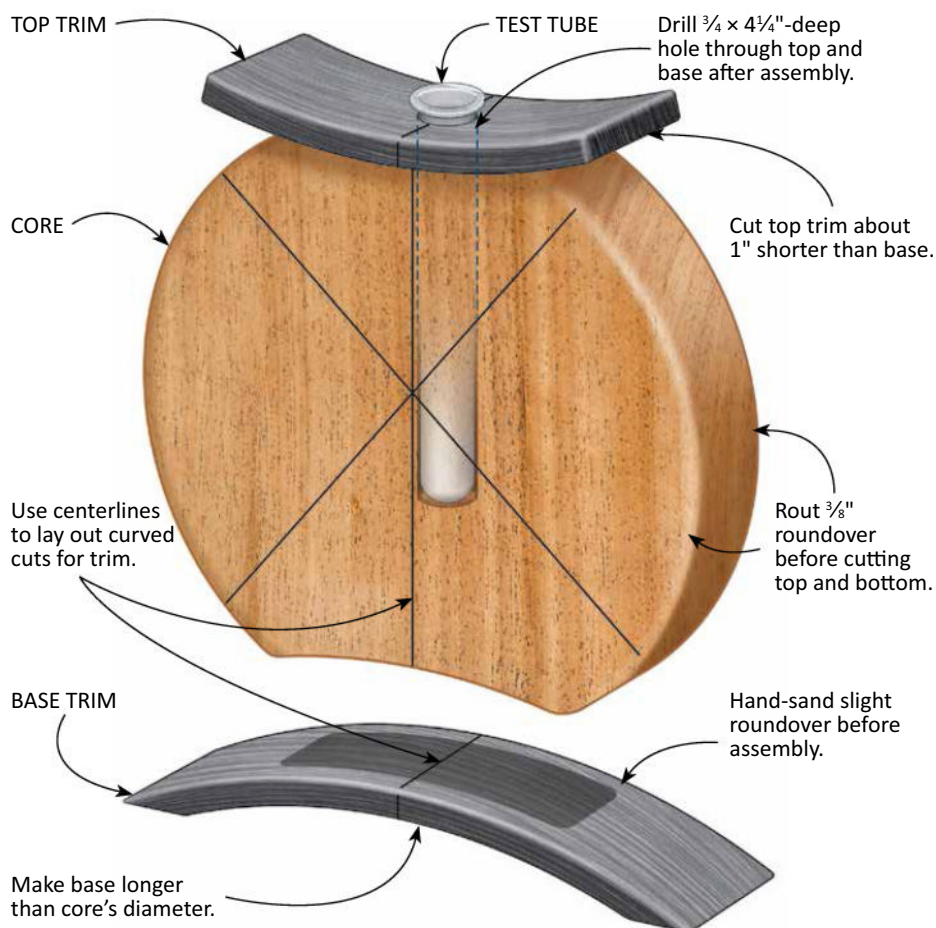
edges into the design acknowledges the curved forms common in Asian architectural styles.

I’ve made quite a few of these vases in a range of sizes, using a variety of different woods. The sizing and construction details I’ll share here will enable you to create your own versions of this small but distinctive project.

Cut & Cold-Formed Curves

Draw, then saw the circular core. The curved trim is cold-formed on a clamping jig. Once the trim has been cut to final size, it can be used to lay out the curved cuts on the core.

You can adjust the core's size to suit your stock; 1¼"-thick stock suits vases up to 7". For larger vases, try 1½"-thick stock. The test tube restricts the arrangement size, so you won't want a core larger than 10". Make the trim strips ¾" wider than your core's thickness.



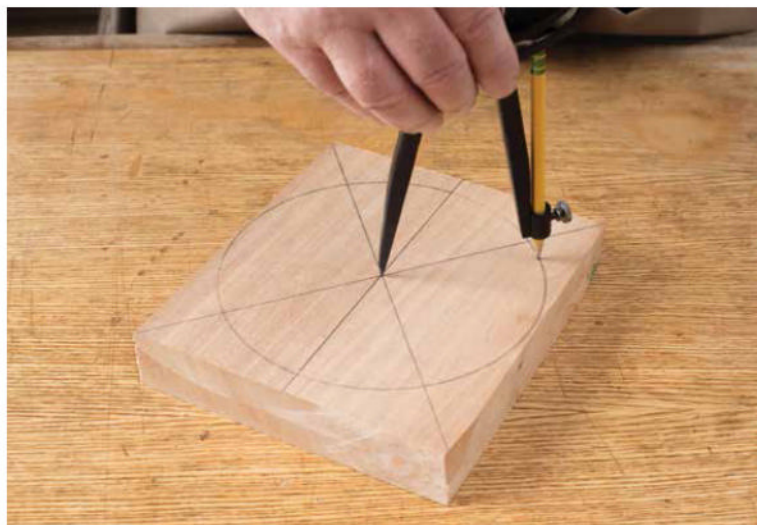
Size, saw, and sand the core

After laying out the core on your blank, bandsaw the circle, and use a disc sander to erase saw marks. Hand-sand the perimeter through 220-grit, and then rout the edges with a ⅜" round-over bit. Finish-sand the core, but try to leave a hint of the layout lines. They'll come in handy when positioning the top and base trim.

Create the base & cap with a bending jig

Put the core aside for now; it's time to make the curved base and cap pieces. I do this using a process called "cold-lamination," a simple way to persuade straight strips to follow a curve. All you'll need is a stack of straight-grained strips, a jig, glue, and a few clamps.

Build the jig shown on page 62. (To make matching forms, I laminated stock to create the



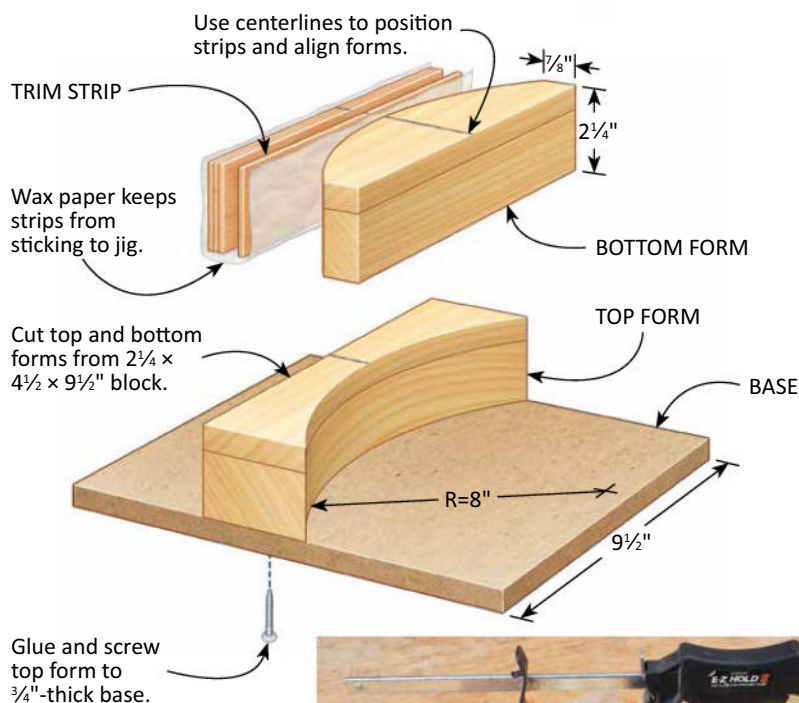
It's OK to round up. Adjust the compass to make the most of your scrap. Saw, and then sand to your line. Save the centerlines for positioning the top and base.

A simple form sets the curves



Rip the strips. Make the strips about $\frac{1}{4}$ " wider and longer than their finished dimensions so that you can trim to final size. To avoid overtaxing the blade, rip half-way then flip to complete the cut.

Make the bending form



Glue up the cap and base. Focus on keeping the centerlines aligned as you cinch the clamps.



$2\frac{1}{4} \times 3\frac{1}{2} \times 9\frac{1}{2}$ " blank, and then bandsawed an 8"-diameter arc.) To keep the strips from sticking, finish the jig with a couple coats of polyurethane and use waxed paper as shown in the drawing.

To make the laminations, I ripped a $2\frac{1}{4} \times 4 \times 8$ " block of mahogany into a stack of $\frac{3}{32}$ "-thick strips. (You can substitute any straight-grained wood, but you may need to adjust the strip width to handle the curve.) A bandsaw is my go-to tool for resawing, but I used a tablesaw outfitted with a thin-kerfed blade and a zero-clearance insert for this small resawing assignment. It's faster and you get strips that require little clean-up. Cut four strips for each curve.

To assemble the trim, coat strips evenly with glue, then clamp them together between the forms. The strips have a tendency to slide under pressure, so keep an eye on the centerline and edges, and adjust as needed. Allow at least four hours for the lamination to dry. Remove the assembly, then repeat with the second piece of trim.

After making the curve, scrape and sand any squeeze-out from the edges, and then rip the trim to width. (I used my stationary belt sander and sanded to final width, but the trim is wide enough to rip at the tablesaw.)

To cut the trim strips to length, reposition the piece in the form and measure out from the centerline. Note that the top trim has square-cut ends, while the bottom trim is angled so that the vase can rest on a table top. Next, cut the trim with a fine-tooth handsaw and touch up the cuts at the disc sander. Finally, hand-sand a slight round-over along all edges and ends and knock down the sharp corners.

Follow the lines to fit the parts

Using the base and top laminations as templates, align the centerlines and mark the arced cuts onto the core. (If you're making several vases in different sizes, label the parts to avoid any mismatches.) Next, saw the bottom and top of the core and then check the fit of the base and top against the core. To sneak up on a perfect fit, you can apply sandpaper to the trim and use it as custom sanding block.

At this point, you can finish-sand the base and top. For added contrast, I dyed the trim black (dying the trim is easier before assembly). It took three coats to achieve an even ebony-like hue.

With the parts cut and colored, you're ready for assembly. Carefully position the base trim so that its edges extend evenly at both ends and at the front and back of the body. I used spacers to center the core on the base when clamping. Repeat this step with the top trim, adjusting the spacers' thickness to suit.

Finishing touches

Boring the hole after assembly isn't difficult, but to avoid a drilling mistake, set the vase solidly against stops, use a sharp bit, and start the hole slowly. To complete the hole, I attached the Forstner to a bit extender (See the Buyer's Guide on p. 76). In a pinch, you could use a hand-held drill and a spade bit.

The fastest and easiest way to finish small projects is with a can of spray lacquer. I finished a batch of vases over a weekend, spraying, buffing, and recoating until I achieved an even sheen. Three or four coats should do the trick.

Centerlines aid in assembly and drilling



Trace the trim. Use centerlines to align the top and base trim with the core, then make the curved cuts on the bandsaw.



Combine the curves. The bottom form doubles as a clamping caul. Shim the core to center it on the trim.



Don't forget the test tube. Use the bottom bending form and a stop block to position the vase. Bore through the top and core with a sharp Forstner bit.



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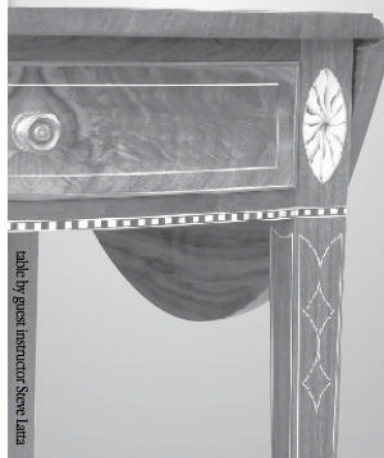
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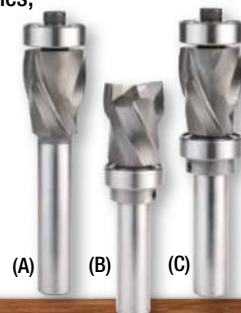


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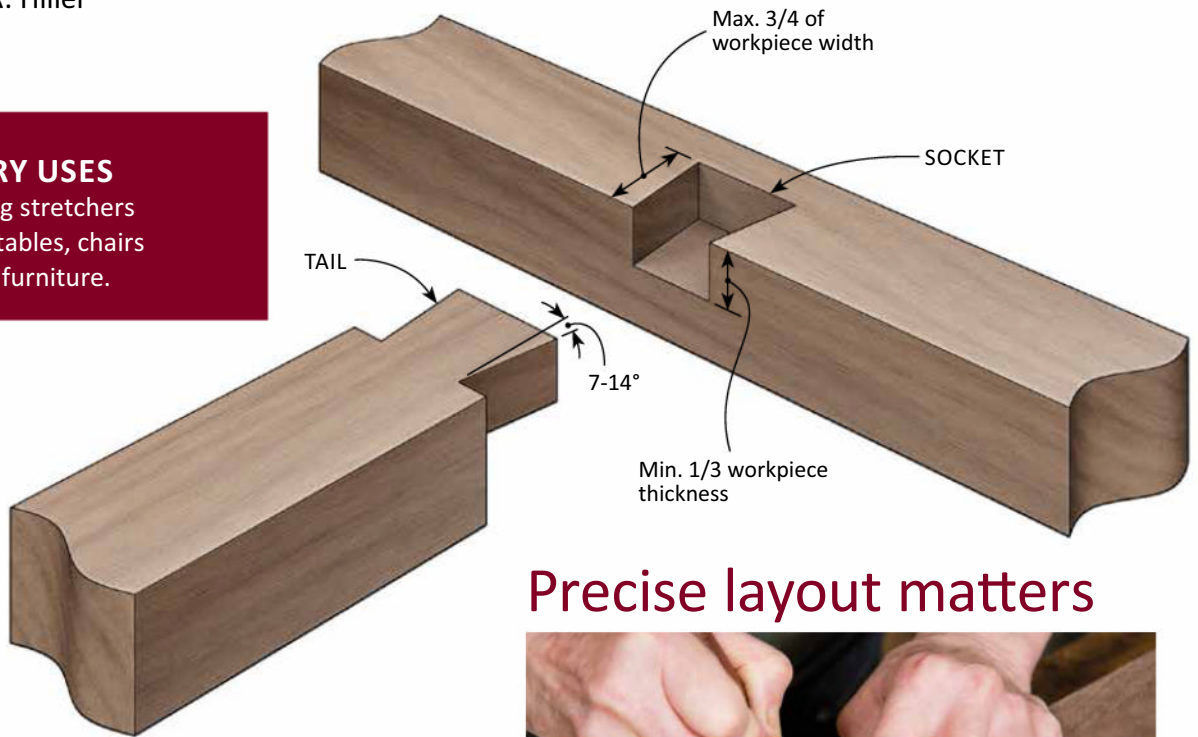
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Dovetail Lap Joint

By Nancy R. Hiller

PRIMARY USES

Connecting stretchers to rails in tables, chairs and other furniture.



The half-lap dovetail is a remarkably strong and versatile joint. Its most common application is joining top rails to the sides of a carcass (see page 36-37) or to the legs of a table. Due to its wedge shape, the dovetail is extremely effective at locking parts together. In fact, because of its great mechanical integrity, a well-fitted, unglued half-lap dovetail can be an ideal joint for knockdown furniture, as shown in the desk on page 50. (It's this application that's shown in these photos.)

As for the dovetail angle, it depends on the wood: for hardwoods, I typically use a 7° slope, while softwoods get a 9-14° slope. Keep the tail fairly wide for strength, and remove no more than 2/3 the thickness of the stock under the tail.

In spite of its angles, the joint is not hard to make. You could use machines to do some of the work, such as cutting the initial half-lap at the tablesaw, but I prefer to make the joint entirely by hand. Doing so is quick, and I get a lot of satisfaction from the direct contact of my hand tools with the material, especially when I end up with a nicely fitted joint.

Precise layout matters



Pencil, then knife. Use a pencil to mark the dovetail shoulders completely around the workpiece. Then knife the sections to be cut, creating a fine line while severing the wood fibers to produce a sharp shoulder.

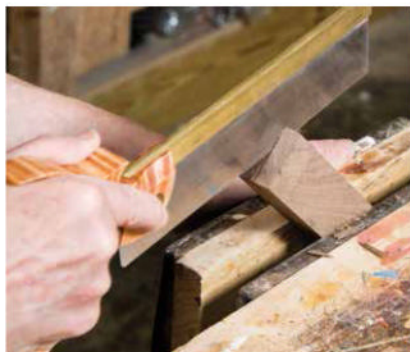


Scribe the lap. Mark out the thickness of the lapped section using a marking gauge. Its scribed lines will help guide your saw. Keep the gauge setting afterward.

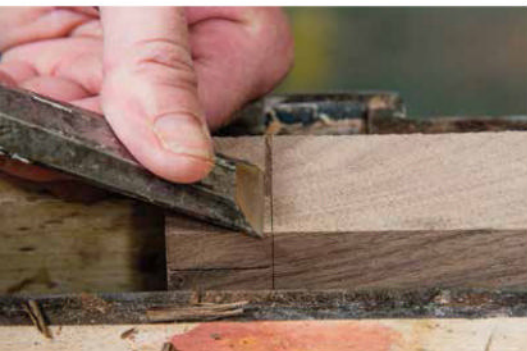
Begin with a hand-cut half lap

Use a sharp, high quality backsaw with a short blade to cut the initial half-lap. Guide starting cuts with your thumb, taking a few light initial strokes, and then carefully staying to the

waste side of the scribe line throughout the process. If your cuts aren't perfect when the sawing is done, you can pare excess material to the scribe lines using a wide chisel.



Make a 3-stage cut. Angle the workpiece away from you, keeping the saw horizontal as you cut, and stopping just short of the shoulder mark. Then pivot the piece toward you and repeat the maneuver, working slowly and precisely. Finish with the piece vertical, laying the saw in the previously cut kerfs as you work down to the shoulder line.



A guiding notch. Begin the shoulder cut by making a guide notch for your saw. Using a sharp, wide chisel held at an angle, gently pare in about $\frac{1}{32}$ ", stopping at the line you scribed with a knife in the first step.



KEYS TO SUCCESS

- Cut the tail first, then use it to lay out the socket.
- Use a good quality dovetail saw.
- Create razor-thin layout lines with a marking gauge and marking knife.

Saw the shoulder. Now saw the shoulder down to the cheek, again staying to the waste side of the line.

Joinery Class

Make the tail

Mark out the dovetail on what will be the outside face of your finished joint. You can do this using a commercial or shop-made dovetail gauge, a bevel gauge, or even a straightedge. Work carefully, but don't worry if the slope of the tail isn't "perfect." Whatever it is, you'll be laying out the socket to match it so that the parts mate precisely for a tight fit.



Lay out the tail. I usually mark out dovetails with a simple gauge I made when I was 20. After marking the face, use a small square to extend the lines across the end of the workpiece to guide your saw cuts.



Saw the shape. As you saw each tail edge in turn, clamp the workpiece in your vise with the cutline perpendicular to the bench, which aids cutting precision. Pay special care to sawing squarely from front to back. Afterwards, use a small square to check that each edge is square to the face of the tail, which is especially important to a well-fitted joint. If necessary, pare with a chisel to make corrections.

Lay out the socket

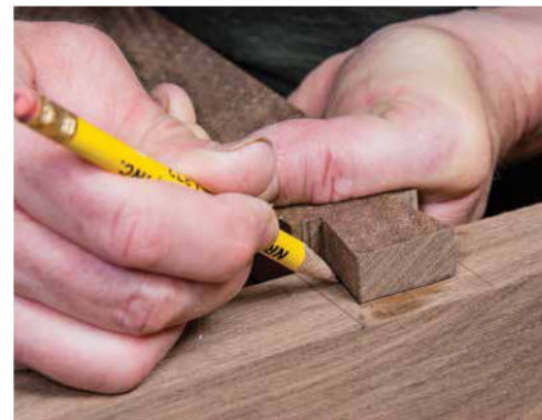
Start by marking the full width of the dovetailed rail across the outer face of the mating piece (here, the KD Desk leg on page 53) at the location of the socket. Then extend these lines squarely across the adjacent inner face.



Gauge the tail length. Set a second marking gauge to register the exact length of the dovetail.



Transfer the length. Use the set gauge to scribe the length of the socket onto the mating piece.



Trace the tail slope. Snug the dovetailed rail up against the mating piece, and trace the tail angles with a knife or very sharp pencil. Then extend the lines at the neck of the tail squarely across the adjacent face, and mark the socket depth on that face using the marking gauge you set when scribing the lap thickness. (See page 66.)

Saw and chop the socket

The first step in cutting out the socket is to excavate most of the waste by first sawing the sides, and then chopping out the rest of the material with a chisel and mallet. Throughout this “roughing” step, make sure to stay a bit inside your layout lines.



Saw the sides. Cut just inside your tail's side layout lines, holding your saw at 45°, and stopping at your socket length and depth scribe lines.

Chopping spree. Begin by chopping out the waste in layers, working toward the bottom of the socket. Angle your chisel blade slightly upward to ease cutting as you tap with your mallet. Stop just short of your socket depth line, and then begin work on the socket sides.

For that, tap downward, carefully holding your chisel vertically, and continue until you have removed all of the waste in the socket to just a bit inside your layout lines.



Leaning in. It's OK to undercut the socket sides a tiny bit for a good fit. Just don't remove too much at the top edges or things can get ugly.

Pare to fit

Set your mallet aside and pare with your chisel to arrive at the perfect fit. Alternate between the socket bottom and sides, removing a tiny bit at a time as you work your way toward your scribed layout lines. Test the fit as you go, taking care not to damage the edges of the parts as you assemble and disassemble the joint.



A perfect pare. When paring, hold the chisel so that your dominant hand powers the cut while your secondary hand firmly guides the tool.



Friction fit. The ideal fit should be snug enough to require a few light hammer or mallet taps. Be sure to use a piece of scrap to prevent damage to your workpiece.

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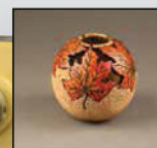
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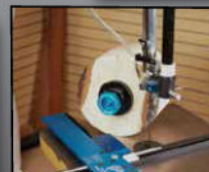
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Staying Sharp With Diamond Stones

The star of Rough Cut prefers to take a diamond-studded route to the perfect edge



Every woodworker knows how important it is to work with sharp tools. We also know there are plenty of opinions about how to get chisels and plane blades sharp and keep them that way. When I worked as a carpenter, I used oilstones. Later on, when I studied woodworking at the North Bennet Street School, I learned how to get razor-sharp edges using waterstones. But I also discovered how quickly waterstones become dished and require flattening. The first time I used a diamond stone, it wasn't for sharpening, but for flattening my waterstones. Eventually, I got

tired of flattening my waterstones and went straight to diamond stones made by DMT—a company right in my own neighborhood.

Today diamond abrasives are the mainstay of my sharpening system—effective not just for chisels and plane blades but also for scrapers, router bits, kitchen knives and just about any edge that needs to be sharp. Although diamond sharpening stones cost more than other types, they more than earn their keep in my shop. I like the fact that diamond stones deliver years of trouble-free performance—with no flattening or other maintenance required.

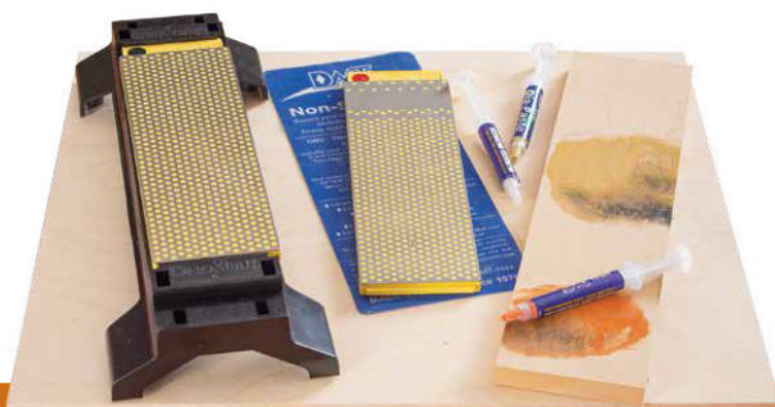
How to use diamond sharpening stones

Start small

Diamond sharpening stones come in a wide variety of grits and sizes. There's no need to buy a full range of stones if you're just starting with diamond abrasives. Skip the extra coarse stones if you've got a grinder to reshape a badly damaged edge. I recommend starting with a couple of the finest stones because these are the ones you'll reach for most frequently to restore an edge.

Keep it simple

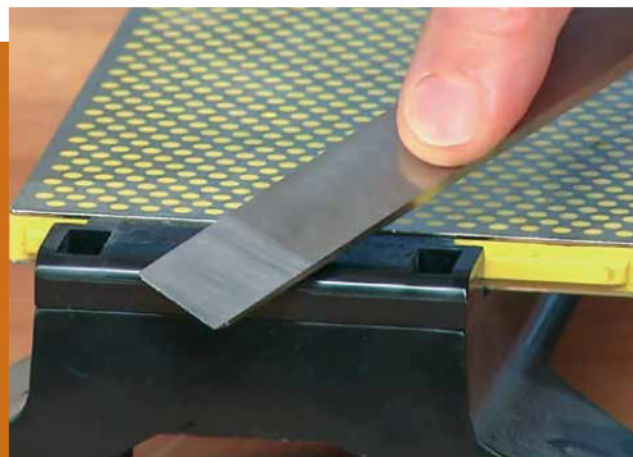
In my shop, I store my most-frequently used diamond stones right next to my chisels and hand planes. Getting diamond stones set up for sharpening is pretty easy. The DMT stones I use can be placed on a nonskid pad or on a specially designed stand. Both methods keep the stone from shifting while you're sharpening, which is important. I use a wet rag to put a few drops of water on the surface of the stone before I start sharpening.



Two-sided stones & some paste. A pair of DMT stones provides four different abrasive grits, from coarse to very fine. Use a plastic stand or a blue vinyl pad to prevent a stone from shifting in use. For a final mirror polish on bevels and backs, three grades of super-fine diamond paste are available. Dispensed in syringe-type applicators, the paste can be rubbed over any flat surface.



Apply the end grain test. Taking a thin shaving across the end grain of a soft wood like pine is a reliable, age-old way to test the sharpness of a chisel or plane blade. It works best if you clamp a scrap piece of wood in a vise, as shown in the photo. Don't stop refining an edge until you can cut thin slices of wood without forcing the blade.



Scratches tell the story. The coarse stone leaves the most visible scratches on the metal. As you move through finer abrasive grades, scratches become finer and eventually undetectable to the naked eye.

Keep a damp rag handy to wipe down the stone after use. Like any sharpening stone, a diamond version should be cleared of swarf (loose metal filings) once you're finished sharpening.

Begin with the back

It's always smart to make sure the back of the chisel or plane blade is flat before you work on the bevel. This is especially true with any chisel (new or secondhand) that you haven't used before. I check the back of a new chisel or plane blade by rubbing the first $\frac{3}{4}$ " of the back along the edge of a fine diamond stone for half-a-dozen strokes or so. Then I examine the scratch pattern left by the diamond abrasives. A uniform scratch pattern indicates a flat surface. Hollow areas will be evident because they won't show the same scratch pattern. To take out a hollow, rub the back over a coarser stone and repeat the scratch pattern test until you get uniform results. Then remove the coarse scratches by finishing the back on a super-fine stone.

Sharpen the bevel until you detect a burr

After finishing with the back of the chisel, sharpen the bevel. I always hollow-grind my chisels and plane irons, but if you use a micro bevel, that's fine, too. Either way, sharpen up to the finest grit until you can detect a burr when running a finger up the back of the chisel. Remove the burr by going over the back and bevel lightly on your finest stone. Then reach for the paste, which I'll explain ahead.

Watch, listen and feel

Diamonds cut faster and deeper than other abrasive particles. If you're accustomed to oil or waterstones, you'll be surprised at how quickly diamond stones remove metal—even in the finer grits. Pay attention to the look and feel of your blades as you

sharpen, and even the sound they make as you move steel across the diamond-studded surface. Before long, you'll be taking full advantage of this sharpening technology.

Don't forget the paste

For the ultimate edge on a chisel or plane blade, I rely on specially formulated diamond paste that contains even finer diamond particles. The DMT paste I use comes in a hypodermic-type applicator that's easy to use. I use my finger to spread the paste on a scrap of hardwood plywood or MDF. Then I run the blade over the coated surface, noting when the grey paste turns dark with microscopic metal particles. Once you see the extremely sharp results you get from this final step, you'll want to do it every time you sharpen.

Tune in for more from *Tommy Mac*

You'll find Tommy's videos at our website (www.woodcraftmagazine.com) and at www.tommymac.us. Also check out Tommy's award-winning show, *Rough Cut - Woodworking With Tommy Mac*, on your local PBS station.

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A&C Entertainment Center (p. 36)

Router Bits:

1. CMT Pattern $\frac{1}{4}$ "SH $\frac{1}{2}$ "D 1- $\frac{3}{4}$ "CL 2- $\frac{3}{4}$ "OL #820290, \$26.99
2. Whiteside RU4900 Solid Carbide Spiral Upcut $\frac{1}{2}$ "Sh $\frac{3}{8}$ "D 1- $\frac{1}{4}$ "CL 3" OL #08K61, \$55.99

Hardware:

3. Cabinet hinge, antique bronze steel 2" x 2", pair #130403, \$9.99
4. Classic brass Arts & Crafts knob, aged bronze, 1- $\frac{1}{8}$ " diameter, 1521AZ #408810, \$27.59
5. Classic Brass Arts & Crafts backplate, aged bronze, 1526AZ #408830, \$15.99

Cup Hinges (p. 44)

1. Drill-Rite Hinge Jig and Bit #143958, \$11.50
2. Carbide-tipped 35mm bit #142511, \$28.99
3. Kreg Swing Stop #145822, \$29.99
4. Kreg Top Trak, 24" #145826, \$23.99
5. Vix bit for no. 5 and 6 screws #16141, \$12.99
6. Pozi screwdriver #150465, \$9.98

Knock-Down Desk (p. 50)

1. Small Pfeil Swiss-made marking knife #05B47, \$22.99
2. BORA mortising and marking gauge #153557, \$29.99
3. Jasper small circle jig, 1" - 7- $\frac{1}{2}$ " #143735, \$29.39

Sharpening with Diamonds (p. 72)

1. DMT Duosharp 8" Diamond Stone Fine/Coarse #140965, \$102.99
2. DMT Duosharp 8" Diamond Stone Extra Fine / Fine #146026, \$94.99
3. DMT Dia-Paste Diamond Compound Kit #829176, \$32.99

K.I.S.S. Mortiser (p. 56)

1. Bessey Single Screw Edge Clamp (4 needed) #141516, \$12.50
2. WoodRiver Standard T-Track, 24" #159894, \$9.99
3. T-Bolts: $\frac{1}{4}$ "-20 x 1- $\frac{3}{4}$ " (10 pack, 2 needed) #130435, \$7.50
4. T-Style knob: $\frac{1}{4}$ "-20 insert (2 needed) #85J95, \$1.30

Asian-Inspired Vase (p. 60)

1. Drill bit: $\frac{3}{4}$ " BORMAX Forstner-style bit #129989, \$27.29
2. Bit extension: 8mm x 125mm #144512, \$23.09

Finish:

3. General Finishes ebony water-based dye, quart #150773, \$18.50
4. Watco lacquer satin spray, 11- $\frac{1}{4}$ oz. #146950, \$9.99
5. Test tube #SU005, \$1.50 available from gourdmarket.com, 410-557-0664

Ulu Knife and Chopping Block (p. 28)

1. WoodRiver Ulu Knife Kit #161198, \$6.99
2. $\frac{1}{2}$ " Rare earth magnet (10 pcs.) #150951, \$13.69
3. Fein Multimaster 350Q #861224, \$199.99
4. $\frac{3}{8}$ " Multitool blade DeWalt Dwa4208, \$12.30 available from amazon.com

Router Bits:

5. Freud solid-carbide down-spiral, $\frac{3}{8}$ "D x 1- $\frac{1}{4}$ " CL x $\frac{1}{2}$ "SH #840349, \$50.97
6. Whiteside bowl & tray $\frac{1}{4}$ "R x $\frac{3}{4}$ "D x $\frac{1}{2}$ "SH #150511, \$35.49
7. Whiteside round-over, $\frac{3}{8}$ "R x $\frac{1}{2}$ "SH #24C24, \$27.99
8. Freud Quadra-Cut, $\frac{3}{8}$ "R x $\frac{1}{2}$ "SH #828712, \$39.97

Scraping Accessories:

9. Lynx 4pc curved scraper set #147419, \$21.50
10. Carbide burnisher \$50.00 available from bluesprucetools.com

Sanding Accessories:

11. Fein sanding disc kit #150652, \$14.98
12. Mirka 5" interface pad #147516, \$16.99

Finish:

13. ODIE'S Oil clear, 9 oz. #856038, \$27.99

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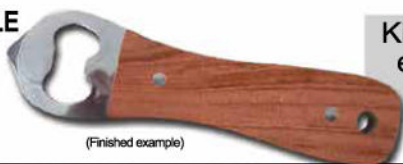
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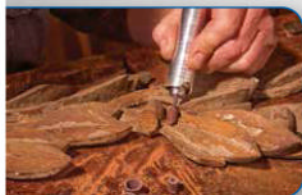
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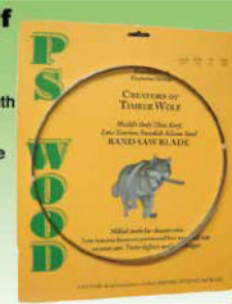
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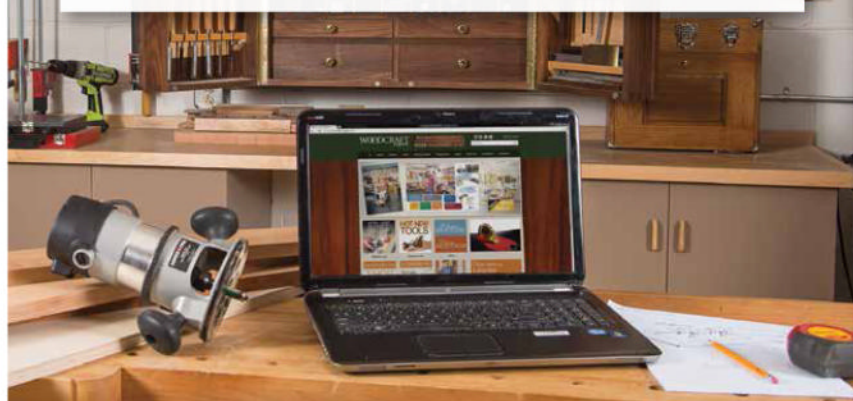
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