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ESSENTIAL SHOPMADE

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JIGS

86 FOUR JIGS FOR HANDPLANES

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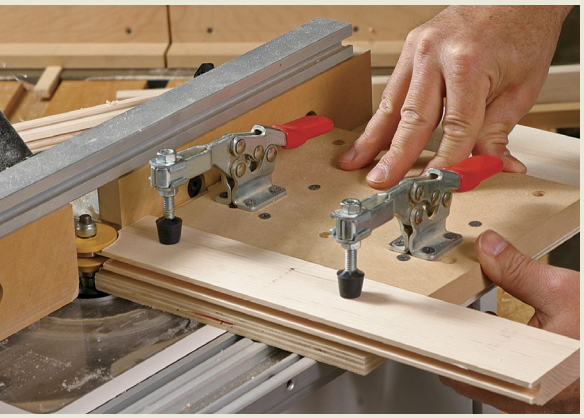

84 SLED FOR COPE-AND-STICK JOINERY

Cover photo: Tom Begnal

Router Table

At the Bench

Departments

The Taunton Press
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editor's letter

YOUR TOOLS NEED HELP

The first jig I ever made was a crosscut sled for the tablesaw. I quickly found out that the standard miter gauge was inaccurate, and worthless for pieces more than 6 in. or 7 in. wide. So I made a basic sled, much like the one on p. 31. From that moment on, my crosscuts were flawless.

At that point I still didn't understand quite what the word "jig" meant (it's any accessory that guides cutting action), but already I was a believer.

Basically, manufacturers cannot design a given tool for every task it might face. Even the best router or handplane sometimes needs help (call it "guidance").

Later on, I made my favorite tablesaw accessory of all, a tenoning jig that straddles the rip fence, a lot like the one on p. 27. It was quick to make and lightning fast to use—and it produces perfect tenons every time. Other jigs added new joints to my arsenal, such as splined miters (p. 45) and finger joints (p. 42).

A great jig is not overbuilt or underbuilt. And it is worth building. In this special issue, we've collected the most valuable jigs ever published in *Fine Woodworking* magazine, creating a shop reference you'll turn to again and again. I've built and used at least half of these. Most are so adjustable and versatile that they are built to last, like the mortising jigs on pp. 62-65. Others are so elegantly simple—like the sacrificial router-table fences on p. 76—that you'll just knock one together for the project at hand and discard it when the job is done.

Whether greenhorn or graybeard, you'll find indispensable jigs here that will improve your woodworking.

—Asa Christiana is editor of Fine Woodworking *magazine.*

Fine WoodWorking

Essential Shopmade Jigs

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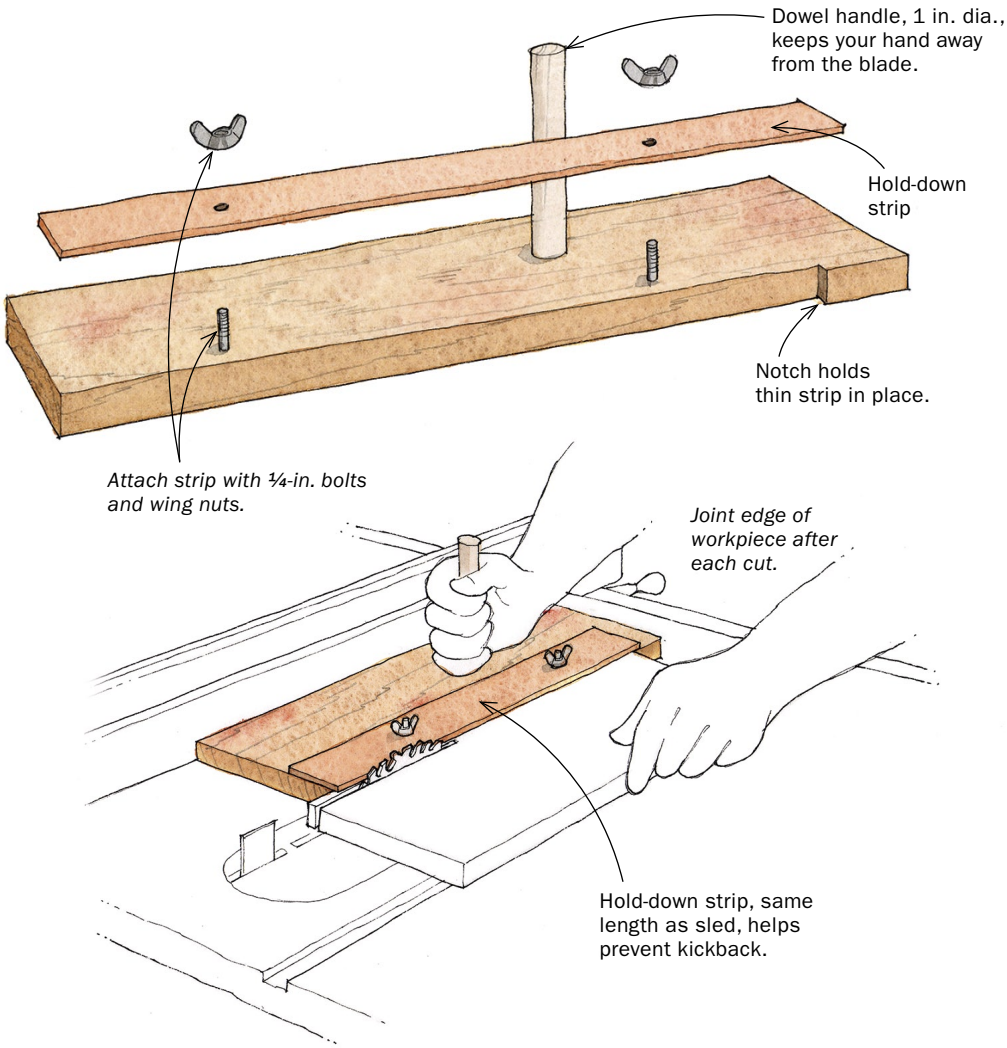
quick tips

EDITED AND DRAWN BY JIM RICHEY

Rip thin strips safely and accurately



Ripping thin strips can be challenging. It's difficult to do it safely with only the strip between the blade and rip fence. On the other hand, if you put the wider section of the board between the blade and fence, you'll have to readjust the rip fence for each cut, leading to inaccuracy. This glorified push stick safely rips thin strips of consistent width. The jig is a piece of ¾-in.-thick hardwood, 6¼ in. wide, with a ¼-in.-deep notch at one end. Install a 1-in.-dia. dowel handle about a third of the way from the back end and add a thin, 2-in.-wide hardboard hold-down strip to help prevent kickback. If your workpiece is thicker than the jig, shim up the safety strip with washers.

To use the jig, set the rip fence so that the desired strip thickness is left between the jig and the blade. Hold the workpiece with your left hand and slide it through. Joint the freshly cut workpiece to get a smooth side on the next strip.

—DAVID KILDAHL, Crookston, Minn.

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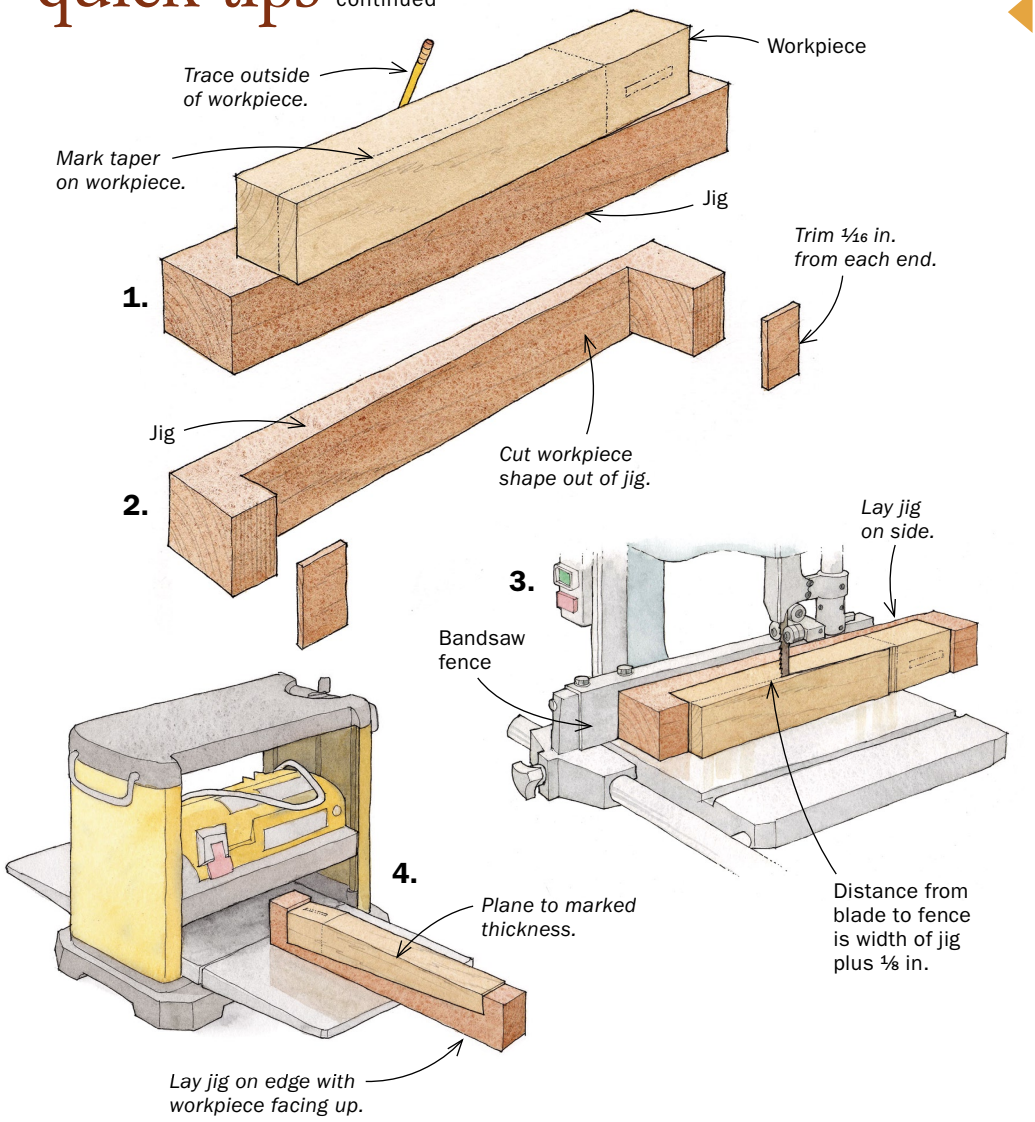


Taper jig combines bandsaw and planer

This jig makes tapered parts accurately and safely. It is similar to my jig on p. 52, but this one is simpler and handles thick workpieces. To begin, cut the workpiece to size, making sure all the face and end surfaces are planed flat and square. Then cut the jig from a piece of scrap about the same thickness as the workpiece, but about 3 in. longer and 1 in. wider.

Mark the taper on the workpiece. Place the workpiece on the jig, line up the taper marks, then trace around the workpiece with a sharp pencil.

Use a bandsaw to cut the jig along the marked line. Use a block plane or sandpaper block to straighten and smooth the cut to the line.

With the workpiece removed from the jig, use the bandsaw to trim about 1/16 in. from the face of the jig's two end sections.

On the bandsaw, make a cut about 1/8 in. wider than the jig. For a workpiece with a taper on two adjacent sides, rotate the part 90° and cut again.

The next step is to run the same jig through a thickness planer with the depth set to clear the jig by 1/16 in., giving the desired dimension. To minimize tearout along the taper, feed the thicker end of the workpiece first.

—MICHAEL C. FORTUNE, Lakefield, Ont., Canada

Jig sets up honing guide

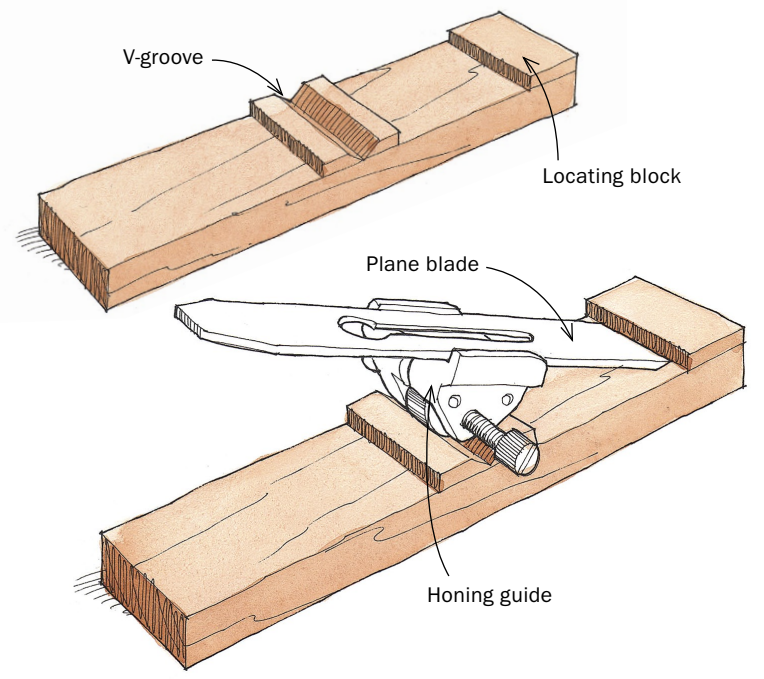
I find it helpful to use a honing guide when sharpening plane blades. But to get the correct sharpening angle with these guides, the blade must extend a specific distance from the guide. If you change the distance the next time you use the guide, the sharpening angle will change.

This setup jig does two things for me. It saves time by making it easy to set the blade extension. It also helps me to be sure the blade is square to the guide.

Make the jig from hardwood. The V-groove positions the wheel of the honing guide and the block locates the end of the chisel or plane iron. The groove and block must be parallel to each other.

To use, set the wheel of the honing guide in the V-groove and slide the plane iron or chisel into the guide until it is square against the block. Then tighten the honing guide's clamping screw.

—MATT DANNING, Piedmont, Calif.



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Fast-action biscuiting jig

Like many woodworkers, I embraced biscuit joinery years ago. But I never seem to have a nice, flat, usable space to register the base of the joiner while making cuts. This is mainly because my workbench is covered with dried glue drops, shavings, and other whatnots.

I solved the problem with a simple, modified bench hook. It provides a flat, smooth registration surface and has a pair of fences to hold the work. The best one is the split fence, which simplifies cutting biscuit slots in the ends of mitered frames.

The jig is made from ¾-in.-thick melamine. Cut the base to 12 in. wide by 16 in. long and each plywood fence to 2 in. wide by 18 in. long.

Start by cutting a ¼-in. by ¼-in. rabbet along one edge of both fences. The rabbets provide a place for dust and shavings to collect, so they won't prevent the workpiece from butting tightly against the fence.

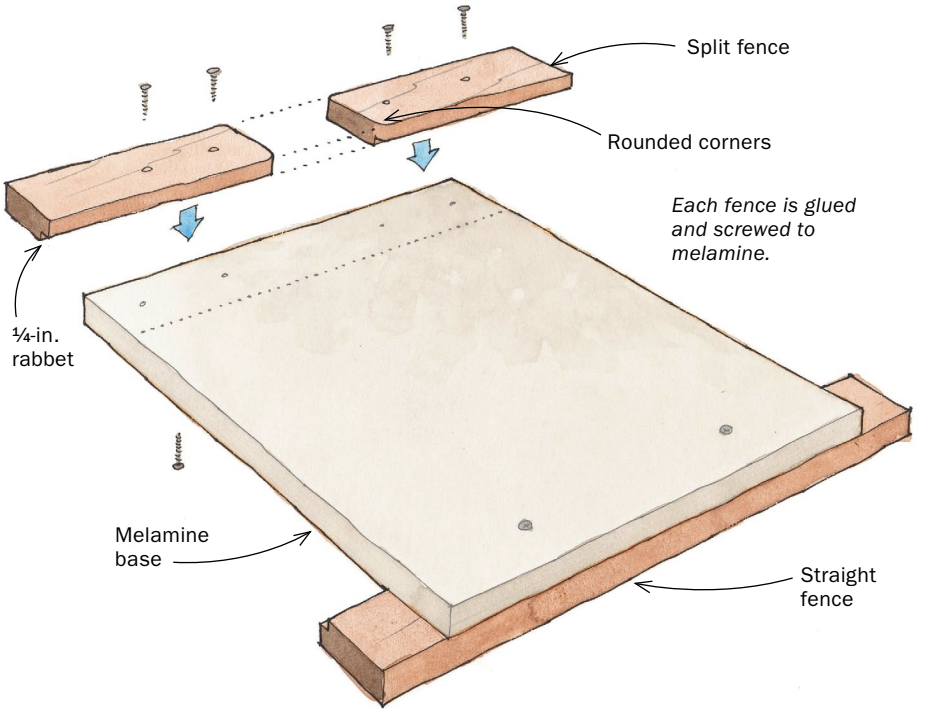
To install the split fence, first mount it in one piece by screwing from the top and bottom. Once it's mounted, mark a 4-in.-long cutout in the center. Remove the fence and cut out the marked section. Then sand a small radius on all four corners of the gap.

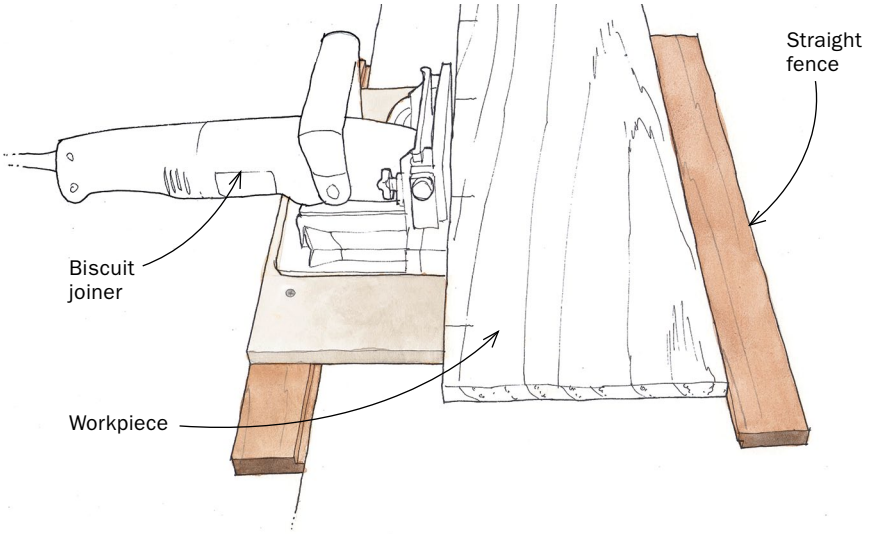
Rounding the corners is important because you're going to be wedging workpieces against these corners and you don't want them so sharp that they mar your material. Install all fences with glue and screws.

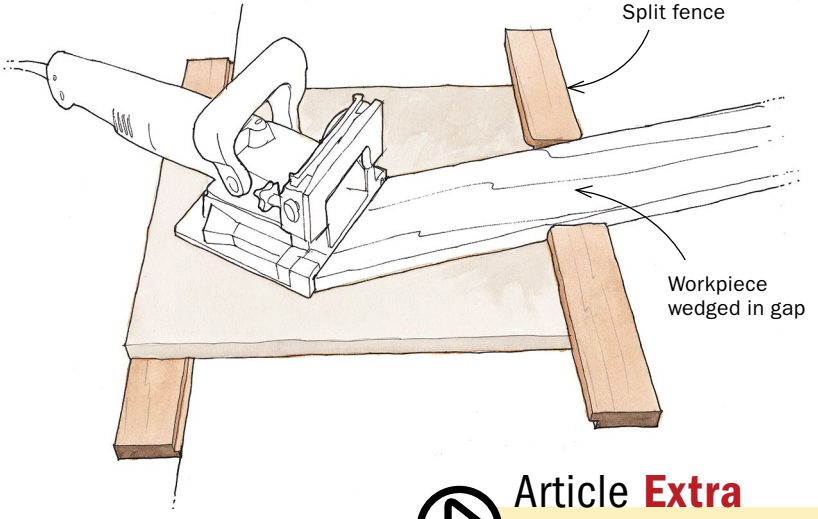
To cut a slot in the edge of a workpiece, simply hook the split fence on the edge of the workbench and place the workpiece against the straight fence. The melamine provides a smooth and true registration surface.

The jig really shines when cutting the end of a mitered joint. Simply place the workpiece in the opening of the split fence, then rotate the workpiece until it binds in the gap. As you cut the biscuit slot in the end, be sure to apply continuous sideways pressure to prevent the workpiece from moving.

—GORD GRAFF, Newmarket, Ont., Canada

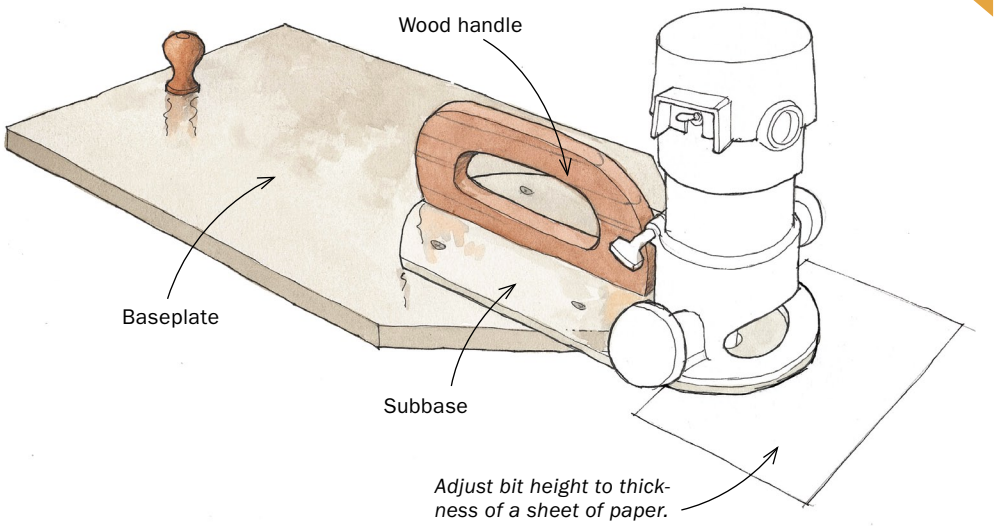






Article Extra

Learn how to harness your biscuit joiner's full potential in our exclusive two-part video series.



Router jig ensures flush edging

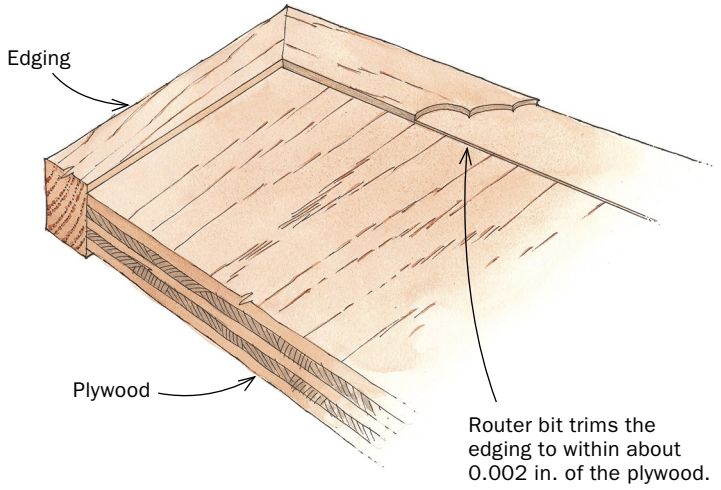
Solid-wood edging often is added to plywood to hide the core plies and to protect the fragile edges of the thin surface veneers.

To ensure a good-looking, flush connection, I mill the edging about ⅛ in. oversize in thickness. Then I glue it to the plywood, making sure the edging projects a bit on both sides. After that, I trim the edging flush using a router and a shopmade jig.

The jig has two parts: a router subbase of Plexiglas and a baseplate of melamine. I chose melamine because it is flat, smooth, and heavy, and it slides easily. I added a handle to the subbase and the baseplate to make the jig easier to control on large sheets. To use the jig in corners, I trimmed the front corners of the baseplate and positioned the router bit ahead of the point. The base is large enough that its weight counterbalances the router and keeps the bit from diving into the work.

With the router in the base, I adjust the bit to ride the thickness of a sheet of paper (typically 0.002 in. to 0.003 in. thick) above the surface of the plywood. This keeps me from removing any more material from the already very thin surface veneer. I then rout away the surplus edging on both sides of the plywood. As a final step, I use a card scraper to remove the router marks and to bring the edging flush with the plywood.

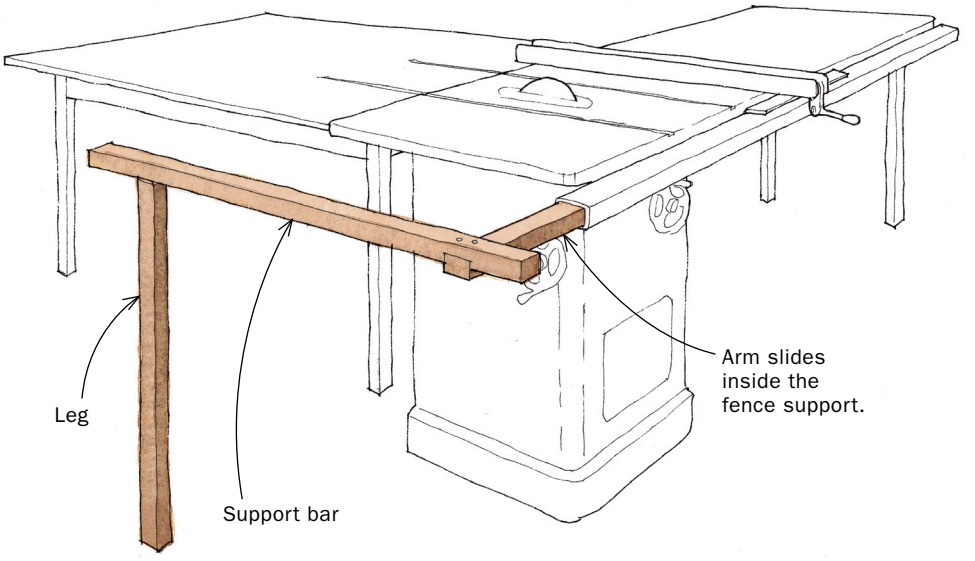
—BRIDGER BERDEL, Tucson, Ariz.



Support for ripping plywood

I use this simple support to aid in cutting full sheets of plywood on the tablesaw. The support consists of three parts—an arm, a support bar, and a leg—and it's easy to make. Size the arm to fit inside the square tubing of the fence rail on your tablesaw and join the parts so that the support bar is the same height as the saw table. When it is not being used, the support rests against the saw table. To use the support, just pull it out to whatever width you need.

—VERN TATOR, Friday Harbor, Wash.



on the market

Store-bought sometimes beats shopmade. Here are a half-dozen commercial jigs that impressed our editors.

Dovetail master. *The Leigh Super Jig comes in three lengths; 12 in., 18 in. (shown with optional VRS vacuum and router support), and 24 in.*

■ DOVETAIL JIGS

New Leigh jigs offer great value

Adjustable tails and pins. *Sliding fingers allow users to create any dovetail spacing. A square-drive screwdriver (supplied) secures them.*

LEIGH INDUSTRIES SUPER 18 JIG
- www.leighjigs.com
- Street price: $320

LEIGH SUPER JIGS are similar to Leigh's flagship D4R dovetail jigs, but their construction has been changed to make them available at a lower price. The dovetail spacing and the width of the tails are fully adjustable. However, a one-piece finger assembly (unlike the two-piece assembly on the D4R) means all pins must be the same width.

Like the D4R, these jigs can cut half-blind dovetails with variable spacing, but Leigh also adopted the more common and faster procedure of cutting equally spaced dovetails in both the tail and pin boards in the same operation.

All things considered, the Super Jig cut through-dovetails and half-blind dovetails as well as the D4R, and it was easier to set up. If you can live without the variable-width-pin feature of the $490 D4R (I can), I suggest you take some pressure off your wallet and buy a Super Jig. The 18-in. jig sells for $320; the 12-in. model, $220; the 24-in., $400. The size represents the maximum board width they can handle.

—Tim Albers works wood in Ventura, Calif.

■ ACCESSORIES

Jig sets any miter gauge to precise angles

GOT A STANDARD TABLESAW MITER gauge, the kind that is almost impossible to set at odd angles, let alone true 90° and 45°? The MiterSet is quick and easy to use, and it's accurate. The jig is a piece of laminate-covered birch plywood with 22 holes and a slot that accepts a standard ¾-in. by ⅜-in. miter-gauge bar. Tapered steel pins fit in the holes to establish positive stops at each 5° increment. An aluminum "step bar" allows the jig to assume any ½° angle between 0° and 55°.

To set your miter-gauge angle (so the face of the gauge faces left), place a pin in the left-side 0° hole, then put the other pin in the right-side hole for the angle you want. Loosen the miter gauge, then slip the bar into the slot in the jig. Slide the bar forward until the face of the miter gauge butts against both pins. Tighten the gauge and you're ready to go. To test the jig's accuracy and repeatability, I made 90° and 45° cuts and checked them. I also cut a couple of octagonal frames. After each cut, I reset the miter-gauge angle. Both frames went together perfectly.

—Roland Johnson is a Fine Woodworking *contributing editor.*

MITERSET
- www.miterset.com
- Street price: $30

Angle setter. *The MiterSet lets you adjust a miter gauge to any angle up to 55° in ½° increments.*

Photos: staff

■ ACCESSORIES

Jig makes it easy to rout circles and ellipses

MANY COMMERCIAL JIGS for routing circles and ellipses are expensive and complex. But the Router Buddy System from Practical Technologies takes a simple approach, and the system is stout and accurate. The basic system allows you to rout circles from 2 in. dia. to 18⅜ in. dia. For larger work, you can buy the large circle jig accessory to rout circles from 8 in. dia. to 60 in. dia. Another handy accessory is the ellipse jig, which cuts ellipses with up to a 12-in. differential between minor and major diameters.

The basic kit and the accessories were easy to set up and performed quite well, putting this jig on my short list of must-have router accessories. The basic Router Buddy retails for $70. The large circle jig and ellipse axis plate accessories cost $70 and $60, respectively.

—Roland Johnson

PRACTICAL SYSTEMS ROUTER BUDDY
- www.practical-technologies.com
- Street price: $70

Simple setup. *Attach the polycarbonate base to the subbase of the router, then slide the aluminum trammel into the dovetailed way. Set it to the desired diameter, then tighten it in place with an Allen wrench.*

Pin centers the bit in a circle. *With the pin on the trammel engaged in a hole, you can rout a perfect circle.*

Safety where you need it. *A featherboard helps keep the board snug to the fence at the start of the cut, where you have the least amount of control.*

Switch on, switch off. *The magnets in the Magswitch featherboard are activated by turning two knobs.*

■ SAFETY

Featherboard mounts quickly on saw table

FOR CERTAIN TABLESAW CUTS, such as ripping narrow stock, a featherboard can go a long way toward improving safety and accuracy. Unlike other commercial featherboards, which lock in the miter slot, the Magswitch Pro Magnet Featherboard mounts in an instant anywhere on a cast-iron saw table. Adjusting or removing it is just as easy.

The secret is a pair of magnets that are activated or deactivated simply by turning a knob. Butt the Magswitch against the edge of the stock (the featherboard must be in front of the blade), apply sideways pressure to bend the thin fingers slightly, then turn on the two magnets to lock it in place.

The Magswitch worked well and is a convenient safety accessory for any shop. The pro model sells for $55 at www.rockler.com (a standard version with smaller magnets is $40). Magswitch will soon offer a model for those who cut with the rip fence on the left side of the tablesaw blade.

—Tom Begnal is an associate editor for Fine Woodworking.

MAGSWITCH PRO MAGNET FEATHERBOARD
- www.rockler.com
- Street price: $55

■ ACCESSORIES

Precise, affordable jig for drilling pocket holes

KREG'S R3 POCKET-HOLE JIG
- www.kregtool.com
- Street price: $40

KREG'S NEW MODEL R3 POCKET-HOLE JIG adjusts easily, without tools, to drill stock from ½ in. to 1½ in. thick in ⅛-in. increments. You can attach it to a workpiece with a C-clamp, or you can use the included face-frame adapter to connect the jig using Kreg's face clamps (not included), which have wide jaws with a deep reach. These accessories speed up the process of drilling multiple holes.

The R3 would be a solid addition to a shop. The kit includes the jig, the Fast Clamp adapter, a bit with stop collar, an extralong square drive, five packs of screws, and a small pack of angled dowel plugs. Face clamps range in price from $15 to $35.

—Mark Edmundson is a woodworker in Idaho.

Pocket holes in a jiffy. *The R3 jig attaches easily to the workpiece with almost any bar or C-clamp. The lip on the end references the edge of the workpiece.*

Clamping without clamps. *The VacuClamp system holds a workpiece in place using vacuum pressure. To release the workpiece, simply press the foot switch.*

■ CLAMPING

Vacuum clamps hold on without getting in the way

VACUCLAMP CLAMPING KIT
- www.vacupress.com
- Street price: $162

ROUTING THE EDGES OF A SMALL PART often requires clamping the piece to a workbench, routing a section of the perimeter, and then moving the clamps to rout the rest of the edge. The process is a hassle, and it can mean burns or lumps where the routing stops and starts. Vacuum Pressing Systems sells a clamping kit that uses vacuum pressure to hold parts in place, eliminating the need for clumsy clamps.

The machined aluminum pads, with a built-in vacuum valve on each side, attach to a vacuum pump. The vacuum pressure (up to 1,800 lb. per sq. ft.) adheres the pads to the benchtop and secures the workpiece to the pads. Pads can be used individually or linked together with plastic tubing. The system works well. It was strong enough to hold a part for carving with chisels and mallet, or for routing. The only downside is that the pads need a relatively clean, smooth surface to work well. Also, the workpiece must be wider than the 4-in.-square pads. The basic kit includes two pads, a foot switch, and 20 ft. of tubing with a quick-disconnect fitting matched to the company's pumps.

—Roland Johnson

The Right Stuff

Choose the right materials, fasteners, and accessories for jigs that work better and last longer

BY GARY ROGOWSKI

A good workshop jig will hold your work accurately and safely so you can make consistent, repeatable cuts quickly. Take the template-routing jig I use at the router table (for a similar jig, see p. 80). It protects my fingers and allows me to reproduce a shape over and over. It also speeds up the shaping process. So in one jig I get safety, accuracy, and speed.

The purpose of any jig is to make life in the shop easier. Whether building a simple one-use jig for the job at hand or a more complex jig to last a lifetime, choose materials wisely and take your time.

I design jigs to be easy to use, with stable materials that are flat and straight; I won't grab just any piece of scrap and waste time trying to make it flat and square. I use plywood or medium-density fiberboard (MDF), with an occasional piece of hardwood where I need a high degree of accuracy or durability. I use glue or simple fasteners so that the jigs hold up in use. And I ease edges to make them friendly to the touch.

Gary Rogowski, a Fine Woodworking *contributing editor, is director of the Northwest Woodworking Studio in Portland, Ore.*

Photos, except where noted: David Heim

USE THE RIGHT MATERIALS

The purpose of the jig will determine what materials you should use. Mostly I use ¾-in.-thick MDF or veneer-core plywood. When I need an absolutely square fence on a jig, I'll use a piece of straight-grained hardwood milled flat and square. When I need to glue up layer after layer, such as when I make a thick bending jig, I'll use particleboard. It's an inexpensive material that works just fine.

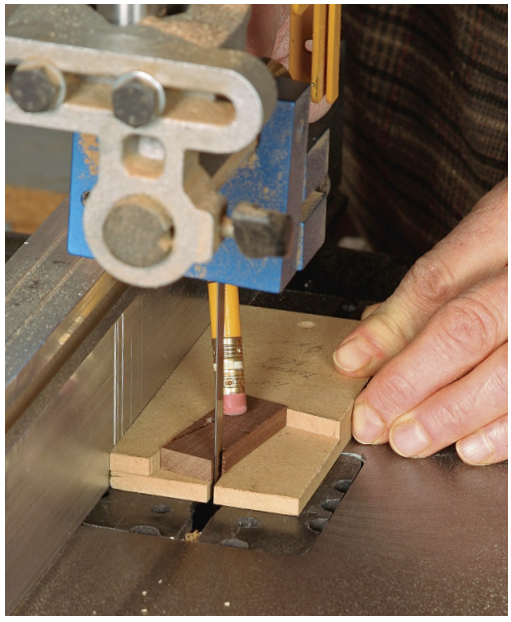
If you need material with no voids or gaps in its edges, then use a material like Baltic-birch plywood. (In the West, a product known as ApplePly is also widely used for jig making.) I've used Masonite for router templates, but I generally prefer MDF because it's easier to see pencil lines on the lighter surface. For jigs that get screwed or nailed together on edge, I use solid wood or plywood and always drill pilot holes to avoid splitting the material.

Material that's ¾ in. thick allows enough room for countersinking large screw heads or bolt heads. It also reduces the chance of splitting if I have to screw into the edge of a piece.

There are times when using thinner stock helps me hold a jig easier or maneuver it faster. When I cut butterfly keys on the bandsaw, for example, I hold the small workpieces steady in a simple jig made from two layers of ¼-in. MDF. It's nice to have a thinner profile on the jig to hold a thin wedge piece.

Flat and stable. *Sheet goods like Baltic-birch plywood and MDF are the basic materials for jigs. Hardwood is best for runners and fences.*

Sacrificial plywood. *This jig for cutting key slots in miter joints is made from scraps of ¾-in. plywood.*



Thin MDF. *Two layers of ¼-in. MDF create a handy jig for cutting butterfly keys.*

Hardwood for durability. *Hardwood components, like these runners on a crosscut sled, can withstand repeated movement and rubbing.*

Low cost. *Particleboard is an inexpensive material for making bending jigs.*

Photos, facing page (bottom), this page (top): Michael Pekovich

USE THE RIGHT FASTENERS

Quick and strong. *Drywall screws and yellow glue are fine for assembling most jigs. A pin nailer can help keep parts aligned during glue-up.*

Jigs like the one I use to cut mortises (see p. 60) need to be assembled with glue to remain accurate through years of regular use. Just be sure that the surfaces you're gluing are clean and clamp them together for half an hour or so.

The trouble with glue is that it acts as a wonderful lubricant for 10 seconds or so, then locks your pieces into the wrong position. Or so I've heard.

To combat that, use brads or pin nails to lock pieces in place. Spread the glue, align the pieces, shoot several nails in place, then put on the clamps. If you don't have a pin nailer, clamp the pieces of the jig at the edges so they won't slip apart when you clamp the faces together. Or, dry-clamp the pieces, predrill screw holes, then glue and screw the jig together.

For jigs that don't require the permanence of glue, use drywall screws or round-head wood screws. Obviously, you shouldn't put any screw where it will get in the way of a blade or bit. For example, my tenoning jig fits over the tablesaw fence, but I made very sure that the screws holding it together are above any blade-height setting. And, obviously, don't use a round-head screw where it might prevent part of the jig from pivoting or sliding smoothly.

Some jigs slip out of adjustment over time, and you can't always tighten screws enough to bring the jig back into line. On my crosscut jig, for instance, I bolted the fence to the sled. That makes it easy to crank down hard on the bolts, both when building the sled and when it needs to be realigned.

Glue for keeps. *For jigs that will see repeated use, glue the components together.*

Pinned down. *A few strategically placed brads keep the parts from shifting during glue-up.*

Simple assembly. *A few drywall screws are often all you need to hold a jig together.*

Extra holding. *Use bolts when screws won't supply enough holding power, as on this crosscut-sled fence.*

Photos, this spread, top: Michael Pekovich

CHOOSE THE RIGHT HOLD-DOWNS

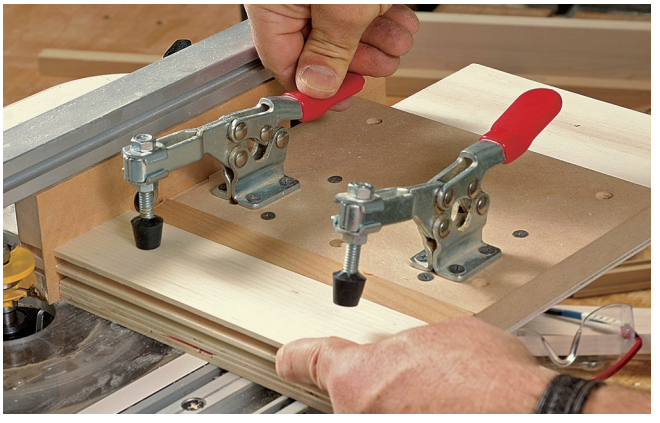
Secure grips. *Wedges, spring clamps, and other small clamps all hold workpieces in place. Quick-action clamps can double as handles.*

Many jigs are designed to work with some type of clamp to hold the jig down on the bench or on a workpiece, to hold a stop block on the jig itself, or to hold a workpiece in place. There are several types of clamp you can use. But always make sure there's no way in the world that the clamp can be nicked by a blade or cutter. And if the clamps will also double as handles, be sure you position them where they keep your hands out of harm's way.

Standard C-clamps or F-style bar clamps work great, especially for holding a jig in place. They're easy to adjust and provide plenty of clamping pressure. When I need only a little holding power, to secure a stop block, for example, I'll use spring clamps. For the ultimate in low-tech clamping solutions, use opposing wedges to clamp your work in place.

For holding workpieces in place, as on a tenoning jig or template-routing jig, DeStaCo-style quick-action clamps are the ticket. Screw these in place or mount them in T-tracks screwed into slots routed into the jig base for clamping pressure exactly where you need it. There are several types of quick-action clamps available, so pick the one that best suits your needs.

Spring action. *A spring clamp often provides enough holding power to keep a workpiece from shifting.*



Double-duty. *Quick-action clamps hold the workpiece in a jig and provide convenient handholds.*

Low-tech hold-down. *Opposing wedges can be an effective way to hold a workpiece in place in a jig.*

WORK WITH FLAT, SQUARE STOCK

Start with flat stock. *Use a straightedge to check sheet goods for flatness. If the first piece isn't flat enough, choose another, or try another portion of the sheet.*

All the surfaces of a jig that need to be flat should be as flat as possible. That's why you use sheet goods. Inspect plywood and MDF for flatness before attaching fences or runners to them. If you find a bad piece, get another, or try a different section of the sheet. Don't rely on screws or bolts to pull a bow out of solid-wood jig parts. Make them flat and square to start. Solid-wood surfaces should be jointed with a handplane or jointer. Make sure that adjacent faces are dead-on square to one another. If you're making a jig that requires parallel surfaces, flatten one face on the jointer and run the other through a planer.

I prefer a two-cut approach to clean up and straighten the edges of plywood, MDF, or particleboard. First, find the best edge and run it against the tablesaw fence for the first rip cut. This edge needs to be as straight as possible or, at the very least, have two-point contact on the fence throughout the cut. Make the first cut ⅛ in. oversize. Flip the piece end for end and cut it to the exact size.

If an edge needs more accuracy than that, use an edge guide with your router to trim an edge true. You also can use a handplane to true an edge, but realize that a sharpening session is in your future

CLEAN UP EDGES

Worst edge first. *Run the best edge against the rip fence and leave the piece oversize.*

Turn it over. *Flip the piece end for end, so the freshly cut side will ride against the rip fence.*

Cut to size. *Reset the fence and rip the workpiece to the exact size you need.*

ACCURATE ASSEMBLY

Clamp in place. *Clamp components together to ensure that they are properly aligned.*

because sheet goods will quickly dull the plane iron.

Bending jigs aren't made perfectly all at once, but are built up and trimmed to size layer by layer. Make a template for the required shape, trace it on all the layers, and cut them to rough size on the bandsaw. Then use the template and a router fitted with a flush-trimming bit to make the first layer the exact shape you need. As you glue each remaining layer in place, use the previous layer as the template to guide the router to trim the new layer to size.

Hold tight. *Keep components clamped as you drill holes and drive screws to be sure the pieces don't shift.*

BUILD UP LAYERS FOR BENDING

Rough out the pieces. *Use a bandsaw to rough out the parts of a bending jig. Cut slightly proud of the layout line.*

Shape the first and attach the second. *Once you've shaped the curve of the first piece, attach the second piece to the bottom.*

Each layer guides the next. *Use a bearing-guided, flush-trimming bit to refine the shape of the second piece. Repeat for additional layers.*

THE **BASICS**

Perfect Plywood for Jigs

Phenolic plywood's smooth, durable surface makes it ideal for jigs and fixtures

BY STUART LIPP

On my first day working in the pattern shop at Steinway & Sons, I was introduced to a great material that has changed my woodworking. Phenolic-surfaced plywood is Baltic-birch plywood that has a thin coating of phenolic resin on its faces.

Used in electrical panels and switches because of its stability and strength at high temperatures, phenolic resin makes this plywood very resistant to moisture, heat, chemicals, and abrasion. Phenolic plywood also has superior strength, flatness, and durability compared to other types of plywood. Its nonstick, glassy surface makes it popular in the concrete industry, where it is used to make forms and molds.

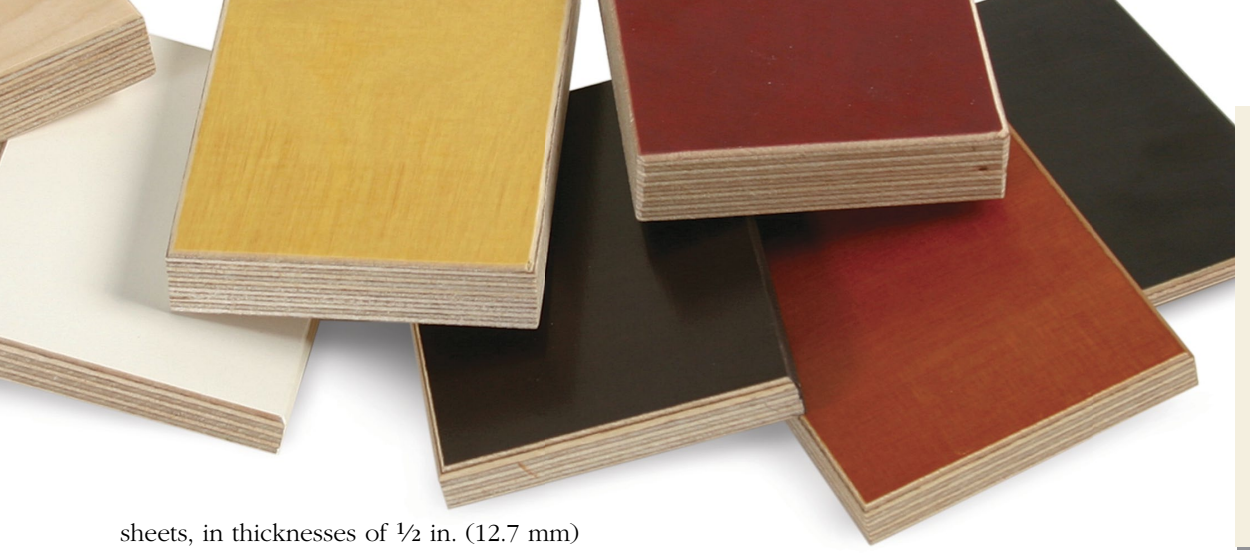
All of these qualities combine to make phenolic plywood ideal for many woodworking applications—from jigs, fences, and cauls to work surfaces and cabinets. Anywhere a jig or workpiece needs to slide over a surface or you don't want glue to stick is the perfect place for phenolic plywood. It is manufactured in 4-ft. by 8-ft.

FOR TABLES

Phenolic is smooth, durable, and low-maintenance. Any place you need to run workpieces across a surface is a good place for phenolic plywood.

Upgrade work surfaces. *Phenolic plywood is tailor-made for a tablesaw outfeed table (left). Workpieces glide past the cutterhead on a router table with a phenolic top and fence (above).*

Photos: Anissa Kapsales



SOURCES OF PLYWOOD

www.andersonplywood.com
(based in Culver City, Calif.)

www.robertsplywood.com
(based in Deer Park, N.Y.)

www.woodcraft.com

www.whitecapdirect.com

www.mccauseylumber.com
(based in Roseville, Mich.)

sheets, in thicknesses of ½ in. (12.7 mm) or ¾ in. (19 mm).

Phenolic plywood is a specialty material, so don't expect to find it at your local home center. It has been around for a while under such aliases as Colorfin, Parklex, Eurocolor Ply, Wisa, and Finnform. Cost varies quite a bit from supplier to supplier, from $54 to $140 for a full sheet of ¾-in. material. The difference depends on the inventory and colors the supplier stocks. The box above right lists several sources.

Use for jigs, surfaces, and cauls

The top surface of a shopmade router table is a good place to use phenolic. So is a tablesaw outfeed table. Made of phenolic, it will perform better than a basic plywood table or a roller stand, and can double as a glue-up table. Dried glue pops right off.

Tablesaw and router-table fences faced with phenolic plywood give you a superior surface that is replaced easily if damaged. Also, any jig that will slide over the surface

Working with phenolic

Phenolic plywood machines like any other plywood product and doesn't dull blades excessively. The resin coating can chip out a little, but using sharp blades eliminates this. Beware: Freshly cut edges can be very sharp, so you should definitely break them with sandpaper or with a roundover bit.

Attaching hardware is not a problem. Screwing into the face can crack the phenolic resin, but pilot holes and a quick hit with a countersink bit eliminate this. Pilot holes are especially important to avoid splitting the layers when you screw into the edges of the plywood.

Sharp edges. *Break all edges with sandpaper or a roundover bit (shown).*

Plane thin stock. *Screw a cleat to a long piece (above) to make a smooth-sliding auxiliary bed for surfacing very thin workpieces on your planer (right).*

Easy to clean. *A countertop wipes off easily with a damp rag.*

FOR FENCES AND JIGS

Whether a jig needs to move fluidly over a surface with the workpiece locked in place or a workpiece has to slide effortlessly along a fence, a phenolic surface is ideal.

Versatile tablesaw fence. *The shorter, sacrificial side is used with a dado set to cut rabbets (left). The tall side is perfect for raising a panel (above). The extra height supports the tall panel as it slides easily across the fence.*

Slick jigs. *A phenolic-plywood tapering jig rides in the miter slot and across the surface of the tablesaw. Since the blade also trimmed the edge of the jig, that edge is the reference line.*

of a machine should have a base made of phenolic plywood. Whether it is a template to be used on the shaper or a tapering jig for the planer, it makes the machining process much easier because friction and drag disappear, giving you a steadier feed rate and better results.

Phenolic also is very easy to clean with a damp rag, so I find myself using leftover pieces for surfaces that tend to collect a lot of dust or debris, such as those under sharpening stations or grinders.

It also makes great clamping cauls. You never have to worry about adhering a phenolic caul to your work. It's been years since I've had to tape or wax a caul, or wrap waxed paper around it. When hand-clamping, ¾-in.-thick material is heavy enough to transfer pressure widely and evenly across the workpiece. I have sets of small, chamfered phenolic-plywood blocks ready to use for glue-ups or small repairs.

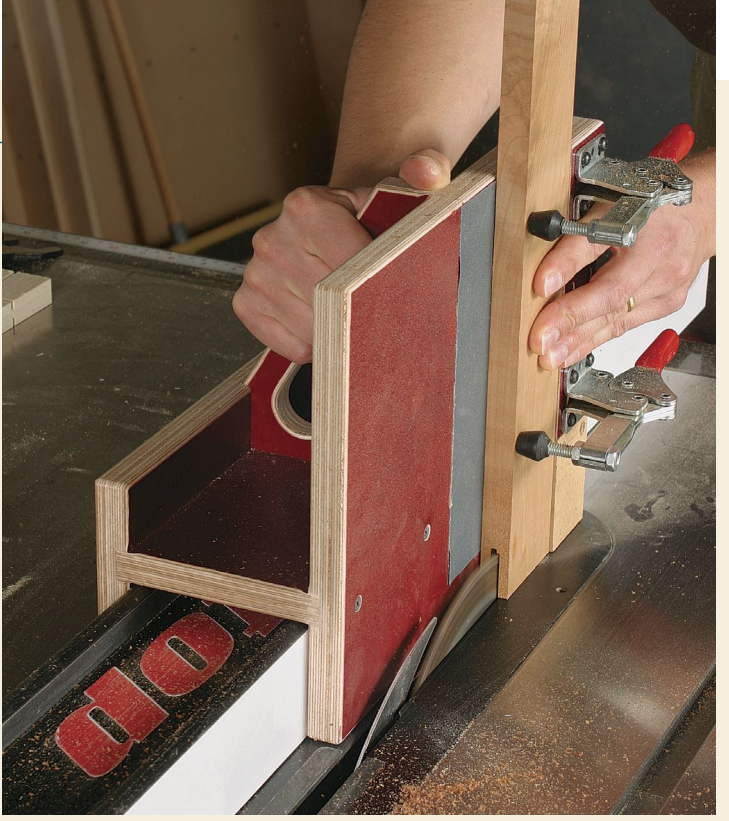
When veneering panels, whether in a vacuum bag or with clamps, the cauls are always slightly bigger than the panels. This overhang ensures that clamping pressure will be distributed across the surface of the veneer and substrate, but it also means glue can squeeze out onto at least the bottom caul, where you can flake it off with a paint scraper after it dries. □

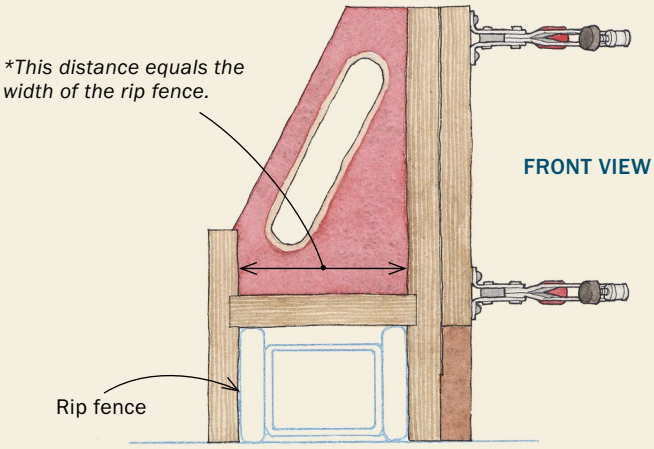
Stuart Lipp works at Steinway & Sons in New York City.

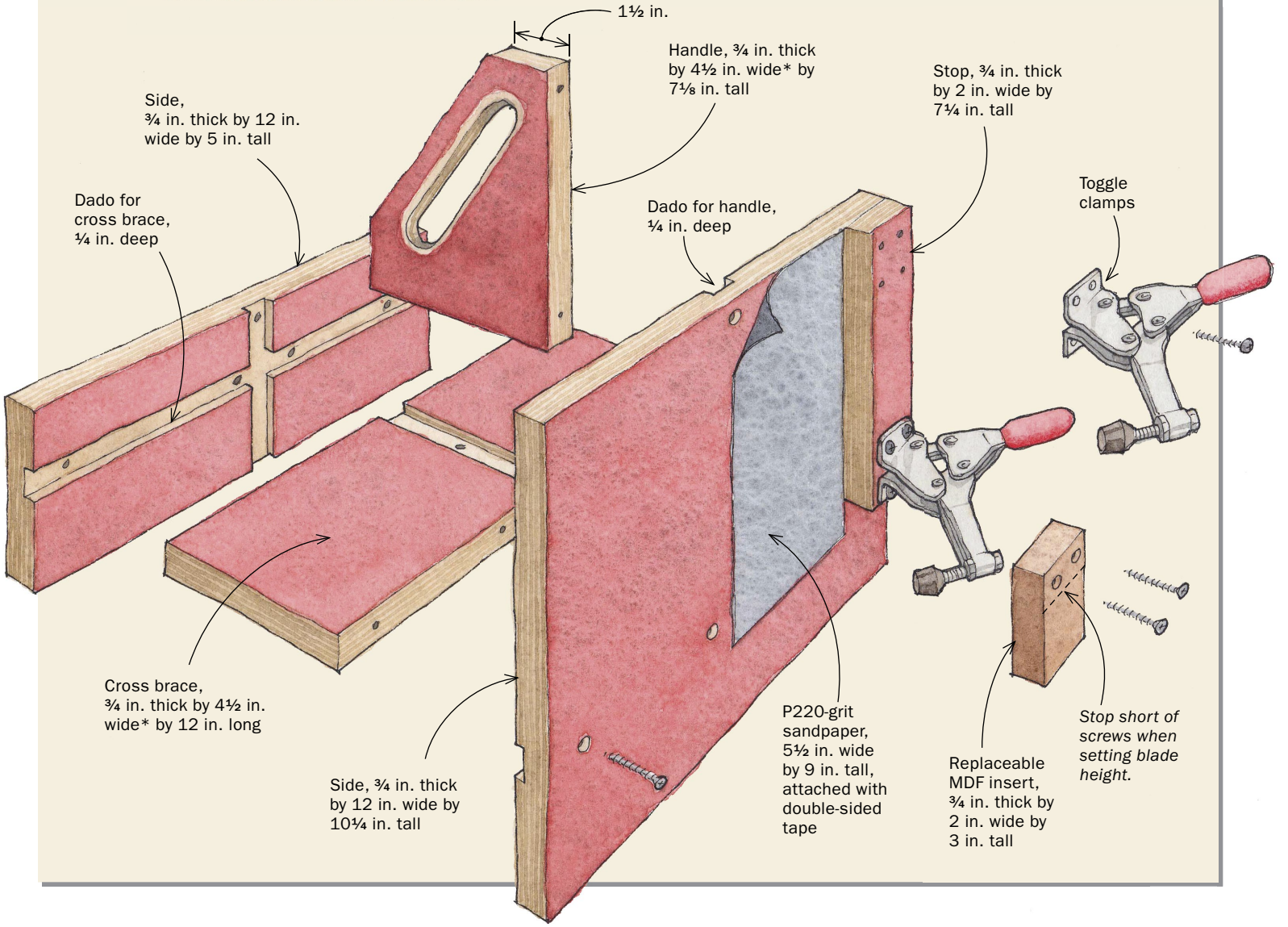
Drawings: Jim Richey

Make a phenolic tenoning jig

This stable, over-the-fence tenoning jig takes advantage of the slick nature of phenolic plywood as it carries the workpiece smoothly along the rip fence and through the blade. Toggle clamps on the vertical fence and sandpaper on the face grip the workpiece. Also, a replaceable MDF insert can be changed after too many saw cuts, and a user-friendly handle makes the jig easy to control.







Upgrade Your Throat Plate

Easy-to-make table inserts deliver safer, cleaner cuts

BY TOM BEGNAL

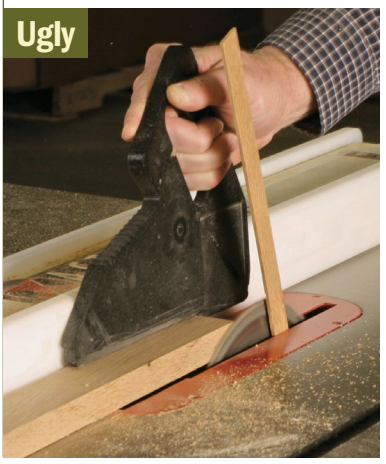
The throat plate supplied with your tablesaw likely has a blade opening that's much wider than the blade. This allows you to easily set the blade at an angle, but it also has some serious drawbacks. First, because there's no support under the workpiece near the blade, tearout often occurs along the edge of the cut. Second, narrow offcuts can get wedged in the gap and then thrown back at you.

To overcome these problems, make a plywood insert that fits into the throat. Then raise the blade through the insert to create a zero-clearance opening. Because the opening fits the blade, tearout is eliminated and offcuts can't get wedged.

Making a zero-clearance insert isn't difficult. You can make several at a time, so you can have one ready for any blade setup. Before you begin, a word of caution: Tablesaw throat design varies by model. So check yours and adjust the steps as needed. Make the inserts from ½-in. birch plywood. It's stiff and strong, and it won't change

Clean cuts. *A zero-clearance opening eliminates tearout because the workpiece is supported next to the blade.*

Rough cuts. *One cause of tearout on the lower edge is a lack of support directly under the workpiece. Most of the throat plates supplied with tablesaws have a wide gap around the blade.*



Dangerous cuts. *Narrow offcuts can fall into the gaps on either side of the blade. If you're lucky, the blade won't launch a trapped offcut back at you.*

INSERTS FOR ANY SETUP

Shopmade inserts are inexpensive and easy to make. So there's no reason not to have one for common blade setups, like the dado widths you use most often.

Photos: Matt Kenney

Make the blank

Once you have an oversize rectangular blank, you'll need to bandsaw it to rough shape and then rout it flush to the throat plate supplied with your saw.

Throat plate becomes template. *Attach the throat plate to the blank with double-sided tape.*

Round the ends. *A bandsaw does this best, but a jigsaw also works. Leave about 1/16 in. of extra material.*

Trim the blank. *Rout the insert flush to the throat plate with a bottom-bearing, flush-trimming bit.*

in width as the shop's humidity fluctuates. This means it won't get stuck in the opening in the summer or become too loose in the winter. Also, many saws are designed for a ½-in.-thick throat plate, or very close to that.

Make a blank with round ends

Use the tablesaw and rip fence to cut a piece of plywood ⅛ in. wider than the saw's throat plate. Then use the miter gauge to crosscut it 1 in. longer than the plate.

Center the throat plate on the blank and attach it with double-sided tape. Next, using the throat plate as a guide, round the ends of the blank with a bandsaw or jigsaw, leaving about 1/16 in. of waste. Trim the waste with a router and a bottom-bearing, flush-trimming bit. A router table makes this easier, but a handheld router can be used. In either case, the bearing runs against the throat plate as the bit trims the waste.

On the router table, feed the insert into the bit from right to left. Keep the bearing on the throat plate and work your way around. Skip over the blade-guard opening, or the bearing will fall into it and cause kickback. You'll get rid of that waste when you cut an opening for the guard assembly.

With a handheld router, rout from right to left. After you rout the first side and end, rotate the blank 180°. Then rout the second side and end.

Cut the blade and splitter openings

You're now ready to cut an opening for the blade. Crank the blade to its lowest position and insert the saw's throat plate into

Cut the openings

Don't remove the blank. *Even at its lowest height, a 10-in. blade prevents a blank from dropping into the throat. So you'll want to cut the blade opening while the blank is taped to the insert.*

Two openings to cut. *Hold down the blank with a push stick (left), staying away from where the blade will come through. Raise the blade slowly. Afterward, mark the opening for the blade-guard assembly (above) and cut it with a bandsaw or jigsaw.*

Shim a low insert

Check for level. *The insert should be flush with the saw table. Use a steel ruler to check for high and low spots.*

Easy fix for low spots. *The plate is supported by a lip or tabs in the saw's throat opening. Apply tape to the low spots to raise the insert flush with the saw table.*

Two types of locks. *On some saws, a fender washer fits under the throat's edge. Others need a brad or screw.*

Article Extra

Learn how to make a zero-clearance insert with an antikickback splitter.

the throat. Slowly raise the blade until it's roughly ½ in. above the insert blank. Now, cut an opening for the blade-guard assembly. Use the throat plate as a template to mark the opening on the insert, separate the insert blank from the throat plate, and then remove the waste with a bandsaw or jigsaw. Next, bore a finger hole with a 1-in.-dia. Forstner bit. This hole makes it easier to remove and replace the insert.

Check for level

Typically, the throat plate is supported by a small lip or tabs inside the tablesaw throat. Your insert should be flush to the saw table when it rests on that lip.

Place the insert into the saw's throat and use a straightedge to test for level. An insert that's too low is easy to fix. Just add some painter's tape at the low spots. An insert that's too high needs a rabbet routed around its underside. It should be wide enough to clear the lip and deep enough to bring the insert flush with the saw table. Use a router and a bearing-guided rabbeting bit to cut the rabbet. Rout no deeper than 1⁄16 in. on each pass.

Install a "lock"

It's important to add a "lock" at the back so the blade won't lift up the throat plate. A fender washer attached in a recess on the underside of the insert makes a good lock. The washer slides under the throat's edge and prevents it from pulling up.

This may not work for your saw. Some throats require a pin-sized arm that sticks out the back of the insert. If yours does, then use either a brad nail or screw as a lock.

Finally, add a few coats of shellac or varnish to give the insert a smooth surface and some wear protection. □

Tom Begnal is an associate editor at Fine Woodworking.

Rabbet an insert that's too high

Lowering an insert is a three-step process: Determine the depth, mark the depth, and cut the rabbet.

A precise measurement. *With the blank in the throat, use a combination square to find how deep the rabbet needs to be.*

Lay out the cut. *Slide the square against the bottom of the insert and mark a line around its edge.*

Cut to the line. *Take 1⁄16-in. passes with a rabbeting bit, and check the insert in the throat after each pass. If you take off too much, just use tape to raise it up.*

Basic Crosscut Sled

Small sled ensures square cuts and handles most workpieces

BY GARY ROGOWSKI

Every saw needs one. *A shopmade sled makes more accurate crosscuts than a miter gauge can.*

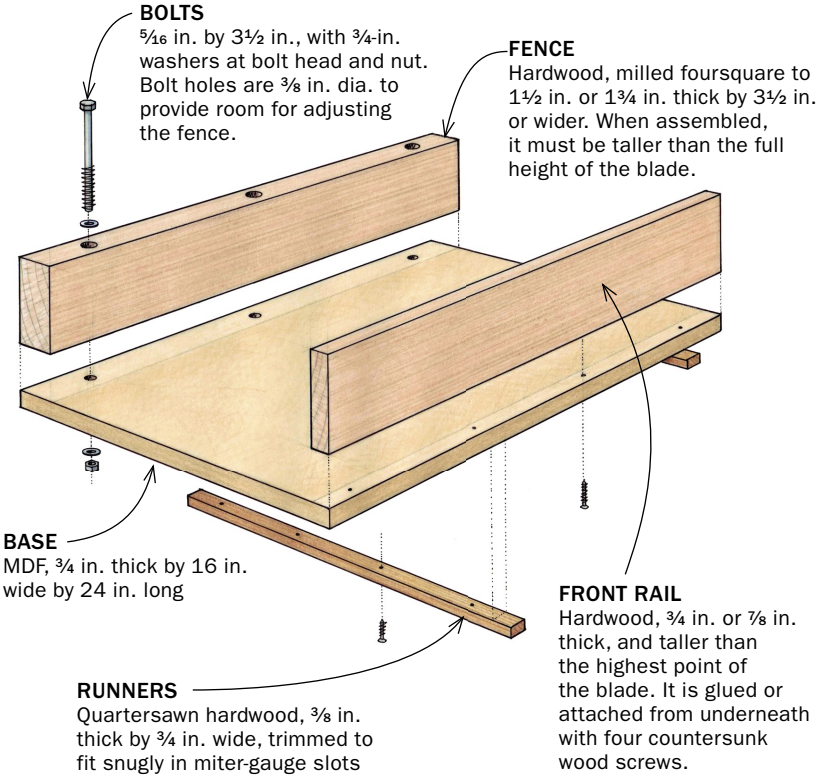
It's a euclidean world, darn the luck. Woodworking goes better when angles are precise, true, and above all, consistent. "Consistently off" may be how your work has been going until now, but making a tablesaw crosscut sled can fix many crosscutting woes.

My sled is a focal point of my shop. With it, I can produce square ends on stock. I can clamp on a stop block or make a pencil mark for repeat cuts. I can use the sled as a platform for other jigs to cut precise angles and a variety of joints. And I can do all that safely and with greater accuracy.

A crosscut sled provides support from behind and underneath, holding a workpiece more securely than most stock miter gauges. This is especially helpful when crosscutting wider pieces, where a sled is much

ANATOMY OF A SLED

A crosscut sled is a versatile tool with just a few carefully assembled parts. Its accuracy relies on close-fitting runners and a square fence.



1. Attach the fence

Bolts offer wiggle room. *They make it easier to adjust the fence so that it is square to the blade.*

2. Install the runners

Make the runners of quartersawn hardwood. With the grain oriented in this way, seasonal wood movement will cause the runners to shrink or swell in thickness, as opposed to width. This means the runners won't bind.

1 *Bandsaw to rough dimensions.* *Set the fence using measurements taken from the tablesaw's miter-gauge slot.*

2 *Joint two faces.* *These will serve as reference surfaces for final trimming of the runners to fit in the miter-gauge slots.*

3 *Trim to final width.* *Take light cuts and check the fit in the slot as you go. You also can use a planer or a handplane.*

4 *Attach the runners.* *Assembling the sled with the runners in their slots helps ensure they'll be parallel and properly spaced when you're done. Attach the runners with wood screws driven into countersunk holes.*

5 *Trim the high spots.* *Push the completed sled back and forth in the slots a few times. Any places where the runners rub against the side of the slots will darken. Trim these areas with a scraper, then wax the runners and the bottom of the sled to reduce friction.*

safer than running a workpiece against the rip fence, a recipe for kickback.

This sled is accurate in part because its twin runners ensure that the stock moves in a straight line past the blade. The stock is registered against a back fence that is carefully set at 90° to the blade. The fence is adjustable, so it can be reset.

Start with a square piece of MDF

I've learned that it pays to make your first sled for 99% of cuts, that is, boards less than 13 in. wide. The sled will be easier to make, move, and adjust. For any cut wider than 13 in., try the "Ultimate Crosscut Sled" on pp. 34-39. It can handle the largest boards and panels with ease.

There are several keys to an accurate sled: a flat baseplate, straight runners that fit snugly in the miter-gauge slots, and a flat and square fence. Make the base out of ¾-in. medium-density fiberboard (MDF) about 16 in. wide by 24 in. long. Attach a front rail that is taller than the maximum height of the sawblade. Its job is to hold the front of the jig together.

Make fence and runners of hardwood

I make the fence out of hardwood, milled foursquare about 1½ in. thick and taller than my tallest cut. I make it this thick so I can fasten it onto the baseplate with bolts and washers. I built my first sled with

Photos: Steve Scott; drawings: Vince Babak

3. Square the fence to the blade

The sled won't make accurate crosscuts unless the fence is precisely perpendicular to the blade. The oversize bolt holes in this fence make it possible to adjust the angle until test cuts yield square results.

1 ***Make the kerf.*** *Cut through the baseplate first, then make a pass at full blade height.*

2 ***Make a test cut.*** *Crosscut a piece of wide stock to gauge the fence's accuracy.*

3 ***Check the cut with a square.*** *Any gaps will help you determine the direction and amount of adjustment the fence requires.*

screws, and they just don't hold up to the banging around this jig gets. If your MDF is relatively square, bolt on the fence so that its rear face is aligned with the back of the base. You'll adjust it later to square it with the blade.

For this sled, I used 5⁄16-in. bolts and drilled 3⁄8-in.-dia. holes. This gives me room to adjust the position of the fence.

The runners are critical to the success of the jig. If they don't run without play in the miter-gauge slots, then your jig will ride sloppily, your cuts will be inconsistent, and your salty vocabulary will grow quickly. Make the runners of hard-wearing quartersawn stock such as oak or maple, about 3⁄8 in. thick, or slightly thinner than the depth of the slots. You don't want the runners bottoming out in the slots and lifting the baseplate off the saw table. Make the runners to fit snugly in width, trimming them with a handplane as necessary. Next, drill four countersunk holes in each runner for the screws to hold it in place.

Mount the runners and adjust the fence

Place the runners in the slots, lay the assembled base and fences on them, and push the package all the way to the rear of the saw table so that one set of countersunk holes is visible. Make sure the jig's fence is relatively parallel to the back edge of the saw. Mount one screw in each runner. Then slide the assembly back to the front edge of the saw table so that two more holes are visible. Mount these screws and then flip the sled over and drill and mount the four remaining screws.

Place the sled in the slots and try to push it. The runners will probably be too tight. Wax them and the bottom and see if will slide. If not, check the runners to see where they're rubbing. Use a scraper or shoulder plane to trim those areas, rewax, and try again. The sled should move effortlessly in the slots with no side-to-side play.

Now you're ready to start working. Make the first cut in the sled by raising the blade just enough to slice through the baseplate. Then raise it for a higher cut. Place a piece of scrap on the sled and crosscut it, checking the results with a square. Adjust the fence accordingly. You can make a full crosscut and flip the pieces to see if they line up perfectly, but I prefer to use a square. Lock down the fence with the bolts when you're cutting square.

Remember to always set down the jig so that it's not resting on its fence. You don't want it knocked about. Also, be very careful of the exit point on the sled. Mark this zone to remind yourself never to place your fingers close to it. □

Gary Rogowski is the founder and director of the Northwest Woodworking Studio in Portland, Ore.

4 ***Mark your starting place.*** *Before adjusting the fence, mark its original location as a reference point.*

5 ***Tighten the fence.*** *When you're done adjusting, crank the bolts home and you're ready to make crosscuts.*

Ultimate Crosscut Sled

Large sled and sawhorse deliver the capacity of a sliding tablesaw for a fraction of the price

BY JOHN McCORMACK

With a bit of support at the outfeed end, most tablesaws excel at ripping—whether wide panels or long boards. Crosscutting these pieces is a different story.

Many commercial shops own large, industrial sliding-table tablesaws that make these cuts safely and accurately. But the options for a one-person shop on a limited budget are less attractive. Even an expensive aftermarket miter gauge has a relatively short stroke, and cutting steadily is difficult because of friction between the workpiece and the saw table.

Many folks make a traditional carpenter's crosscut sled. When accurate, these sleds are very useful, but the fences tend to warp and bow, and you have to shim them with masking tape. Another disadvantage is that these sleds lack a built-in measuring tape and stop system. The resulting cuts

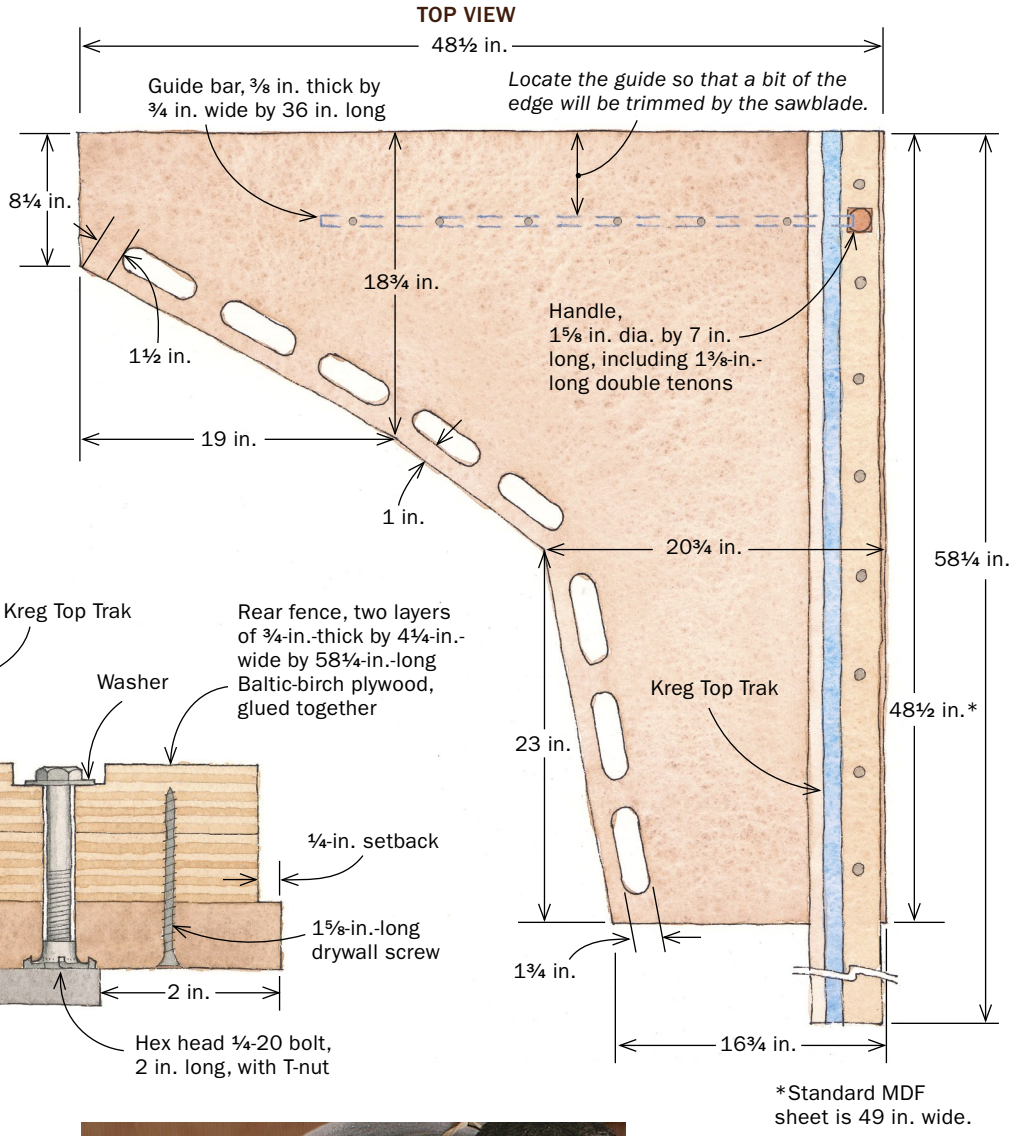
LARGE PIECES AND REPEAT CUTS

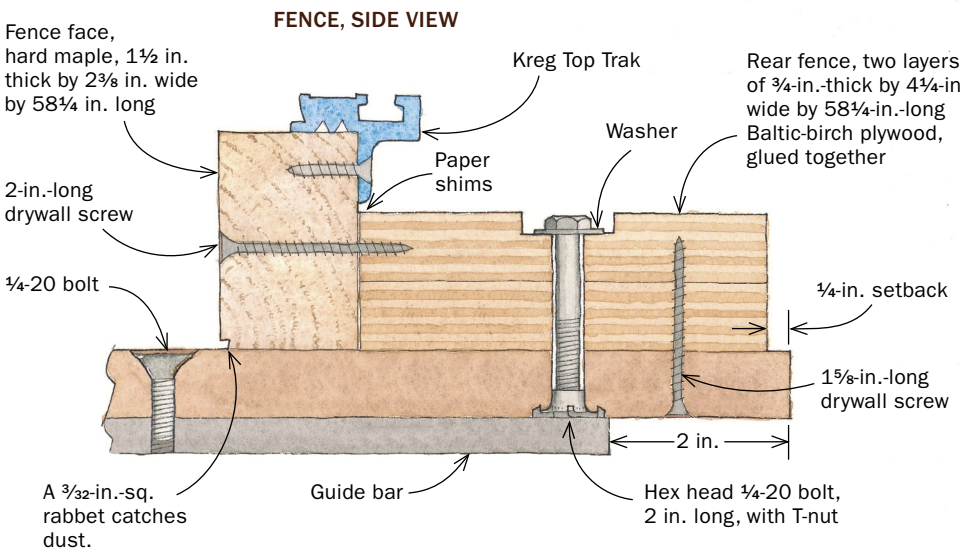
Used in conjunction with the sawhorse (p. 39), the crosscut sled can cut very large pieces safely and accurately. Crosscutting an 8-ft.-long piece of plywood is possible (left). The flip-stop on the sled's fence allows you to make accurate and repeatable crosscuts (right) on stock up to 56 in. long.

Photos: Mark Schofield; drawings: Jim Richey

A NEW APPROACH

The triangular shape is designed to support large pieces yet minimize the weight of the sled, while the handholds make the sled easier to carry on and off the saw. The 36-in. miter bar gives the sled a similar crosscut capacity. The single bar rides in the left-hand miter-gauge slot, so with your right hand on the dedicated handle, your body is safely to the left of the blade, unlike with a carpenter's sled. The two-part fence is designed not to bow and has a flat face that can be adjusted if necessary. It is perfectly square to the blade. The sawkerf marks the edge of the sled, making for easy layout and splinter-free cuts. Finally, a track-mounted stop, keyed to a self-adhesive ruler, ensures precise, repeatable crosscuts.





are seldom truly square or accurate. Last, the back fence limits the crosscut capacity.

A third alternative is to build this sliding crosscut sled, which I first encountered at the Program in Artisanry at Boston University. Carefully made, it will crosscut large panels and long boards accurately, squarely, repeatably, and safely. This wide sled relies on extra support at its outboard end. On p. 39, I've included plans for a versatile sawhorse that will handle this job and many others.

Construct the bed and an adjustable fence

The bed of the sled is made from ¾-in.-thick medium-density fiberboard (MDF), which is flat and durable. Cut the initial square on the tablesaw, and then use a jigsaw to remove the triangular waste piece and make the cutouts. Round over the edges of the cutouts and just the upper edges around the perimeter. Keep the lower edges square to reduce dust getting under the sled.

Mark the location of the miter-slot bar so that the sled overhangs the sawblade position by

Make the bed

Start with a square of MDF. *Clamp it to a pair of sawhorses and cut away the waste section.*

Cut out the handholds. *Multiple handholds make it easier to maneuver the bulky sled on and off the saw, and also slightly reduce the weight.*

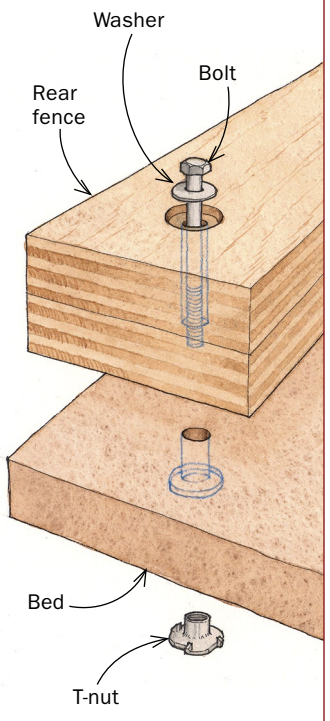
Add the fence and guide bar

1 ATTACH THE REAR PART OF THE FENCE

Locate the fence. *After drilling holes in the rear section of the fence, square it to the bed, clamp it, and tap a drill bit with a hammer to mark the location of the holes.*

Customize the nuts for MDF. *Designed to penetrate wood, the long spurs on the T-nuts need to be shortened to go into MDF. Attach a nut and a T-nut to one of the bolts used to secure the plywood fence to the bed of the sled. Working on the left-hand side of the T-nut so that the force pushes the nut onto the bolt, gently grind away about half of each spur.*

BOLT THE REAR FENCE TO THE BED



¼ in. This will be cut flush once the sled is finished.

Attach a plywood fence—To get perfectly square crosscuts, the fence must be absolutely straight. It has a plywood rear section and a hardwood face. The rear piece gives the fence its stiffness. It consists of two layers of ¾-in.-thick Baltic-birch plywood laminated into a 1½-in.-thick by 4¼-in.-wide bar. True this up after lamination.

Lay out the fence-attachment holes so they miss the location of the miter-gauge bar. Using a Forstner bit, counterbore ⅞-in.-dia. holes, 5⁄16 in. deep, into the top of the fence. Then use a brad-point bit to bore 5⁄16-in.-dia. holes through these counterbores and through the fence.

Lay the fence on the sled table ¼ in. from the edge nearest the operator. That way, if the sled is knocked, the blow is absorbed by the bed and won't knock the fence out of alignment. Square the fence to the line marking the location of the guide bar, and clamp the fence to the sled table. Place the 5⁄16-in.-dia. brad-point bit in the fence holes and tap the bit with a hammer to transfer the location to the MDF. On a drill press with a fence, use a 1⁄16-in.-dia. bit to transfer the hole location to the underside of the sled. Turn over the bed and use a 1-in.-dia. Forstner bit to counterbore 3⁄32-in.-deep holes for T-nuts. Finally, bore all the way through the MDF with the 5⁄16-in.-dia. bit.

Before you attach the fence to the bed, you need to add a handle located right over the miter-gauge bar. I turn my handle on a lathe and double-tenon it into the fence, but you also can use a thick dowel glued into a drilled hole. Make sure the handle is far enough back on the fence so the flip-stop (added later) will slide by.

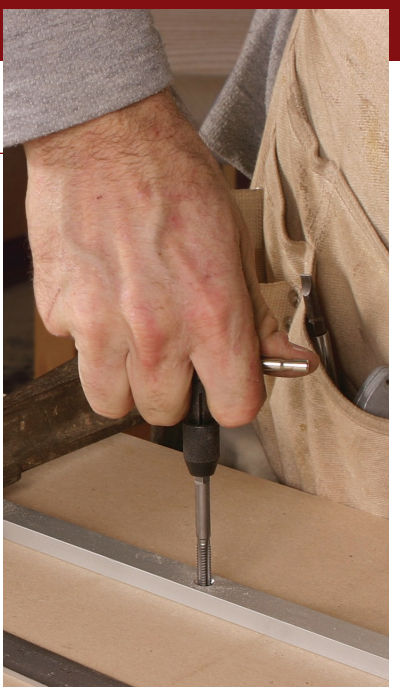
The fence is attached to the bed with ¼-20 bolts screwed into T-nuts sunk into the bottom of the bed. Grind down the T-nut spurs so they'll work on MDF.

Add the guide bar—Turn the sled over so that both the fence and the location of the guide bar overhang the bench. The guide bar is attached to the bed with machine screws, but this involves drilling and tapping holes in the bar. If you've never done this, I suggest using a piece of extruded aluminum for the bar. Relatively soft, it drills and taps easily, but because the tolerances are less than for steel, you will have to dimple one side to create a tight fit in the miter slot. Mild steel is harder to drill

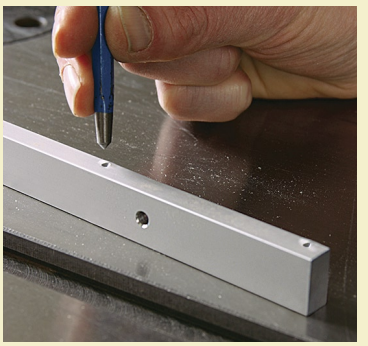
Attach the fence. *Tap the T-nuts into the underside of the sled, slide ¼-in.-dia. bolts through the fence, and then use a socket wrench to drive the bolts into the T-nuts.*

2 ATTACH THE GUIDE BAR

Drill and tap the guide bar. *McCormack uses a #7 drill and then taps the bar to take ¼-20 machine bolts.*



A machinist's trick



To create a tight fit in the miter slot, use a center punch to create dimples on the side of the guide bar nearest the blade. Place dimples ⅛ in. from the top of the bar, starting ¼ in. from the ends and spaced every 3 in. File the dimples to fine-tune the fit.

and tap but will wear better. Both bars are available at www.onlinemetals.com (aluminum, part No. 6061-T6; steel, part No. 1018-CF).Clamp the bar at the location you marked earlier, drill through both bar and sled, and then tap them with a ¼-20 tap. With the bar still clamped, working from the underside, countersink the holes on the top of the sled and screw flat-head machine screws through the sled into the bar.

The second part of the fence, the hardwood face, gets a 3⁄32-in.-square rabbet on its bottom front edge so dust can collect there instead of pushing the workpiece out of alignment during multiple cuts. You also need to drill and countersink holes in the face to attach it to the plywood back.

The top of the fence face receives a Kreg Top Trak, which comes in 4-ft. and 2-ft. lengths. You'll need two sections of track to extend the length of the 5-ft. fence. Drill and countersink holes along the track and attach it to the fence face with wood screws. Clamp the two sections of fence together, place shims between them to ensure that the face is dead flat, then screw them together.

Adjust the fence to cut square

Make the first cut on the sled to trim away the ¼-in. overhang on the bed and the fence. Then, to square the fence, make test cuts on a 2-ft.-wide by about 20-in.-long plywood panel. The panel needs a true edge to ride against the fence face, so handplane or edge-joint it dead straight. Make the first crosscut, flip the panel 180°, and cut the opposite side with the true edge of the board still against the sled. Measure the board's width near the sled fence and then at the far end of the board. If the fence is not at 90° to the sawblade, this test cut will double the observable error.

If the second measurement is greater than the first, you are cutting at more than 90°. Put a fine pencil mark on the sled's bed in

3 ADD THE FACE OF THE FENCE

A straight fence. *Clamp the two sections of fence together, and use pieces of paper as shims until a straightedge verifies that the front of the fence is perfectly straight.*

Join the two fences. *Once you're certain the face of the fence is straight, use 2-in. drywall screws to attach it to the back section of the fence.*

Square the fence

The first cut. *With the fence and miter bar attached, you can trim the bed flush with the blade. If you push the sled into the blade, very little of the miter bar is engaged in the slot at the start of the cut. It is safer to raise the blade through the first few inches of the sled.*

front of the face, unlock all but the right-hand attachment bolt, and rotate the fence slightly clockwise. The ¼-in. bolts in the 5⁄16-in.-dia. holes give you enough play. If the second measurement is less than the first, rotate the fence counterclockwise. Relock the fence and make two new test cuts. Keep adjusting until you are cutting a true rectangle. Then drive countersunk drywall screws through the underside of the bed into the plywood fence.

Apply a strip of right-to-left self-adhesive rule to the Top Trak, and then calibrate the cursor on the Kreg flip-stop.

Safe operations while using the sled

You are now ready to make perfect, square crosscuts and cut boards to the same length time after time. However, you should take precautions if you work near the capacity limits of the sled. When making a wide offcut, use a catcher keyed into the right-hand miter gauge and sitting level with the sled. This will support the offcut and prevent tearout near the end of the cut.

If you crosscut at the maximum width, be very careful that the sled does not see-saw out of the miter-gauge groove at the start of the cut, causing the sled and the workpiece to kick back. You'll also find it helpful to have an outfeed table for your saw; otherwise the sled could fall off at the end of the crosscut. It's a good idea to hang the sled on the wall when not in use so that it doesn't get damaged. □

John McCormack is a furniture maker and woodworking teacher in San Francisco, Calif.

TEST CUTS ENSURE THE FENCE IS SQUARE

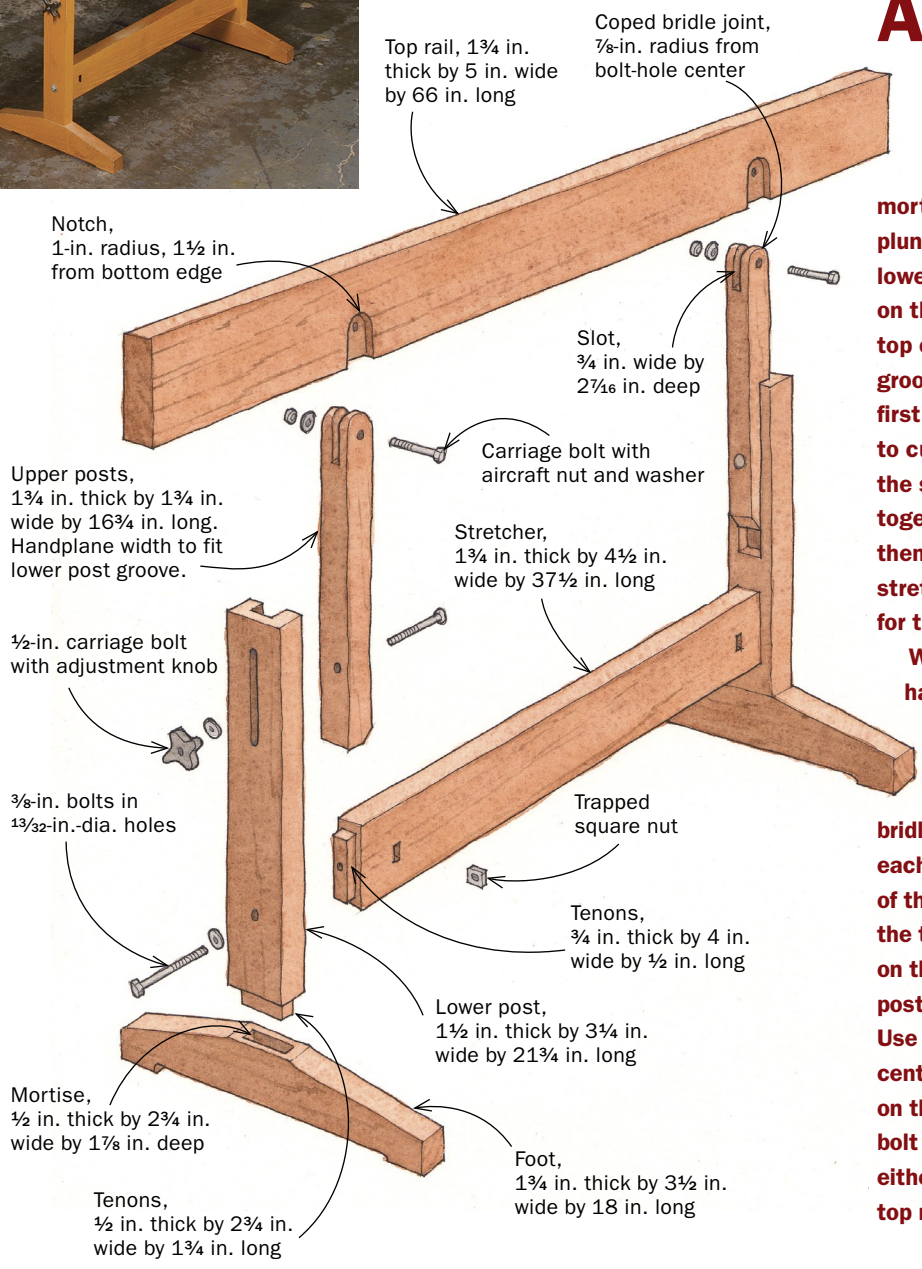
The first cut. *Take a piece of plywood, about 20 in. square, with one side perfectly straight. Place this side against the fence, mark the opposite side with a triangle, and cut one of the adjacent sides using the sled.*

The second cut. *Flip the test board 180°, keeping the same side against the fence, and cut the side opposite the first cut.*

Measure the difference. *Measure the width of the board adjacent to the fence and at the opposite end. If there is a difference, the fence isn't perfectly square to the blade.*

Adjust the fence. *There is a small amount of play in the bolt holes. Place a pencil mark on the bed of the sled next to the fence, loosen all but the right-hand fence bolt, and pivot the left-hand end of the fence forward or backward. Tighten all the bolts and make another pair of test cuts.*

Build an adjustable sawhorse



Although designed to be used with the crosscut sled, this sawhorse, or a pair of them, finds numerous uses in my shop. Finish-mill the parts to the correct dimensions, but leave the upper posts 1/32 in. extra thick to be fit to the lower post grooves later. Lay out and cut the trestle-foot mortises, using either a hollow-chisel mortiser or a plunge router, and then cut and fit the tenons on the lower trestle posts. Bandsaw the reliefs and tapers on the feet. Lay out the height-adjustment slots in the top outside faces of the lower posts, and the stopped grooves on the top inside faces. Plunge-rout the slots first, only just deeper than needed. Use a dado blade to cut the grooves, then chop them square. Clean up the surfaces of the lower posts and feet, and glue them together. Assemble them to the stretcher and clamp them in place. Bore the holes for the bolts in the lower stretcher using the hole in the post as a guide, aiming for the center of the nut mortise.

With the base assembled, you can work on the top half. Handplane, scrape, or sand the upper posts to fit the stopped grooves in the lower posts. Bore holes for the ½-in.-dia. carriage bolts and chop the square relief for the bolt shank. The coped bridle joints allow the upper rail to pivot if the height of each leg needs to be different. Lay out the female part of the coped bridle joint on the upper post and bore the top ends for the 5/16-in.-dia. bolt. Cut the bridle joint on the tablesaw and round the ends. Attach the upper posts to the lower base with ½-in.-dia. knobs and bolts. Use the tight structure to lay out the location of the centers of the two male parts of the coped bridle joint on the lower edges of the upper rail. Bore the 5/16-in.-dia. bolt holes first, and then plunge-rout away the waste on either side of the male part of the bridle joint. Wax the top rail, assemble the horse, and put it to use.

Set up the sled horse. *Use a level to ensure that the top rail of the horse is even and parallel with the top of the tablesaw. The coped bridle joints allow the horse to be used on uneven floors.*

Mark its position. *Once you have the sawhorse set, mark the point where the stiles meet, and where the feet are located on the floor. Now you can use the horse elsewhere and reset it quickly.*

Locking blocks. *If you are worried about the combined weight of the sled and a heavy workpiece causing the horse to shift, clamp a custom-size block into the gap below the upper stile.*

Tapering Jig

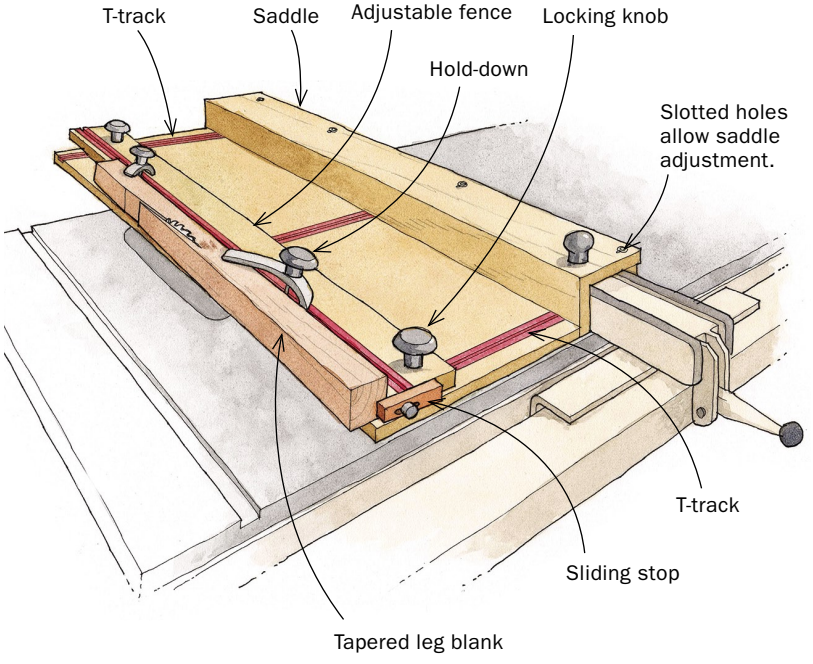
Versatile sled works with solid stock as well as sheet goods

BY ALAN CARTER

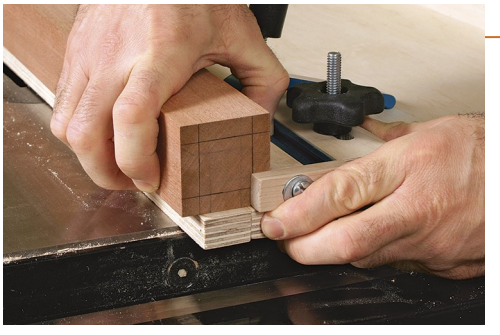
This adjustable sled not only makes tapered legs, it also makes angled cuts on sheet goods as wide as the tablesaw will allow. It consists of a sliding base, fences, and a workpiece support for tapering sheet goods. The long fence can be used to cut tapers up to 15° on pieces up to 40 in. long. I also have a shorter fence for cutting steeper tapers on shorter pieces.

The fence locks into position with knobs and T-slot bolts that slide in T-tracks. The two hold-down clamps ride in a T-track as well. The sliding stop registers workpieces accurately.

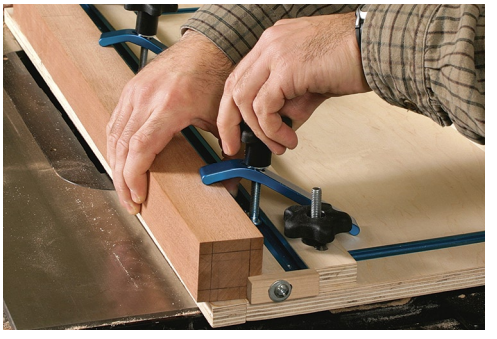
The right side of the sliding base features a saddle that rides the saw's rip fence for maximum accuracy. The far side of the saddle



LEGS



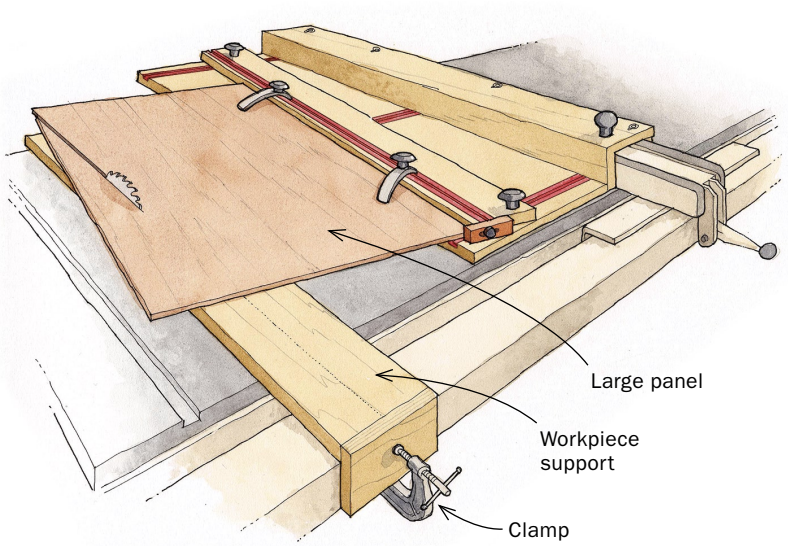
Line up the taper. *With the stock against the stop, slide the jig's fence until the marks for the taper align with the edge of the jig.*



Lock down the stock. *Tighten the locking knob to hold the fence, then secure the stock with hold-downs in the T-track.*

Photos: David Heim; drawings: Jim Richey

TAPERING WIDE PANELS



is adjustable with slotted holes for the screws, so the jig will slide smoothly over the fence without slop or binding.

To taper a leg, I first adjust the base position using the rip fence so that the jig is right next to the blade. I then mark each end of the workpiece to get the taper I want and line up the marks with the edge of the jig, which is also the cut line of the blade. After that, I move the fence up to the leg blank, butting the bottom of the leg against the stop at the bottom of the fence. Finally, I tighten the hold-downs and make the cut.

When tapering wider pieces, I use a workpiece support that straddles the blade. The support is a piece of Baltic-birch plywood the same thickness as the base of the jig, with a sawcut partway through it and a fence that I clamp to the saw's fence rail. I have drawn a line down the center of the support in line with the blade to assist in lining up the workpiece for the cut. With this support I can move the jig as far away from the blade as necessary. □

Alan Carter is a woodworker in Lisle, Ill.

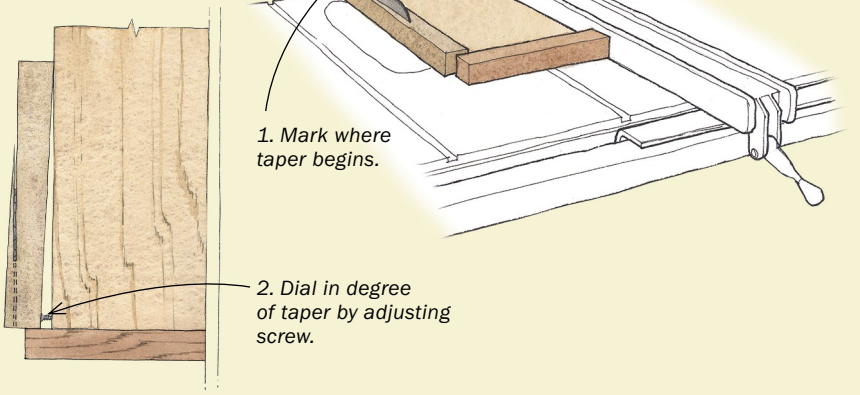
Clamp on the support. *An auxiliary support, the same thickness as the tapering-jig base, straddles the blade.*

Clamp down the work. *Set the jig's fence for the degree of taper, clamp down the workpiece, and cut.*

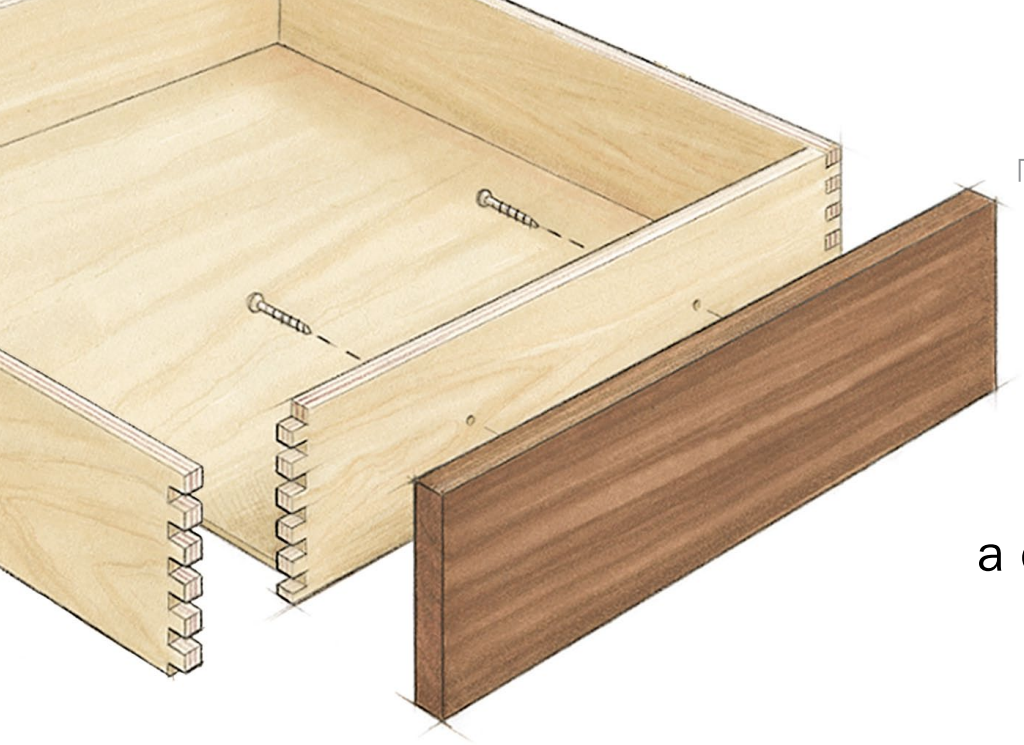
A simple alternative

Make this jig from ¾-in. thick plywood, about 8 in. wide by 5 ft. long. Attach a 1½-in.-square by 10-in.-long stop to one end and install a flathead screw in the base near the stop. To use, mark where you want the taper to start on the workpiece and tighten or loosen the screw for the amount of taper. If you want, say, a ½-in. taper, unscrew the screw ½ in. Place the jig against the rip fence with the bottom of the leg against the stop and the screw. Move the rip fence until the blade just touches the mark where you want to start the cut.

—David Sutter, Wilbraham, Mass.



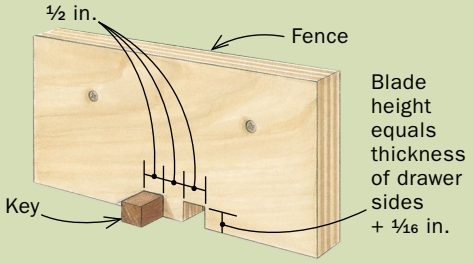
Box-Joint



A simple jig teams up with a crosscut sled and a dado blade to create quick and sturdy drawer boxes

MAKING THE JIG

A plywood auxiliary fence on a crosscut sled lets you cut accurate notches.



Cut the first slot. *With a ½-in. dado set, cut a slot equal to the height of the finger-joint notches near the center of the plywood auxiliary fence.*

Insert a key. *Cut a piece of hardwood ½ in. wide and the same height as the notches. Cut off a short piece of the key and glue it into the first notch.*

The key positions the fence. *Using the offcut as a spacer, position the key ½ in. to the right of the blade. Then screw the auxiliary fence to the crosscut sled.*

1 ***The ends of each piece are identical.*** *For the first cut, butt the top edge of the workpiece against the key.*

Photos: Asa Christiana; drawings: Bob La Pointe

Jig for Drawers

BY LON SCHLEINING

It's exasperating when I can't find a tool. Usually I know it's in a pile somewhere, or on a shelf, or over there where I think I saw it last…

Well, all that frustration is behind me now. After years as a professional woodworker, I finally built a real tool chest. It's a set of drawers designed to nestle under my workbench. In keeping with the practical nature of this project, I chose box-jointed (also called finger-jointed) drawer boxes with applied fronts. Box joints are strong, attractive, and easy to cut using the tablesaw setup shown here. The applied drawer fronts go on after the boxes are in place, making the fitting process much easier. The drawing at the top of the facing page shows the basic drawer construction.

When planning the tool cabinet, I standardized the sizes as much as I could so that I could make several parts of the same size. I ran the box-joint fingers 1/16 in. extralong so that I could sand them flush after the drawer box was glued up. This meant cutting the box parts 1/8 in. longer than I needed them and carefully adjusting the blade height 1/16 in. above the thickness of the parts.

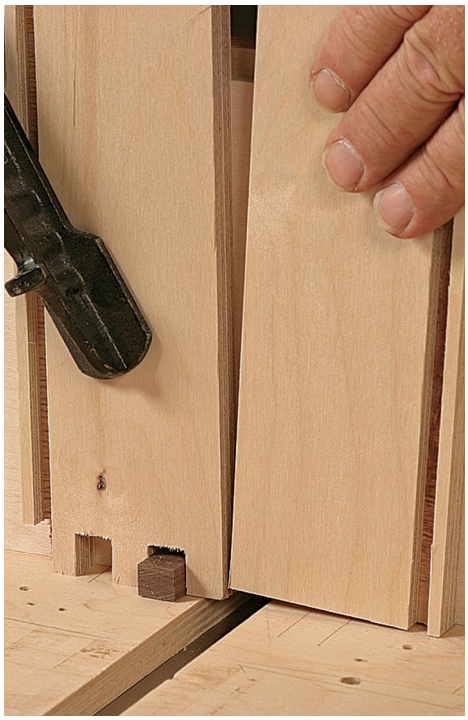
Once I assembled the drawer boxes, attached the drawer slides, and mounted them in the case, I was ready for the fun part: installing the solid-wood drawer fronts. The challenge was to have as fine and even a gap as possible around each one, while allowing for some shrinking and swelling with changes in humidity. I cut the drawer fronts to length and width so that they all fit together into the opening, with no gaps. I used credit cards as spacers to establish the gap on the top and bottom of each drawer.

Even the finish for the drawers is practical. I used a few coats of varnish thinned about 50% with turpentine, applied with a rag and rubbed off before it dried.

Now everything is in its place. Sure, I can't remember which drawer my mortising chisel is in, but I know it's in there somewhere. □

Lon Schleining makes furniture and stairs in Long Beach, Calif., and teaches woodworking throughout the United States.

2 ***Make the second cut.*** *To cut the second notch, just place the first notch on the key. The final notch on this drawer will be partial, which looks fine at the bottom edge of the drawer.*



3 ***Locating the mating side.*** *Flip the first side, put its first notch on the key, and clamp it. Butt the mating side against the first side (above). Cut the first notch on the mating side (right). The dado blade should just clear the first side. Now proceed as usual.*

4

Article Extra

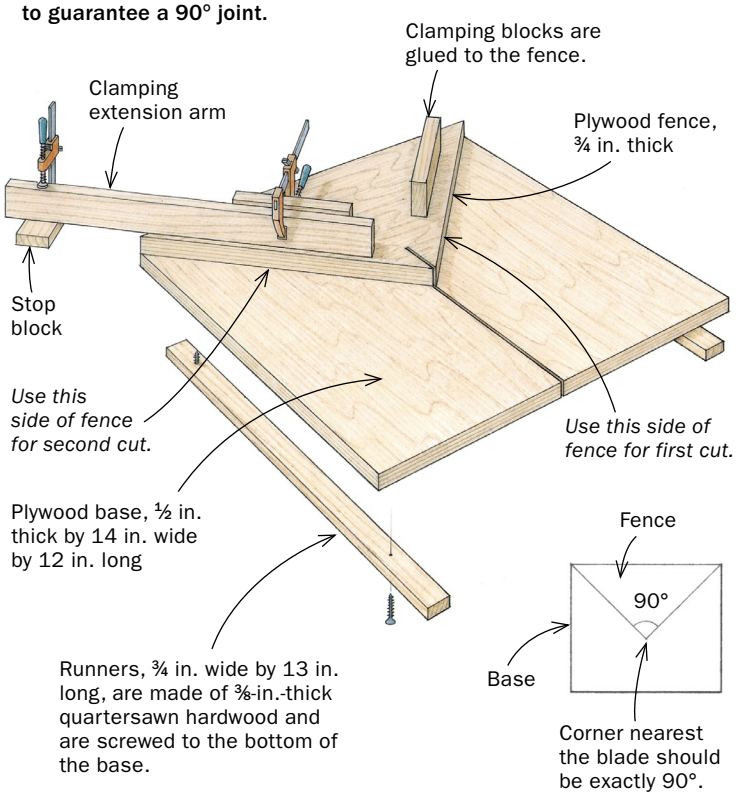
Watch our step-by-step video on how to cut a box joint.

Faster, Stronger Miters

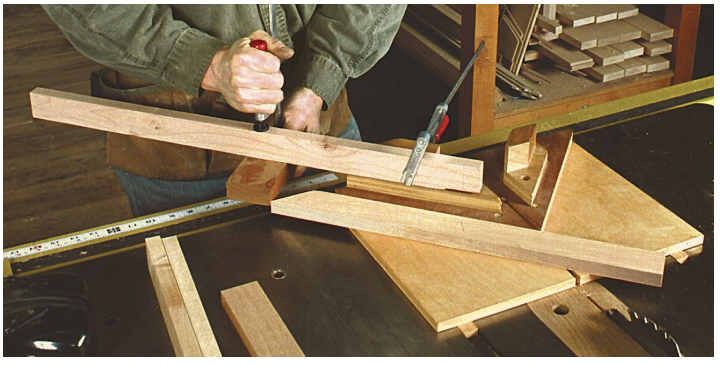
A small sled guarantees 90° joints. Other jigs make it easy to add keys and splines

PICTURE-FRAME SLED

Cut adjoining parts on opposite sides of the jig to guarantee a 90° joint.



The first cut is made on the left-hand side of the jig. *If the work slips, it will do so away from the blade.*



Uniform length. *Mark the length on the workpiece and on the right-hand fence. Clamp a stop block against the mitered end.*

Photos, except where noted: Mark Schofield; drawings: Vince Babak

The miter joint is an elegant and straightforward method for joining parts that meet at an angle without showing any end grain. Whether you are building the frame for a veneered panel, applying wrap-around molding, constructing a simple picture frame, or making a box, a miter joint will serve your needs. But the devil is in the details. To get perfect miters requires perfectly mating joints and at least one form of strengthening.

Every miter cut is made at 45° in one direction and at 90° in the other. For a miter to close up well, both angles need to be cut exactly. Make rough adjustments using a plastic 45° drafting triangle, then take several practice cuts, checking the results with a combination square.

When cutting miters on a tablesaw, you'll get the best results using a jig that holds your work to move it past the blade.

Picture-frame jig ensures accuracy

The picture-frame jig on the facing page has a flat base, two runners, a fence, and clamping blocks. The base can be made of any flat ½-in.-thick sheet stock. Make the runners out of quartersawn hardwood, so seasonal movement won't affect their fit.

The fence of the jig is ¾-in.-thick plywood. Cut the corner of the fence at a right angle, then screw it to the base. It won't matter if it's mounted a little off a true 45° angle as long as you always cut one piece of the miter joint on the left side of the fence and the other on the right side. The cuts will always be complementary and mate perfectly. Put on the clamping blocks last. You can clamp a stop block to these blocks to make cuts of uniform length.

How to strengthen miters

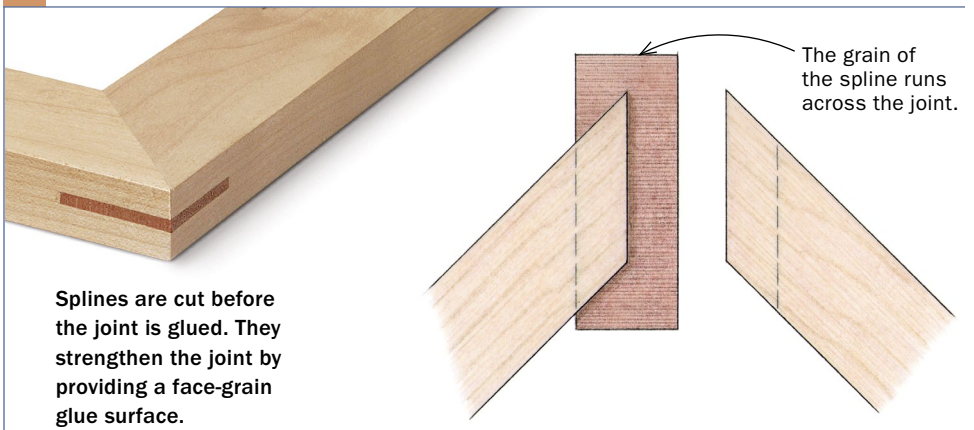
Reinforce miter joints with splines or biscuits, which are inserted before the joint is glued up, or keys, added after glue-up. The method you use is determined by several factors, the most important being aesthetics. Do you want to conceal the strengthening for a seamless look, as with a gilded picture frame, or emphasize it, as with face keys?

Splined miters in frames—Spline cuts are made along the length of the miter. They're

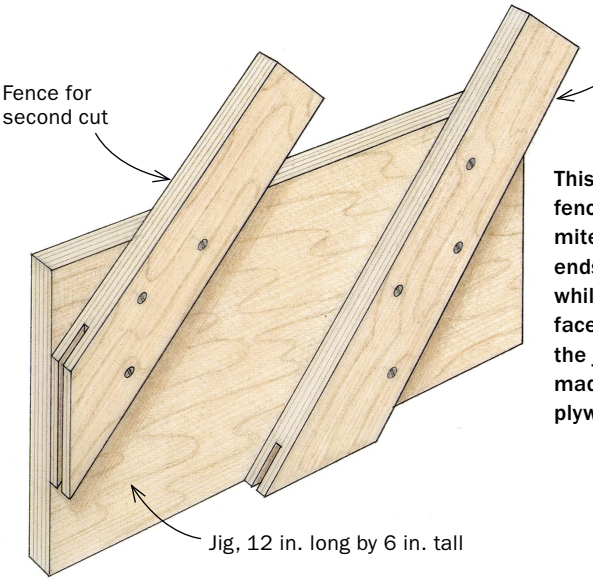
Online Extra

Gary Rogowski shows how to make and use his picture-frame jig at **FineWoodworking.com/jigs.**

SPLINE-CUTTING JIG FOR FRAMES

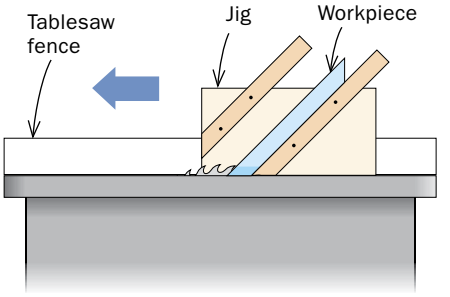


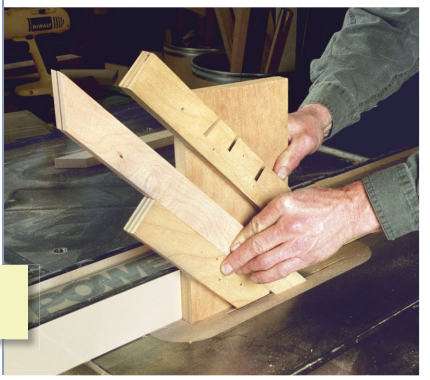
Splines are cut before the joint is glued. They strengthen the joint by providing a face-grain glue surface.



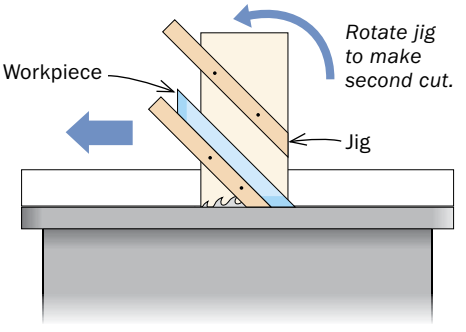
This jig has two 45° fences, which allow miters to be cut on both ends of the workpiece while keeping the same face registered against the jig. All parts are made of ¾-in.-thick plywood.

Cut one end. *Hold the workpiece firmly in place and register the jig against the tablesaw fence.*





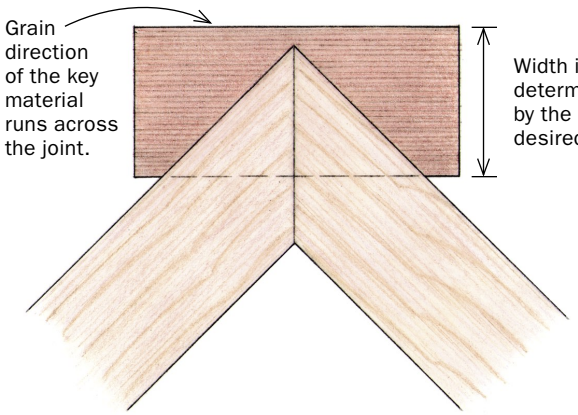
Then cut the opposite end. *Rotate the jig and register the workpiece against the other fence.*



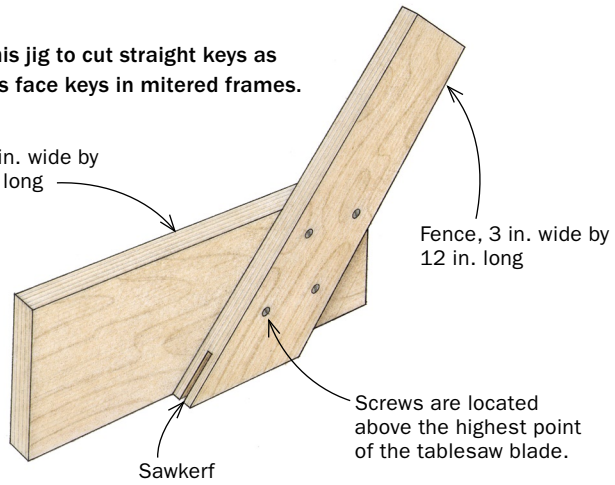
KEY-CUTTING JIG FOR FRAMES

KEYS FOR FRAMES

Keys are added after the joint has been glued. Both face keys and centered keys add to the glue area of the joint.



Use this jig to cut straight keys as well as face keys in mitered frames.



One jig cuts two keys. *Simply by adjusting the fence of the tablesaw, the key-cutting jig can cut either straight keys in the center of the frame (above), or face keys on the front of the frame (right).*

most easily made on the tablesaw. Use the spline-cutting jig to support the workpiece at a 45° angle to the blade.

With the frame piece in the jig, set the fence so that the sawkerf is centered in the thickness of the stock. If it's not, the faces of the frame members will not be flush. One way to prevent this is by having a miter jig with two fences (see p. 45). Set the blade height for a cut that's no more than ¼ in. to ⅜ in. deep. Because the grain of a spline in a solid-wood frame has to run in the same direction as the frame members, too deep a spline cut makes for a wide and fragile spline. Use a flat-grind blade to put a flat bottom on the cut. Mill up the spline material out of a contrasting wood to set off the joint. Fit one side of the spline and check to see that it will let the joint close up nicely. If the fit is a bit loose, clamp across the face of the joint as well.

Keys reinforce miter joints

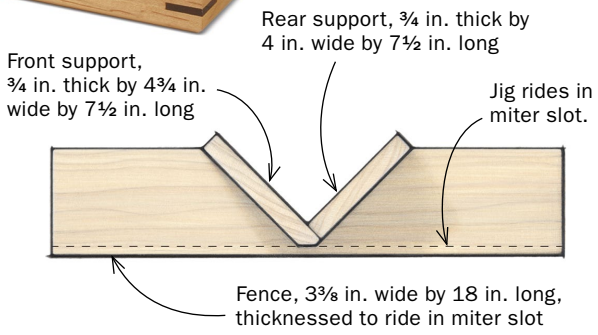
Mitered frames may also be reinforced after glue-up using keys inserted into mitered corners from the outside. Appropriately sized slots may be cut on a tablesaw or router table.

A keyed miter jig works great for holding a glued-up frame in place while you pass it through the sawblade. Set the blade height for the full depth of cut, and use a flat-grind blade. Cut each corner, holding the same face of the frame to the jig.

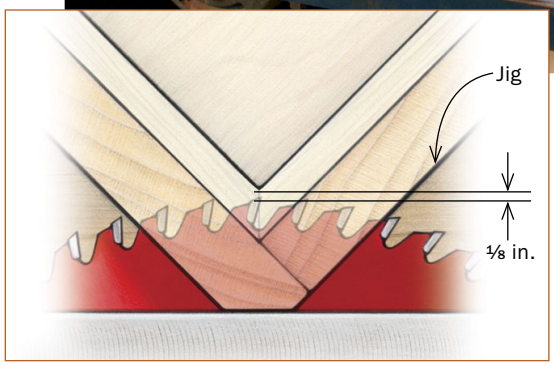
Photos, facing page: Tom Begnal; drawings, facing page: Christopher Mills

SPLINES WORK ON BOXES, TOO

Contrasting splines add strength and style to the corners of boxes. A slot-cutting jig makes it easy and safe to run the box over the blade at a 45° angle.



Story stick dials in setup. *Use a pencil to mark the slot locations on one corner of the box, then transfer the locations from the box to a thin, narrow stick. After that, use the stick to position a stop block on the jig.*



Cut the slots. *With the jig riding in the miter slot, make the first cut. Slot all four corners before moving the stop block for the next spline location.*

Mill up key stock wider than the depth of the slot. Trim the stock to thickness on the tablesaw, using a thin push stick to help you move the work safely past the blade. Use a handplane to trim the key exactly to thickness, then cut it longer than necessary.

Fit keys in their slots so that they're snug and only require a light tap to position them. Make sure when gluing that they fit all the way down in the slot on both sides. Once the keys are dry, clean them up on the bandsaw. Then handplane away from the corner in each direction to trim the key flush.

Face-keyed miters for frames probably originated when someone made a straight key cut in the wrong spot. It was a pretty mistake. Make these cuts using the keyed miter jig on the tablesaw. Place the cut just on the outside edge of each corner on both faces. When gluing, make sure the keys fit down to the bottom of the cut on both sides of the joint. Put clamps across the keys to hold them in place. Finally, plane them flush, being careful of the contrasting grain directions. □

Gary Rogowski and Doug Stowe contributed to this article.

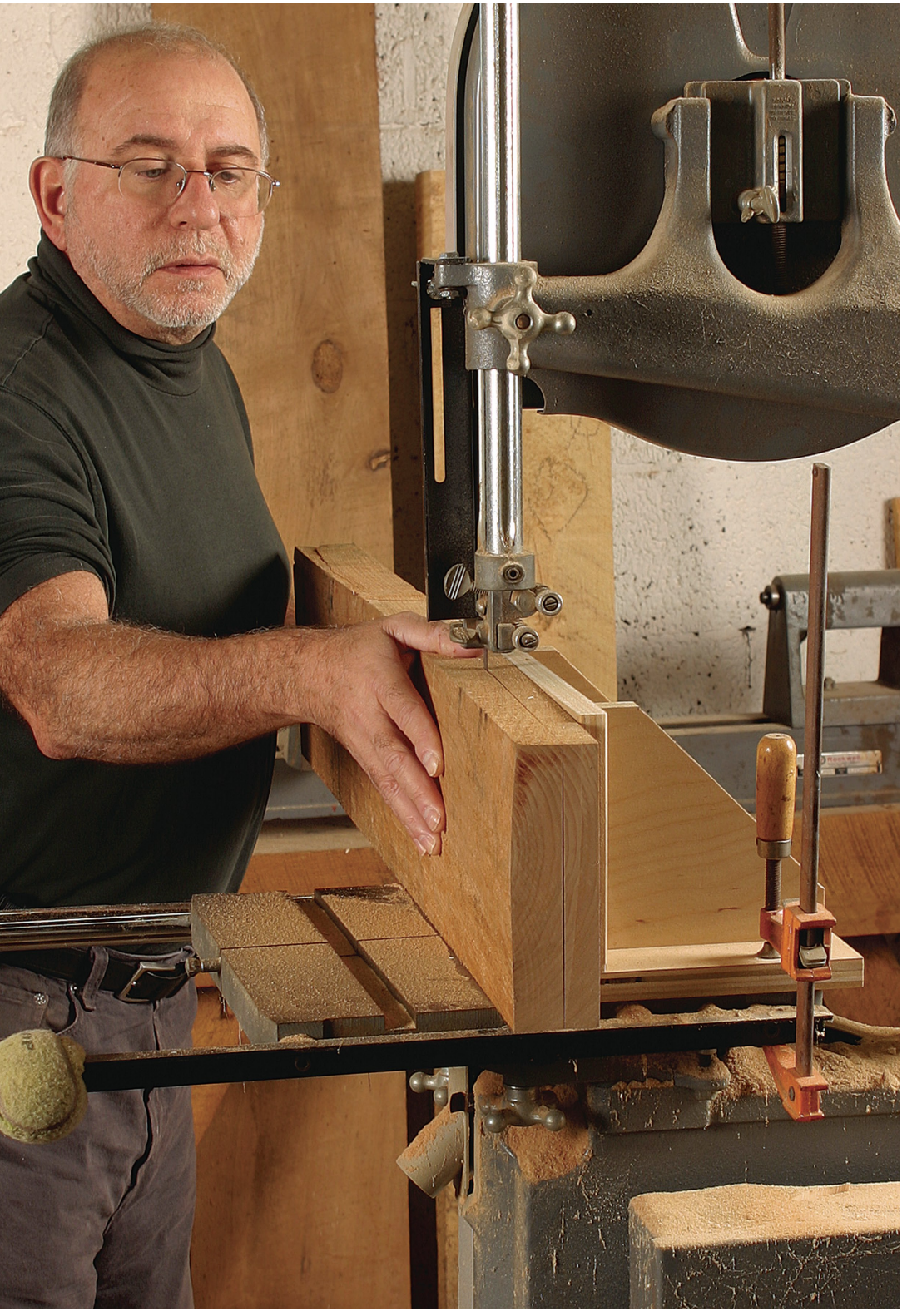
Slip in the splines. *After planing the spline stock to fit and cutting out little triangles, add glue to the slots and splines and slide them into place.*

Sand the splines flush. *You can use a stationary belt sander to quickly sand the splines flush to the sides of the box. A block plane also works well.*

Online Extra

See how Gary Rogowski enhances miter joints by adding keys at **FineWoodworking.com/jigs.**

Fence for Resawing



Make smooth resaw cuts and slice thin veneers

BY LONNIE BIRD

Resawing thick stock on the bandsaw to create thinner lumber or veneer offers a variety of benefits. It not only allows you to move beyond the standard lumber dimensions, but also opens all sorts of design options. For instance, you can slice a board in half to create book-matched panels; you can slice extrathin stock for dividers and delicate boxes; and you can cut your own veneers.

For most resawing, I'd use a hook-tooth blade with 2 tpi to 3 tpi, ⅜ in. to ½ in. wide and 0.025 in. thick. This coarse blade effectively pulls sawdust out of the kerf, allowing the blade to run cooler and thus cut faster. It's also critical to adjust the bandsaw. Mount, track, and tension the blade; then square the table to the blade and adjust the guides. Finally, build an auxiliary fence like the one shown here.

Before resawing, it's important to determine and adjust for blade drift, the tendency of the thin blade to begin cutting out of parallel with the fence.

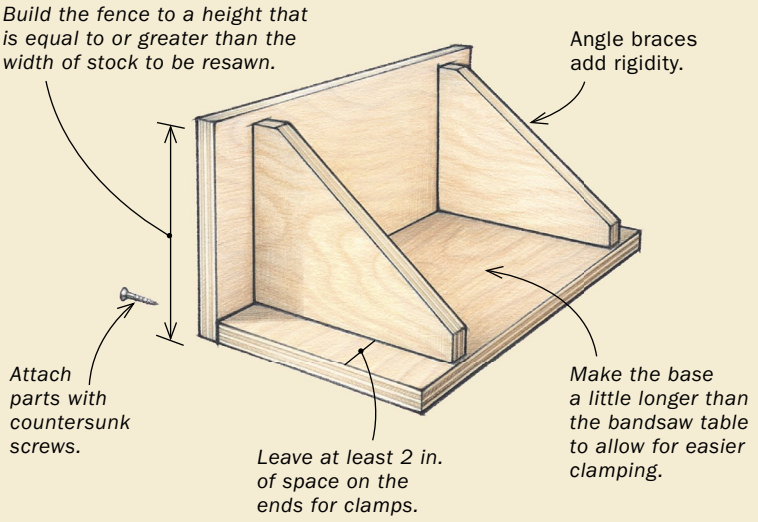
When resawing veneer, run the workpiece lightly over the jointer after each cut. This gives you one flat face to glue to the substrate, allowing you to smooth the rough outer face easily without fear of spoiling the veneer. Then place the jointed face against the bandsaw fence and continue cutting. If you plan to book-match the boards, stack them in the order that you cut them so that it will be easier to find good matches. □

Lonnie Bird is a woodworker and teacher in Dandridge, Tenn.

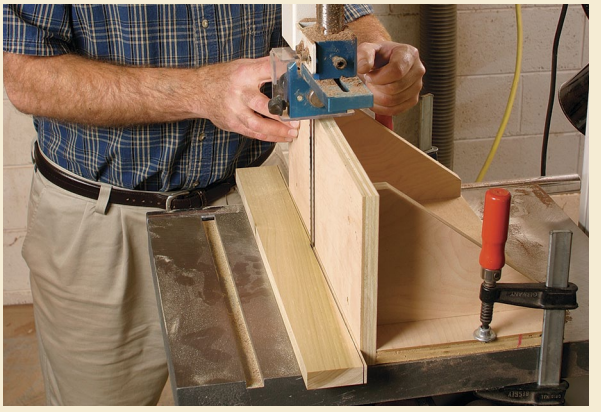
Photos: Thomas McKenna; drawings: Christopher Mills

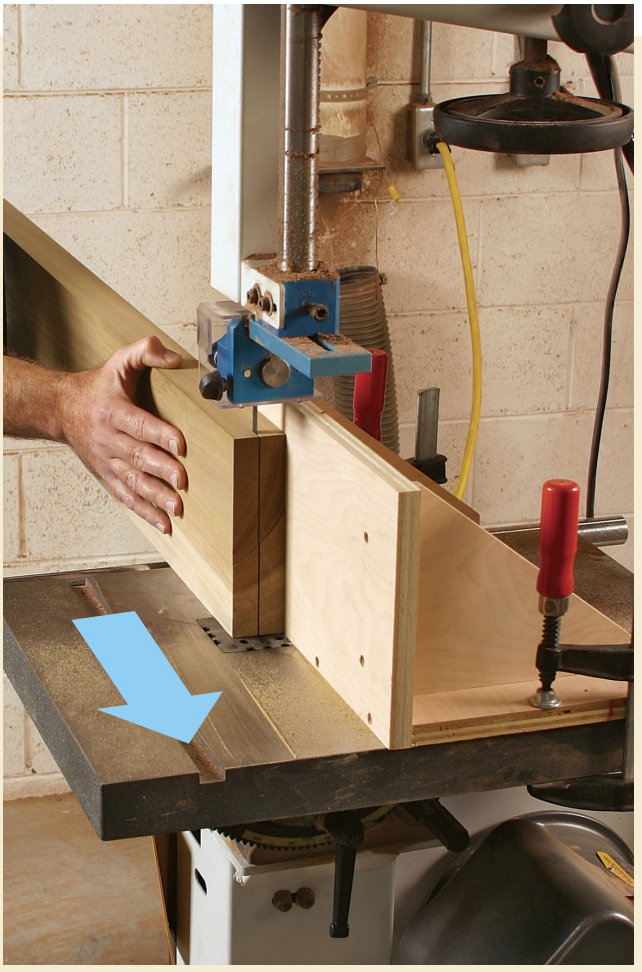
TALL FENCE IS EASY TO MAKE AND USE

A tall auxiliary fence made from ¾-in.-thick plywood or medium-density fiberboard (MDF) helps support wide stock for resawing, ensuring cuts that are true (parallel) and smooth.



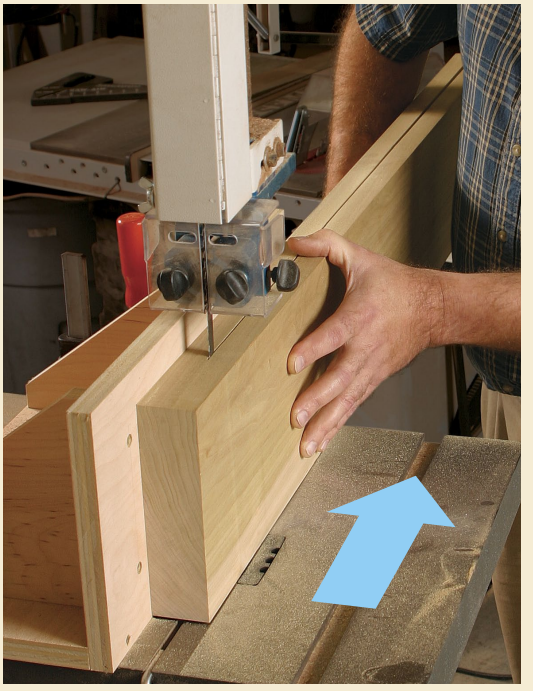
Adjust for blade drift when installing the fence. *Raise the guides and cut along a scribed line freehand (left). Stop midway through the cut, hold the test piece in place, and clamp the auxiliary fence against it (below). This ensures that the blade won't wander during the cut.*





TIPS FOR RESAWING

Smooth, safe cuts. *To ensure a true cut, joint one side and run it against the fence. Use one hand to push the board and the other to hold it flat against the fence throughout the cut.*

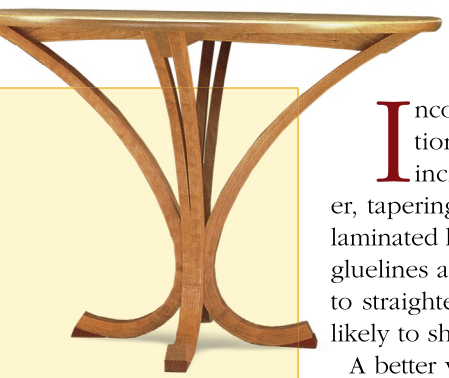


Pull long stock through at the end of the cut. *Before the board starts to fall off the table, walk to the outfeed side and pull it through. Again, support it with one hand while using the other to hold it flat against the fence. This method keeps your hands away from the blade. When resawing veneer, stay on the infeed side and use a push stick at the end of the cut to keep your fingers clear.*

Easy Tapered Laminations

One jig works with the bandsaw and planer to make tapered plies a snap

BY MICHAEL C. FORTUNE



Bent and split. *Fortune sawed into the tops of these bent, tapered legs to insert stretchers.*

Incorporating tapered, curved laminations in your furniture opens up an incredible range of designs. However, tapering the component after it has been laminated has two disadvantages. If too many gluelines are broken, then the part will begin to straighten. Also, the severed gluelines are likely to show as a series of ugly lines.

A better way is to taper the individual plies, so that when they are glued together, both the inside and outside curves are continuous wood with no disfiguring gluelines. I have a jig that makes creating tapered plies a snap. It works not only to cut the tapered plies on the bandsaw, but also to clean them up on the planer.

Determine the dimensions of the plies

After creating a full-scale drawing of the piece, the first step is to figure out the number and thickness of the plies. This is a balancing act: The bond between thick, curved plies with only a few gluelines might weaken, letting the part slowly straighten, a process known as "cold creep." Conversely, too many plies introduces too much glue, increasing the risk that the piece will contract or warp as it dries. As a guide, a 1-in.-thick laminated part bent around a 12-in. radius should comprise about 10 plies. You should be able to bend the plies around the form by hand; if not, make them thinner and add more.

When calculating the number of plies, start at the thin end of the finished part, maintaining a minimum

Mitered together. *He made each leg from two tapered, laminated parts mitered together along their length. A miter reinforced with loose tenons joins legs to aprons.*

thickness of 1/16 in. at the tapered end of each ply. Any thinner and they may not survive being passed through the planer. Then divide the thick end by the number of plies to get the maximum thickness of each ply. I recommend making the plies 1/4 in. wider than the finished part, and 1 in. longer (measured along the outside of the lamination) at both ends, to allow for cleanup and final sizing.

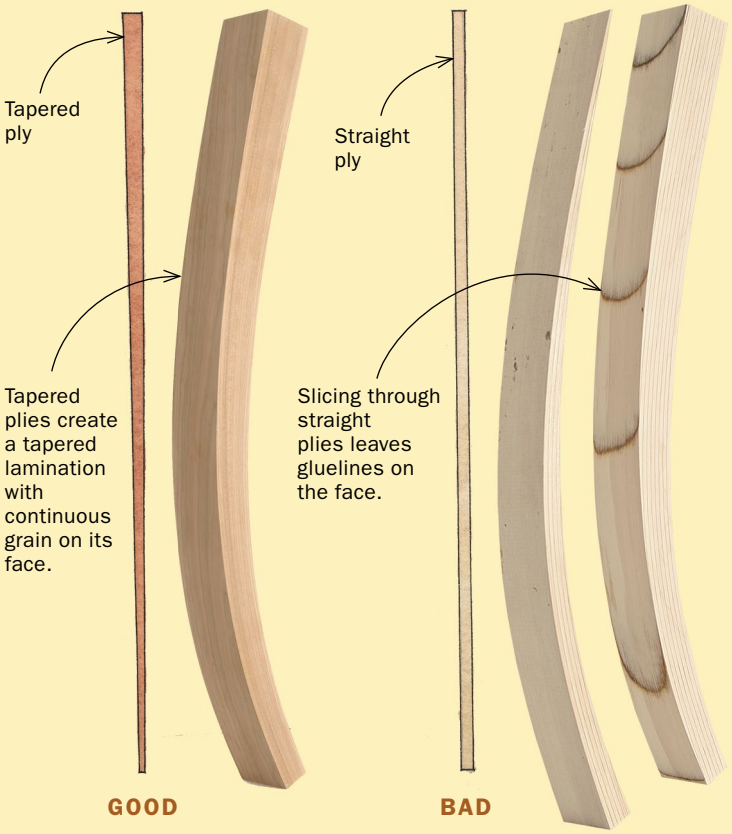
Graceful chair. *Fortune used bent, tapered laminations for the legs and stretchers of this armchair.*

Make the bandsaw/planer taper jig

The dimensions of the jig can be changed to suit the project. I've used these jigs for making tapered parts from 1 ft. to 14 ft. long. Make the jig 2 in. longer at each end than the length of the plies. This 2-in. space accommodates end stops on the jig and any planer snipe. Make the jig wide enough to accommodate your plies, but be aware that the width of the jig is limited by the resaw

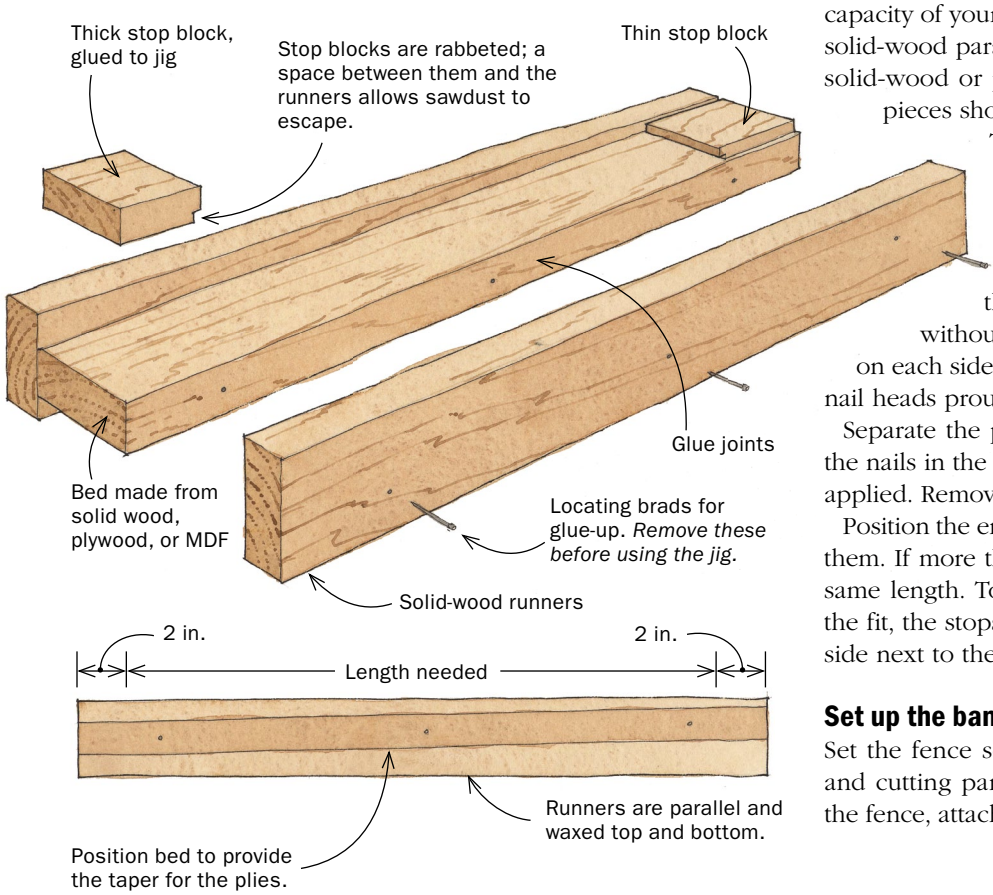
TAPER THE PLIES FOR A CLEAN LOOK

By tapering the individual plies before they are glued into a lamination, the tapered outer surfaces remain solid with no visible gluelines (left). If you taper the piece after it has been laminated, you will cut through the gluelines, spoiling the appearance and potentially weakening the piece (right).



Make the tapered plies

BANDSAW AND PLANER TAPERING JIG



capacity of your bandsaw. The jig is made up of three pieces: two solid-wood parallel runners (¾ in. thick is best) and an inclined solid-wood or plywood bed that provides the taper. The three pieces should be jointed and planed as straight as possible.

Two inches from each end of the runners, carefully measure down from the top edge and mark the thin dimension of the ply on one end and the thick dimension on the other. Draw a line connecting the two points. Align the top surface of the bed with this line and clamp the parts together without glue. Drive in two or more small finishing nails on each side so that they penetrate the bed by ⅛ in. Leave the nail heads proud so they can be pulled out later.

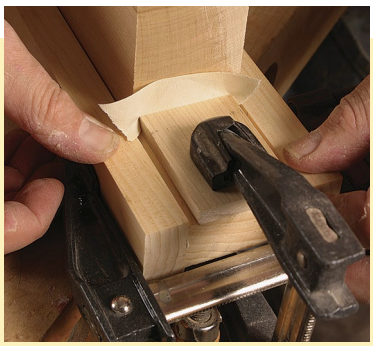
Separate the parts, apply glue, and reassemble them, aligning the nails in the holes to stop the parts from sliding as clamps are applied. Remove the nails when the glue is dry.

Position the end stops so the blank just slips in and out between them. If more than one blank is involved, all must be cut to the same length. To keep sawdust from accumulating and affecting the fit, the stops are rabbeted on the inside with space on either side next to the runners.

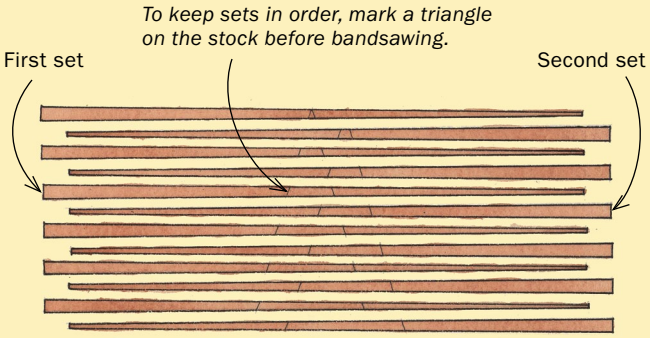
Set up the bandsaw and make tapers

Set the fence so that the blade is 1/32 in. to the right of the jig and cutting parallel to the fence. If both runners don't contact the fence, attach a taller auxiliary fence (see p. 48). Bring a guide

BANDSAWING



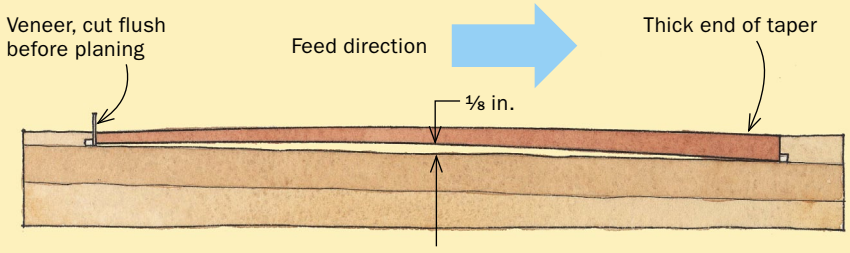
Stop blocks secure the blank. *On either end of the jig, glue and clamp a stop block. You should just be able to slip a piece of paper in between the blank and each stop block.*



Two sets of plies. *After cutting each tapered ply, joint the face, flip the blank end over end, and cut the next one. Note the simple guide platform that keeps the workpiece level.*

PLANING

Run each ply through the planer. *Glue a piece of veneer to one stop block (left), causing the ply to bow upward about ⅛ in. When pushed down by the infeed roller of the planer, this bow greatly reduces the risk of the ply being picked up and shredded by the planer knives. With straight-grained wood, feed the thick end of the ply into the planer first (above) so that the knives are cutting downhill and not against the grain.*



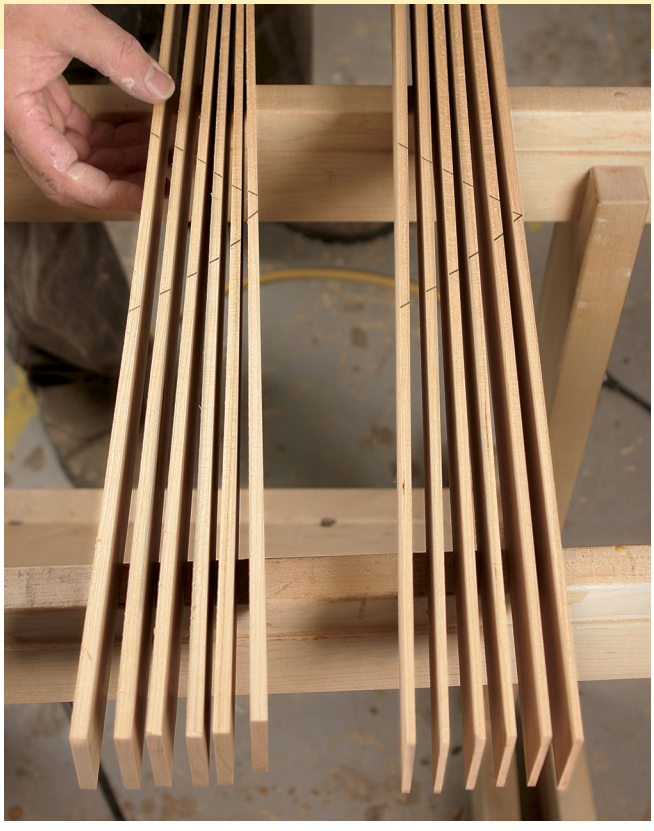
platform with a small cutout around the blade up to the jig and attach it to the bandsaw table. This can be done with double-sided tape, or with screws set into a block of wood clamped to the edge of the table.

The platform helps to support the blank while it is carried past the blade. For this reason, the thickness of the platform should match that of the jig's runners. The guide platform should extend beyond the front and back of the blade by a little over half the length of the blank. When cutting long plies, the ends of the platform can rest on adjustable stands.

The tapered plies are cut from a blank of solid wood. It is a good idea to draw a triangle on the top surface of the blank to keep the laminates in order.

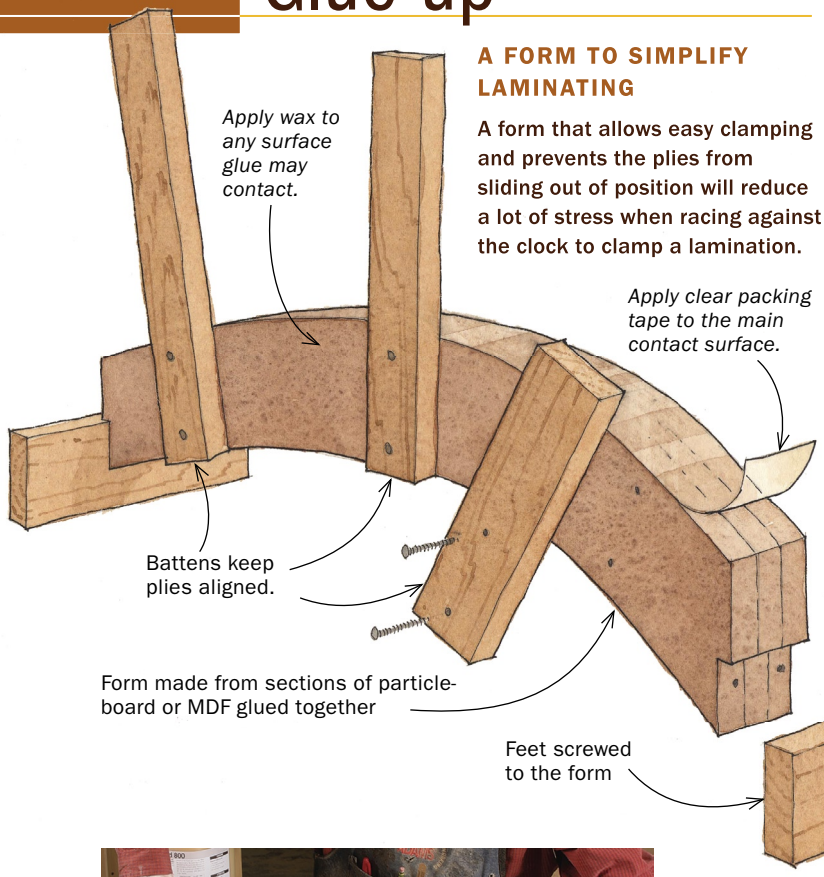
The blank must be flipped end-for-end each time a tapered ply is cut away. If not, the thick end of each ply comes from the same end of the blank, and the blank becomes increasingly tapered. You will quickly run out of wood on one end of the blank, and each successive ply will have more and more weak cross-grain. The blank should be wide enough to provide enough plies for at least two packets of laminations.

Place the blank in the jig (triangle pointing up) and run it through the bandsaw. The thick stop should be toward you so the blank is less inclined to slip off. After each pass, lightly joint the bandsawn face of the blank, then flip it end-for-end so the



One board, two sets of plies. *After planing the plies, use the triangle drawn on the original blank to stack the two groups in their correct sequence for grain-matched laminations.*

Glue-up



A FORM TO SIMPLIFY LAMINATING

A form that allows easy clamping and prevents the plies from sliding out of position will reduce a lot of stress when racing against the clock to clamp a lamination.

triangle is pointing down, reinsert it in the jig, and cut another taper. Pile the tapered plies in these two groups according to the triangle marks as they come off the bandsaw.

Shim the plies and run them through the planer

The bandsaw leaves surfaces too rough for making tight glue joints, so you'll need to plane these surfaces smooth. Glue a piece of veneer or a thick card to the face of the thicker end stop on the jig. When inserted, the plies should bow up about ⅛ in. at the center point. The infeed roller on the planer will press the bow flat, which in turn will jam the ply against the end stops, greatly reducing or eliminating shredding. The 1/32-in. gap you set between the jig and the bandsaw blade will provide enough material to plane before you get down to the tops of the jig's runners.

Install a ply in the jig, bandsawn face up. The thick end of the ply usually enters the planer first so that the grain slopes away from the rotating planer knives, reducing tearout. The exception is plies with crooked grain, so examine the grain first.

Run the sled through the planer, carefully lowering the cutterhead until it begins cutting the taper. One pass might do it, but be cautious about taking off too much material at once. Also, be certain that the plies retain their desired thickness.

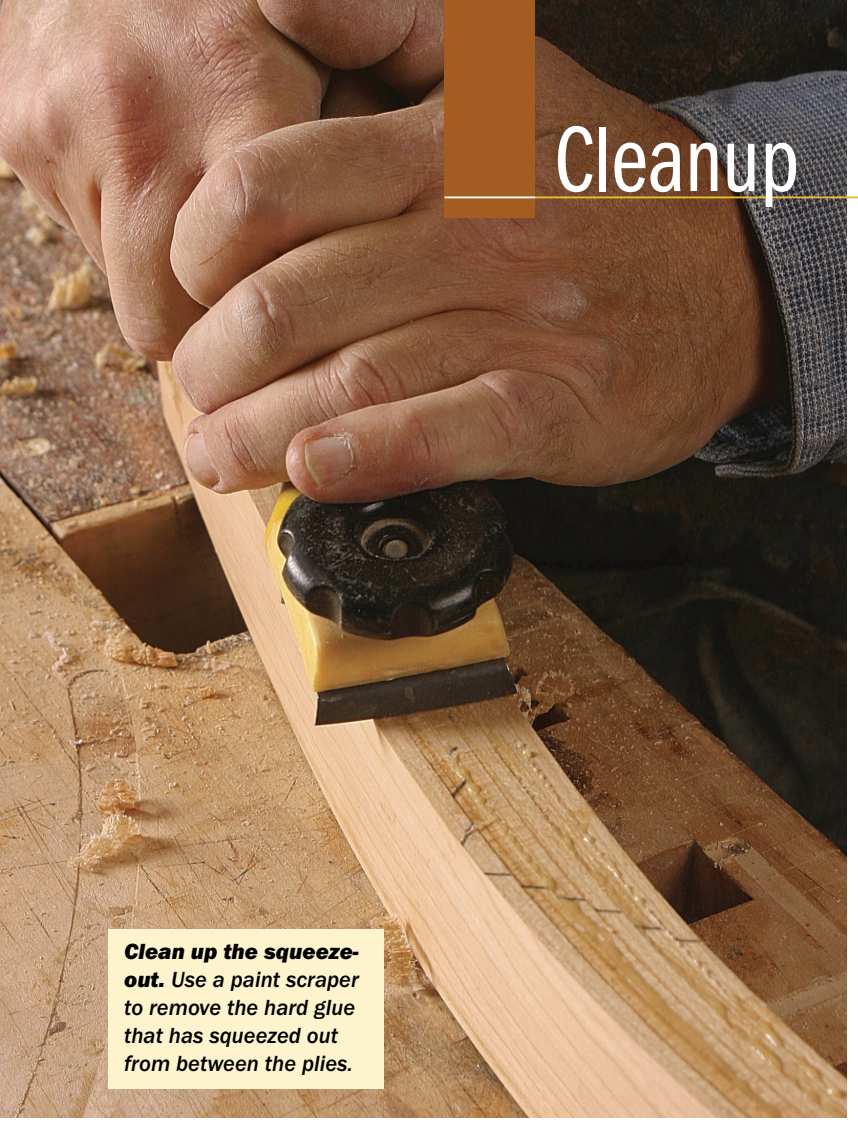
A better form for bending

For all my laminating and steam-bending, I use a one-piece "male" bending form (the plies are bent over the form rather than into a concave form) made from particleboard or medium-

Apply the glue. *With a limited open time, it is important to apply the glue quickly. Tape the plies to a piece of cardboard and use a metal spreader with a serrated edge to apply an even coat of glue.*

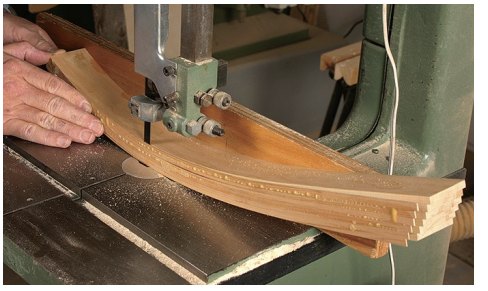
Clamp from one end. *Place the plies and the packing strips on the form, and keep them parallel by clamping them to a batten (above). Then begin clamping them to the body of the form, working from one end to the other (right).*

Cleanup



Clean up the squeeze-out. *Use a paint scraper to remove the hard glue that has squeezed out from between the plies.*

Joint one edge. *Run the edge that was scraped across the jointer.*



Saw safely to width. *Using a bandsaw to rip the lamination to width is safer than using a tablesaw and risking kickback.*

Plane to thickness. *Run the lamination through the planer to remove the bandsaw marks and bring the lamination to final thickness. Trim the ends on a miter saw using a jig, or on the tablesaw using a sled.*

density fiberboard. The shape is bandsawn and the inside curve runs parallel to the outside so the clamps won't slip off. Attach battens long enough to guide the unclamped plies as they are brought around the form.

The form's surface should be smooth and true. You can either remove the bandsaw marks with a stationary disk or belt sander, or surface the face with a ⅛-in.-thick layer of Masonite, taking into account the extra thickness when designing the form. Cover the surface with packing tape, and apply paste wax to all the other parts of the form to resist glue adhesion.

Before you apply glue, do a dry run

Pressure radiates from a clamp's pad at about a 45° angle. To achieve uniform pressure but avoid having clamps placed almost next to each other, you need to position the clamp pads farther away from the workpiece so that the cones of pressure overlap. I use at least a 1-in.-thick stack of padding strips made from ⅛-in.-thick plywood, and apply packing tape to the face of the strip in contact with the plies.

For most woods I use urea/formaldehyde glue. Its rigidity and lack of cold creep make it ideal for laminations. I always do a dry-clamping run and time it to ensure I am within the adhesive's open time of about 30 minutes, depending on temperature. I use a metal mastic spreader with 1/32-in. curved notches stamped along the edge (Hyde Co., part No. 19120; www.hydetools.com). The notches deposit the perfect amount of glue (for veneer work, too), and the spreader is easy to clean with a damp cloth.

Tape down the ends of the plies to a piece of cardboard on a bench, paying attention to the triangle mark sequence. Leave aside the top piece, which isn't glued. Pour the glue onto the plies and spread it with the notched spreader. Draw the glue down the length of the plies to avoid forcing it between them.

On oily tropical woods I use an epoxy, applying the glue to both sides of each laminate. After gluing one face using the above procedure, I take the strips off the cardboard one at a time and glue the second side with a 2-in.-wide piece of spreader.

Gather the plies and the packing strips together and move the entire assembly to the form. Starting at one end, clamp the lamination to the batten, then clamp it to the form, and then repeat these steps until you reach the far end, alternating clamps front and back of the form. Let the lamination dry overnight.

Remove the dried glue from one face with a paint scraper, run that face across the jointer, and then finish the cleanup as shown in the photos above. You are now ready to use my mortising jig (see p. 64) to do the joinery on these curved parts. □

Michael C. Fortune is a widely recognized woodworker who lives near Peterborough, Ont., Canada.

Drawings: Jim Richey

7 Must-Have Router Jigs

Simple ways to guide the router for accurate joinery and shapes

BY GARY ROGOWSKI

Your router is strong but lazy. You have to steer it. That's where the jigs shown on the next few pages come in. They are some of the simplest to make and use, yet they control your router for precise and repeatable cuts.

There are several types: straightedges that guide the router base, jigs that enhance a router's edge guide, and various template-routing jigs.

First, though, check a few things on the router. Use a straightedge to be sure that the base is flat. If it's not, you can either lap it as you would the sole on a handplane or make a new one from ¼-in. Plexiglas.

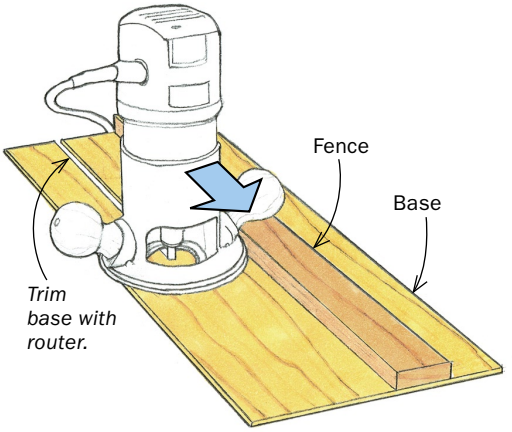
Next, check to see if the bit is concentric with the base. Put a ½-in. straight bit into the collet, tighten it down, and then measure from the edge of the subbase to the cutting edge of the bit. Rotate the bit and measure to it in three or four spots. On some routers, you can adjust the base to compensate for any lack of concentricity. If you can't do that, pay attention when routing against a fence and never rotate the base as you make a cut. This will ensure that the cut will be the same distance from the fence. I use the router handle as a guide, making sure to keep it right above the fence.

A more reliable way to ensure consistency is to work with a square base or

Photo, this page: Asa Christiana

1 MAKE A STRAIGHTEDGE GUIDE

Attach a piece of straight ½-in.-thick plywood to a piece of ¼-in. plywood or MDF. Use the router to trim the base parallel with the fence.



The guide keeps the router in line. *Setup is easy, because the edge of the jig marks the edge of the cut.*

with a subbase that has one straight edge. If your router doesn't come with a straight-edge cut into the base, you can make one from Plexiglas.

Jigs that guide the router base

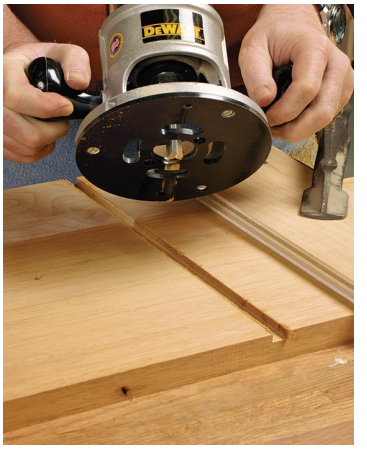
Your router already has a base, so why not use it as a guide? That's the simplest way to guide a router. Clamp a fence to the workpiece and make a straight cut, holding the router base tight to the fence. If you move the router from left to right across the workpiece, the clockwise rotation of the bit will pull the router tight to the fence.

A basic guide—Any board with a straight edge can work as a fence. But when I want a cut exactly on a line, I use my straight-edge guide. Cut a straight piece of ½-in. plywood as long as the edge you need to cut and 3 in. to 4 in. wide. Glue this to a base of ¼-in. plywood or medium-density fiberboard (MDF). Mount a straight bit and cut through the base, keeping the router base tight to the plywood fence. Use this new edge as your guide.

T-square jig—Many cuts, such as dadoes for shelves, need to be made square across a board. To make these cuts accurately, build a T-square jig to automatically set your fence square to an edge. It consists of a fence to guide the router across the work and a crosspiece to hold the fence square to the workpiece. Glue and nail or screw the pieces together, making sure that they join at exactly 90°. With the same bit you'll use to cut the dadoes, cut a dado in the crosspiece. That will help you align the jig with layout marks. When making the cut,

2 MAKE A JIG FOR DADOES

Create a right-angle jig. *Attach a crosspiece made of 1-in. stock at 90° to a ½-in.-thick fence. Routing through the crosspiece marks the cut location, making it easy to align the jig with layout marks.*



Making the cut. *Push the router along the right edge of the fence and the cutting action will keep it on track.*

Photos, except where noted: Steve Scott; drawings, this page and p. 59: Hayes Shanesy

3 ADD A FENCE FOR GROOVES

A fence attachment guarantees cuts parallel to an edge. *A great way to modify this standard router fence is to add a straight piece of narrow stock for a longer, more stable fence.*

Keep the fence tight against the workpiece. *This ensures that the cut is straight, smooth, and parallel to the edge.*

don't rotate a round router base, or you might make a crooked dado.

Jigs that use an edge guide

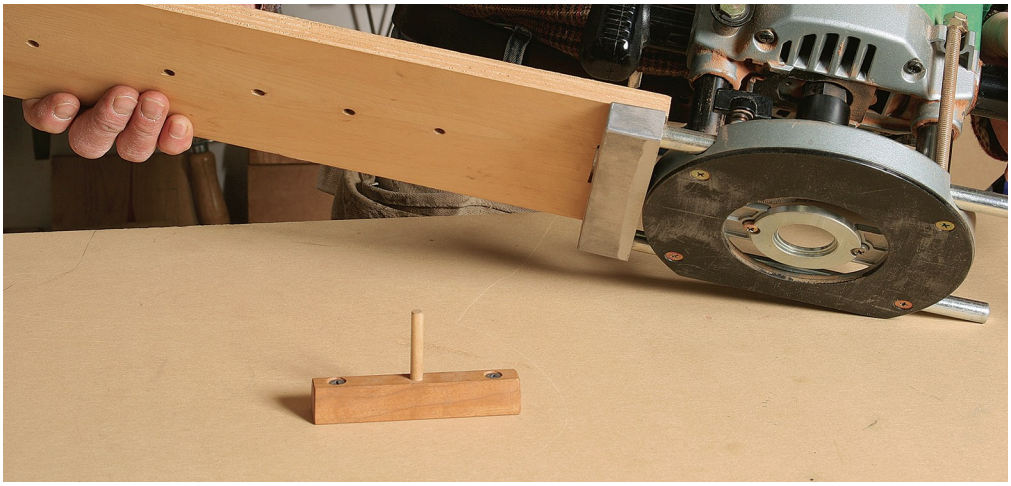
When routing close to the edge or end of a board, use the edge-guide accessory. Check that the guide has no side-to-side play and that its locking screws are tight before starting a cut. I prefer to attach an auxiliary fence for greater support in a cut. A piece of ¾-in. plywood works fine.

Set the distance by rotating the bit so that one cutting edge is closest to the guide's fence, then tighten the fence. Start a cut by holding the edge guide tight to the edge of the work. Once the router begins cutting, get both hands on the router. Put most of the downward pressure over the board so that the router doesn't tip in the cut. Don't run the router the full length of the cut. Come back from the right end toward the center with a climb cut to minimize tearout.

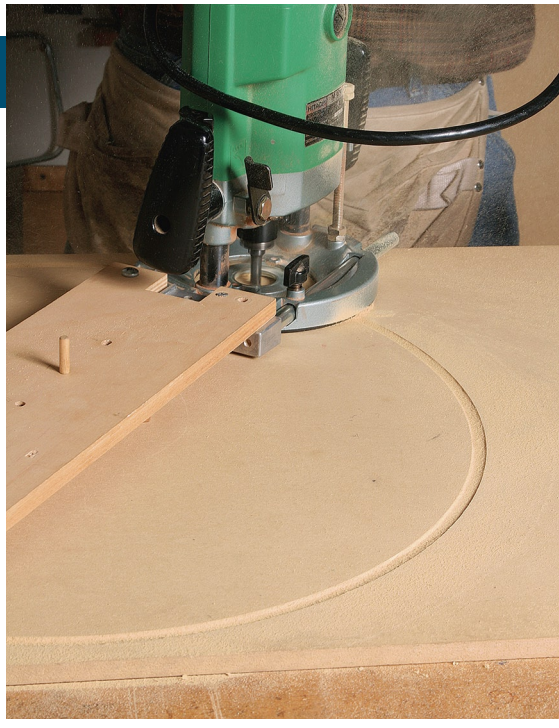
Stopped cuts—For stopped cuts like mortises or grooves, use the guide in conjunction with clamped-on stops. Mark out your stopped cut first. Line up the router bit over one end of the cut and clamp a stop block tight against the base. When making the cut, slide into the stops gently.

Cutting circles—You can modify the edge guide to use it as a guide for cutting circles and ovals with a plunge router. I screw an edge guide to a long plywood arm that I drilled with holes for various radii (see photos, below). I screw a block with a dowel to the underside of the workpiece, near its center, then fit the hole for the

4 CUT CIRCLES FROM A MODIFIED EDGE GUIDE



A circle-cutting jig in two parts. *First, screw a plywood arm, drilled with center holes, to the top of the router's edge guide. Next, make a block the same thickness as the edge guide and glue a dowel in the center. Screw the block to the center of the workpiece and slip the plywood arm over it. Cut the circle in a series of passes.*



Photos, this page (bottom): David Heim

correct radius over the dowel. After that, all I have to do is move the router clockwise, making a series of progressively deeper cuts, until the circle is cut.

Shaping templates

When shaping parts—say, a stretcher with one curved face—use a template and a bearing-guided router bit for accurate, repeatable cuts. Cut the templates from anything that's easy to shape, such as MDF or Masonite. Mount the template on the workpiece with screws, brads, or double-faced tape. Use a top-mounted, bearing-guided bit to ride against the template. When routing large shapes, be aware of cutting against the grain or cutting uphill into the grain. Either climb-cut those shapes or cut only downhill, then flip over the panel and mount the template on the other side to cut the matching downhill shape.

Routing with guide bushings

Template guides or rub collars mount to the bottom of the router base and guide the router against a template. Template guides offer a couple of important benefits: One, you can use them with a plunge router. Two, you can use them with a spiral bit, which helps clear chips from the cut.

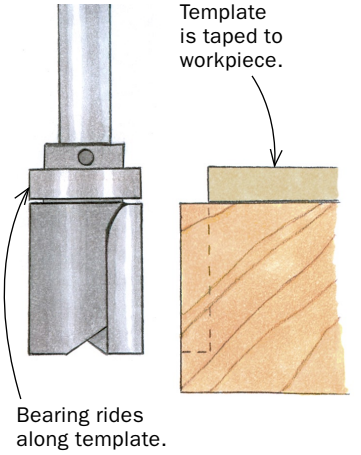
Template guides typically are used to cut mortises or, with a commercial jig, dovetails. When using a guide bushing, make the template larger than the slot you want to cut. How much larger? Two times the offset—the difference between the bit diameter and the outside diameter of the guide bushing.

Be sure that the router bit fits easily through the guide bushing. Also make sure that the bushing is securely fastened to the router base. The bushing could come loose if the router collet touches it while the router is running (this is very exciting but destructive to the guide). Move the router clockwise, keeping the bushing tight to the template. Don't move the bushing away from the template or back up in the cut because the bit's rotation can move the router away from the template.

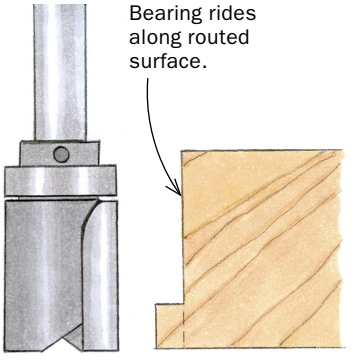
Mortising templates—A simple jig lets you cut mortises with a plunge router and guide bushing. Make the template from a piece of ¼-in. MDF that's large enough to support the router. Nail a hardwood fence to the MDF so that the fence is slightly proud of the edge of the MDF. Determine

5 USE A TEMPLATE FOR CURVES

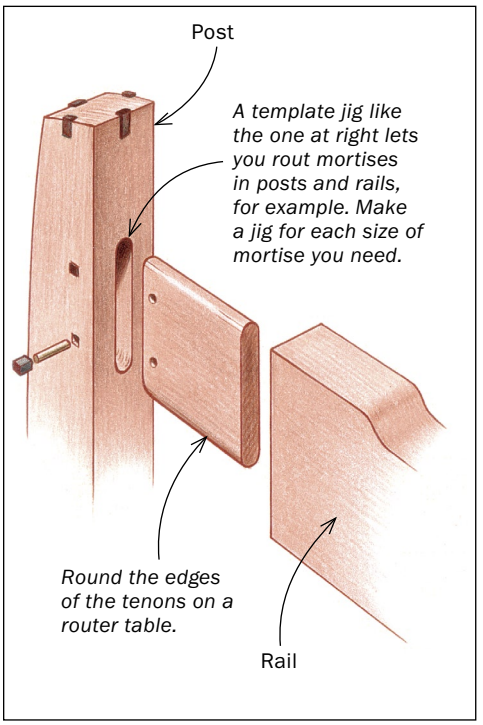
A bearing-guided straight bit rides the template's edge. *The bit trims the workpiece flush with the edge of the template.*



Thick stock requires a second pass. *Remove the template and increase the bit depth. The bearing will now reference against the already trimmed surface of the workpiece.*



6 A MULTIPURPOSE MORTISING JIG

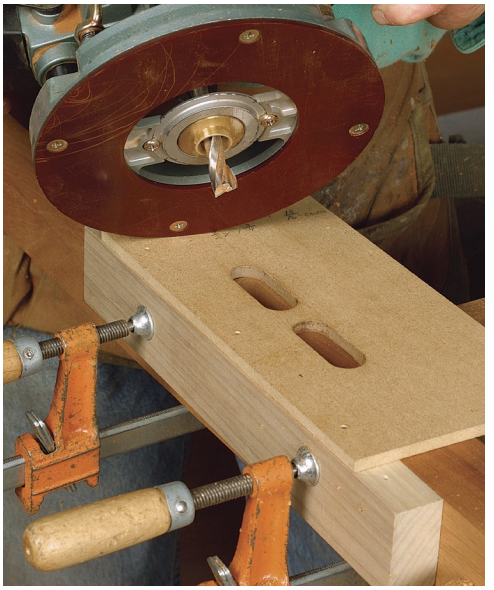


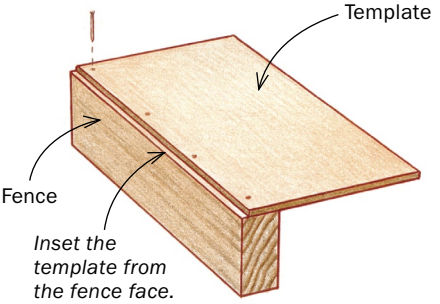
the size of slot to cut in the MDF to serve as the guide-bushing template. Lay out that slot, then cut it on the router table, with the template fence riding along the router-table fence to guide the cut. That ensures the slot is absolutely parallel to the fence.

Lay out the mortise on the workpiece and clamp the template in place, centered over the layout lines. Set the bit depth, making sure that the collet nut won't contact the template guide when you plunge the bit to full depth. Take shallow cuts and occasionally clean out the ends of the template slot to remove chips and sawdust.

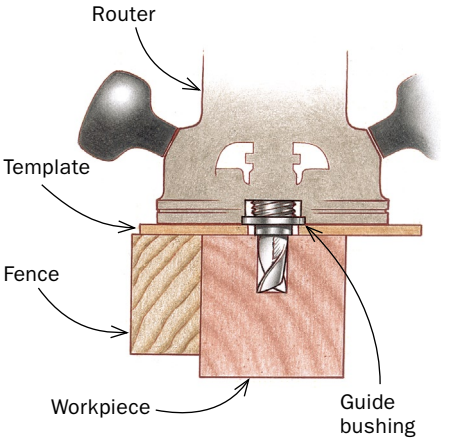
Routing hinge mortises—When setting more than a few hinges, making up a template will save you time. Cut a slot in a piece of MDF that's sized to the hinges you'll use, plus the appropriate offset for the guide bushing. Add a fence to fit over the edge of a door or cabinet side. Make the first cut close to the face of the board, moving the router from right to left to prevent tearout at the edge. Then move into the mortise with the guide bushing against the template. Use a chisel to clean up the round corners. □

Gary Rogowski, a contributing editor for Fine Woodworking, *is director of the Northwest Woodworking Studio in Portland, Ore.*

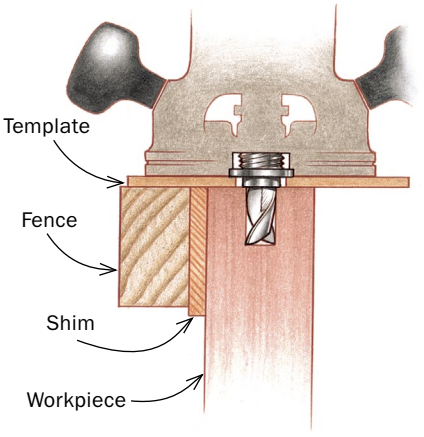




Start at the router table. *Attach a hardwood fence to the ¼-in.-thick MDF template, leaving it slightly proud of the edge. Lay out the slots and drill starter holes to make it safe to lower the jig onto the spinning bit.*



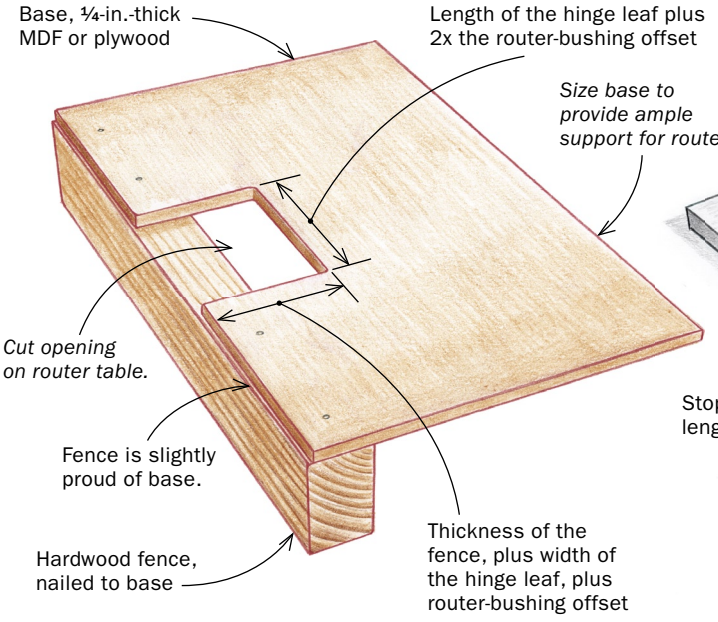
Mortising face grain. *Place the workpiece in a vise and clamp on the template. The guide bushing follows the template to cut the mortise. Take a few passes to get to full depth.*

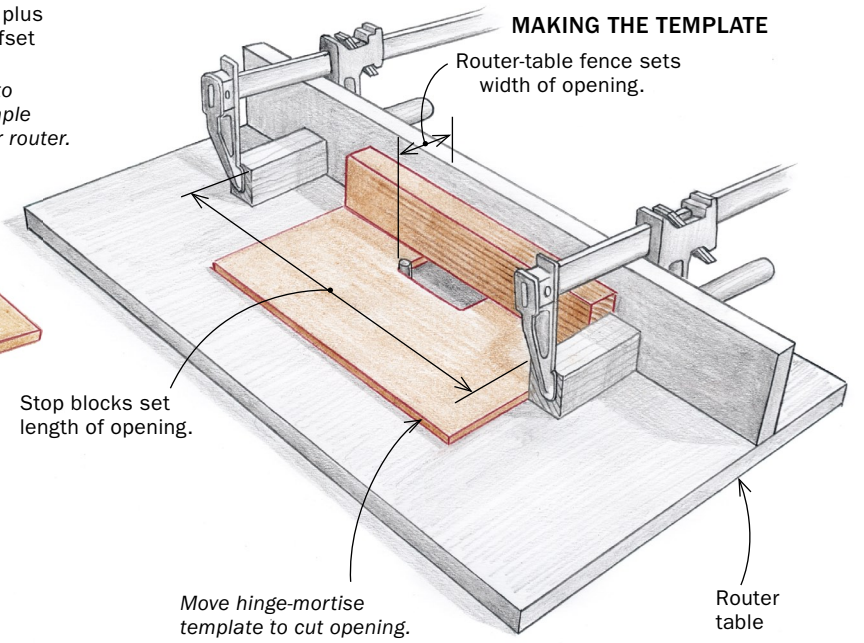


Mortising end grain. *The jig is large enough to support the router for end-grain routing. If necessary, insert a shim between the workpiece and the template fence to center the mortise.*

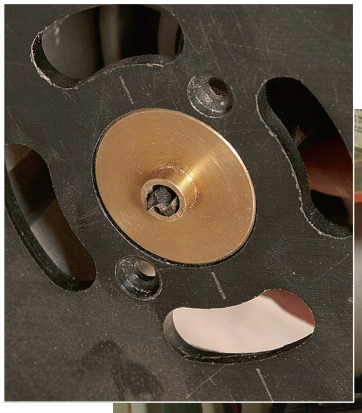
Photos, this page: Asa Christiana; drawings; Michael Gellatly

7 CUT HINGE MORTISES WITH A TEMPLATE AND GUIDE BUSHING





Template guides bushing. *A simple jig (right), similar to the mortising jig on the facing page, provides a track for a router fitted with a guide bushing (below left). The bit is set to make a cut equal to the thickness of the hinge.*



Cleanup and fitting. *The router leaves the mortise with rounded corners, which need to be squared by hand to produce a clean, snug fit for the hinge.*

Photos, this page: David Heim; drawings: John Tetreault

Quick Jig for Mortises

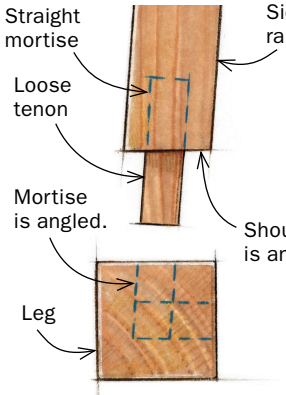
Router box allows slip-tenon joinery

BY KEVIN RODEL

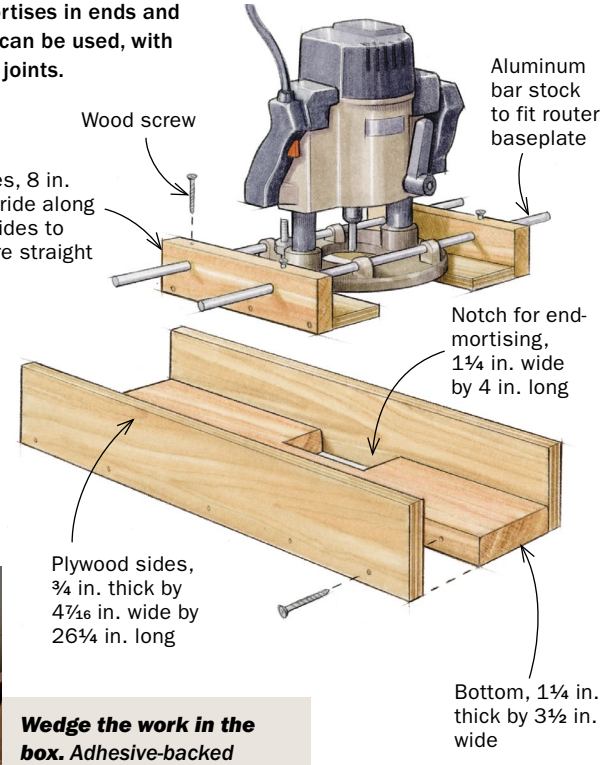
Not boxed in. *Rodel has made this chair many times, using the router box to cut both straight and angled mortises.*

Chair joinery, simplified

The router box allows you to cut mortises in ends and edges. This means that slip tenons can be used, with angled shoulders being simple butt joints.



ANGLED-JOINT DETAIL



Wedge the work in the box. *Adhesive-backed sandpaper prevents the wedges from slipping.*

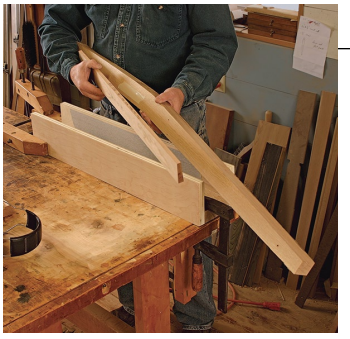
Photos: Thomas McKenna; drawings Bob La Pointe

I designed this router box to make it easier to build the side chair shown on the facing page. Not only did it help with construction of the first chair in 1993, but it has come in very handy many times since. The router box isn't limited to chair components. It will work with table legs and any other narrow workpiece that needs to be mortised.

As the drawings show, the box has a hardwood bottom and plywood sides. A plunge router is outfitted with a pair of L-shaped plywood fences that ride on bars threaded through the router baseplate. The fences help keep the router stable and guide its movement along the top of the box.

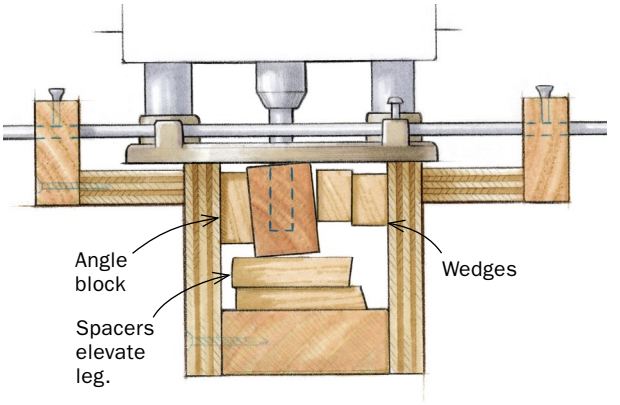
Two simple features make the box extremely versatile. One is the notch in the bottom, which lets you cut mortises in end grain for slip (also called "loose") tenons. Using slip tenons makes angled joinery much easier because you need only cut angled butt joints on the parts, as opposed to cutting angled shoulders around a built-in tenon. The other is the wedges, spacers, and angle blocks. Wedges steady the work inside the box. Angle blocks tilt the workpiece to whatever angle you need, such as for cutting angled mortises in chair legs. And the spacer blocks elevate the work so it's even with the sides of the box. □

Kevin Rodel is a furniture maker and teacher in Brunswick, Maine.



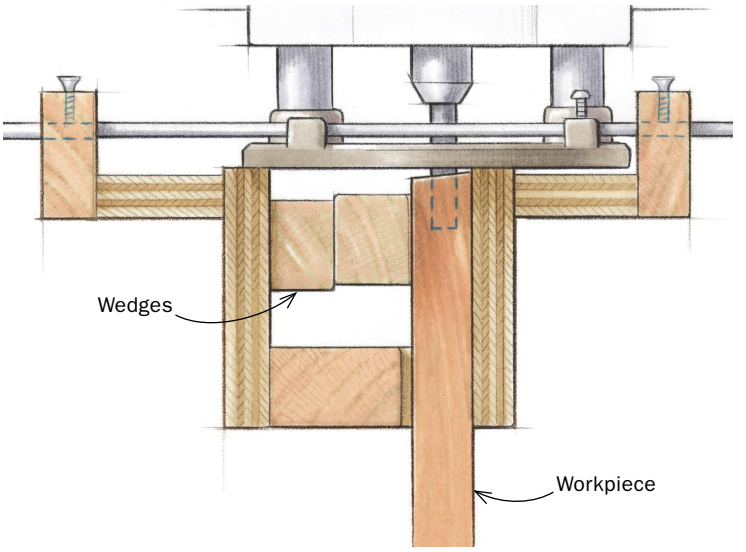
Angle block orients the leg. *Cut the block to the angle needed, then set it against one side of the leg and add the wedges. Cut the mortise with a plunge router.*

ANGLE BLOCK FOR ANGLED MORTISES



Mortise the ends of workpieces. *Mortises in end grain, typically for slip tenons, are easily cut by wedging the work vertically in the router box.*

MORTISE END GRAIN, TOO



FINISHING MORTISES

Square up the mortises. *Although some people leave router-cut mortises rounded at the ends, shaping the tenons to fit, Rodel prefers to square up mortises with a chisel and mallet. Slip tenons should fit with only a bit of hand pressure.*

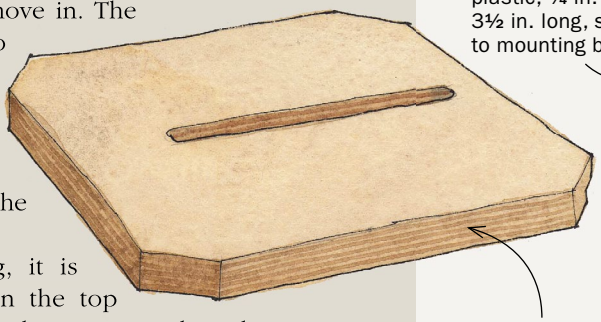
Versatile Mortising Jig

An adaptable clamping surface holds curved and straight parts

BY MICHAEL C. FORTUNE

One of the challenges when working with curved parts is how to cut joinery on them. When tapering solid stock, it's best to cut the joinery before cutting the taper, but this is not possible with laminated work, such as the bent, tapered laminations described in my article on pp. 50-55. A few years back, I created a simple jig that enables me to cut mortises in a variety of curved pieces. I've since discovered that the jig works equally well when mortising straight pieces or cutting mortises in end grain.

The jig consists of a mounting block, a fixed vertical piece, and a sliding top surface that has two sliding stops that create a channel for the router to move in. The mounting block is secured to the front edge of a workbench between two benchdogs. Alternatively, it can be screwed to a longer piece of plywood that is clamped to the top of the workbench.



When constructing the jig, it is important that the dadoes in the top surface and the mounting block are in matching locations to receive the ¾-in.-thick ultrahigh molecular weight (UHMW) plastic guides. The plastic and other hardware is available from www.rockler.com.

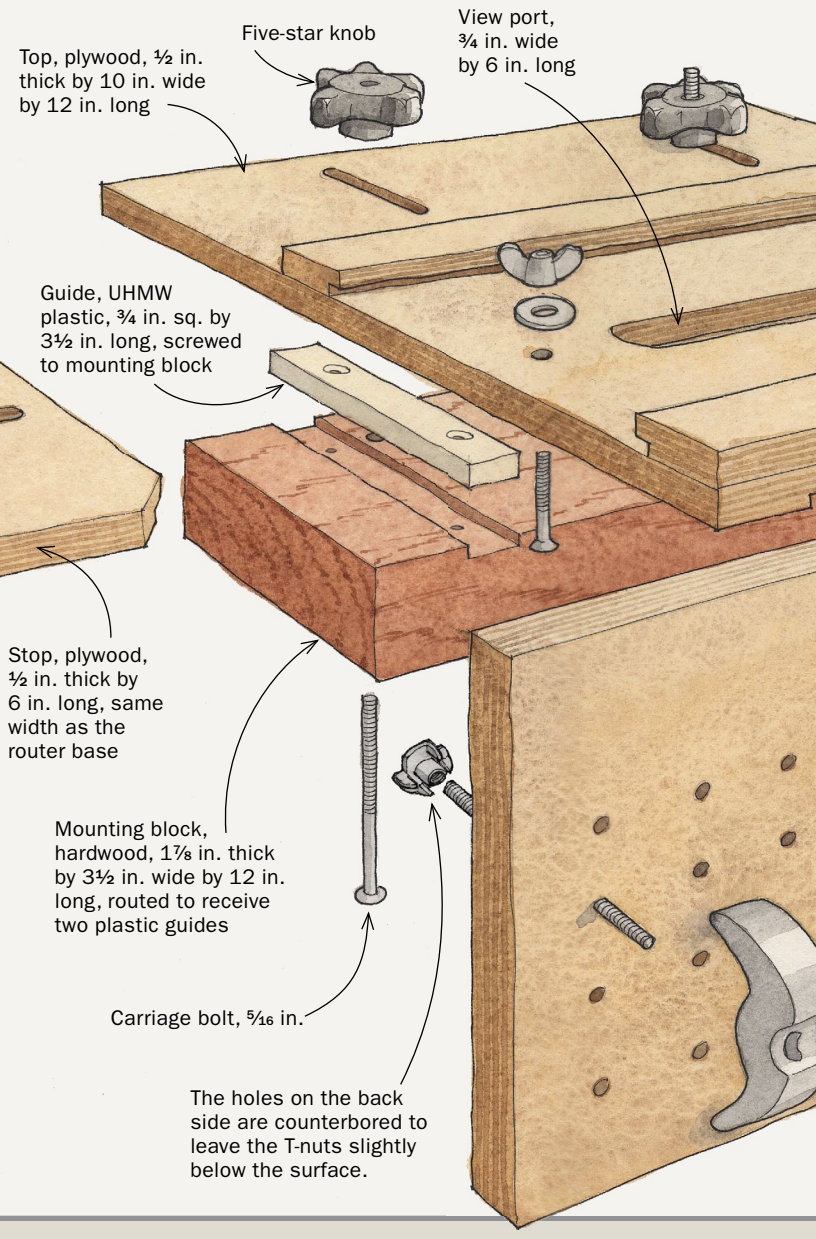
Here's how to use the jig: Lay out the mortise on the workpiece and then clamp it to the front vertical surface of the jig, touching the underside of the top. Now slide the top forward until the mortise is centered in the large viewing slot. Eyeballing it is sufficient, as once set up, the jig will cut matching parts identically. Now place the router on the jig and lower the bit until it just touches one end of the mortise. Slide the adjustable stop up to the base (round or square) of the router and tighten the wing nut. Repeat these steps at the other end.

Although you can use any straight bit, I use a spiral upcutting bit. The upcut design clears the chips from the mortise and a vacuum attached to the router removes them. □

Michael C. Fortune is a woodworker near Peterborough, Ont., Canada.

Setup in 3 steps

Clamp the piece to the jig. *Center the mortise in the viewing port and tighten the hold-down clamps. If more than one piece is being cut, a stop block aids repeatability.*

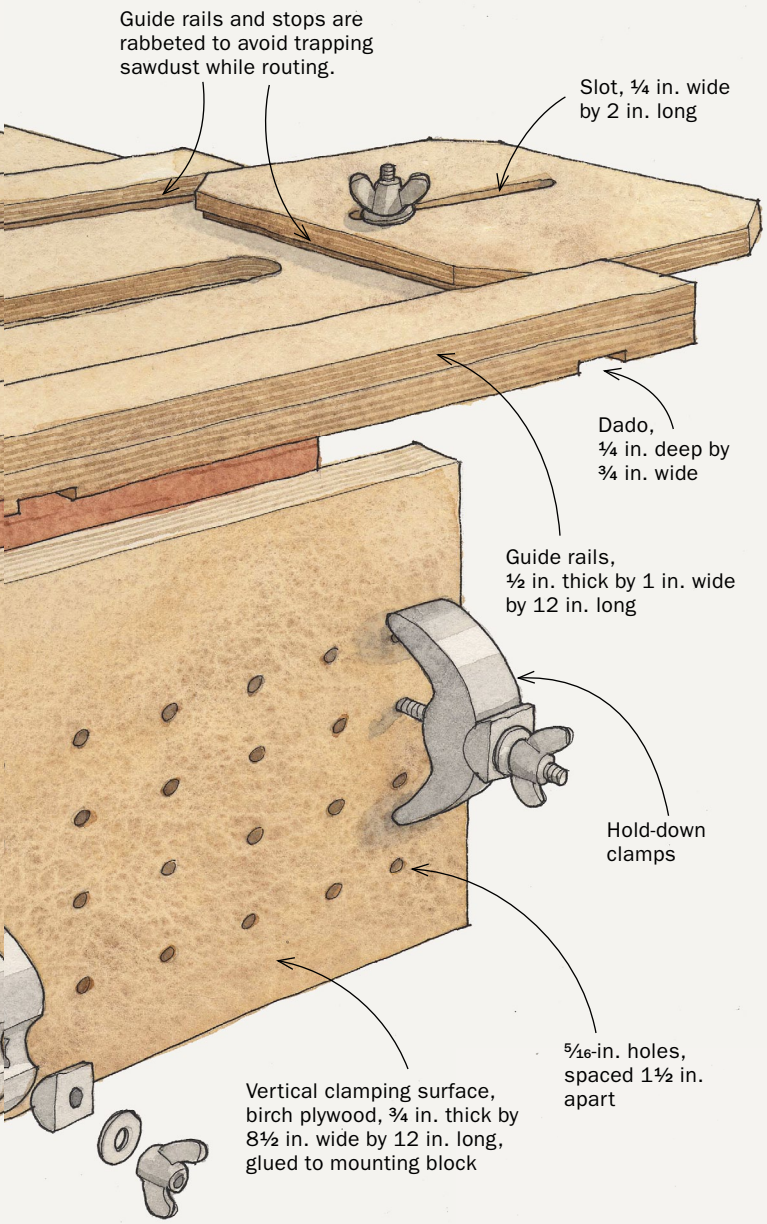


Photos: Michael Fortune; facing page (bottom right): Steve Scott; drawings: Jim Richey

2

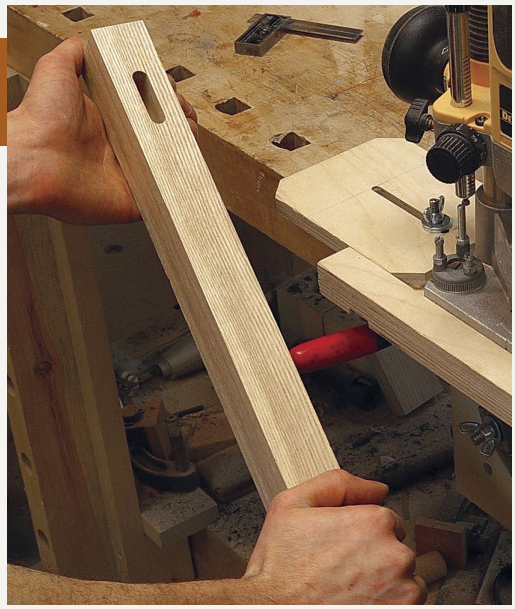
3

Adjust front to back and side to side. *Slide the top so the view port is centered on the mortise (above). With the router bit just touching one end of the mortise (right), move the slide until it touches the router base and tighten the wing nut. Repeat at the other end.*

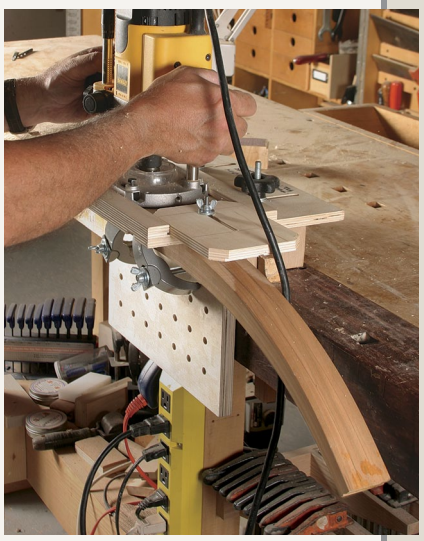


Mortise 3 ways

On straight pieces. *With the workpiece secure and the jig aligned, use a straight-cutting bit to excavate the mortise, increasing the depth ⅛ in. with each pass. You can square up the mortise with a chisel or use a rounded loose tenon.*



Into end grain. *The jig is flexible enough to allow end-grain mortises to be cut, such as for slip tenons.*



Curved pieces, too. *The jig allows clean, accurate mortises to be cut on all sorts of curved pieces.*

Cut Matching Curves

Glue blocks ensure an exact fit between panels and solid-wood edging

BY CAROL KOEBBEMAN

Designing a table with a veneered plywood center and solid-wood border, I was confronted with the dilemma of matching the curves on the plywood and the border. The solution came to me in the early hours of the morning: In the same way a thin strip of wood can be bent to a desired arc, I realized I could use a pair of strips to make matching templates, one to shape the plywood center and the second to shape the solid-wood edge. The solution lay in how to stiffen these thin strips to withstand the force of a bearing-guided router bit.

Cut a pair of edge strips out of ¼-in.-thick plastic-coated Masonite or medium-density fiberboard (MDF), which gives a smooth surface for

A perfect match. *The author solved the problem of how to cut matching curves on the veneered panels of the table and the solid-wood edging.*

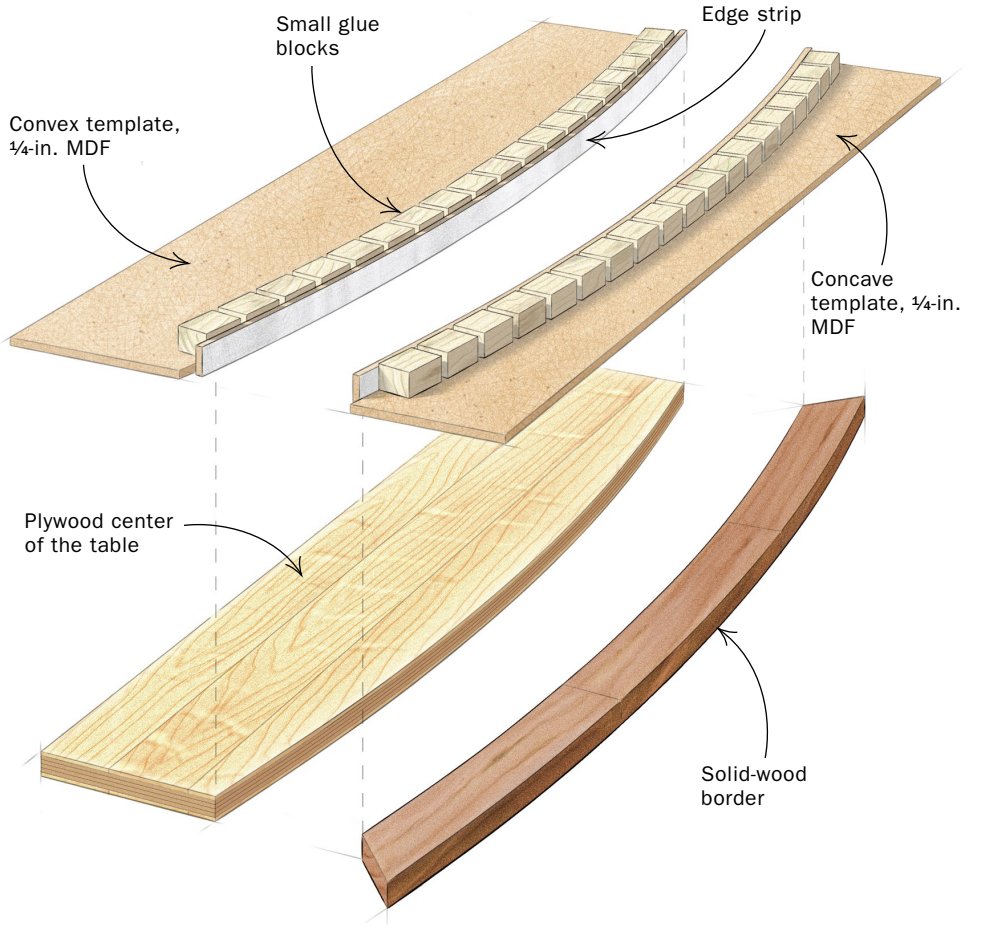
Make the convex template

Bandsaw the two bases. *Don't worry about cutting a perfectly smooth curve on the bandsaw (left). Use hot-melt glue to attach wooden blocks to the center and each end of the base. Let the blocks slightly overhang the edge of the base (above).*

Photos: Mark Schofield

HOW TO MAKE PERFECTLY MATED PROFILES

Even in the unlikely event that you could saw a perfect curve, the width of the sawkerf would prevent you from using the resulting pieces to create perfectly matching concave and convex profiles. To overcome this problem, the author invented a pair of matching templates.



Form the curve. *Clamp an edge strip to the three blocks to form a smooth curve.*

Use more blocks to stiffen the template. *Glue more blocks to the base and the back of the strip. Take care not to alter the curve.*

Drawings: John Hartman

Make the concave template

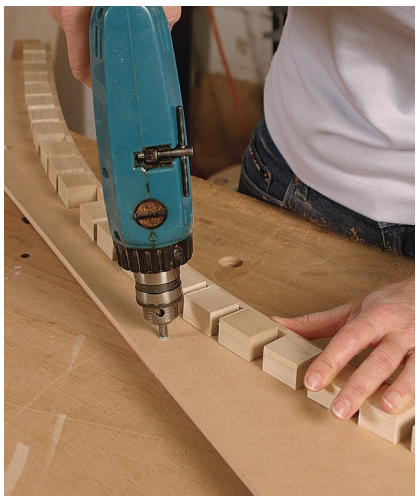
Create the matching profile. *Thoroughly clamp the strip that forms the face of the second template to the first one (left). Slide in the second base until it almost touches the back of the second strip. Attach blocks to the base and the strip using hot-melt glue (above).*

the bearing to ride against. I made them ¾ in. wide, a few inches longer than the curve. For larger, shallow curves, try ⅜-in.-wide material.

Bend one strip to the desired curve and temporarily clamp it to a base of ¼-in.-thick MDF, plywood, or Masonite. The base should be the same length as the strips and slightly wider than the depth of the curve. Mark the curve on the base, remove the clamps, and cut the curve on the bandsaw. You now have two bases whose curves roughly match the concave and convex curves on the tabletop.

Place one of the bases on your bench and attach a small block of wood to the center and to each end of the curve using hot-melt glue. The blocks must stand slightly proud of the edge to ensure that irregularities in the bandsawn cut don't interfere with the final curve. Bend one of the strips and clamp it to each of the blocks with the smooth edge facing outward to produce a curved edge. Reinforce this strip by gluing more blocks at about ¼-in. intervals along its length, taking care not to alter the curve.

USE THE TEMPLATES FOR LAYOUT AND SHAPING



First, use the templates as a layout tool. *With the concave template face down, use it to trace the curve on the solid-wood table edging (left). It is important that the template doesn't move when in use, so after roughing out the curve on the bandsaw, screw the template to waste areas of the workpiece (above).*

Trim the edging. *Use the concave template to rout the finished curve on the inside of the table edging.*

Finally, remove the clamps and glue the strip to the end blocks.

Use first template to form a second

The secret to matching curves begins by clamping the second ¾-in.-wide strip to the face of the first template. Make sure you use plenty of clamps to ensure there are no gaps between the strips. Slide the matching base in until it is almost touching the second strip, then repeat the process of gluing blocks to hold this second strip to the second base, gradually replacing the clamps with blocks.

When you are done, flip both templates over. Each should have a graceful curve that matches the other perfectly. If not, fiddle with the fit until no gaps exist.

Use the templates twice for each curve

The first step is to use each template as a layout tool. Use the bandsaw to cut away most of the waste, staying proud of the layout line. Then clamp the workpiece on top of the matching template and use it to guide the bottom-bearing router bit around the curve. Go slowly to ensure a clean cut. If you make a mistake and gouge the workpiece, unclamp the workpiece, slide it slightly forward, and re-cut the profile.

It may be difficult to clamp the concave template to the narrow solid-wood border. If so, screw the template onto parts of the border that will be cut away later.

When finished, you will have two parts whose curves join perfectly. □

Carol Koebbeman lives in Sacramento, Calif.

A perfect match. *Using the two templates will shape pieces that match flawlessly over their entire length.*

Sliding Dovetails for Pedestal Tables

Jig makes it easy to cut precise slots in round stock

BY MARIO RODRIGUEZ

As a woodworking instructor, I'm always looking for interesting and challenging projects to present in my classes. A pedestal table, small or large, satisfies my criteria for an intermediate-level project.

The one shown above is a Shaker round stand by Christian Becksvoort, modeled after a 19th-century original now in New York's Metropolitan Museum of Art. It can also be made in a Federal style, with the more elaborate column shown on the following pages. You'll find larger versions in many styles, including dining tables with two pedestals.

Whatever style you choose, you usually begin by turning the column on the lathe, and then turn your attention to the legs.

Be sure that the bottom portion of the column, where the legs attach, is straight and uniform. Any dips or a taper will create gaps where the column receives the legs. A surface that's not uniform will have a detrimental effect on the way the legs fit.

Make the dovetail jig

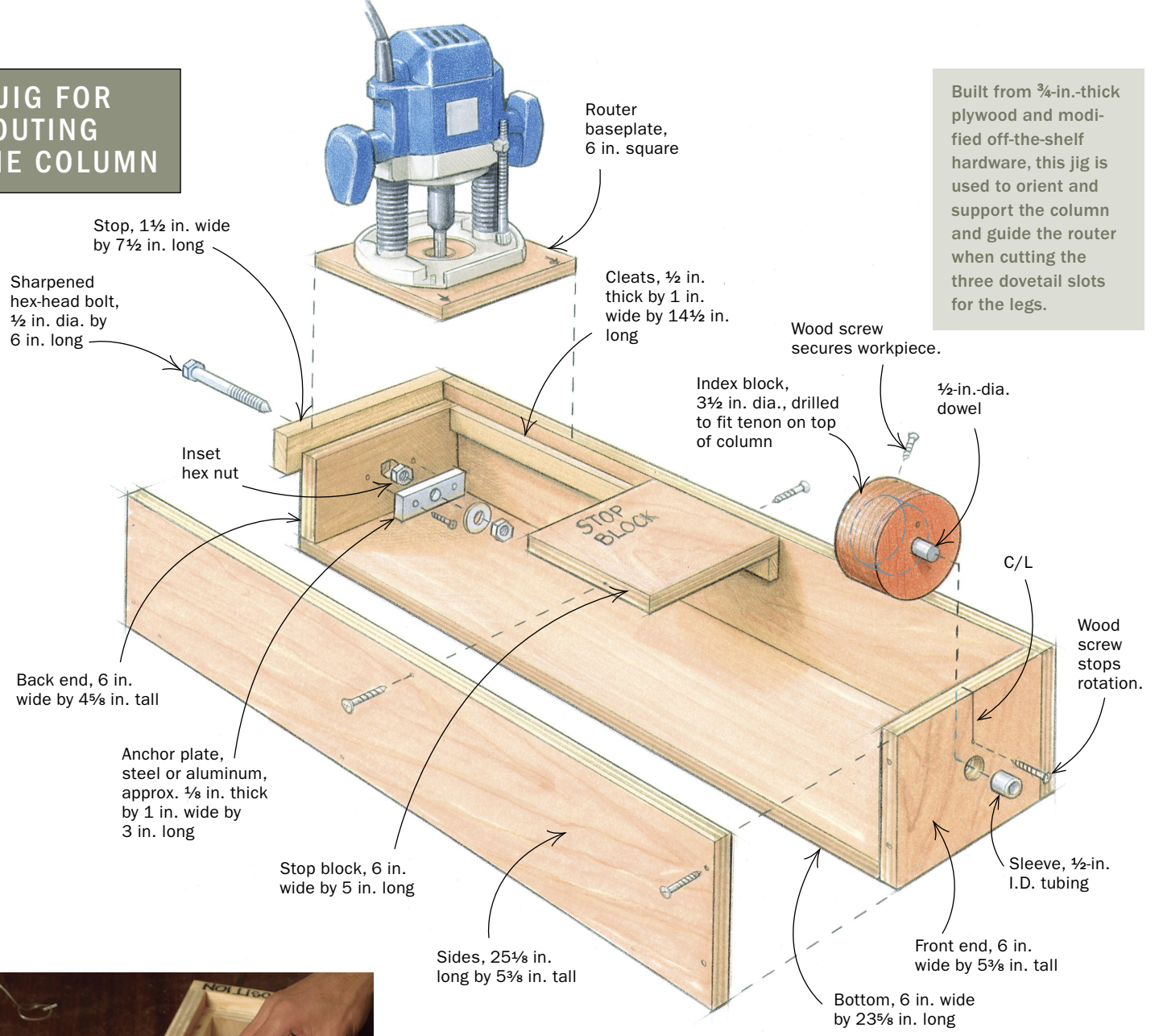
The traditional and most effective method of joining the legs to the column is with sliding dovetails. Once the legs have been attached, the flare of the dovetails prevents them from loosening over time.

The key to achieving snug and handsome dovetail joints is to cut the slots first and then make the dovetails to fit. You can cut those joints by hand, but it's easier and more precise to do it with a

Photos: staff

A JIG FOR ROUTING THE COLUMN

Built from ¾-in.-thick plywood and modified off-the-shelf hardware, this jig is used to orient and support the column and guide the router when cutting the three dovetail slots for the legs.

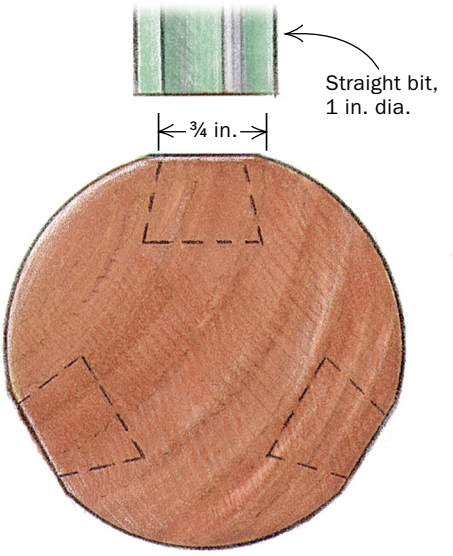


Mount the column in the router jig. *First, insert the column into the index block and secure it with a wood screw to keep it from rotating within the block (left). Align the base of the column in the jig using the dimple created by the lathe and hold it in place by tightening the sharpened hex bolt (center). Finally, locate the column for routing by aligning one of the three scribe lines on the index block with the centerline on the jig and fastening it with a screw (right).*

ROUT THE DOVETAIL SLOTS IN THREE STEPS

1. CUT A FLAT SHOULDER

Trim a ¾-in. flat centered over each of the slots so that the legs will join flush to the column.

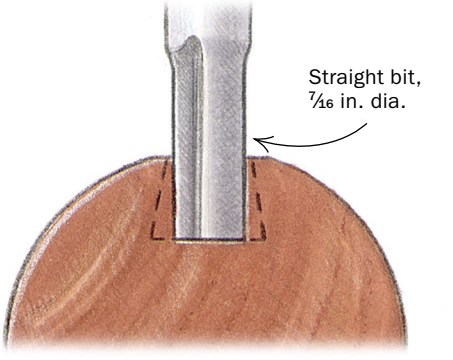


handheld router and the jig shown here. The jig keeps the router and leg perfectly aligned for the multiple cuts needed to shape each dovetail recess.

To cut the dovetails, remove the turning from the lathe and mount it in the dovetail jig. The dovetail slots should be 120° apart on center. The jig is equipped with an index block, made from pieces of ¾-in. plywood glued together and cut to a 3½-in.-dia. cylinder. It's drilled with a hole to match a tenon turned on the column, to align the column for each slot. Match the 120° marks on the index block to a corresponding mark on the jig. A wood screw secures the column in each position for cutting. A hex-head bolt, sharpened to a point, secures the top of the column.

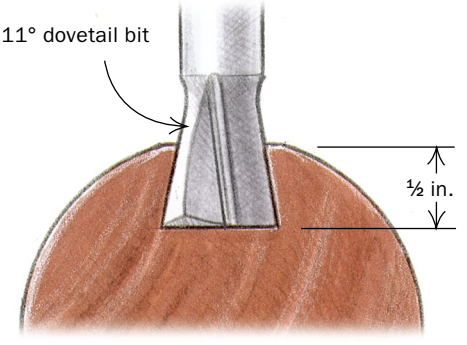
2. HOG OUT THE WASTE

Set the bit to cut ½ in. deep and stop just short of the column shoulder.



3. ROUT THE DOVETAIL PROFILE

Take your final pass and wait until the bit stops spinning before backing it out of the cut.



Cut the slots with three router bits

There are three steps to cutting the dovetail slots. First, establish a flat edge on the column for the shoulder of the leg. Use a 1-in.-dia. straight router bit, and set up the cut to trim a flat surface just wide enough for the thickness of the leg.

It's better to cut this a little wide. A wide flat can be rounded with a file, but a narrow flat will create a gap where the leg meets the column. The stop block on the

Drawings: Bob La Pointe

DOVETAIL THE LEGS ON THE ROUTER TABLE

Make a cradle for the legs. *A jig, made using the leg template, supports the leg while routing. The sides of the jig ride on an auxiliary fence screwed to the router-table fence. Put steady pressure against the fence as you rout to ensure a clean cut and tight fit in the recess in the column.*

Glue the legs in the column. *Apply glue liberally to each dovetail and tap it into the slot until it's fully set.*

router jig should be set so the dovetail slot stops just short of the column shoulder.

After cutting a flat edge for the three legs—rotating the column in the jig for each cut—switch to a 7⁄16-in. straight bit and hog out most of the waste for each slot. This step reduces the stress on the router and the wear on the dovetail bit. The slot should be ½ in. deep.

Finally, change router bits again to a dovetail bit (mine is an 11° bit). Be sure the router is still set for a ½-in.-deep cut and take a final pass on each slot. Set the column aside until you're ready to cut the dovetails on the table legs.

Cut the dovetails

To cut the dovetails on the legs, set up the router table with an auxiliary fence and the same dovetail bit used for the slots. I make another simple jig (see photos above), using the leg template, to cradle the legs while routing. Before cutting into the real legs, use a cutoff from the leg material of the same thickness and make test cuts to fine-tune the fit of the dovetail into the column base. Carefully pass the stock upright along the fence to cut one cheek of the dovetail. Flip it over to cut the other side.

If you discover that a dovetail doesn't fit right in the column, run it back across the bit and apply more pressure against the fence. It might take off just enough to make the fit easier.

Assemble the table

Glue the legs to the column, checking for a tight fit and a clean joint between the shoulder of the legs and the column. The legs should go on without incident if you have carefully cut the dovetails on the router table. □

Mario Rodriguez, a professional woodworker for more than 30 years, teaches at the Philadelphia Furniture Workshop.

Beyond the Basic Fence

Build a tall fence with a good dust port and add sacrificial fences as needed

IMPROVE YOUR EVERYDAY FENCE

A sturdy workhorse. *A tall shopmade fence with a dust-collection port will enhance the utility of your router table.*

ADD A ZERO-CLEARANCE FENCE

Buried. *For cutting moldings with no tearout, bury the bit in a sacrificial fence, which supports the stock and acts as a chipbreaker.*

AND AN OFFSET FENCE

Support for edge profiles. *When cutting a full profile, you'll need an offset fence to support the stock on both sides of the bit.*

A fence is essential for any router table. But not all fences are created equal. The one supplied with the router table is fine for most work, but it helps to have other fences on hand.

First, make a tall fence like the one shown on the facing page. With it, you can run pieces on edge, such as when cutting raised panels or sliding dovetails. The added height also offers ample room for clamping on featherboards.

The base and fence are made from ¾-in.-thick medium-density fiberboard (MDF), with plywood support brackets to keep the fence square to the table. A box attached behind the opening for the bit makes an effective dust collector.

The face of the fence is laminated, so work will slide easily along it, but you could substitute phenolic plywood for the laminated MDF (for more on using phenolic plywood for jigs, see pp. 24-27).

Two other useful fences are as simple as they come. They consist only of a length of jointed 2x stock. Both fences allow you to rout molding profiles without tearout.

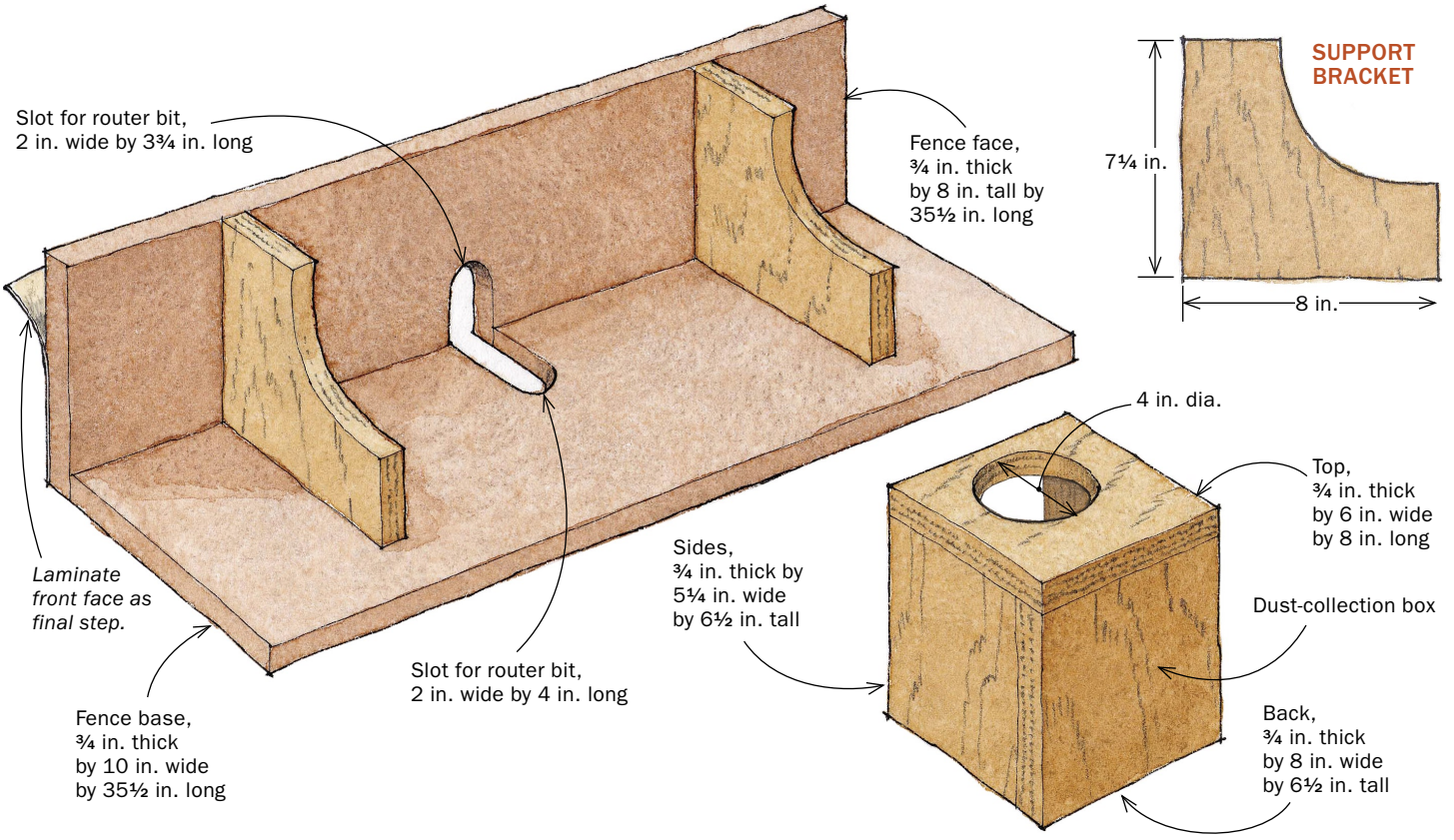
To use the simplest of these fences, you bury the router bit in the fence to create a zero-clearance cavity. For bearing-guided bits or complex profiles, you first have to bore an opening in the fence, then pivot the bit into the opening to bury the infeed side of the bit.

The other simple fence provides support on the infeed and outfeed sides of the cut when you're profiling the entire edge of a piece. All you need to do is cut back the infeed side of the fence on the jointer. A few test cuts on some scrap will tell you when you've created enough of an offset.

Peter Schlebecker and Steve Latta contributed to this article.

Photos: staff; drawings: Jim Richey

A good router table needs a good fence



When building this router-table fence, take the time to ensure that it is straight and square. Make the bottom and face pieces out of ¾-in.-thick MDF, and the support brackets out of ¾-in. plywood. Bandsaw openings for the largest bit you expect to use. You can always reduce the size of the opening with a zero-clearance auxiliary fence made of ¼-in.-thick material. The top of the dust-collection box should have a hole cut into it to accept the fitting for the dust hose.

Glue and screw the bottom and face together, and then attach the brackets and dust box in the same way, making sure they force the bottom and face into a perfect 90° angle. Be sure to drill pilot holes for screws to avoid splitting. The final step is to glue a piece of plastic laminate to the face using contact adhesive. The fence simply clamps to the table, so dedicate a couple of good clamps to it.

Start with the bottom and face. *Glue and screws are a fast, strong, and easy way to secure the face to the bottom. Squareness is vital to the fence's function, so check for square as you secure the brackets.*

Simple dust collection. *Four pieces of ¾-in. plywood make up the dust-collection system. A hole in the top piece allows you to connect a dust hose.*

Sacrificial fences tame tearout

A crisp molding lends the same touch of elegance to a well-made cabinet that a silk tie bestows on a sharp-dressed man. But in order for their magic to work, neckties and moldings both must be treated with care. A molding with torn-out grain or fuzzy edges will spoil the effect, like a soup stain in the middle of your chest. The fences shown here and on the next pages are designed to produce crisp, clean moldings.

To eliminate tearout, bury the bit in a wooden fence, creating a zero-clearance cavity that lets the fence serve as a chipbreaker. There are two types of this fence made from wide 2x stock with a jointed face and edge.

The first is a very simple fence made by using the bit itself to cut the zero-clearance cavity. Clamp one end, bury the bit a little deeper than you need, then bring the fence back to the appropriate setting and clamp the free end. If you are raising the bit into the fence, go only as high as necessary. Creating a cavity taller than your final bit height reduces the chipbreaking effectiveness.

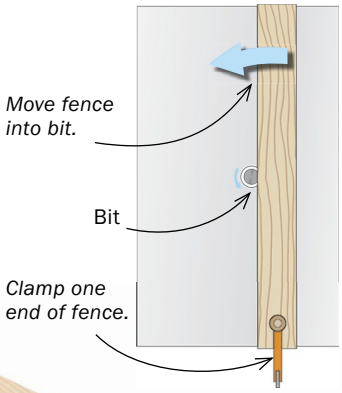
For complex bits or those that can't cut their way into the fence, such as bearing-guided bits, drill the fence opening with a Forstner bit. This also makes it easier to joint the infeed side to make an offset fence (see facing page).

To prevent chipout in heavily figured stock, reorient this fence so that the bit is literally buried in the infeed side. To do this safely, clamp a straight backer board behind the fence. Loosen the clamps that hold the fence and, with the router running, slide the infeed side of the fence into the bit. The rotation of the bit pushes the fence against the backer board. After setting the fence, reclamp and continue running the molding.

Another advantage of any sacrificial wooden fence is that you can quickly screw guards or hold-downs in place.

A SIMPLE FENCE FOR SIMPLE BITS

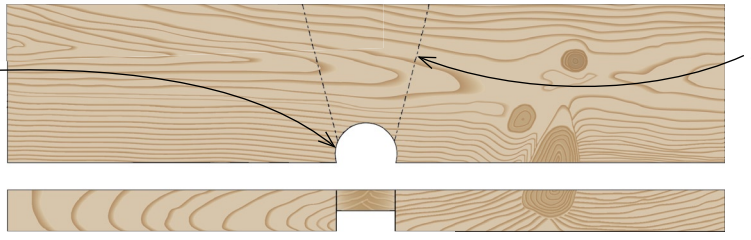
A bit with no bearing or post on top can cut its own deep, zero-clearance cavity. Start with a jointed piece of 2x stock.

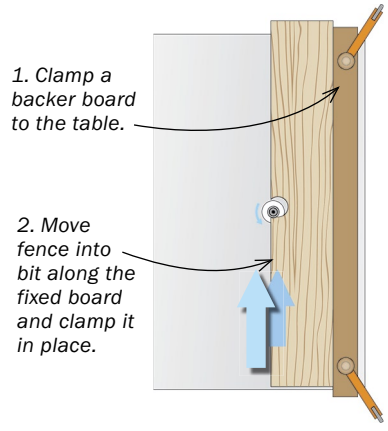


Bury the bit. *Clamp one end of a wooden fence to the router table and, from the other end, carefully pivot the fence into the rotating bit. Then clamp it down.*

A FENCE FOR COMPLEX PROFILES

Drilling the opening is easier for tall, complex profiles. To create zero clearance, bury the bit on the infeed side.





Push the fence into the bit. *The infeed edge of the bit is buried, so the workpiece fibers are fully supported where the bit exits the cut.*

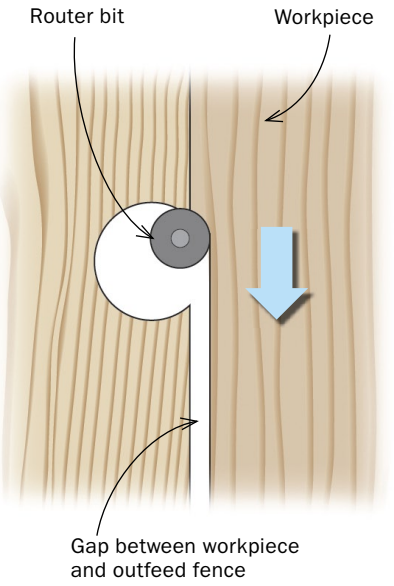
Drawings, this spread: Kelly J. Dunton

Use an offset fence when molding an entire edge

Profiling an entire edge is very much like jointing the edge of a board: All of the original surface is removed to create the profile. With a standard setup, this means the profiled workpiece won't ride against the outfeed fence. For proper support, the outfeed fence should be set flush with the cutter while the infeed fence steps in about 1/32 in. Make passes on a scrap piece to dial in the offset.

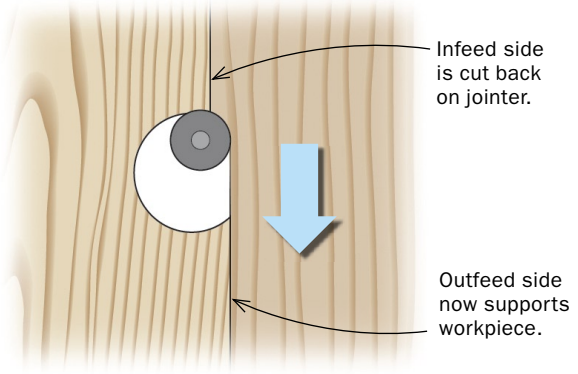
Although this might sound a little complicated, it's actually quite simple to set up. Take a jointed piece of 2x stock and drill an opening for the bit. Set the jointer to a 1/32 in. depth of cut and joint the edge of the fence just to the cutout. Lift it off the table and ... shazam! You have an offset fence.

THE PROBLEM: NO OUTFEED SUPPORT



No fence support. *When the bit removes the entire bearing surface, a standard fence can't support the outfeed side.*

An offset fence in one easy step. *Simply joint the infeed edge, stopping at the bit cutout.*



THE SOLUTION: MAKE AN OFFSET FENCE

Running smoothly. *The offset fence supports the work on the outfeed side and makes for a smooth cut.*

Control and Conquer

Five simple jigs turn any table into a precision machining center

BY PETER SCHLEBECKER

Easy to make and use, the five jigs and fixtures shown on the next pages are some of the most useful router-table jigs at the Center for Furniture Craftsmanship, where I teach and manage the facilities. With them, we repeat shapes consistently, quickly, and precisely. We make stopped cuts in angled workpieces, creating invisible and strong joinery. Profiling narrow stock is easier and safer. Edge-jointing a stack of veneers can be done effortlessly.

At the school, we use the jigs on a sturdy router table with a top that measures nearly 3 ft. by 3 ft. In my experience, that's large enough to handle a wide array of workpieces and jigs.

Of course, if you don't have a router table like that, you still can use these jigs. But if your table surface is small, you may have to scale down the jigs accordingly.

Article Extra

Watch Peter Schlebecker put his router jigs through their paces.

Peter Schlebecker teaches at the Center for Furniture Craftsmanship in Rockport, Maine.

1 Featherboard

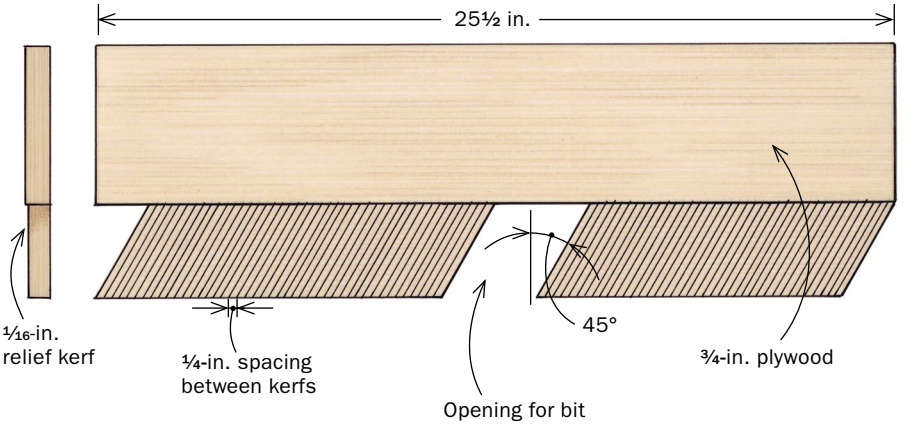
MANAGE SMALL AND NARROW WORKPIECES

Also called a finger board, this simple fixture holds a workpiece firmly against the table surface while a cut is made. It is particularly important to use if the workpiece is very narrow and there is a risk of getting your fingers too close to the blade. I use a featherboard for a pencil bead or for any other small molding, such as the slightly curved profile on dozens of pieces for a tambour door.

The configuration that works best for the router table is a long piece of ¾-in. plywood that is about the same length as the router-table fence, with feathers cut on both sides around a notch for the bit. Plywood is strong in every direction, so it allows you to orient the feathers along the side of this long board. Lay out pencil lines at 45° with ¼-in. spacing, and then cut the feathers on the bandsaw. The kerf will leave feathers about 3⁄16 in. thick, small enough to flex well but still be strong.

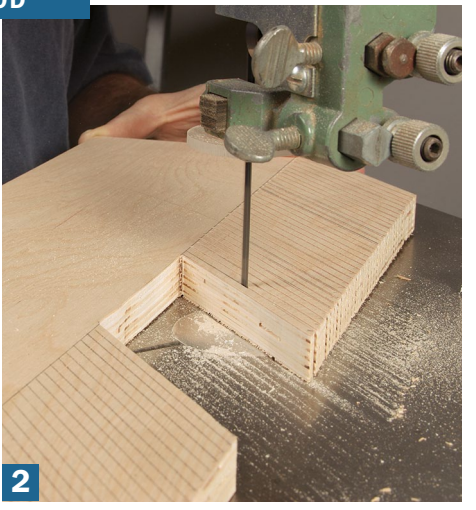
To use the featherboard, put the workpiece on the table, apply light, downward pressure to the featherboard, and mount it to the fence with two clamps.

Safe and accurate. *Featherboards are great for holding workpieces down, but they do not allow the workpiece to back up. If there is a problem in the middle of the cut, either stop the router or just keep pushing the piece through. Use a thin push stick near the bit.*



CUT THE FEATHERBOARD IN PLYWOOD

Reduce friction between the feathers and the fence. *Before cutting the feathers, narrow the fence side of the plywood with a shallow cut, about 1⁄16 in. thick.*



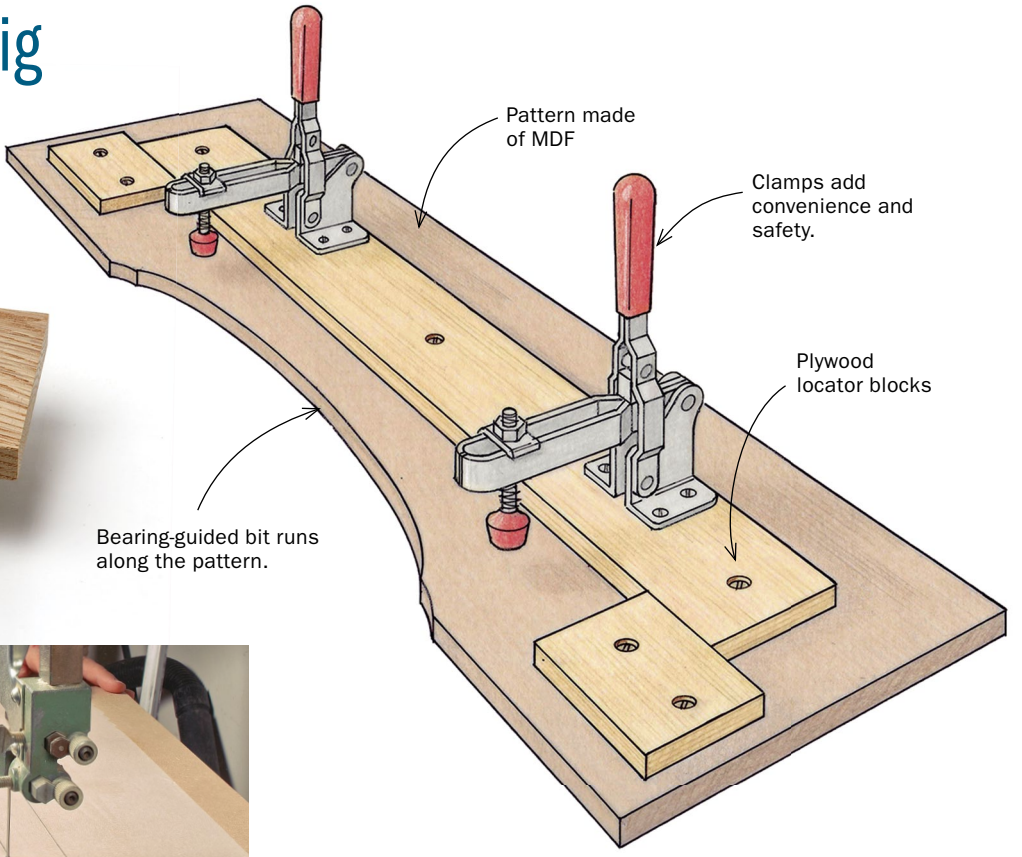
Freehand the feathers on the bandsaw. *First, remove the cutout for the bit, and then cut the feather lines.*

Put on the pressure. *To have an effective hold-down that still allows the piece to move along smoothly, keep a little downward hand pressure on the featherboard while you clamp it in place.*

Photos, except where noted: Anissa Kapsales; drawings: Vince Babak

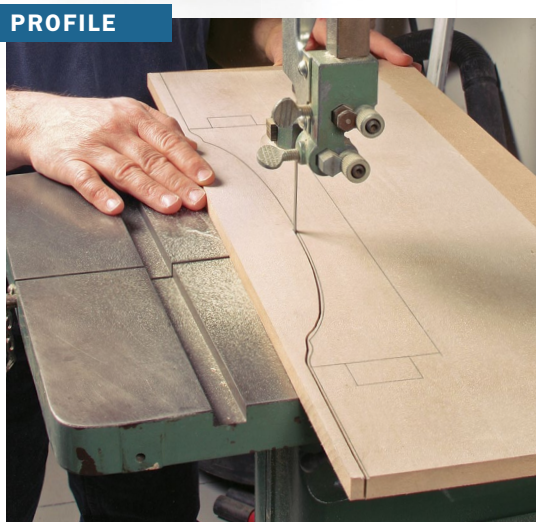
2 Pattern-routing jig

FAST, PRECISE, AND EASY MULTIPLES

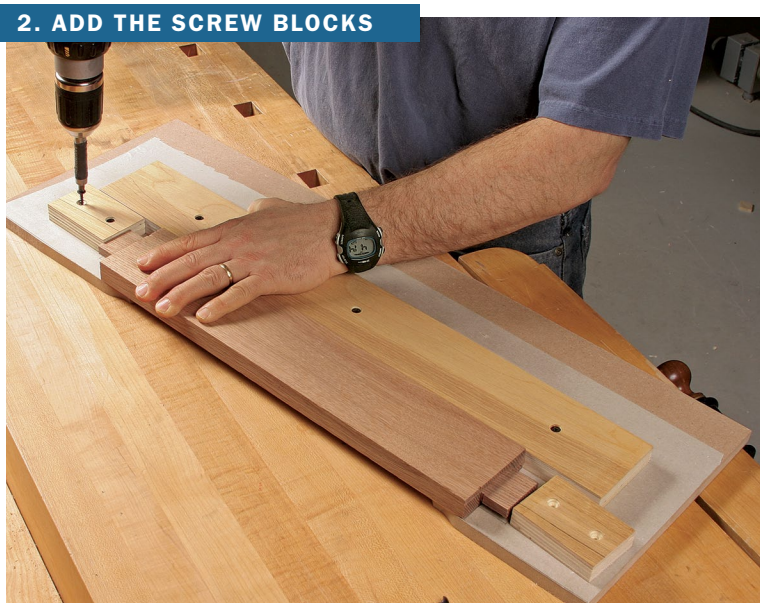


1. CREATE THE PROFILE

Make the pattern jig. *Draw the shape on tracing paper and glue it to MDF. Bandsaw close to the line, and then fair the curve to the line with a spindle sander or a block and sandpaper.*



2. ADD THE SCREW BLOCKS



Position the blank and draw the shape. *With the blank correctly located on the jig, screw locator blocks behind and on each end of the blank. Consider adding toggle clamps for extra control.*

The most common use of the router table in our shop is pattern-cutting. Used for curved legs, aprons, or multiples of any kind, pattern-cutting is when a part is cut out using a bearing-guided, flush-trimming bit. The piece is roughed out slightly oversize on the bandsaw and mounted to the pattern. The bit then follows the pattern, producing the same profile every time.

This particular jig makes pattern-cutting as easy as possible. I've included an extra area before and after the pattern so the bearing has a place to ride as it moves into and out of the cut. I made it easy to locate workpieces instantly, and the toggle clamps hold the work in place and serve as built-in handles.

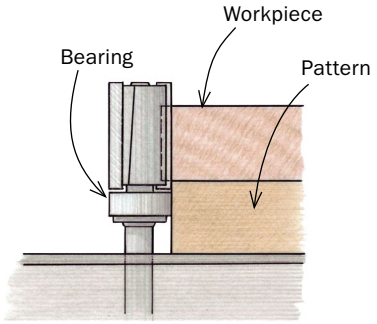
To make a pattern jig, draw the outline of the shape on tracing paper, and then use spray adhesive to glue the paper to a piece of MDF. Use a piece larger than the shape so there will be room for toggle clamps, locator blocks, and start-and-stop areas for the bearing. Bandsaw close to the line and clean it up with power- and hand-sanding.

Position a blank on the pattern and surround the blank with blocks to locate it. Then use the jig to trace the shape on the blank. Remove the blank and bandsaw the shape, leaving it about ⅛ in. oversize, and return the workpiece to the jig. I usually install toggle clamps to hold the blank firmly.

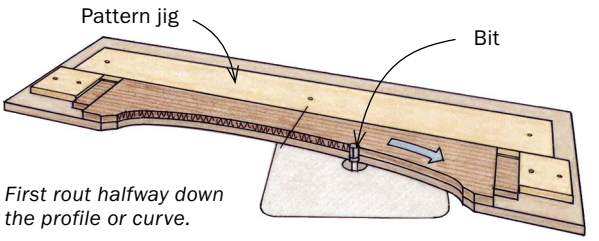
When routing, begin the contact with the bearing on the pattern portion ahead of the actual blank. Follow through the cut to the other end; it's always good to take a second pass to clean up any inconsistencies left by sawdust and vibration.

3. ROUT THE WORKPIECE WITH A PATTERN BIT

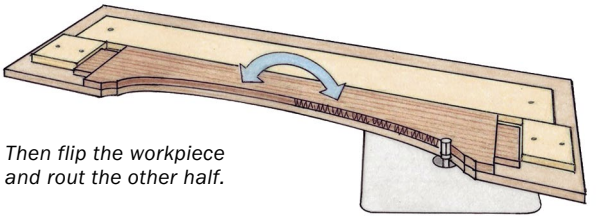
Bandsaw the waste, then rout. *Transfer the pattern to the blank (above). Bandsaw away the bulk of the waste, reinstall the blank in the jig, and rout (right). The bearing-guided bit rides along the pattern.*



Pay attention to grain direction. A sharp bit can cleanly cut mild reversals in grain, but when the grain is steep and tears out, a symmetrical piece can be flipped in the jig to work the grain in different directions. If the piece is asymmetrical, make a second, opposite jig and flip the workpiece.



First rout halfway down the profile or curve.



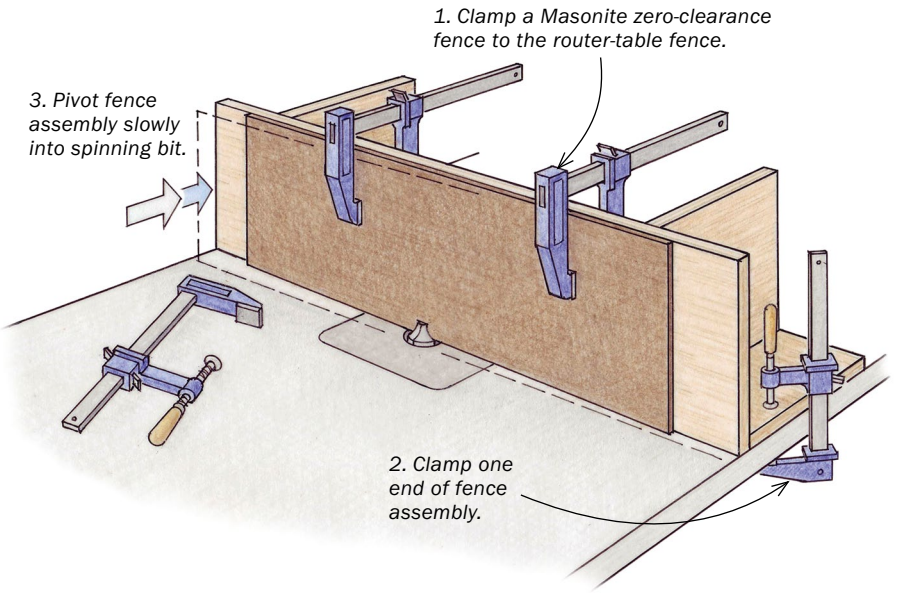
Then flip the workpiece and rout the other half.

3 Zero-clearance fence
FOR SMALL WORKPIECES

Sometimes workpieces are so short, there is a risk that they will dip into the opening in the fence and cut too deeply, or that the leading edge of the wood will catch the outfeed side of the opening. A zero-clearance fence will prevent these problems and make the operation safer. I use this auxiliary fence anytime I rout a profile around a small drawer front or door. A bearing on the router bit could get in the way of the fence, so if there is a bearing, you'll need to remove it.

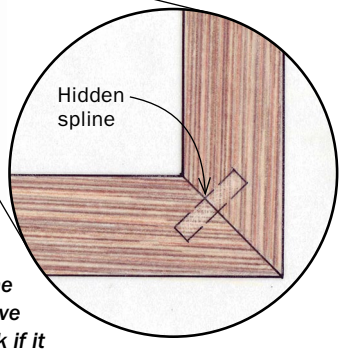
The zero-clearance fence clamps onto the regular fence. Make it out of ¼-in. Masonite, about the same size as the regular fence. I use Masonite because it is stiff enough to stay straight near the center when clamped on the ends. After bringing the main fence forward of the bit and clamping on the Masonite, clamp one end of the main fence to the table. With the bit set at the correct height, start the router and then pivot the entire fence so that the bit slowly cuts through the hardboard. I bring the cutter just a bit farther out than needed and then back it off to leave a little clearance for the blades. This reduces heat buildup and noise. Stop the router, lock down the free end of the fence, and try a test cut.

No room for error. *A zero-clearance fence closes the gap around the bit and prevents short work, like this drawer front, from dipping into the open space.*

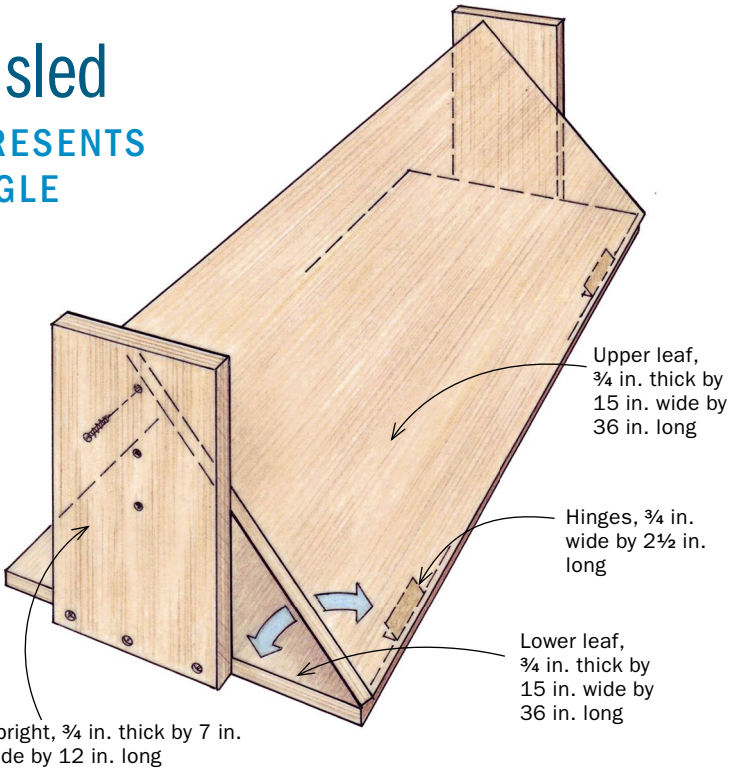


4 Miter angle sled

SIMPLE SLED PRESENTS WORK AT AN ANGLE



Hidden joinery. *An angle sled makes it simple to run a stopped groove into the edges of a mitered carcase, like this one by Seth Deysach, where the groove would show at the front and back if it went all the way through.*

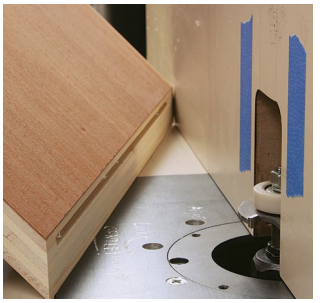


When it is necessary to present a piece of wood at an angle to the router bit, as with a mitered joint with spline grooves in box or carcase construction, this sled makes it easy. Cutting the grooves on the tablesaw is not an option if you want to make stopped grooves, hiding the splines. But this sled, used on the router table with a slot-cutting bit, will do the job perfectly.

Constructing the sled is simple. I make my sled big enough to hold a range of sizes with extra space to screw in hold-down blocks should I need them. Two squared boards of sheet material are held together with inexpensive utility hinges, and end pieces establish the angle. The workpiece is clamped onto the upper leaf so that the leading edge just touches the table surface. Or you can align the side or top edge with marks or stop blocks screwed to the upper leaf. When routing the end of a narrower piece, the upright end can serve as a right-angle guide as long as the components of the jig have been made accurately square.

A router bit can be used with a bearing that will run along the workpiece, as in the case of the slot-cutting bit.

Set up the angle. *Once the leaves are hinged and the uprights are screwed to the lower leaf, use a bevel gauge to set the angle (left), and screw through each upright to lock the upper leaves (right).*

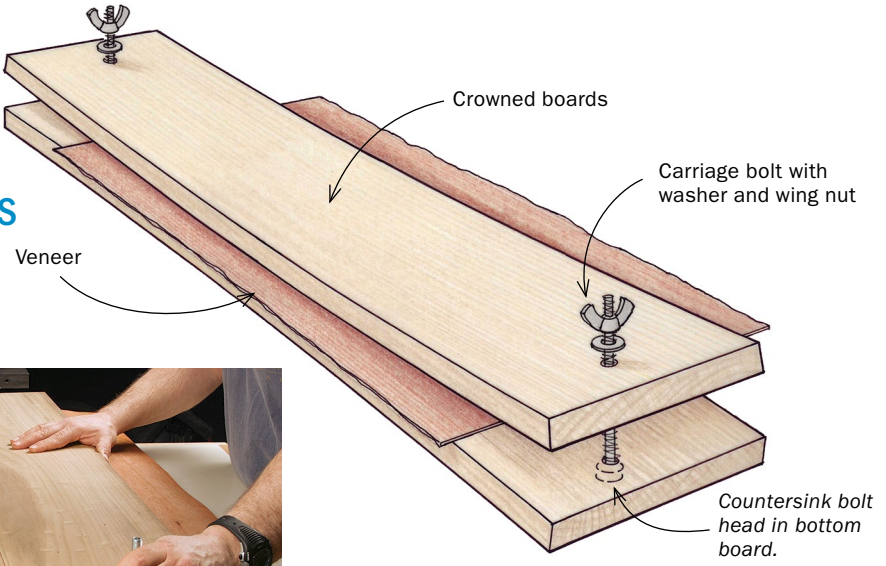


Use the fence as a pivot point for a stopped cut. *With the workpiece clamped on the angle sled and the stopping points taped on the fence, use the fence to pivot into the bit on one end and out on the other.*

Photo, top left: Seth Deysach

5 Veneer jig

JOINT PERFECT EDGES ON A STACK OF VENEERS



Tighten veneers in the jig. *The excess should protrude about ⅛ in. from the edge. Use a flush-trimming bit to do the trim cut. Go slow so as not to chip out highly figured veneers, and take a second pass to perfect the edge.*

Edge-jointing veneers with a handplane can be time-consuming and frustrating. Instead, you can use a veneer-trimming jig to joint multiple leaves of veneer at the same time. I like this jig because it is simple, can handle any width of veneer, and is easy to re-true on a jointer. It consists of two poplar boards bolted together at the ends. For short lengths, two flat boards will suffice. However, for veneers up to about 5 ft. in length, I make a longer jig with a crown in the boards so that clamping pressure is even along the entire length.

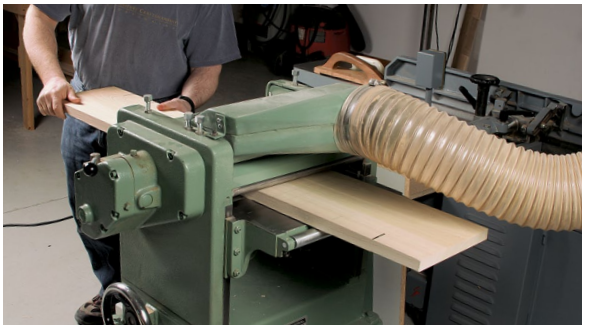
To create the crown, square up two 5/4 boards to about 1⅛ in. thick. Set the jointer to take a 1/16-in. cut and run the first board over the cutterhead about one-third of the way along the board. Stop the motor, turn the board around, and repeat on the other end, same face down. Repeat this three times on both ends, stopping each time about 4 in. from the end of the previous cut. The board should be tapered on both ends in a series of steps.

Next, flip the board and use a planer to remove the material in the center until the whole board has been planed end to end. A planer won't remove the crown from the board and the steps will not show up on the planed side. Flip the board and take a pass or two to clean up the stepped side. Repeat the process on the other board.

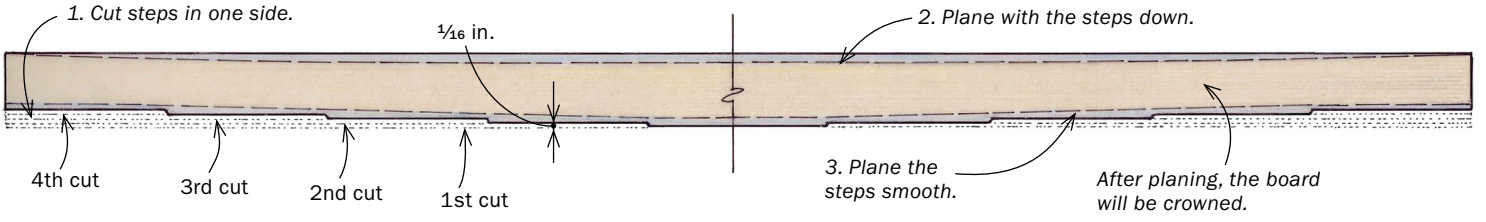
Drill holes for carriage bolts, making sure to countersink the heads and install washers and wing nuts. When the crowns of the boards are pressed against each other, they will force the whole jig to lie flat on the table surface. Lock the assembly down and run both edges over the jointer to true them up, and you're ready to insert veneer leaves and edge-joint them.

CROWNED BOARDS ARE THE KEY

Start with steps. *Schlebecker takes multiple jointer passes on both ends of the boards, shorter each time. He tapes a mark on the jointer and matches it to lines on the top of the board to know when to pick up the board.*



Plane it smooth. *Next, with the steps facing down on the bed, he runs the board through the planer until the board has been planed across its length. Then he flips the board over and gradually removes the steps.*



2 Jigs for Router-Made

The end grain is the tough part. *Use the sled to keep the rails square and secure for end cuts. After making test cuts to ensure the faces will be flush, begin by coping the rail with the flat edge against the fence to prevent tearout.*

An easy-to-make sled and a push block simplify cope-and-stick joinery

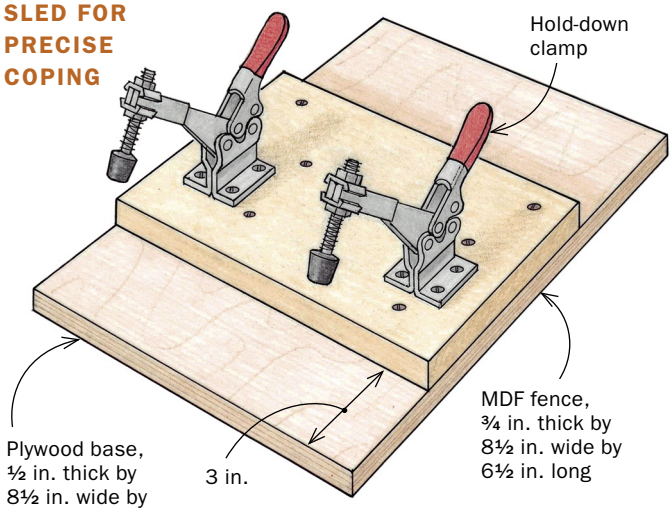
BY MICHAEL PEKOVICH

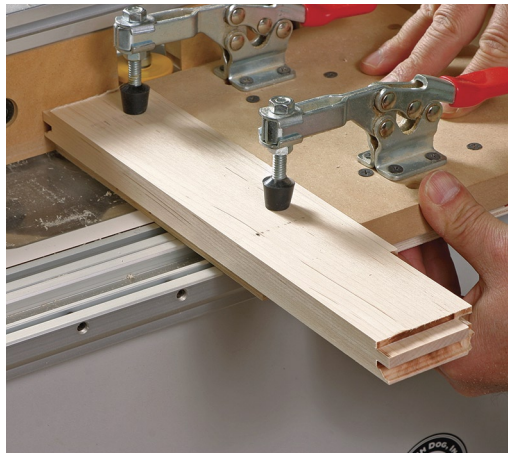
Recently, when I remodeled my kitchen, I was faced with the task of making 31 cabinet doors. I needed speed and simplicity, so I broke out my router table and a set of cope-and-stick router bits. These bit combinations allow you to rout door frames quickly. The first bit routs a profile and panel groove on the inside edge of all the frame parts. The second bit is a mirror image of the first, routing a coped profile and a stub tenon on the ends of the frame rails. Here, you'll see the method I used to rout the ends of the rails accurately and safely.

A sled for end-routing

Once you've cut the stick profile along the length of all the rails and stiles, it's time to install the coping bit and profile the ends of the rails. Do not try to run these

A SHOPMADE SLED FOR PRECISE COPING





Back the profile with its mate. *Before coping the opposite end, run a short length of scrap past the coping bit to make a backer block for the rail's profiled edge (left). With the backer block mated behind the piece, cope the second rail end (right).*

Photos: staff; drawings: Vince Babak (this page); Jim Richey (facing page)

Frames

rails against the router-table fence without additional support; they are too narrow to stay square against the fence. Instead, use a simple plywood sled fitted with hold-down clamps to run the stock squarely and safely across the bit. By the way, this sled works well for other end-grain jobs, like creating stub tenons.

I made the sled from an 8½-in. by 14-in. piece of ½-in.-thick plywood. That's large enough to support the workpiece without being unwieldy. A wide piece of medium-density fiberboard (MDF) makes the fence for the workpiece, provides a platform for the clamps that prevent the workpiece from shifting, and keeps my hands well away from the blade.

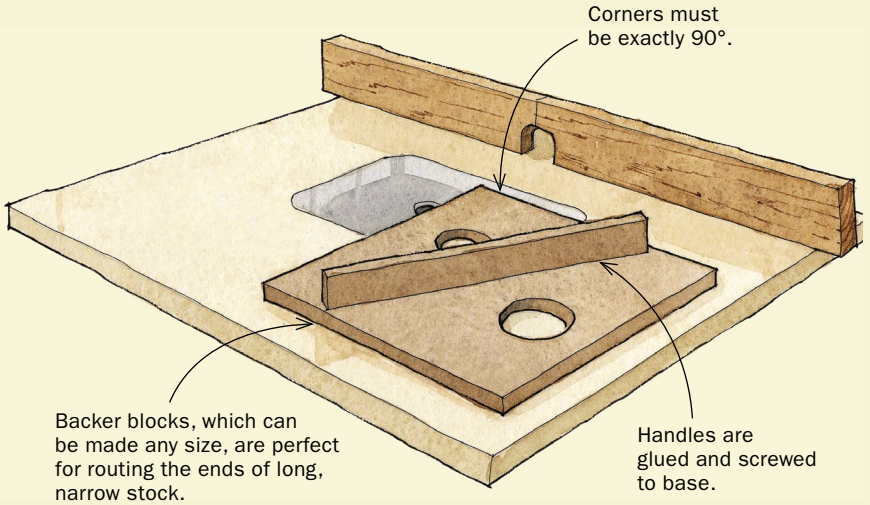
Before setting up the sled, cope the long edge of an extra piece of frame stock to make a special backer block. This piece will marry with the profiled edge of the rail stock and prevent tearout. When the other end of the rail is routed, the trailing edge will be flat, and a flat backer block will suffice.

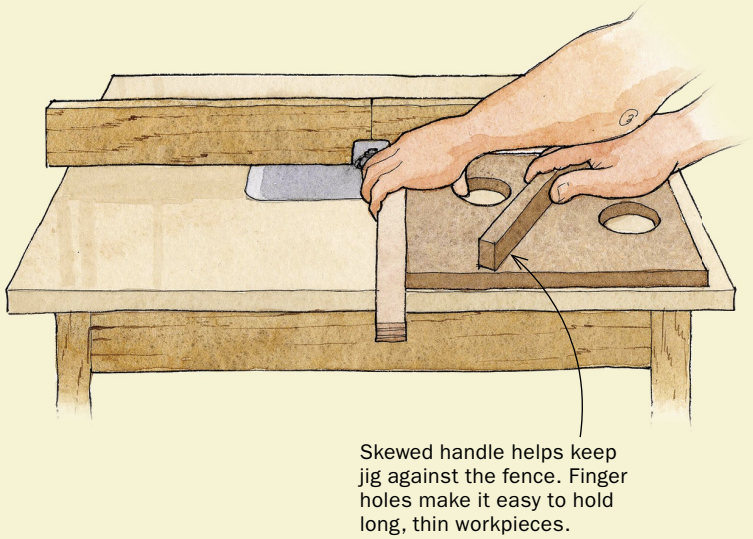
After you've made the backer block, clamp an offcut in the sled and take a test cut. Adjust the bit's height until the two pieces are flush and you're ready to cope the rails. Start with the flat edge against the sled fence and cope the first end. Then turn the rail end for end, insert the backer block into the panel groove, and cope the other end. □

Michael Pekovich is Fine Woodworking's *art director.*

The finished joint. *The router-table sled lets you cut the ends of the rails square, producing a tight cope-and-stick joint with no tearout.*

A simpler approach to end-grain routing





This router-table push block offers an even quicker way to support stock at 90° to the fence, such as when cutting stub tenons in a frame or using cope-and-stick router bits.

Made of MDF, it features a skewed handle that keeps fingers away from the router bit and automatically applies pressure against the fence as you push the workpiece through the cutter.

To use, simply hold the workpiece against the block and push through, keeping the block firmly against the fence. The block can be reversed to make a new zero-clearance backer, and it's easy to replace when it gets worn out.

—Serge Duclos, Delson, Que., Canada

4 Bench Jigs for Handplanes

Accurate handwork is easier with these clever jigs

BY NORMAN PIROLLO

Like many woodworkers, I began with hand tools but quickly progressed to using machines for almost every aspect of my work. A few years ago, as I developed my woodworking business, I decided there must be a less dusty and more peaceful way to make furniture. I took courses at a woodworking school whose philosophy was all about hand tools. This experience opened my eyes; you might say I became a born-again woodworker. Safety was also a factor in my transformation. For example, it can be dangerous to machine small parts on a tablesaw or bandsaw.

Now, instead of hearing the drone and whine of machines and breathing dust all day, I listen to classical music and sweep up shavings at the end of the day.

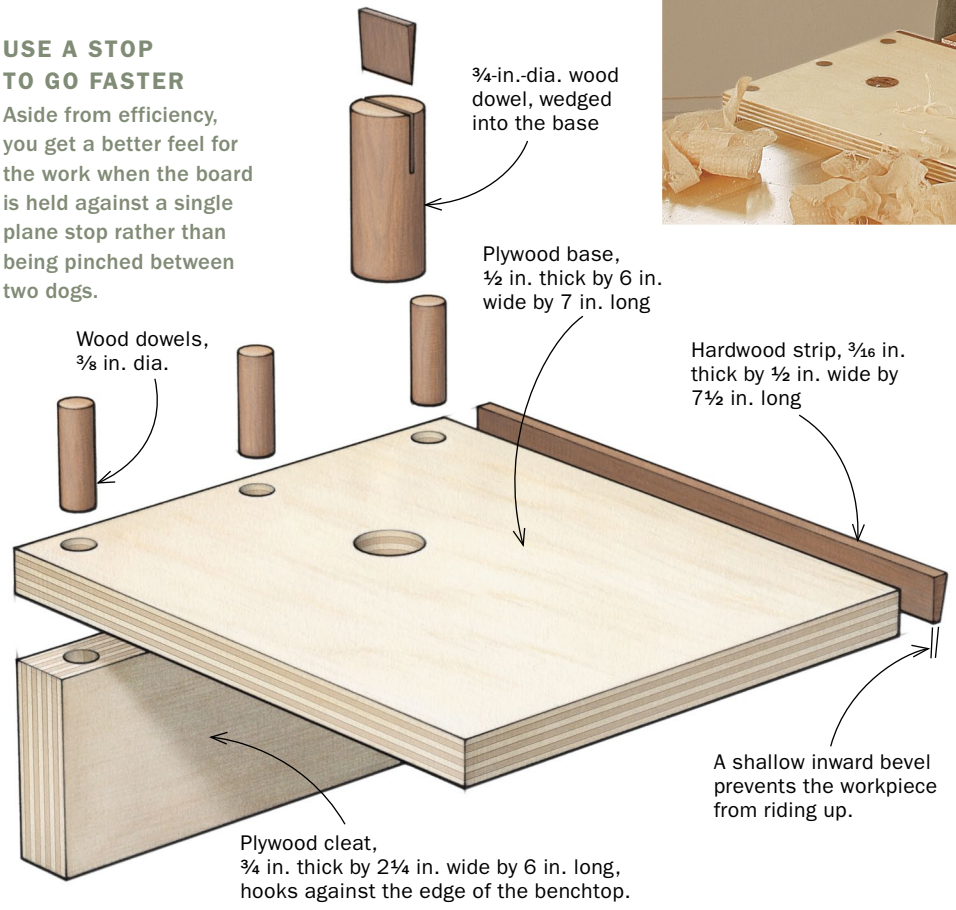
While I do use machinery sparingly, productivity remains the key to any business, so I've had to make my handplaning efficient without sacrificing quality. I use a series of jigs for different planing situations. The jigs have ¾-in.-dia. dowels that fit into dog holes in my workbench. If your bench doesn't have dog holes already, you need to drill only two or three because all the jigs are interchangeable. The jigs and techniques I'll describe are by no means new—handplanes have been used for centuries—but I've added my own modifications. One of these is that I'm left-handed, so you'll need to flip the plans if you're a righty.

Norman Pirollo is the owner of Refined Edge Furniture Design in Ottawa, Ont., Canada.

1 Planing stop

USE A STOP TO GO FASTER

Aside from efficiency, you get a better feel for the work when the board is held against a single plane stop rather than being pinched between two dogs.



Locate the big dowel. *Center the base over a dog hole. Use a ¾-in. Forstner bit to nick the underside of the base where you will drill.*

Drill for the others. *With a ⅜-in. brad-point bit, drill three holes at the front of the base for dowels that connect the cleat.*

Attach the cleat. *Insert the big dowel, ensure the base is square to the bench, then clamp on the cleat and extend the ⅜-in. dowel holes.*

For face-planing boards at least ½ in. thick, I use a simple stop that is attached to the bench with a single dowel. To prevent the jig from pivoting in use, a cleat registers against the front edge of the bench.

After cutting out the two parts, clamp them together and place them on the workbench, centered over a dog hole. Insert a ¾-in.-dia. Forstner bit into the hole from the underside of the bench and use the spur to mark the location on the bottom of the jig base. Use the same bit to drill the hole on the drill press, and then use a ⅜-in.-dia. brad-point bit to drill three holes for the dowels that will connect the cleat.

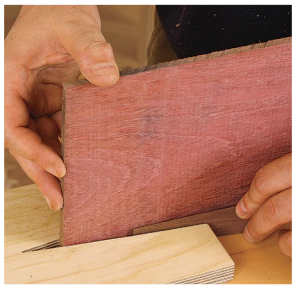
Dowel stock varies fractionally in diameter; a slightly loose fit is fine in the dog hole, but you need a tight fit into the base of the jig. To ensure a good fit, I saw a kerf into the top of the ¾-in. dowel. I apply glue and insert the dowel, then compress a hardwood wedge into the kerf using the jaws of a vise, which locks the dowel in place.

When the glue is dry, insert the base into the dog hole, clamp on the cleat, square the base to the edge of the bench, and extend the ⅜-in.-dia. holes into the cleat. Glue in the dowels and, when dry, plane everything flush with the base.

On the working edge of the stop, I glue a strip of hardwood with a shallow inward bevel on its face to keep boards from slipping upward. I apply a single coat of oil finish to my jigs for looks and protection, but this is optional.

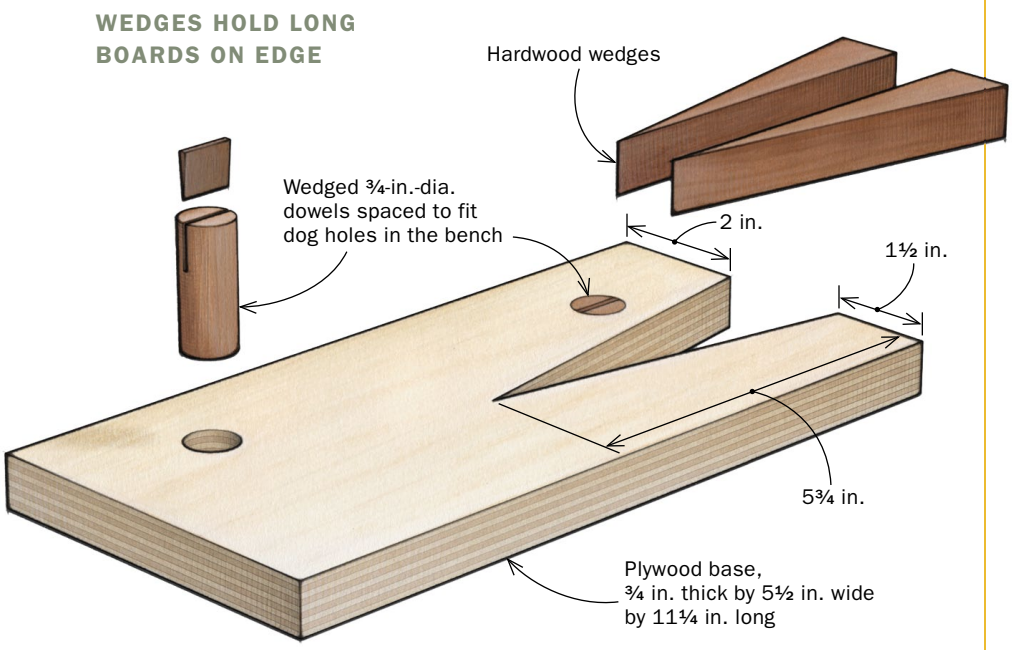
Photos, except where noted: Mark Schofield, second from top: Norman Pirollo

2 Bird's-mouth stop



When edge-planing long boards, I employ a bird's-mouth stop. This attachment works remarkably well for holding a board on edge and is much faster than using a front vise, with or without a board jack.

Attached to the bench via two adjacent dog holes, this jig takes a bit more time to make than the planing stop, but the two dowels give great rigidity and eliminate any tendency for rotation. Any board up to about 1½ in. thick can be inserted into the V-shaped slot in the jig and held in place with a small hardwood wedge on either side. The easiest way to make the wedges is to use the opening in the base as a template, cut the wedges on the bandsaw, and then clean them up with a handplane while holding them in a vise.



Edge-planing made easy. *A bird's-mouth jig allows you to rest the whole length of a board on the bench while you edge-plane it. If held in a vise, only a part of the board is supported.*

A flat surface. *Even if your benchtop isn't flat, the plywood base of the planing board provides a flat surface to plane on.*

Thin stock, no problem. *When planing stock less than ¼ in. thick, add an auxiliary base of ⅛-in.-thick Masonite so the plane will clear the stop.*

Drawings: Christopher Mills

3 Planing board

I reach for my planing board when working shorter or otherwise difficult workpieces. It combines a flat base with smaller versions of the first two jigs in this article.

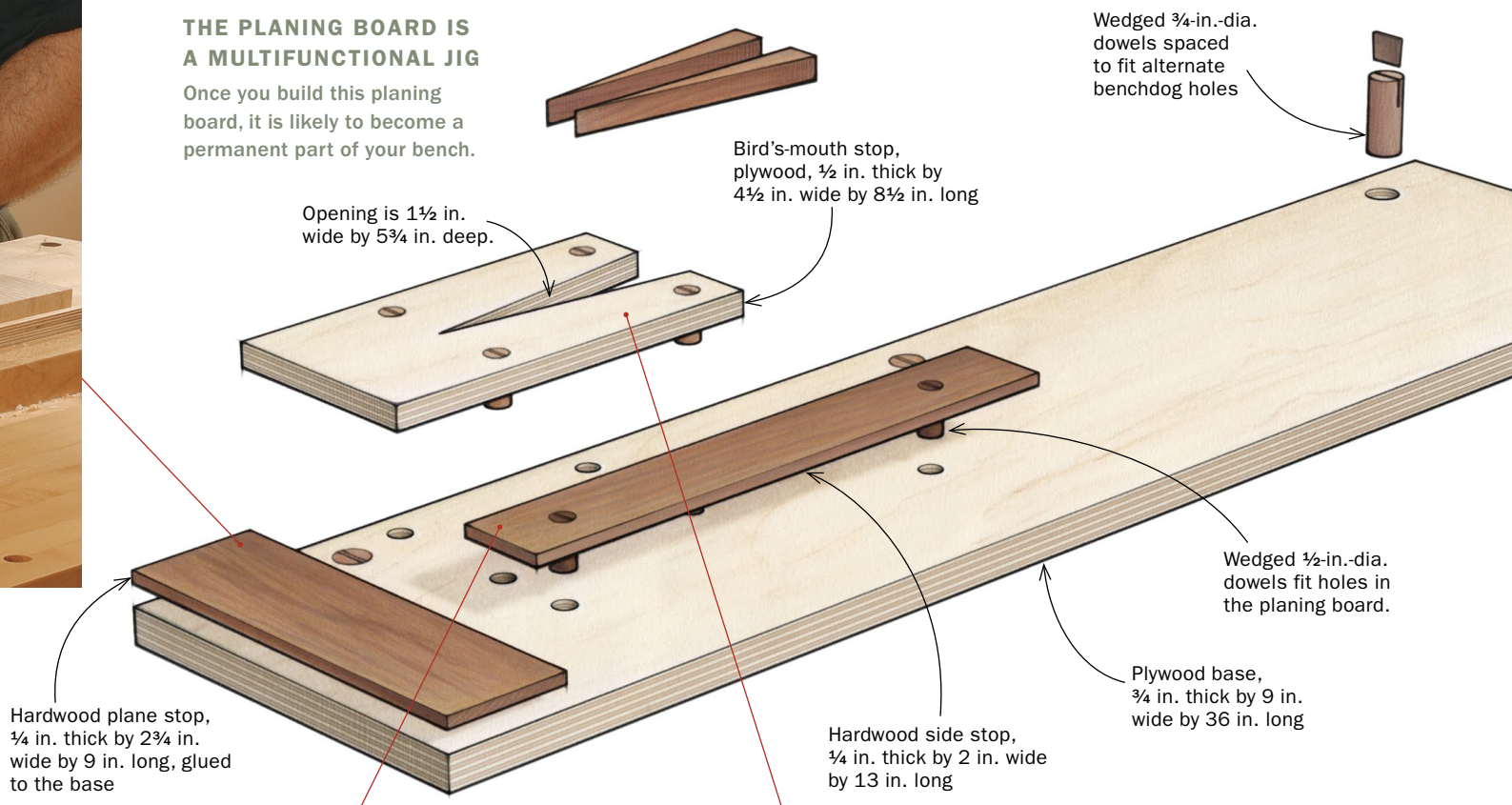
The planing board has two advantages. It guarantees a flat surface to plane on, even if the benchtop isn't flat. Also, it allows me to plane thin, narrow stock. I add a base of ⅛-in.-thick Masonite to plane stock less than ¼ in. thick instead of installing a thinner plane stop.

If I need to skew the plane slightly to lower the cutting angle and slice through difficult grain, I add a removable side stop that plugs into the planing board using two ½-in.-dia. dowels. This provides lateral support.

For jointing the edges of boards, I attach a smaller version of the bird's-mouth stop. In this way I can plane the face and the edge grain of a short workpiece without removing the planing board.

THE PLANING BOARD IS A MULTIFUNCTIONAL JIG

Once you build this planing board, it is likely to become a permanent part of your bench.



Side support. *When you need to skew the plane or plane across the board, use the side stop to support the workpiece laterally.*

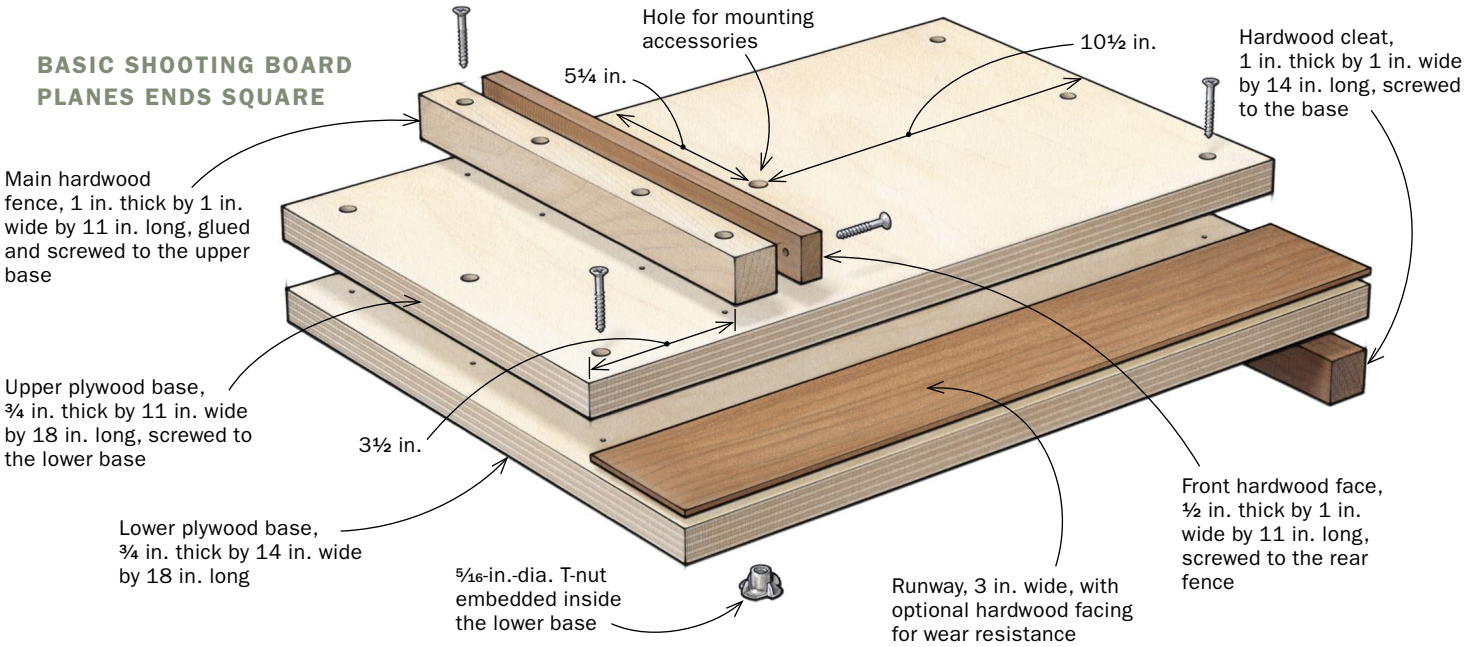
There's more. *Once you've planed the face of the board, use the bird's-mouth attachment to plane the board's edge.*

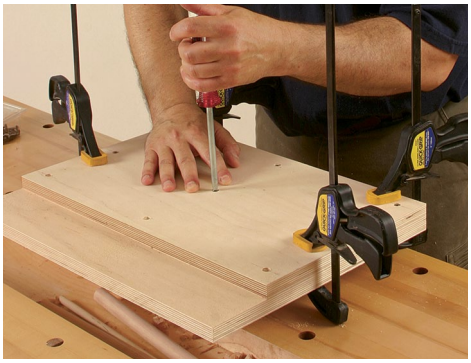
4 Shooting board

When it comes to trimming the ends of boards, especially small ones, I turn to my shooting board. The jig, which hooks over the edge of the benchtop, consists of a base, a fence, and a runway for a handplane to glide along. The plane removes shavings in fine increments, leaving the board the correct length and the ends square and smooth, ready to be used in joinery.

The two-part fence, which supports the work and prevents tearout, must be exactly 90° to the runway and flush with the edge of the top base. The main fence is glued and screwed to the base, while the front face is screwed to the main fence so that it can be shimmed if needed. The best plane to use is a low-angle jack plane whose 37° cutting angle, long body, and large mass make it ideal for shaving end grain. Push the plane downward and toward the end of the workpiece with one hand, and use the other to secure the workpiece against the fence. This movement takes a little getting used to but soon becomes second nature.

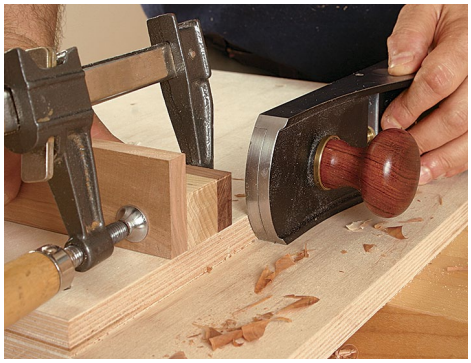
Square and true. *Place the board against the fence with the end fractionally beyond the end of the fence. Slide the plane past it, taking thin shavings until the end of the board is clean and perfectly square.*





Make a runway for the plane. *The 3-in.-wide runway is formed by screwing the upper base to the lower base.*

A square fence is critical. *If the front face of the fence isn't 90° to the runway, you can shim it.*



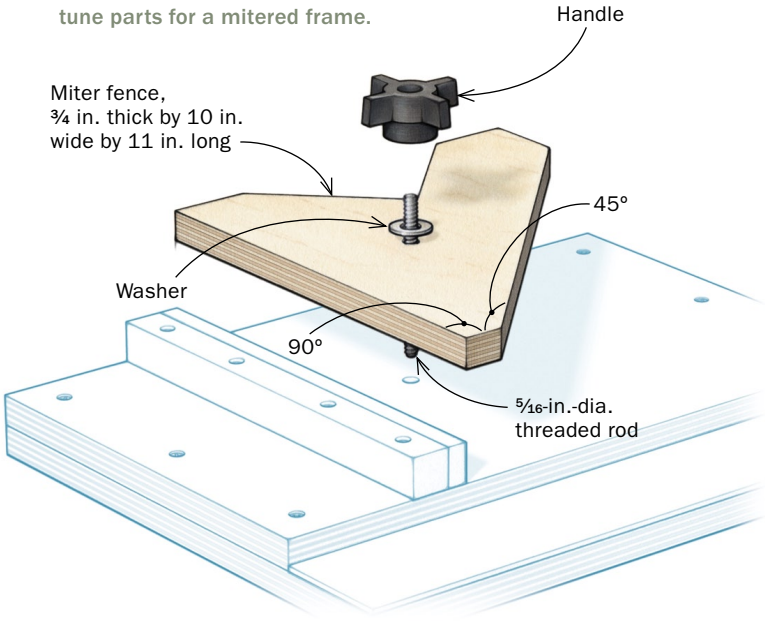
Trim the end. *Before use, trim the fence flush with the edge of the top base. Clamp a piece of scrap to the fence to prevent tearout.*

TWO ACCESSORIES FOR PERFECT MITERS

I recommend two easily installed attachments for this shooting board. The first is a triangular-shaped piece of plywood used to tune a flat, or frame, miter; the second is a larger block of wood with a face angled at 45°, used to trim a standing, or carcase, miter. Both attachments are held to the base using threaded rod that is screwed into a T-nut embedded in the underside of the jig. This group of easily constructed jigs leaves joints that surpass those left by a machine, and does it quicker.

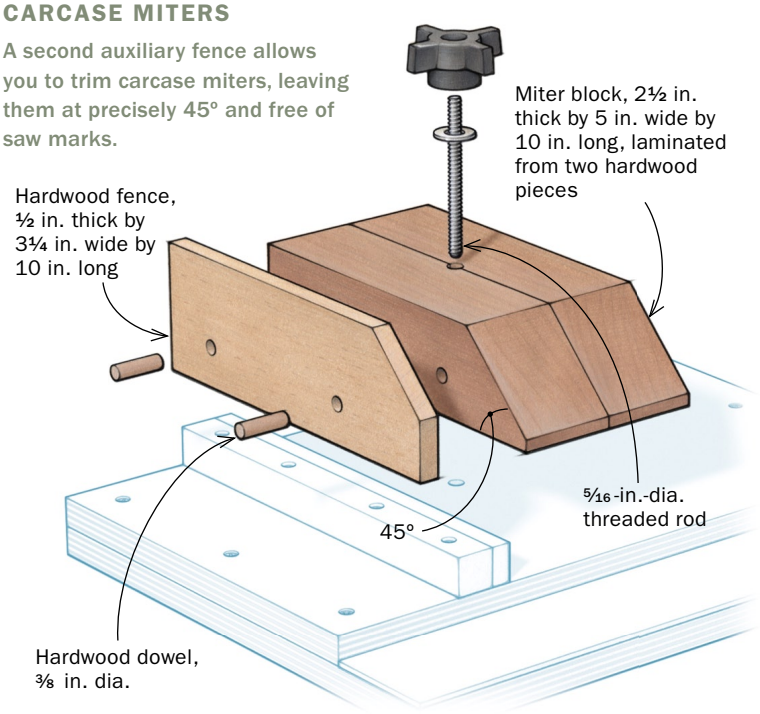
FRAME MITERS

By adding a 45° plywood fence, you can use the shooting board to fine-tune parts for a mitered frame.



CARCASE MITERS

A second auxiliary fence allows you to trim carcase miters, leaving them at precisely 45° and free of saw marks.



Locate the hole from underneath. *Hold the miter fence in position on the shooting board.*

Check the angle. *Make sure the fence is exactly 45° to the edge of the runway.*

Laminated block. *The large glue surface needs plenty of clamps to create enough pressure.*

Quick change. *The knob, T-nut, and threaded rod allow quick removal of both miter fences.*

Fine-Tune Your Joinery

Miter shoot is an invaluable handplane guide

BY TOBY WINTERINGHAM

"What's that?" asked Peter Korn, looking at the thing clamped in the tail vise of my bench. The object was a screw miter shoot that I use on almost every project. Korn, director of the Center for Furniture Craftsmanship in Maine, had come to my shop to invite me to teach at the school. When I accepted, he asked if I would bring my miter shoot. "No," I replied, "but I'll make one for you while I'm there."

In my workshop, students make a miter shoot as their first task. It teaches them the importance of accuracy, care, and respect for tools, and they leave with a jig that will benefit them throughout their careers.

The miter shoot consists of two working surfaces aligned at 45° and 90°. The former is used to true up miter joints; the latter to square up tenon shoulders and cheeks. I can't claim credit for inventing

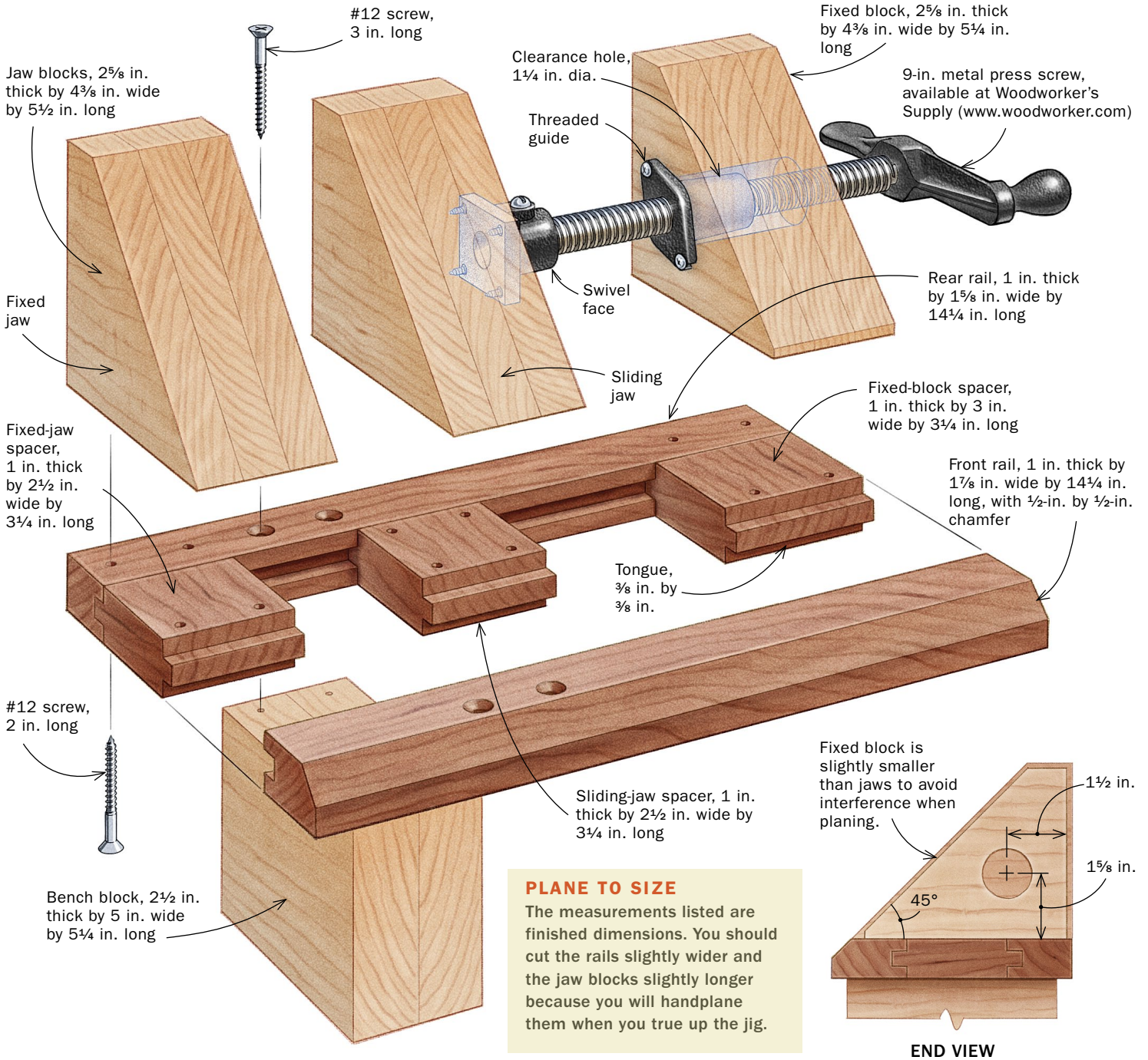
GOOD FOR MORE THAN MITERS

Although the jig is known as a miter shoot because it can be used to trim joints at precisely 45°, the opposite side is set at 90° and is used to fine-tune mortise-and-tenon joints.

Master the miter. *Use the shoot to true up parts for miter joints. The base prevents tearout on the outside edges.*

Tame your tenons. *A shoulder plane can be used on its side (left) to trim a tenon's cheeks. Used vertically (right), it trims and squares the tenon shoulders.*

Photos: Mark Schofield; drawings: John Hartman



PLANE TO SIZE

The measurements listed are finished dimensions. You should cut the rails slightly wider and the jaw blocks slightly longer because you will handplane them when you true up the jig.

this tool. As a student at the Royal College of Art in London, I discovered a decrepit one gathering dust under a bench. Even in poor condition, the jig was so much better than a bench vise for trimming miters that I decided to build one for myself.

The base has a sliding block

The shoot consists of a metal press screw attached to a fixed block; a pair of wooden jaws, one of which slides along a tongue-and-groove base; and a block attached to the underside of the base that mounts in a bench vise. I quickly realized that the secret to this tool is accuracy: The sliding jaw must run smoothly on the base with no sloppiness. Time invested in construction will pay dividends during use.

The base consists of two rails separated by three spacer blocks. The middle block slides up and down the rails. The easiest way to cut the tongue-and-groove joinery is with a rabbeting bit in a router table, but you also could use a dado blade on the tablesaw. In either case, the three spacers must start out identical in length to keep the rails parallel. Then take a thin shaving off the shoulders and the cheeks of the center spacer, just enough that it will slide while keeping the fit snug. Wax on the assembly also helps.

When you are certain that you have the right fit, glue the end spacers to the rails with the sliding spacer between them. After glue-up, plane the base perfectly flat.

Fit the jaws and install the screw

Although you can make the fixed block and the two jaws from any tight-grained

1 MAKE THE FRAME AND ATTACH THE FIXED JAW

Dry-fit the base. *Before you glue the two end stretchers to the rails, check that the center stretcher will slide freely but with minimum play.*

Create the jaw blocks. *After flattening and squaring the laminated stock for the jaws and the fixed block, make the 90° and 45° crosscuts. You might have to screw on a piece of scrap to handle the short blocks safely.*

12/4 or 10/4 hardwood, it is cheaper to laminate three pieces of 4/4 wood, and you'll have less wood movement. After the glue has dried, mill and handplane the sections true and square—the sides must meet at exactly 90°. Then make the 45° and 90° cuts on the miter saw or tablesaw, leaving the jaws slightly oversize. Later you will handplane them flush with the base.

On the drill press, drill and countersink holes on the underside of the base for attaching the jaws and the fixed block. On the top of the rails, drill holes for the bench block (see drawing, p. 93). While at the drill press, drill a hole in the fixed block to accept the threaded guide of the press screw. I locate the hole just below center—nearer to the rails to lessen the chances of the jaws skewing on narrow pieces. Don't install the guide just yet.

Both blocks and jaws are attached to the base with long woodworking screws. I don't use glue, so I can dismantle the miter shoot if it needs adjustment. The easiest way to attach the fixed block to the base is to clamp the block in a vise, then clamp the base to the block. Extend one hole into the block, drive in a short screw, and use a good square to make sure that the block is perpendicular to the long sides and the face of the base.

Complete the other three holes one at a time, installing long screws and checking the block for square. Finally, replace the first screw with one of the correct length.

Repeat these steps with the fixed jaw. If the fixed jaw is aligned correctly, you can clamp the sliding one to it while fitting its screws. It is still worth checking as you go, because screws tend to pull one way or another. I set the sliding jaw just over the

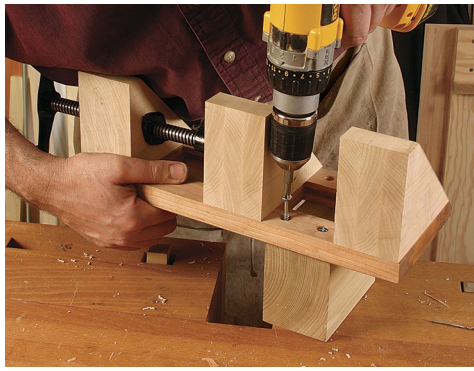
Attach the fixed block and fixed jaw. *With the block held in a vise, insert a short screw into the block through predrilled holes in the base (left). Check that the block is square to the base (right), and then insert longer screws into the three remaining holes before replacing the first screw.*

Add the hardware. *Detach the fixed block from the base, insert and screw on the threaded guide, then reattach the block.*

2 ADD THE SLIDING JAW AND SCREW

Attach the sliding jaw. *After you have screwed the fixed jaw to the base, clamp the sliding jaw to the fixed jaw and screw it to its sliding spacer.*

Add the swivel face. *Screw the threaded rod through the guide to see where to attach the swivel face to the sliding jaw.*



Screw on the bench block. *A block of wood, screwed to the two rails of the base, holds the miter shoot in a bench vise.*

edge of the sliding block so that the jaws make contact but the spacers don't.

Lightly hammer the threaded guide into the fixed block and secure it with screws. Insert the threaded rod, screw on the removable swivel face, and place it against the sliding jaw. Find the location that allows the rod to run true. If there is any angle, the thread will bind as the jaw slides.

Attach a large block to the back of the miter shoot, screwed through the top and bottom rails. This allows the miter shoot to be clamped in either a tail or front vise with either the 90° surface or the 45° surface faceup. Finally, use a handplane to true up the jaws in line with the base, keeping the surfaces flat and square. Again, the secret is accuracy; so take your time.

How to use your miter shoot

Take care when you first use the tool. In time, you'll get a feel for the crucial last stroke of the plane that brings the workpiece level with the miter shoot, and will avoid the next pass that planes the surface of the shoot. Used correctly, the surfaces of the jaws do not get worn quickly. I only true up mine once a year.

To true up tenons, fit the workpiece between the jaws with the shoulders fractionally proud of the surface. A few strokes with a shoulder plane will clean up the shoulders and bring them to an even height. Then, with the plane on its side, check that the tenon's faces are square.

Miter joints will lose their terror now that you can plane each component flat and true without the risk of tearout. □

Toby Winteringham is a woodworker in Norfolk, England. You can see his work at www.tobywinteringham.co.uk.

3 SQUARE THE JAWS

True up the miter shoot. *After the tool has been assembled, the two working faces of each jaw must be planed flush with the base while keeping them flat and square.*

Check the angle. *Use a good combination square to check that the faces of the miter shoot's jaws are at 45°.*

AT THE **BENCH**

Draw Better Curves

Jigs for regular arcs, fair curves, and ellipses

BY PAUL SCHÜRCH

For centuries, wooden-boat builders have been drawing templates and designing components that feature long, curved lines and surfaces, thus creating boats of grace, beauty, and strength. The term fairing a curve comes from boatbuilding and refers to the process of creating an organically flowing line without flat spots or kinks, bringing various curved surfaces into alignment. If a line is not fair in a boat design, it can undermine the boat's beauty and strength. Having worked as a boat builder early in my career, I find that creating pleasing curves is equally as important when designing furniture.

Everyone has the ability to look critically at a curve, but I find that many woodworkers distrust their intuition. When evaluating whether or not a line works in a piece of furniture, it comes down to instinct and gut feelings. Just as important as trusting your design sense, though, is having the right tools and jigs to draw and shape curved furniture components.

Tools for drawing circles

One of the most basic curves that can be incorporated into a furniture piece is the radius curve, or arc. These are prevalent in every type of woodworking, from tabletops to aprons to the doors on a cabinet.

Producing an arc is relatively straightforward. We're all familiar with drawing a portion of a circle with a compass. The only adjustments you can make are to increase or decrease the radius.

When it comes to drafting furniture components, you often will require large-scale radii. To draw these large-radius arcs you need trammel points, which are standard drawing aids available from many woodworking-, art-, and drafting-supply dealers. Trammel points act like an oversize compass when mounted to a beam. The only limitation to the size of the radius they can draw is the length of the beam. You can create a simple trammel using a stick, a nail (for the pivot point), and a pencil that is secured to the stick.

To draw a curve with a trammel, tape your drawing paper to a large, flat surface, such as a sheet of smooth plywood, melamine, or medium-density fiberboard (MDF), and then draw a centerline beyond the paper, at least the length of the desired radius. Plant the pivot point of the trammel along the centerline and draw an arc with the secured pencil. If the radius seems too dramatic, you can flatten out the arc simply by moving the pivot point farther away from the centerline.

Arc jig—Another way to draw an arc without a compass is with a simple arc jig. This jig consists of two long, narrow strips of plywood fastened together at an angle at the center of the arc's

Photos, except where noted: Matt Berger; facing page (bottom): Wayne McCall

SIMPLE ARCS

Radius curves, also called arcs, are the most common curves used for tabletops, aprons, and some door frames. Because they have a single center point, they are the simplest to draw.

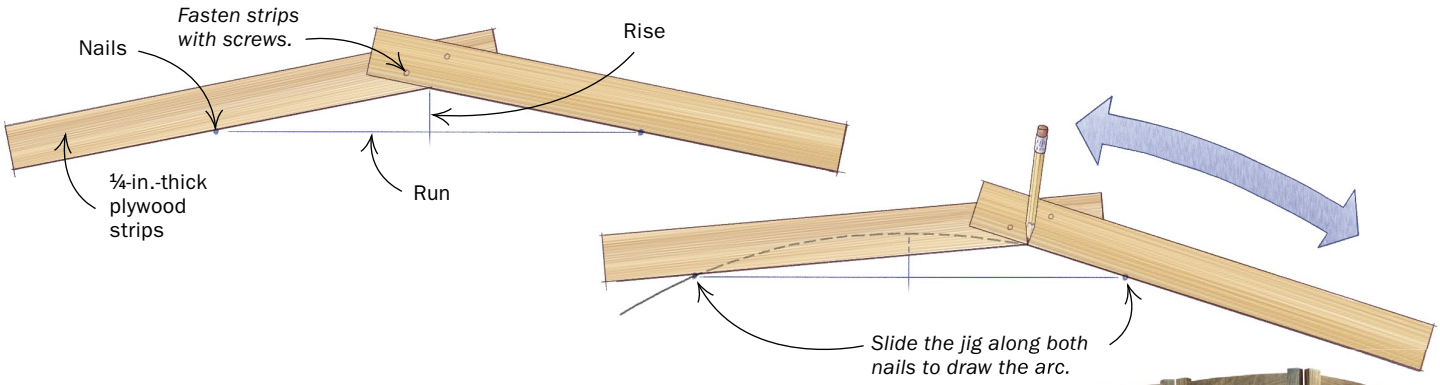
TRAMMEL POINTS

Commercially available trammel points are excellent for drawing large-radius circles and curves. Because the two-part drafting tool can be mounted on a beam cut to any length, they allow you to draw circles and arcs of almost any diameter.

A JIG FOR LARGE-RADIUS ARCS

This jig requires two nails and two long, narrow strips of plywood. Locate the nails in the drawing surface at the desired width, or run, of the arc. Connect the nails with a straight line, then draw a perpendicular line at its center point to indicate the height, or rise, of the arc. Position the plywood strips so that they rest against the nails and intersect at the rise. Screw the strips together and place the pencil at the intersection to draw the arc.

Arc jig. *This simple jig allows you to draw a perfect arc of almost any size without having to calculate the radius.*



Furniture with curves

Much of the curvy work in Schürch's portfolio was drawn full-size using fair- and radius-curve drawing tools. The plans require a great deal of time. Once they're down on paper, the furniture has been methodically built in his mind. The easy part, he says, is going out to the shop and constructing it.

Rose chest. *This piece (21 in. deep by 46 in. wide by 33 in. tall) features fair curves on the legs, an oval medallion on the top marquetry, and bowed front and side panels created with a 10-ft. radius curve.*

Round table. *Schürch's Ribbon Butterfly coffee table (42 in. dia. by 19 in. tall) features a circular tabletop and lower shelf and fair-curve legs.*

Folding screen. *This hinged three-panel screen (56 in. wide by 64 in. tall) has bamboo marquetry laid out with fair-curve tools. The top and bottom rails are designed with a radius, while the outermost leg stiles are fair curves.*

Adjustable jig for fair curves. *Schürch designed this pinch fairing jig to create fair curves when drawing full-size furniture plans.*

radius (see drawing, p. 97). Drive a nail into the drawing surface at each end of the desired arc, and set the angle of the jig so that the strips intersect at a height above the nails equal to the highest point of the arc.

Moving the jig from side to side against the nails—with a pencil at the intersection of the plywood strips—will create a perfect arc. To change the radius, increase the pitch of the angle where the two pieces of plywood are fastened together. In addition to drawing arcs, I have used this jig with a router to cut arc templates.

Fair curves with a batten

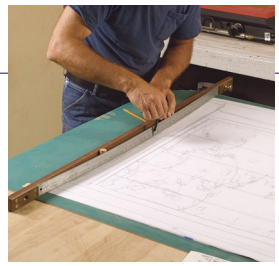
I often use fair curves in my furniture. These are a bit more challenging to create because they can't be plotted mathematically or with a compass. One portion of the curve might be a dramatic bend that gradually flows into a straight line.

I make most fair curves using a long and straight, defect-free square stick, called a batten. When held under slight tension, a batten usually will yield a fair curve and can be adjusted easily.

Depending on the curve you wish to produce, you can make a batten from a number of materials, as long as they are free of internal tensions, knots, or defects that otherwise would create kinks or flat spots in the curve. The best materials include MDF,

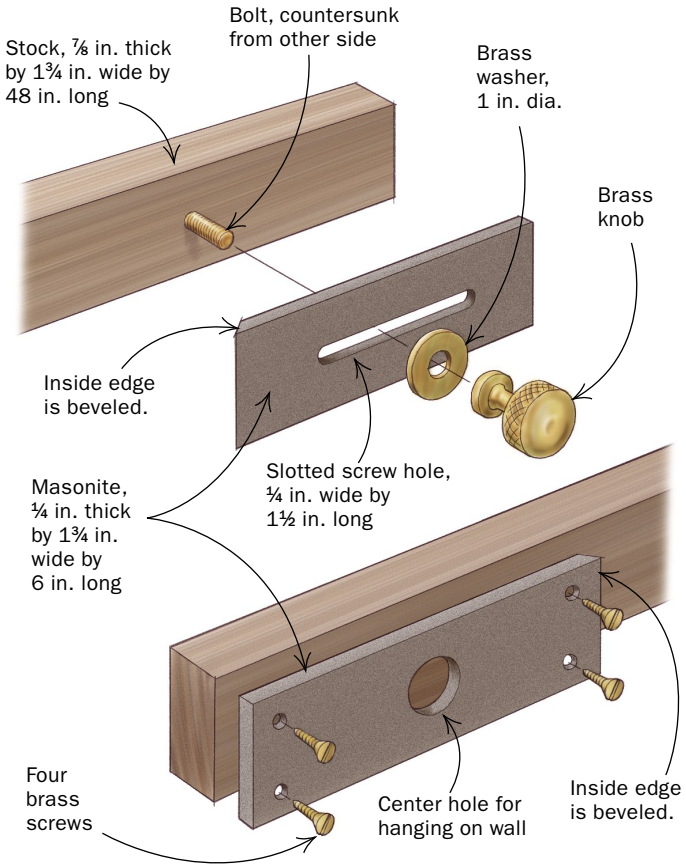
GRACEFUL CURVES

A fair curve has an ever-changing radius and mimics the graceful curves found in nature. A truly fair curve flows naturally, with no awkward transitions.



ADJUSTABLE PINCH FAIRING JIG

Fair curves are easy to create with this jig, which bends a metal rule into a curve and then allows you to set the apex of the curve anywhere along its length with a dowel.



Commercial drawing tool. *A flexible curve, available from a woodworking-, art-, or drafting-supply catalog, can be bent into a fair curve and will hold its form.*

Drawings: Chuck Lockhart

Play with the stops until the curve looks right. *Position one brick stop at each end of the metal-rule batten to set the end points, and then push on the apex of the curve with a third brick stop.*

mahogany, spruce, a long, thin metal rule, or even a plastic pipe. The thickness of the batten also is important and depends on the size of the curve you are making. For example, a 4-ft.-long bend can be done with a batten measuring about ¼ in. square, whereas an 8-ft.-long bend may require a batten that is 1 in. square.

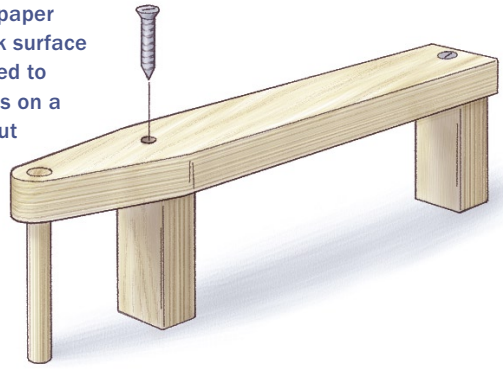
There are a few basic principles to follow when bending a batten into a fair curve. After determining the two end points of the curve, secure the batten slightly past these two points; then apply pressure to any point along the length of the line to create the curve, lining up the jig so the batten crosses over the two end points. Then trace the line with a pencil.

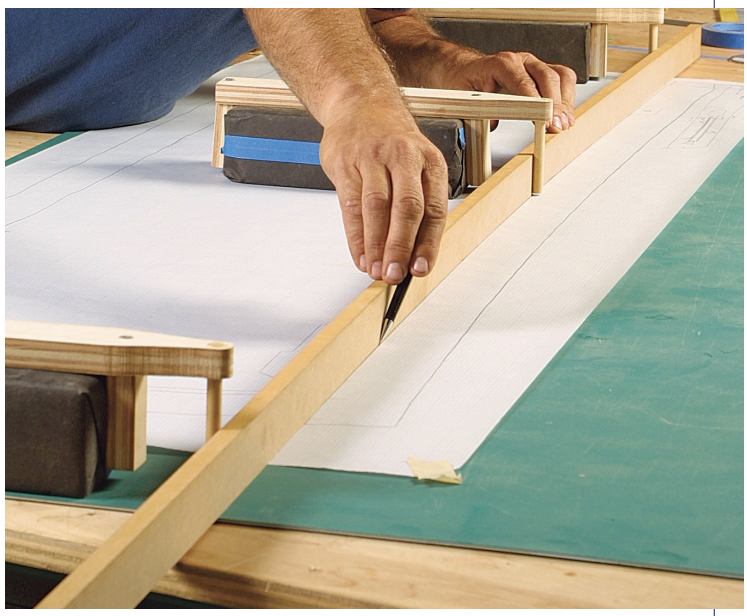
Adjustable pinch fairing jig—If my desired curve isn't too long, as when designing the top of a frame-and-panel door or the legs of a chair or cabinet, I use a shopmade jig that bends a metal rule (see facing page). This jig traps both ends of the rule and creates a bend when the two points are compressed slightly. Then, when you jam a dowel along the length of the curve between the rule and the jig, it creates a pressure point on which the fair curve wraps.

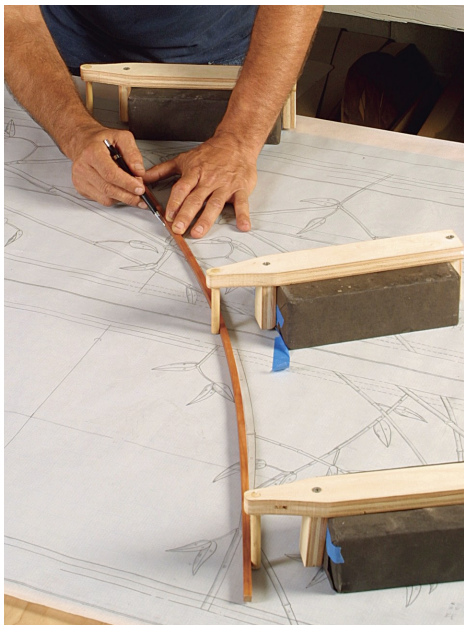
The pinch fairing jig is mobile and keeps the fair curve fixed when you move the jig. It can be flipped over to create the mirror image for drawing the other side of a piece of furniture, or used to draw a reveal next to your original fair line when shifted to the

BRICK-STOP BATTEN

A simple plywood jig, anchored by a brick wrapped in heavy paper to protect the work surface and drawing, is used to set the three points on a batten for laying out a fair curve.







MDF for big curves. *MDF is an ideal material for drawing long curves because it has a consistent density and no stress points.*

Thin stock for dramatic curves. *A thin piece of straight-grain mahogany works well for drawing tight curves like the bamboo marquetry on Schürch's hinged three-panel screen.*

new location on the drawing. Don't compress the metal rule too much, or the jig will yield a nonfair curve.

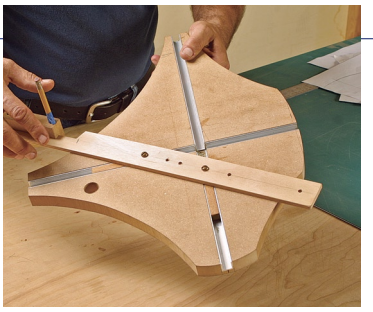
Brick-stop batten for long curves—When drawing long curves, such as the 64-in.-tall stiles on my folding screen (shown on p. 97), I use a brick-stop jig to hold a batten at three points of a bend. One brick stop at each end secures the batten a little past its start and stop point, and the third brick stop pushes on any one point along the length of the batten to create a curve. There should be light pressure on the bend to ensure that the batten will be fair while under tension. Try bending battens of different dimensions until you achieve the correct tension for the curve. When sighting down the curve, you should see no flat spots or kinks, and there should not be so much tension that the bricks slide while you're applying pressure with the middle brick stop.

Elements of an ellipse

Another curve I like to use in marquetry designs or tabletop shapes is an ellipse. I find that the easiest way to draw an ellipse is with an oval maker's jig, which is good for drawing tabletops,

PRECISE ELLIPSES

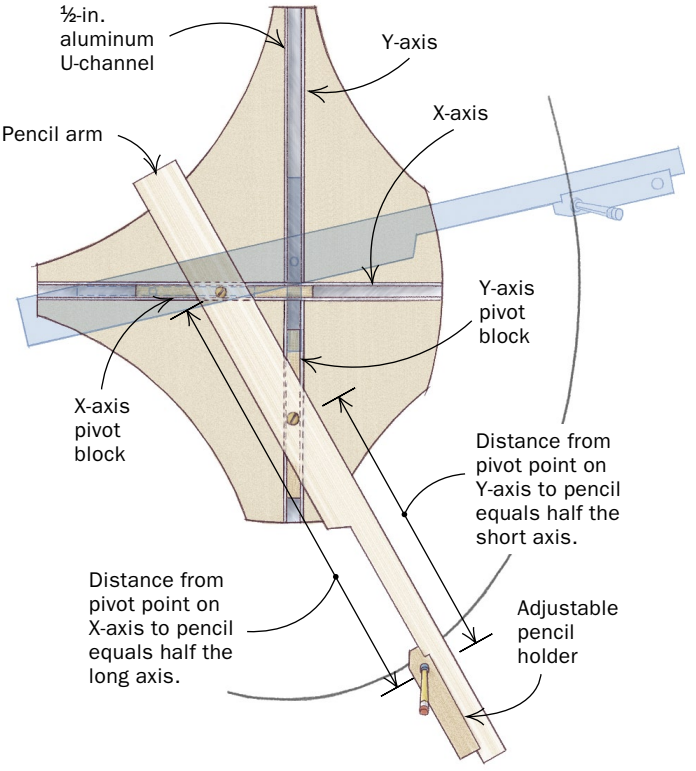
An ellipse often is used for tabletop designs. It has an X-axis and a Y-axis, which can be lengthened or shortened to create everything from a circle (equal axes) to an elongated oval. A jig can help you draw ellipses of all sizes.

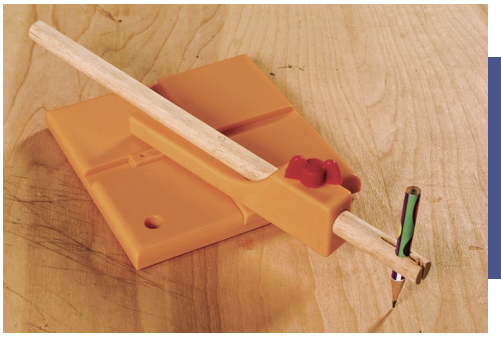


How to change the shape and size of an ellipse. *Adjust the axis locations on the pivot blocks as well as the location of the pencil.*

OVAL MAKER'S JIG

This jig for drawing ellipses (or circles and ovals) has a pencil arm attached to two pivoting axis blocks, which ride in T-tracks as the arm rotates around a center point.





Oval drawing jig. *This commercially available jig lets you draw ellipses, circles, and ovals with a maximum axis of 30 in.*

crown or apron elements on a cabinet, and decorative veneering designs. My shopmade jig is an MDF board that has dadoes cut at 90° to each other in which hardwood axis blocks can slide. I put aluminum U-channel in the dadoes on my jig. The pencil arm is loosely screwed onto each axis block. When the arm is rotated, both axis blocks move back and forth within the dadoes.

Begin plotting an ellipse by drawing the rough shape on scrap paper and then aligning the jig so that its center is rooted where the X-axis and Y-axis intersect. Then measure the distance from the center of the rough ellipse to the farthest point on the short axis, drill a hole in the arm, and screw it onto the axis block. Repeat the same procedure to determine the distance of the long axis. After drilling and fastening both axis blocks to the arm, manipulate the jig to ensure the action is smooth enough to draw the ellipse. The axis blocks cross over the center when you draw the full ellipse. The height-to-width proportions of the ellipse are adjusted by drilling new pivot points through the arm where it fastens to the axis blocks. To increase the size and maintain the proportion, simply move the pencil farther out on the arm.

Another way to change the size of the ellipse is to draw one on paper and then enlarge or reduce it on a copy machine. □

Paul Schürch builds custom furniture in Santa Barbara, Calif. You can see more of his work online at www.schurchwoodwork.com.

Adjust the curve of the sole. *In addition to setting the blade, an adjustment knob on the compass plane changes the curve of the sole to a convex or a concave shape.*

A handplane for curves

Compass planes, also known as radius planes, have a long history in furniture making due to their unique ability to handplane curved surfaces. I find a compass plane indispensable for shaping curves. This tool lets me take curved plywood templates as well as curved workpieces straight from the bandsaw to completion. It creates a smooth line and leaves a square edge on the template to aid bearing-guided router bits better than a sanded edge.

A compass plane works similarly to a standard bench plane and has a depth-adjustment screw and a lateral adjustment lever for the iron. Unlike a bench plane, though, its thin metal sole can be adjusted to a convex or concave curve. When setting up a compass plane to fair a concave curve, give the sole a slightly tighter inside radius than the curve to be planed. For convex curves, set the plane to the precise curve. When set correctly, it takes only a few passes with the plane to create a smooth, fair curve.

The Stanley No. 113 compass plane I use is no longer being produced, but it can be purchased secondhand. At least two toolmakers, Kunz and Anant, currently have compass planes on the market.

Plane a concave curve. *Tune the sole to a slightly tighter inside radius than the curve to be planed and keep pressure on the nose with each pass.*

Plane a convex curve. *With the sole of the compass plane set to the desired curve, make several passes, putting pressure on the nose of the plane until the curve in the workpiece is fair.*

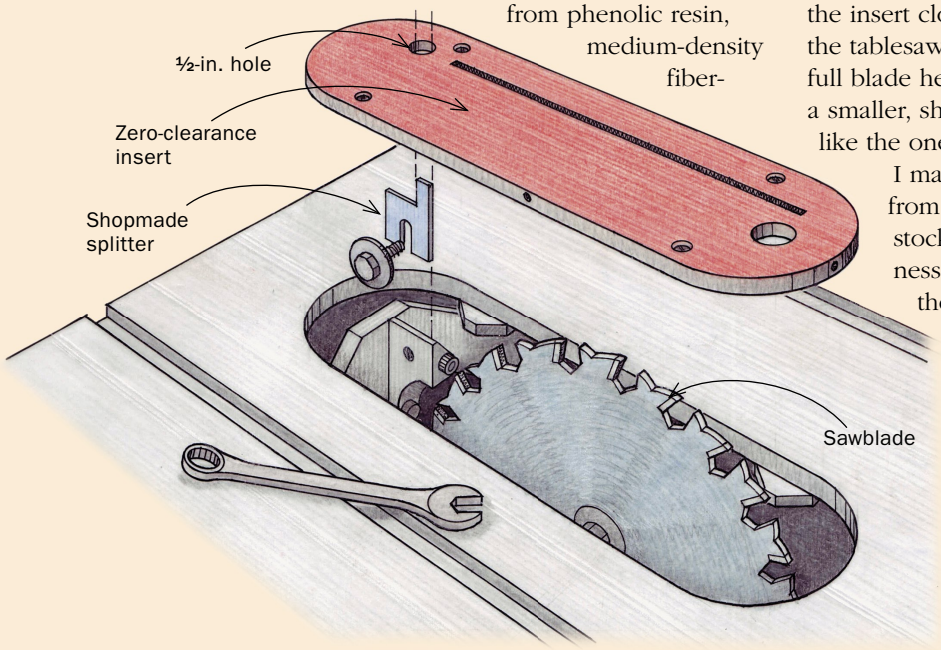
Q&A

Custom splitters for zero-clearance inserts

Q: Is it possible to use a splitter with a zero-clearance insert?

—LEO CHEE, Southbury, Conn.

A: THE LONG SPLITTER SLOT at the back of a regular steel throat plate usually comes to within ½ in. of the blade slot. If you copy this in a zero-clearance insert made from phenolic resin, medium-density fiberboard (MDF), or plywood, the insert probably will crack (for more on zero-clearance inserts, see p. 28). Instead, I drill a ½-in.-dia. hole through the insert close to the back of the tablesaw blade slot (cut at full blade height) and insert a smaller, shopmade splitter like the one shown.



I made this splitter from aluminum sheet stock. Get the thickness that matches the kerf of your blade—0.100 in. for most thin-kerf blades, around 0.125 in. for standard blades. To cut the aluminum without damaging it, I attach it with double-faced carpet tape to the bottom of a piece of ⅛-in.- or ¼-in.-thick Masonite or MDF. I use a fine-tooth metal-cutting blade in my jigsaw and the material cuts like butter. Be sure to use a blade that can handle curves, and don't use the orbital action on the jigsaw, just the up-and-down motion. I cut the mounting slot by drilling a hole at the top of the slot and then cutting two straight lines up to the hole's widest points.

Like any splitter, this one is designed to prevent kickback, but not accidental blade contact. So be sure to use it with a blade guard.

—Hendrik Varju is a professional woodworker near Acton, Ont., Canada.

Cutting round stock on the bandsaw

Sled offers solid support. *To cut the ends of round stock safely on the bandsaw, clamp the stock in an L-shaped sled that's screwed to a miter gauge. For stability, be sure the clamp sits below the stock's centerline.*

Q: As I was pushing a 12-in.-dia. pillar through a ½-in. bandsaw blade against the fence to try to square the end, the blade suddenly went off track, chewing up the table insert and part of the door that covers the bottom wheel. What happened?

—BILL BALLEZA, Houston, Texas

A: MOST LIKELY WHAT HAPPENED WAS THE PILLAR ROTATED A BIT as you were cutting, snagging the back of the blade and forcing it forward out of the guides. For safety, the pillar should have been stabilized by fastening it to a plywood sled; if the pillar was long, the outboard end of the sled would need to be supported on a roller stand.

On a bandsaw, there is nothing restraining the blade from being pushed forward and out of the guides. It takes only a small amount of pressure on the trailing edge of the blade for it to shift forward. And a ½-in. blade needs to move forward only about ⅜ in. for it to push clear of the side blocks and inflict the type of damage described in the question. That's why you should never try to back out of a cut with the blade moving.

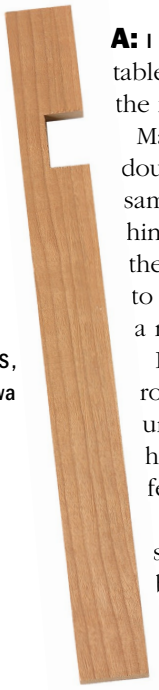
—John White, a woodworker in Vermont, is the former shop manager for *Fine Woodworking*.

Photos: staff; drawings, this page: Vince Babak; facing page: Christopher Mills

Clever stick aligns box hinges

Q: I have to install hinges in a large number of boxes I'm making for a client, and the fit and spacing have to be right on the money. What's the easiest way to handle this task?

—RUSSELL WELLS, Des Moines, Iowa



A: I DISCOVERED A SIMPLE way to use a router table to create perfect-fitting hinges, using the flip stick shown here.

Make the stick about ¼ in. thick, roughly double the width of the hinge leaf, and the same length as the box. Decide where the hinges will go and mark that distance on the stick. Only one hinge location needs to be marked. Use the tablesaw to create a notch for that hinge location.

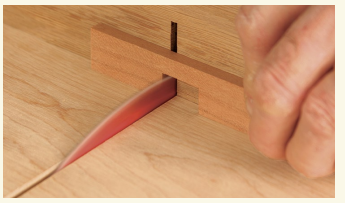
Install a 3⁄16-in.-dia. straight bit in the router. Adjust the bit height until it's just under half the thickness of the closed hinge. Butt the flip stick against the fence and position the stop blocks.

Rout the hinge mortises, then flip the stick end over end, reclamp the stop blocks, and cut the second mortises.

—Doug Stowe builds furniture and boxes in Eureka Springs, Ark.

1. MAKE THE FLIP STICK

Cut the stick to length. *The stick is cut to the same length as the box; use the box as a template to mark the length.*

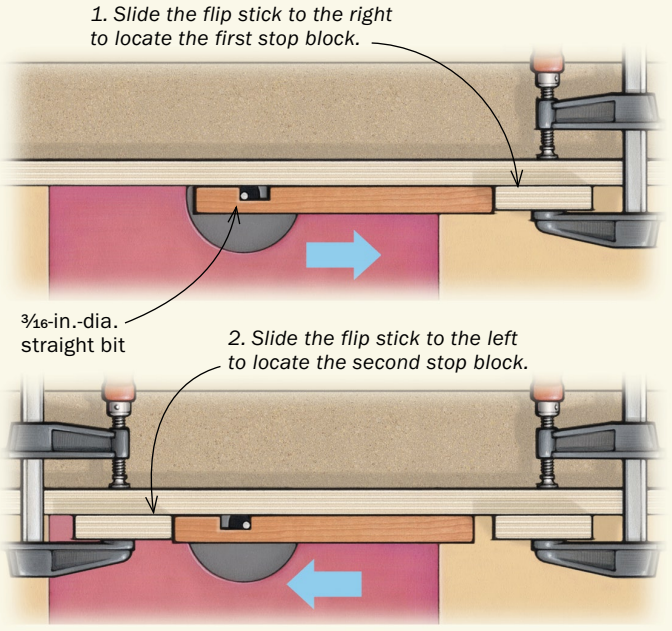


Notch the stick. *Stowe uses his tablesaw to cut a precise notch to accept the leaves of the hinge.*

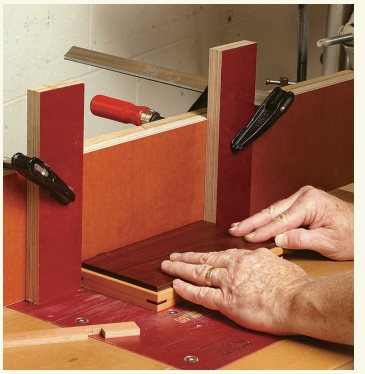
A perfect fit. *Nibble away slowly until the hinge leaf fits snugly in the notch.*

2. USE THE STICK TO SET UP THE ROUTER TABLE

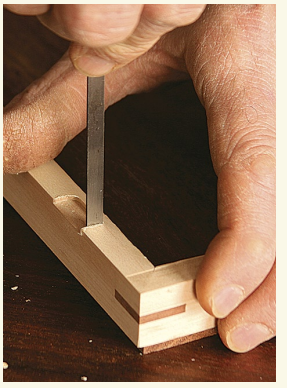
Position the stop blocks. *With the flip stick serving as a template, clamp a pair of stop blocks to the router fence.*

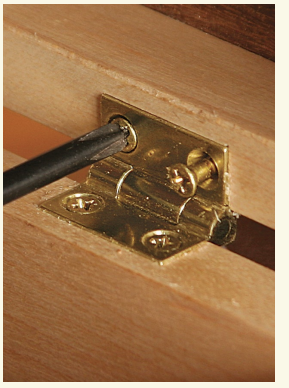


3. ROUT THE HINGE MORTISES



Mortise in two steps. *With the stop blocks in place, cut one mortise in the lid and a second on the box. Flip the stick and reposition the stop blocks; then cut the remaining mortises on the lid and box.*





Square the corners and install the hinges. *The router bit leaves rounded corners, so you'll need to square them with a chisel. The fit will be perfect.*

Simple jig locates bed-bolt mortises

Q: I would like to make a trestle table that uses bed bolts to attach the stretcher. These bolts require very long holes in the ends of the stretcher and a small mortise for each nut. Is there a surefire way to locate the mortises in the stretcher even if I drill slightly off line?

—DAN MORGAN,
Pearl River, N.Y.

A: YES. I USE A SIMPLE JIG for bed bolts. Insert a bolt into the stretcher, and the jig hugs the bolt to align itself with the hole you drilled. The jig's dimensions are determined by the length of the bolt you use and the thickness of the post.

Make the jig from scrap. Two tabs on the underside, equal in length to the thickness of the post minus the counterbore for the bolt head, will straddle the bolt.

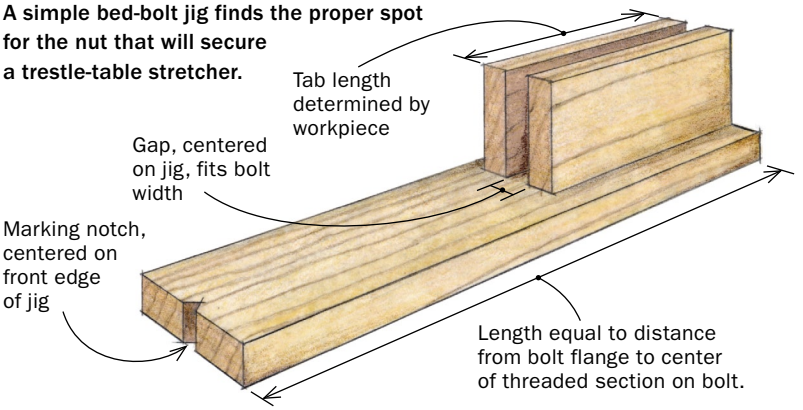
Designate a front end of the jig, insert the bolt between the tabs, then mark and cut a notch in the front edge at the point where the bolt protrudes. In use, the notch will be aligned over the bolt's centerline, and halfway along the threaded area.

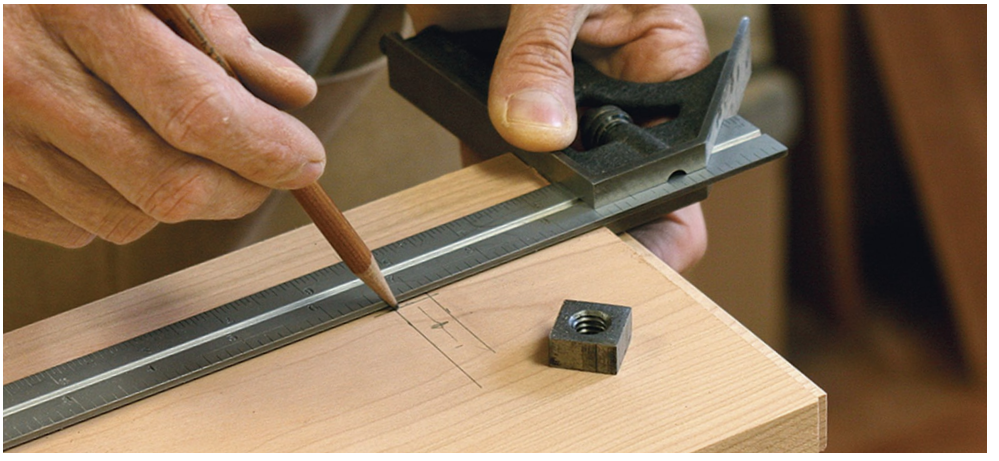
Mark the stretcher at the notch to establish the nut-mortise location. Using a square, mark in the mortise dimensions, then drill and chisel out the mortise. Repeat the process for the remaining bolts.

—Christian Becksvoort is a Fine Woodworking *contributing editor.*

LOCATING A NUT MORTISE IN A STRETCHER

A simple bed-bolt jig finds the proper spot for the nut that will secure a trestle-table stretcher.





Insert the bolt to align the jig. *Becksvoort aligns the jig over the protruding bolt, brings the jig up to the rail's end, and marks at the notch, which is centered over the threads of the bolt. Then he uses a square to scribe the dimensions of the mortise that will snugly seat the bolt's nut.*

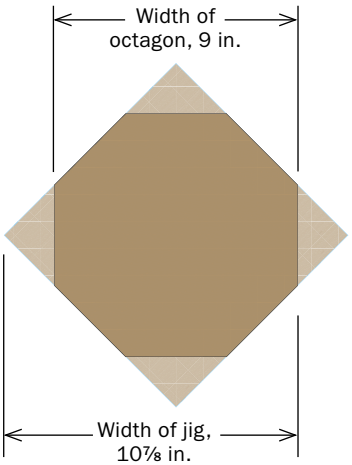
Drawings, this page and p. 106: Kelly J. Dunton

WOODWORKERS MART

Cut a perfect octagon on the tablesaw

Q: I would like to cut a 9-in.-wide octagon on the tablesaw. How can I do this safely?

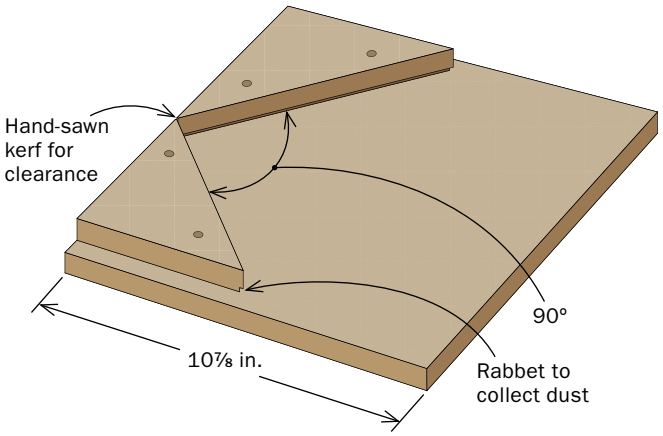
—STEWART LEVINE, via Knots online forum



A: FOR A 9-IN. OCTAGON, start with a blank 9 in. square. For the jig, begin with a base ¾ in. thick by at least 9 in. long. To determine the width, multiply the side of a square by 1.41 (in this case, 9 × 1.41 = 12.69 in.). Subtract the 9-in. width from 12.69 in., and you get 3.69 in. This is the sum of two opposite corners of the blank that will be removed to create an octagon. Divide 3.69 by 2 to get 1.84. Add 1.84 to 9, and the result is 10.84, or roughly 10⅞ in. This is the width of the jig and the distance from the fence to the sawblade.

Cut a pair of 45° triangles and attach them to the jig. Use a backsaw to open a sawkerf gap where the two points touch. Place the blank in the jig, and cut off a corner of the workpiece. Turn the workpiece 90° and repeat three times for a perfect octagon.

—*Roland Johnson is a* Fine Woodworking *contributing editor.*



Follow this sequence. *The first cut and the second are made with the opposite 90° corner fully nested in the jig. Before the third cut and the fourth cut, the opposite corner is already cut, so the workpiece doesn't reach fully into the jig.*

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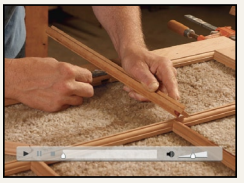

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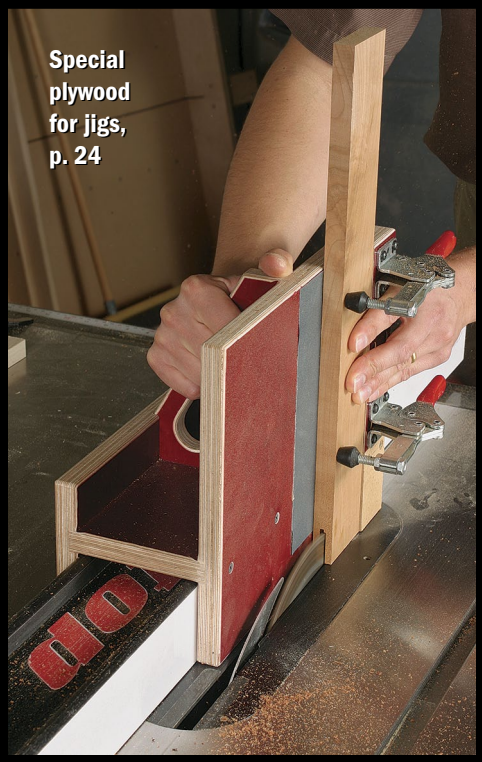

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