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Tablesaw – Winter 2015

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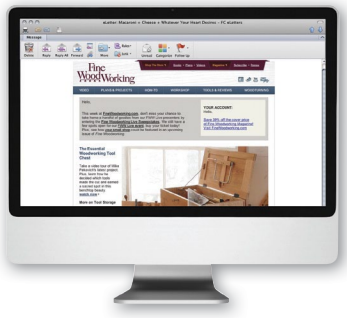

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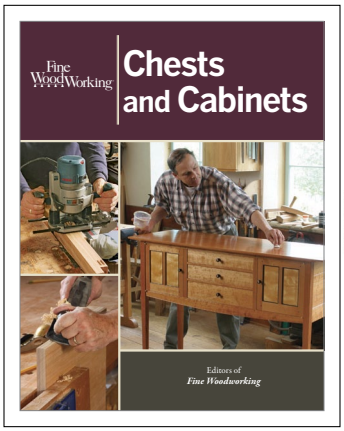

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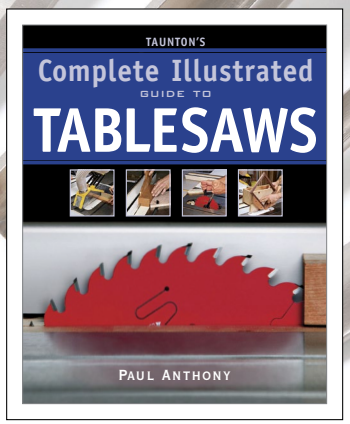

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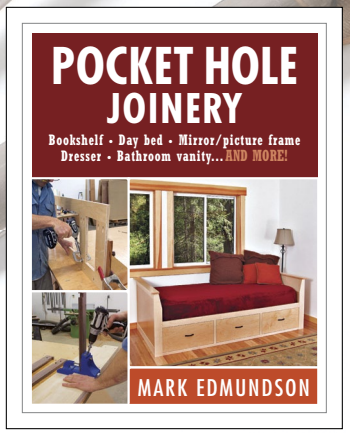

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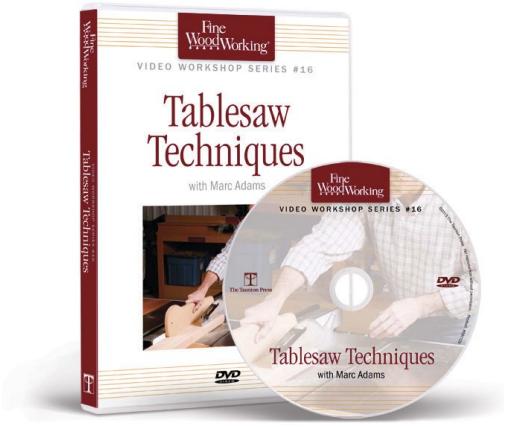

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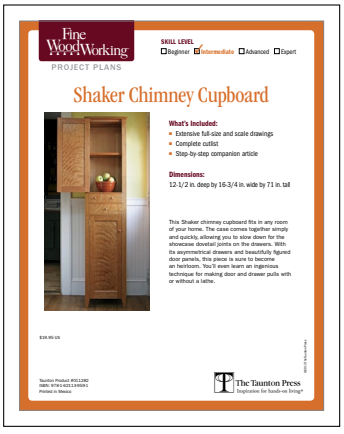

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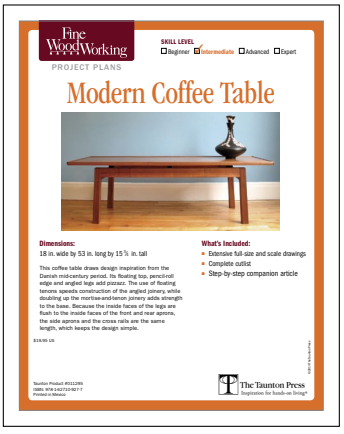

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from the editor

DO ONE THING, AND DO IT WELL

It used to be that when I walked into a new shop I'd do a quick scan of the room. The first thing I'd notice was the overall layout. Then I'd find the bench and figure out where the hand tools lived. Next, I'd zero in on the jointer, planer, and bandsaw. I'd gaze at the lumber and how it was stored, check out the different species, admire any projects in the works. And then, finally, once all the rest had been taken in, I'd give an obligatory nod to the tablesaw.

That was misguided. The core of the modern woodworking shop is the humble tablesaw, and it deserves more reverence. The tablesaw does one thing—cuts straight lines—and does it extremely well. But within the confines of doing that one thing, it offers unmatched versatility and amazing accuracy. The possibilities of what you can accomplish on your tablesaw are unlimited.

That's where *Tablesaw Jigs, Tips, and Techniques* comes in. This special issue gathers the best tablesaw-related articles from the pages of *Fine Woodworking* to help you advance your skills and answer all your tablesaw questions—even some you didn't know you had. Increasing tablesaw safety is at the forefront of these articles. Basic maintenance tips will help you get your saw performing better than ever. You'll learn techniques for cutting strong, elegant joinery. There also is a wealth of information about shopmade add-ons such as featherboards, outfeed tables, inserts, jigs, sleds, and more that will open up safer, smarter, and more efficient ways to use your tablesaw. And it's full of innovative projects to use in conjunction with the tablesaw or that can be built easily using the tablesaw.

Keep this issue close at hand. You'll turn back to its solid advice again and again.

—ANISSA KAPSALES
Editor, Tablesaw Jigs, Tips, and Techniques

THE BEST OF Fine WoodWorking

Tablesaw
Jigs, Tips, and Techniques

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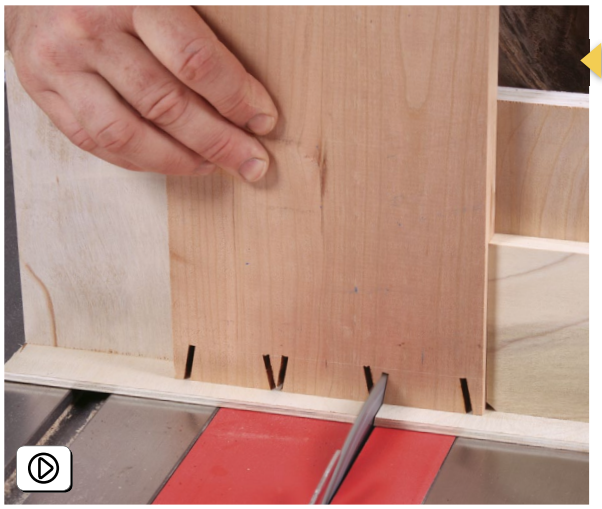

Dead-On Dovetails

You don't need to be a hand-tool pro to cut accurate, tight-fitting dovetails. See how to crank out beautiful joinery on your tablesaw (p. 57) while retaining that hand-cut look.

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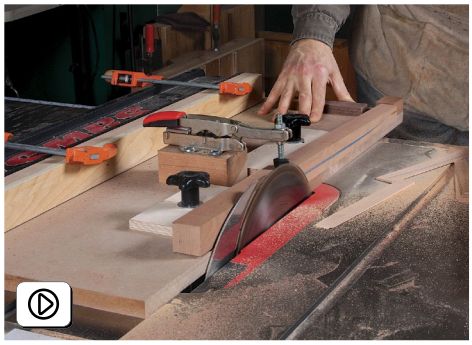

New Take on Tapering

Period furniture pro Steve Latta has rewritten the book on the traditional leg-tapering jig (p. 44). Find out what sets his jig apart from the pack in this video tour.

Soup Up Your Saw Fence

Make quick work of rabbets, tenons, and more with this tablesaw add-on you won't want to live without (p. 80).

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VIDEO WORKSHOP

Sharpen Your Tablesaw Skills

Unlock your tablesaw's full potential with furniture maker and teacher Marc Adams. In this Video Workshop series, Adams walks you through a variety of essential techniques, including how to:

- Build your own splitters and zero-clearance throat plates
- Construct a custom crosscut sled
- Cut precise joinery

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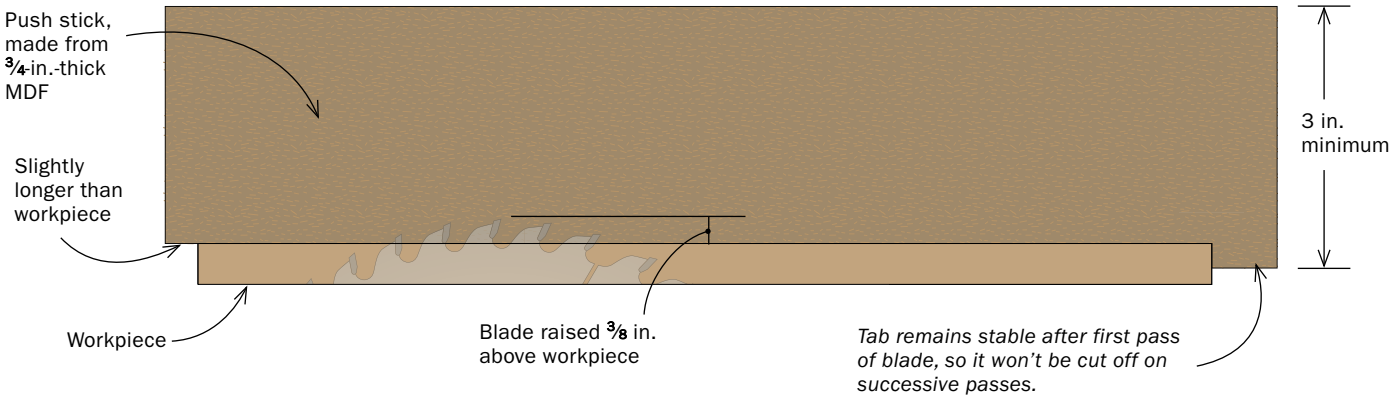
quick tips

EDITED AND DRAWN BY JIM RICHEY

Use a long push stick when ripping narrow boards



Woodworkers often need to cut thin strips on the tablesaw, yet ripping those strips between the rip fence and blade seems like it would be a dangerous practice. With the right push stick, though, this is a cut that's easy and safe to make.

Make the push stick from a piece of ¾-in.-thick MDF that is at least 3 in. wide and a little longer than the board being ripped. The length of the push stick makes it easy to hold the entire strip down as it passes the blade. Its width keeps your hands far from the blade.

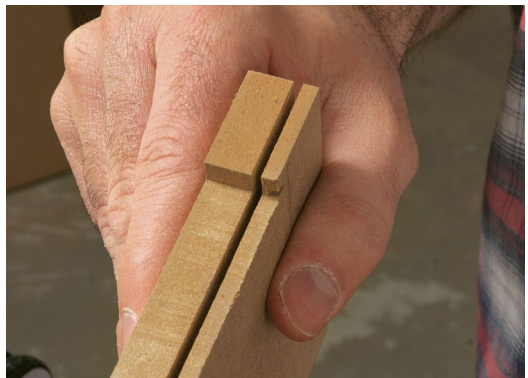
A tab on the back pushes the stock. To make it, cut a notch on one edge that is just shallower than your stock is thick and not quite as long as the push stick. After you rip the first narrow strip, a thin tab is left on the inside of the push stick. Here's the reason for making the push stick from MDF: The tab on a plywood stick would curl up and be cut off on the second pass, but the tab on an MDF stick will not curl.

You also should use a thin-kerf blade and a zero-clearance insert with a riving knife or stub splitter. Set the blade about ⅜ in. above the stock and keep the splitter lower than the blade.

—STEVE LATTA, Lancaster, Pa.

Get better control with a long push stick. *By applying downward pressure over the entire workpiece, the push stick keeps it from lifting up.*

Hands clear the blade. *The full push stick buries the blade and keeps your hands well away from it for a second level of safety.*



MDF stays straight. *The narrow section left after the first cut won't curl into the kerf and get cut off.*

Photos: staff

For accurate miters, set the blade with a drafting triangle

A drafting triangle is a great tool for setting a tablesaw blade to 45° for miters, but it can be tricky to get the correct angle. The key is to make sure you are holding the triangle perpendicular to the blade. Put your miter gauge in its slot (which should be parallel to the blade), and hold the triangle on the fence and against the blade. The miter gauge ensures that the triangle is perpendicular to the blade and that the blade is set to 45°.

—MICHAEL PEKOVICH, Newtown, Conn.

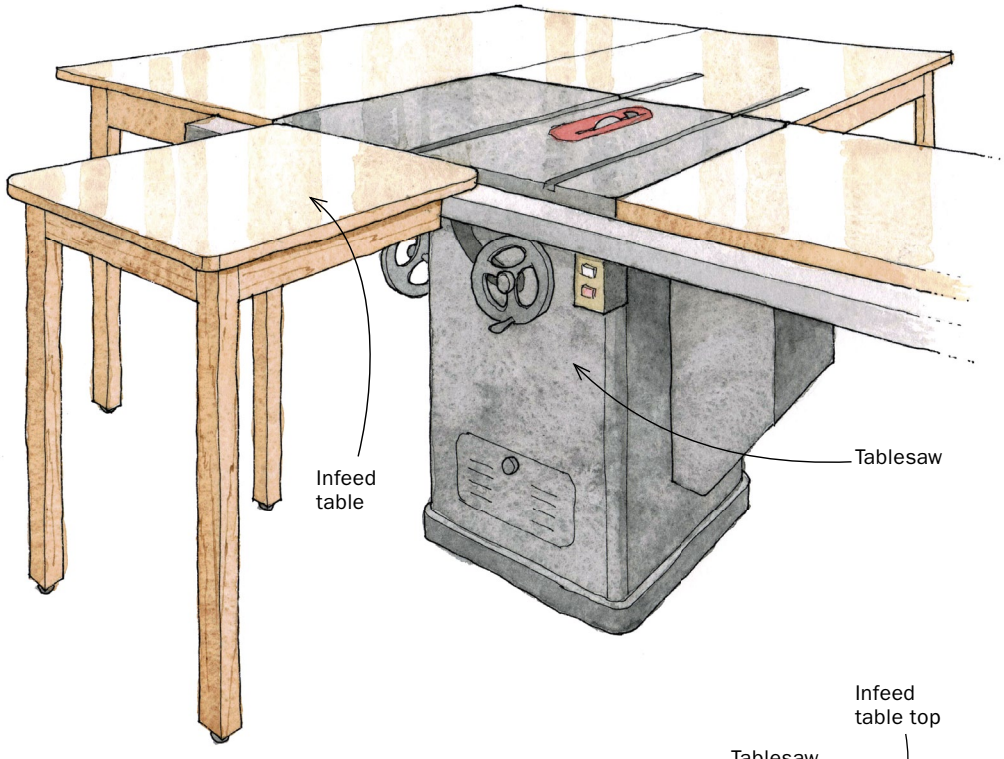
Hold the triangle perpendicular to the blade. *That way, the angle side is a true 45° in relation to the blade.*

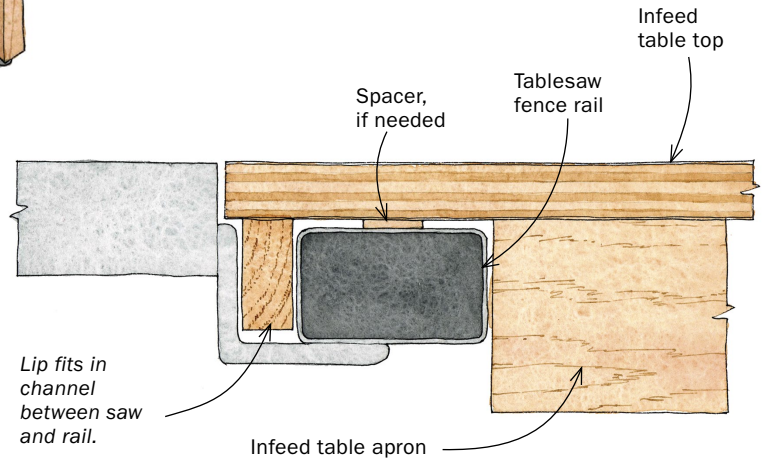
Pop-on table makes plywood easy to cut

To handle large, unwieldy sheets of plywood on the tablesaw, I use this simple pop-on infeed table. The table features a lip on the front that slips into the channel between the fence rail and the tablesaw. My saw has a Biesemeyer fence, but I imagine the same concept could be adapted to most other fence designs. With the table in place, I can focus my attention on keeping the stock against the fence instead of also struggling to support a heavy sheet.

You can slide this compact table to any position on the front of the saw. This allows you to push it aside to finish the cut comfortably.

—CHARLES RICCARDELLA, Springboro, Ohio



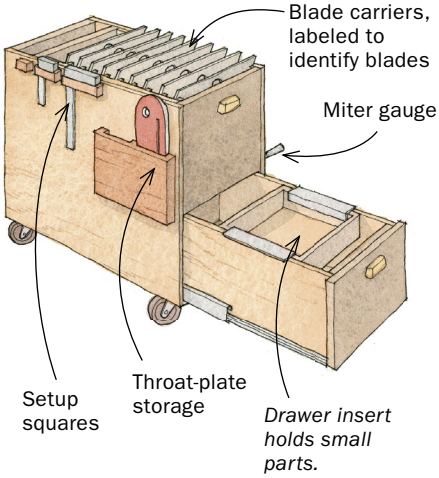


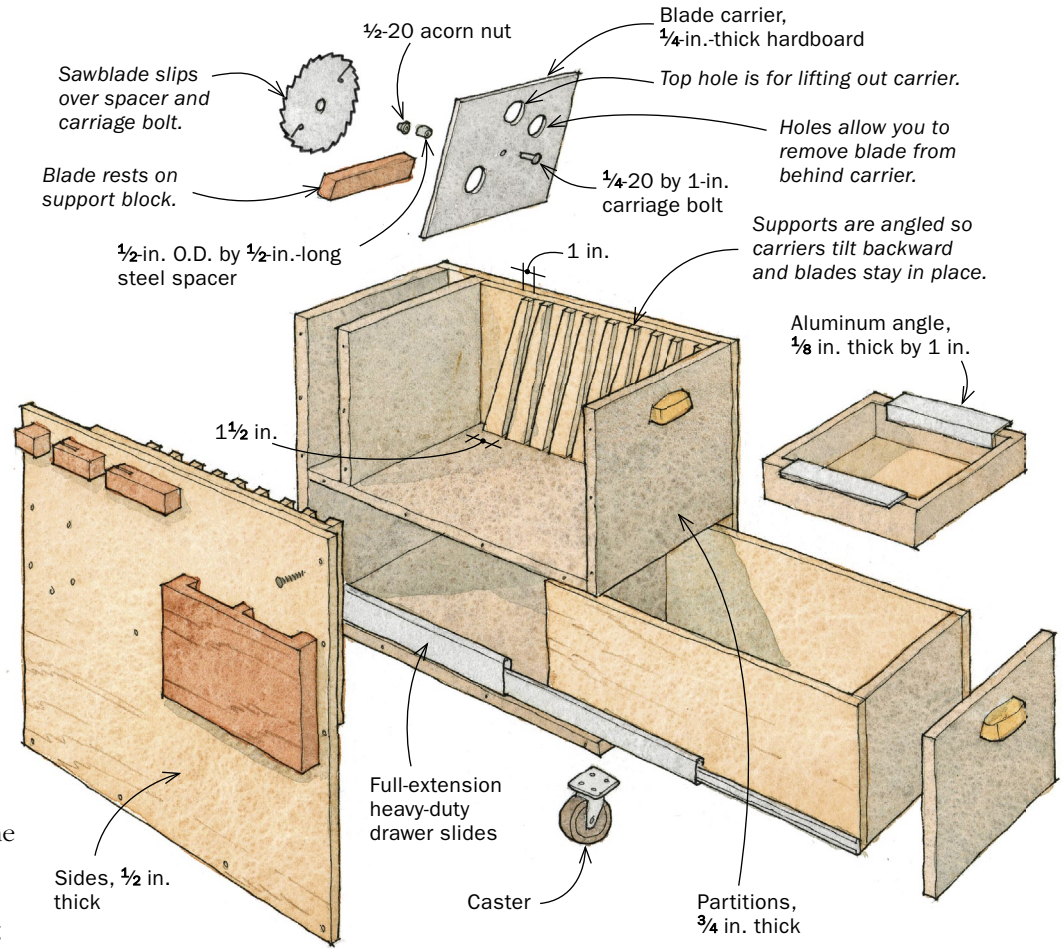
Quick Tip

A zero-clearance tablesaw throat plate will wear through over time, widening the space next to the blade. Rather than making a new insert, just use an automotive body filler, like Bondo, to refurbish the old one. Fill the saw slot solid with body filler, sand the surface smooth, and raise the blade through the insert. Body filler is also great for filling blade cuts in radial-arm-saw tables and restoring the missing parts of sacrificial fences.

—FRED TIETZE, Gainesville, Va.

Tablesaw cart keeps blades and accessories close by





When I first bought my tablesaw, I had one blade, an arbor wrench, and a rip fence. But after a few years, my collection of blades was hanging on the wall and my accessories were stored randomly all over the shop. I put an end to the tablesaw clutter by building a rolling storage cart that sits under the extension table of my saw.

The cart holds all the tablesaw's fixtures, including blades, miter gauge, setup squares, wrenches, and throat plates. Blades slip on and off the carriers easily. The carriers slide into an angled rack, which keeps the blades in place. All the materials and hardware can be purchased at your local home center.

The sides and drawer boxes are made of ½-in. plywood; the rest is ¾-in. Joinery is simple (screws). The cart should fit under the extension table of your saw (don't forget to allow for the casters). Its length should not exceed the front-to-back dimension of your saw's extension table. I use 10-in. blades, so I made the interior width 13 in. I left 1½ in. of clearance between the cart and the extension table. The extra space allows me to leave the carrier for the blade I'm using right on top of the other carriers. That way, when I change blades, I don't have to go looking for it.

—DAVID GROSZ, Stamford, Conn.

Low-dust lubricant for a tablesaw

A white grease stick found in the automotive aisle of most hardware stores is useful for lubricating tablesaw gears without attracting dust. It has the consistency of soft soap. A toothbrush will let you apply a thin coat to the gears. If you can't find the stick grease, use a furniture wax like Johnson's paste wax. It works nearly as well.

To help clean the gears before applying the grease, use a spray penetrating oil such as WD-40 and a stiff brush.

—JOHN WHITE, Rochester, Vt.

Less grease means less dust. *A thin coat of Panef's white stick lubricant is easy to apply with a toothbrush and isn't a dust magnet. After scraping some grease onto a toothbrush, press the bristles into the gears as you rotate them with the handle.*

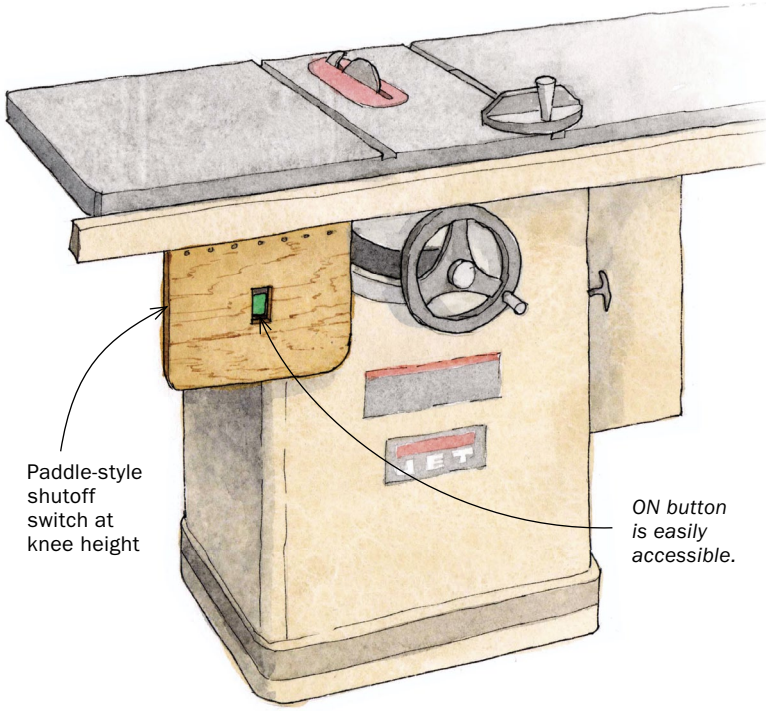
Knee-paddle switch cuts power safely

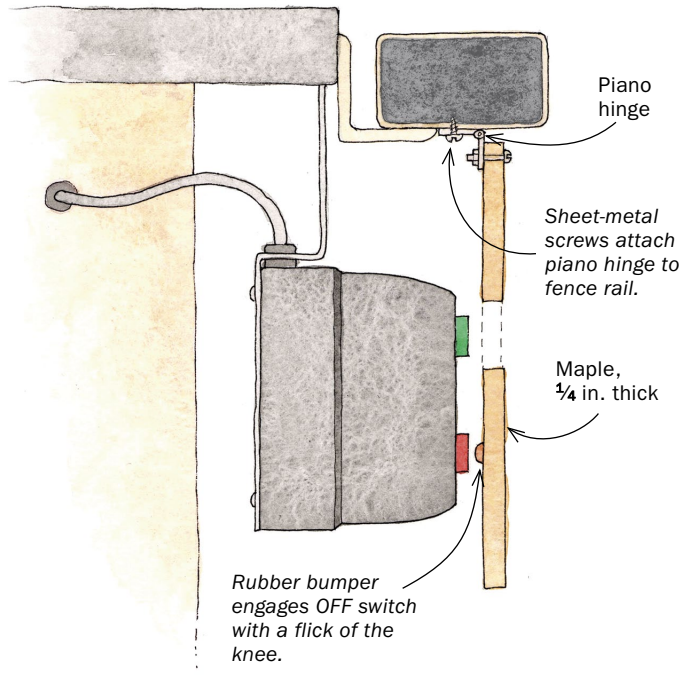
One day after having a board bind up in my tablesaw and almost kick back, I looked into installing a paddle-style shut-off switch, sometimes called a panic switch. A commercial version I found would have required major alterations and rewiring. So I built this oversize maple paddle and attached it to the saw above the existing switch housing. This concept should work with almost any push-button switch as long as you can find a convenient place to attach the paddle.

It's very easy to operate. At the end of a cut, a mere flick of my knee cuts off power with both hands still safely above the table and on the workpiece. A rubber bumper (available at most hardware stores) installed over the OFF switch ensures that the paddle hits the switch.

I installed similar switches on my jointer, router table, and bandsaw.

—ANDREW JOHNSON, Boise, Idaho





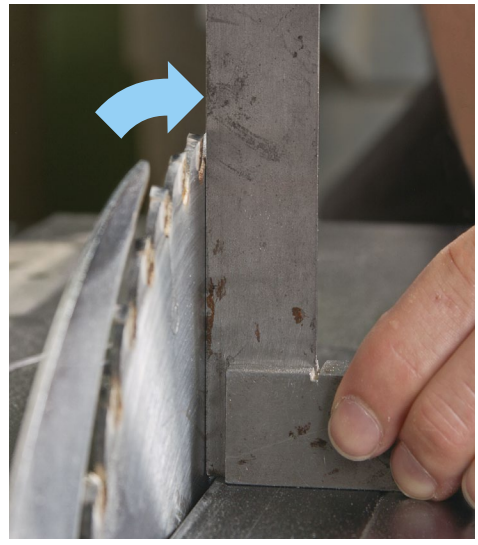
Don't trust the internal stop to set a tablesaw blade at 90°

If the internal stop on your tablesaw is no longer setting the blade at an exact 90°, there is probably sawdust built up on the setscrew. You can clean it off, and it should work fine, but you'll just need to clean it off again in the near future. That's a hassle.

Instead, I set my stop so that the blade can go past 90°. I then place a square on the table and move the blade back until it's just right. It takes just a minute and it assures a precise setting.

—MICHAEL PEKOVICH, Newtown, Conn.

Go past square first. *Don't set the stop for exactly 90° or any dust buildup will void the accuracy. Instead, allow the blade to go slightly past vertical.*



Then come back. *Place a square next to the blade and adjust the blade's tilt until the angle is correct. (Make sure you're not hitting a tooth.)*

Tablesaw Basics

What Size Saw Is Right for You?

The choice depends on the type of work you do

BY SCOTT GIBSON

Whether you're a furniture maker, a weekend woodworker, a trim carpenter, or a remodeler, a tablesaw is an essential tool simply by virtue of the number of jobs it can do, from ripping and crosscutting stock to precise sizes, to cutting dadoes and joinery for cabinets and other furniture. No other woodworking tool is as versatile.

The wide assortment of available models—everything from portable tablesaws on wheels to half-ton cabinet saws—should make it possible to find a saw that matches anyone's budget and space limitations.

Portable saws save space

Portable saws can easily be carted from job to job or stowed in a corner of the garage or basement when not in use. While some of their features vary, they share a few basic characteristics. They're fairly light in weight, are available with collapsible stands that make them easy to move, and are less expensive than contractor or cabinet saws. They're also very loud because they use universal motors, the same kind found in routers and circular saws.

Power is not really an issue. All of them have enough muscle to cut framing lumber and 2-in.-thick hardwood. But you may have to feed the thickest boards slowly.

The biggest downside is the small table size, which makes it a struggle to cut sheet goods or crosscut long boards.

Midsize saws are a step up

If you don't need portability but your workspace or budget is still somewhat limited,

THE SAFETY REVOLUTION

In recent years, U.S. saw makers and the government have been looking at ways to make tablesaws safer. In most accidents, kickback is the culprit. Kickback occurs when the kerf in a board pinches around the back of the blade, hurling the workpiece back at you and potentially drawing your hands into the blade.

The best way to prevent kickback is to have a riving knife. Long common on European tablesaws, riving knives have finally arrived on the U.S. market, thanks to a new requirement from Underwriters Laboratories. Mounted behind the blade, a riving knife prevents the kerf from pinching the spinning blade. What's more, a riving knife moves up and down with the blade and pivots with the blade as the bevel angle is changed.

Another revolution in saw safety is the SawStop, a brand of saw that has a mechanism that senses bodily contact and stops the blade instantly. The SawStop company rolled out its first tablesaw in 2005, a cabinet saw, and is now also selling a contractor version. In addition to the blade-stopping technology, the SawStop saws also feature riving knives. You'll pay more for the peace of mind, though, up to $3,400 for the cabinet saw and up to $1,850 for the contractor saw.

RIVING KNIFE

SAWSTOP BLADE-STOPPING TECHNOLOGY

Photos, except where noted: staff; Rikon saw: courtesy of the manufacturer

KEY FEATURES OF ANY TABLESAW

Look for a sturdy rip fence, and bevel and height adjustments that operate smoothly. Also, consider which way the blade tilts. With a right-tilt saw, you'll have to move the fence to the left of the blade for bevel cuts, which can be awkward. Finally, pay attention to rip capacity, which dictates how large a ripcut you can make.

PORTABLE SAWS

Price range: $315 to $700
Motor: 15 amps, 110 volts
Table: Stamped steel

Designed for portability and use on a job site but have enough power to handle many common woodworking tasks.

CONTRACTOR SAWS

Price range: $500 to $900
Motor: 1½ hp, 110 volts
Table: Cast iron

Offer enough power to handle serious woodworking jobs while fitting into smaller spaces. Dust collection is not very efficient.

HYBRID SAWS

Price range: $800 to $1,200
Motor: 1½ to 2 hp, 110 or 220 volts
Table: Cast iron

Offer enough power to handle serious woodworking jobs while fitting into smaller spaces. Have better dust collection and slightly more power than contractor saws.

CABINET SAWS

Price range: $1,200 to $3,300
Motor: 3 to 5 hp, 120 volts
Table: Cast iron

Stationary tools for the serious woodworker or cabinetmaker. Have big motors and big tables, with lots of capacity.

a contractor saw or a hybrid tablesaw is a good option. These saws offer more power and capacity than portable saws, and are much less expensive than cabinet saws.

Contractor saws usually have motors rated at 1½ hp, mounted outside the saw cabinet on cast-iron trunnions. Hybrid saws have more robust motors, rated at between 1½ hp and 2 hp, mounted inside the cabinet. Most saws in these categories have cast-iron tables and wings, or extensions, which help reduce vibration. Although hybrids cost slightly more than contractor saws, their better features and slightly higher horsepower make them a better buy for the more committed woodworker.

Cabinet saws are serious performers

If you have the space and budget and are serious about building furniture, you'll be happiest with a cabinet saw.

The single biggest reason to make the investment is the added power they offer over portable and hybrid/contractor saws: 3-hp to 5-hp, 220-volt motors are the rule; that means dedicated circuits. Added weight (one model weighs nearly a half-ton) and cast-iron trunnions that support the blade assembly should mean very little vibration, a real plus for smooth, accurate cuts. Also, all have integrated dust ports.

And because these are stationary machines, you can add large outfeed and side extension tables to the saw, increasing the capacity to handle large workpieces and 4x8 sheet goods. □

Scott Gibson is a woodworker and freelance writer in Maine.

BASICS

Simple Tablesaw Tune-up

Get perfect cuts every time

BY ASA CHRISTIANA

Some power tools will do their best work right out of the box. Don't expect that kind of performance from your new tablesaw. Unlike a cordless drill or router, a tablesaw needs a tune-up on day one.

If you are incredibly lucky, every part and accessory will arrive perfectly aligned. I've heard of such miracles but never witnessed one myself. The trouble is that a misaligned saw is a dangerous saw, and you won't know until you make a cut. At best it will be rough and inaccurate; at worst the board will kick back at you or become jammed against the fence or blade midcut.

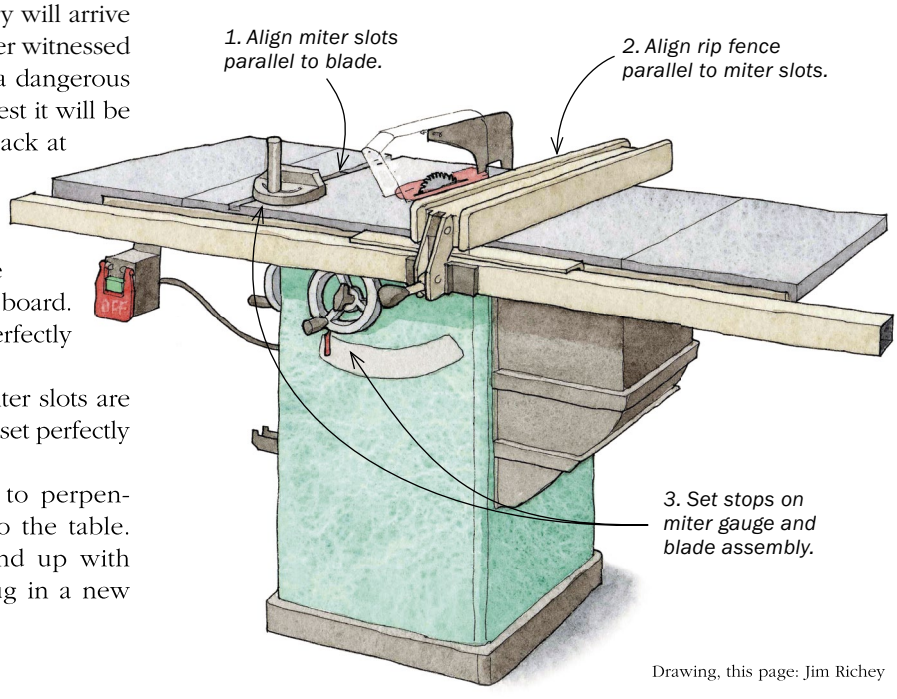
A tablesaw is designed so that the teeth at the front of the blade do all the cutting, and the teeth at the back spin freely, without rubbing or cutting into the board. For that to happen, the board needs to travel in a perfectly straight path through the blade.

So the first step is aligning the table so that the miter slots are parallel with the blade. The rip fence also needs to be set perfectly parallel to the blade.

From there, the tune-up switches from parallel to perpendicular, as you set the blade and fences square to the table. Those 90° angles are essential if you want to end up with tight joints and square projects. So before you plug in a new

THREE STEPS TO SAFE, SMOOTH, SQUARE CUTS

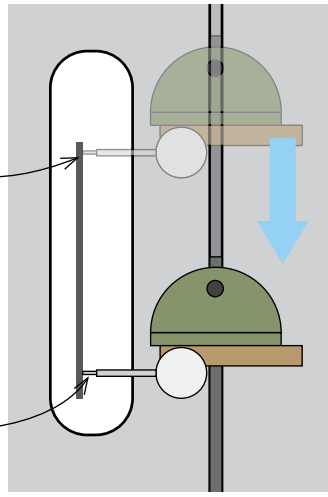
For perfect crosscuts, align the table's miter slots parallel to the blade. For ripcuts, align the fence with a miter slot, and it will be parallel to the blade, too. The last step is setting two built-in stops for square cuts.



Drawing, this page: Jim Richey

1. CHECK BLADE ALIGNMENT

Zero the dial at the front. *Clamp the wood block onto the miter-gauge fence so the indicator is pushing against a tooth. Move the blade and miter gauge to find the high point on the tooth, and then zero the dial on the indicator.*



Check at the back. *Mark the tooth you measured earlier, and rotate it to the back of the table for another check. The dial shows a different reading at the back, meaning that this table is misaligned.*

TIP **COMBINATION SQUARE WORKS, TOO**

Close enough for safe cuts. *Although not as precise as the indicator, a combo square can be used in a pinch. Run its fence against the edge of the miter slot, and check that its ruler just touches a tooth at the front and back of the blade.*

or used machine for the first time, go through the following steps. Once your saw is dialed in, it will stay that way for a very long time.

Align the blade parallel with the miter slots

To align the table (and its miter slots) with the blade, you're going to have to go under the hood, at least a little. Most tablesaw manufacturers attempt this step at the factory, but even the best machines can get knocked out of line during shipping, and used machines are a crapshoot.

How you check this alignment is the same on all saws, but the way you adjust them differs a bit. To check, take a measurement from the edge of one of the miter slots to the front and back of the blade. If the measurements are the same, the blade and table are aligned. I recommend using a 0-to-1-in. dial indicator for this step. Get the plunge style. You can find one on Amazon.com for $20 to $30.

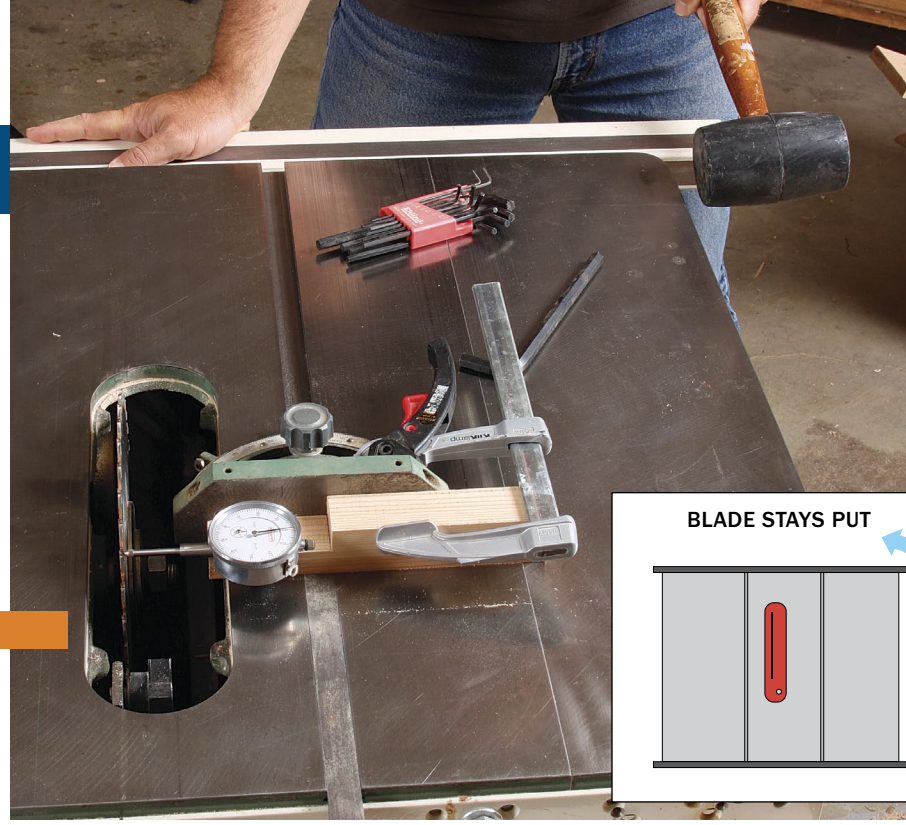
Start by raising the blade as high as it will go to increase the distance between back and front, which will give a more precise

Drawings and photos, except where noted: Kelly J. Dunton

2. ADJUST AS NECESSARY

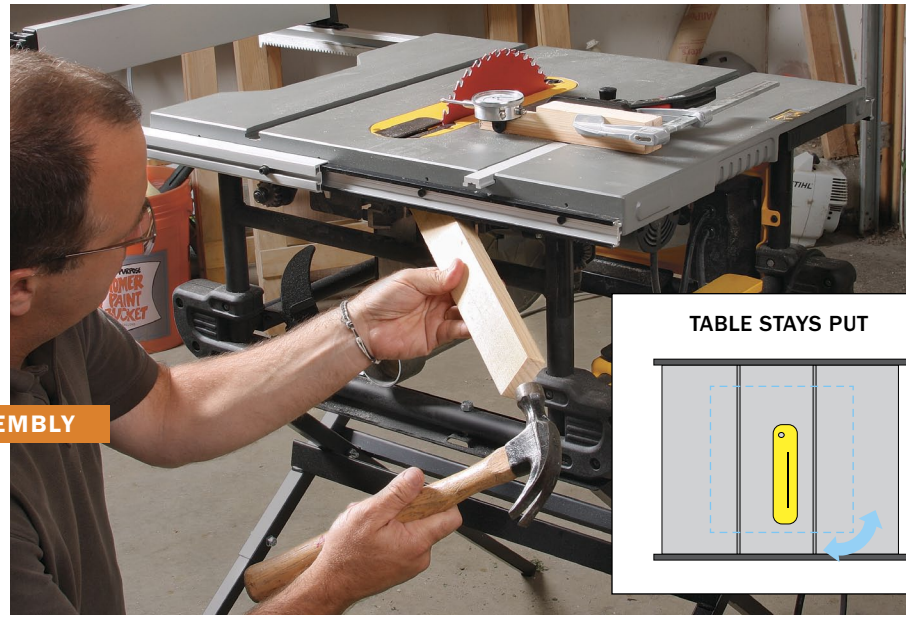
CABINET SAWS: SHIFT THE TABLE

Loosen three of the four bolts that attach the table to the saw cabinet (above). Give the table a tap at one of the loose corners (right), and recheck the blade alignment. Lock down the bolts when the readings at the front and back of the blade are within 0.001 in. of each other.



SMALLER SAWS: SHIFT THE BLADE ASSEMBLY

Loosen three of the bolts that attach the blade assembly (trunnions) to the underside of the table (above). Place a wood block against the loose end of the blade assembly, which is underneath the table, and give it a few taps. As before, lock down the bolts when you get the blade aligned.



measurement. In case the teeth are a little uneven or have some pitch built up on them, rotate the blade and use the same tooth for each measurement. The two numbers should be within 0.001 in. of each other, 0.002 in. at the most. If your measurements match on the first try, buy a Powerball ticket. If not, you'll need to make an adjustment.

Adjusting cabinet saws—On these saws, the trunnions (the assembly that holds the blade) are attached to the cabinet, and the table is attached independently, meaning you can move it and the blade stays put.

Adjusting job-site saws—On smaller saws—called job-site, portable, contractor, or hybrid saws—the blade assembly is usually attached directly to the tabletop. That means you'll have to go a little farther under the hood. Check your manual, and take a look under the table for the attachment points. Newer saws make them easier to access.

Align the rip fence and check the splitter

Now that the miter slots are parallel with the blade, you can simply align the rip fence with one of the slots and know that it is square to the blade, too. Just line up the fence with a miter slot, feel for misalignment using your fingers, and adjust the fence.

All saws should have some form of splitter behind the blade, designed to sit in the slot that it cuts, preventing the board from turning sideways and kicking back. If the splitter is not aligned with the slot, the board will pull away from the rip fence or jam against it—both bad situations. On some saws you can simply flex the splitter sideways to align it; on others there will be a way

3. ALIGN THE RIP FENCE

Once you have the miter slots aligned with the blade, you can simply line up the rip fence with a miter slot to see whether it is parallel to the blade, too.

Go by feel. *Clamp down the rip fence along the edge of one of the miter slots. Use your fingertips to check if the fence is flush with the slot from the front all the way to the back (above). Adjustments vary, but all are easy. On T-square fences like this (right), there are simple set screws on the bracket that rides the guide bar.*

to adjust it at its base. If all else fails, use thin shims or washers at the attachment point to shift it slightly one way or the other.

Two stops make accuracy more convenient

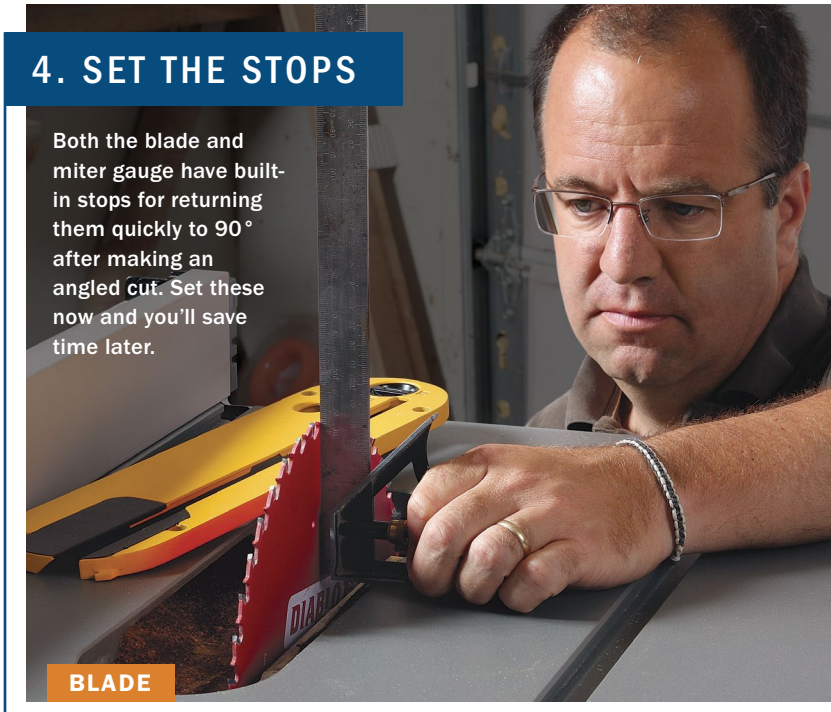
For ripcuts and crosscuts alike, you also need the blade to be square to the table. There is a stop on the saw to help you return the blade to a perfect 90° every time. You can use a square to realign the blade after each bevel cut, and test cuts to be really sure, but it's nice to have a stop you can rely on. The miter gauge that came with your saw also should have a stop on it for the 90° setting. If that stop is wiggly or sloppy in any way, replace the miter gauge with an aftermarket model. Before squaring the fence, add a long sacrificial piece of plywood or MDF to it.

The tablesaw is the most important machine in the shop. Invest in a good one, and then invest the time it takes to set it up correctly. □

Asa Christiana is special projects editor at Fine Woodworking.

4. SET THE STOPS

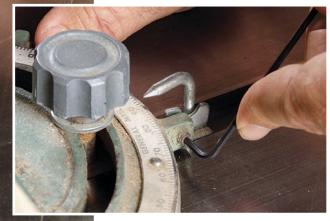
Both the blade and miter gauge have built-in stops for returning them quickly to 90° after making an angled cut. Set these now and you'll save time later.



Square the blade. *Use a square to get the blade as close to 90° as possible. Then make a test cut on a thick, flat piece and check that with your square. That's the only way to know if your saw is accurate.*

Now set the stop. *The stop's location differs on various saws. Loosen it, push it against the blade assembly, and lock it in place.*

Square the fence to the blade. *It's always good to attach an auxiliary fence to a miter gauge, so do this first. Get the fence as close to square as you can with a triangle or square, and try a test cut as before. Then adjust the set screw that acts as the stop.*



BASICS

Miter Gauges

Get the most from this standard tablesaw accessory

BY STEVE LATTA

Not long after you set up your first tablesaw, you'll find yourself reaching for one of woodworking's most common and useful accessories—the miter gauge.

Standard equipment with every tablesaw, a miter gauge is the tool many beginners use to make their first crosscuts.

With a miter gauge, you can accurately cut workpieces to length with square ends and make a variety of angled cuts, including those for mitered corners. As you progress in your woodworking, you'll probably add a crosscut sled to your tool kit, but you won't outgrow the miter gauge.

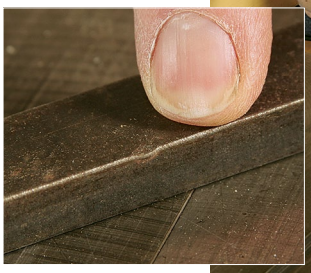
Setting up the gauge

The miter gauge consists of a bar and an adjustable head with a knob to lock the adjustment. The bar fits in the slots in the saw table that run parallel to the blade. Look for a sturdy aluminum headstock and an unobtrusive locking knob with a secure and comfortable grip.

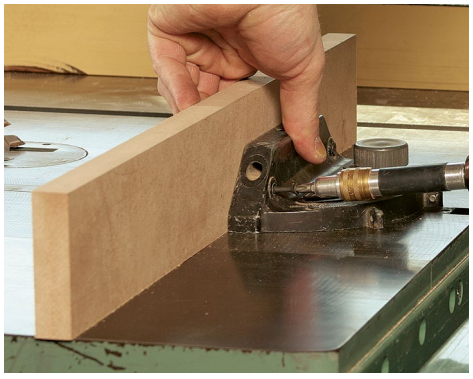
Attaching an auxiliary fence will help brace the stock against the blade's tendency to push back toward the user and cause it to pivot on the corner of the gauge. The fence should be tall enough to retain its strength when the blade passes through

Setup

Don't assume the stock miter gauge is ready to use as is. It needs some help.



Check the sliding action first. *If there's too much side-to-side play, peen the bar to dimple a corner and widen it slightly.*



Attach an auxiliary fence. *This is a must because it supports longer pieces and reduces tearout. Latta uses ¾-in. thick, 3-in.-wide MDF.*

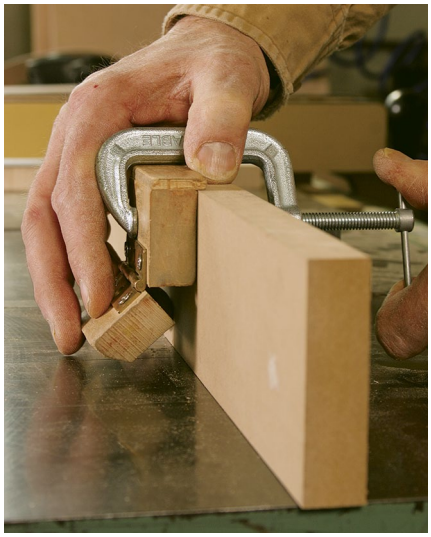
Set the gauge for a square cut. *If the blade and slot are parallel, you can use a known 90° reference to orient the gauge to the blade.*

Check the results. *After setting the gauge to 90°, make a test cut. The cut surface should be square to the edge you held against the fence.*

Photos: Steve Scott

Stop blocks

The stop block is an age-old way to cut multiple workpieces to the same length without measuring again and again.



A hinged block is nice. *It lets you trim both ends of a board without changing the setting.*

Using the hinge. *With the block flipped up, trim one end square (above). Then butt the square end against the block and cut to length (right). Cutting multiples will be quick and accurate.*

it. Extending the fence 1½ in. or so past the blade will help you safely push short cutoffs beyond the blade.

The preset angle stops on most miter gauges are rarely accurate. To set for 90°, put the gauge in the slot upside down and, with the lock knob loosened, slide the head up flat against the rip fence rail and tighten the knob. If the saw is properly set up, that should do it. Check it once with a drafting triangle to make sure it is accurate.

Making a basic crosscut

To make a 90° crosscut, simply hold the stock against the miter-gauge fence and push the gauge through the cut. To avoid pinning the stock to the table and to keep your hands a safe distance from the blade, apply downward pressure only over the gauge's steel bar. After completing the cut, be sure to move the stock off the gauge and away from the blade before sliding the miter gauge back. This avoids the chance that the blade will catch, and throw, the workpiece during the return stroke.

You can work to a simple pencil mark, but a stop block makes it easy to crosscut multiple pieces to the same length. My block is hinged and designed to work with my 3-in.-tall auxiliary fence. A small piece of ¼-in. plywood fastened at the top of the block keeps it about ⅛ in. off the saw table. This gap prevents dust buildup, which can hinder accuracy. The plywood also keeps the stop perpendicular to the table. If a stop block is clamped at an angle, there will be discrepancies in length

For longer work, a longer stop block. *A hooked block, held in place with a pair of clamps, works for even the longest workpieces.*

For short cutoffs, a standoff fence. *If you use the rip fence as a stop, short pieces can get trapped between the fence and blade. So butt the workpiece against a standoff stop, clamped to the rip fence well in front of the blade.*

Two gauges run side by side. *One sits in each slot; together they support a long fence.*

Two gauges can be better than one

Cut accurate dadoes. *The twin-gauge setup works well for making cuts across the middle of a long workpiece. Used miter gauges are inexpensive and easy to find at flea markets or online.*

between pieces of different thickness. When crosscutting, hold the workpiece tight against the fence and stop block.

A second gauge adds versatility

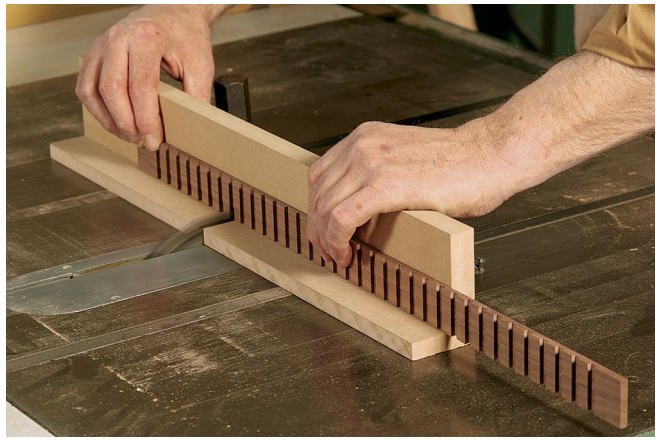
I always have one or two extra miter gauges around the shop. They are handy for dedicating to a specific task or for using in tandem to support a long fence for crosscutting longer workpieces. A crosscut sled is better, but this arrangement is a good substitute. A twin-gauge setup also supports an L-shaped fence for making specialized cuts such as dentil molding, finger joints, and knuckle joints.

A tip for angled cuts

When setting up for an angled cut, it's important to set the gauge so that the leading end of its fence points toward the blade. If the trailing end of the fence is closest, the force of the cut tends to pull the stock into the body of the blade. This leads to burn and tearout when the blade exits.

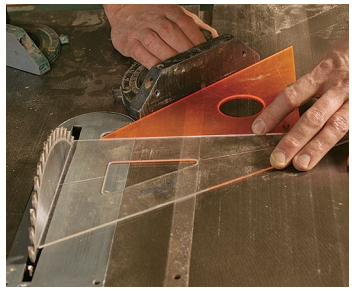
And if a stop block were used, the angle would tend to pull the stock away from the block. Also, the auxiliary fence should stop at the blade so the scrap from the cut does not get pushed onto the back of the blade. □

Steve Latta teaches woodworking at Thaddeus Stevens College of Technology in Lancaster, Pa.



Add an L-shaped fence for small work. *The fence helps prevent tearout in small work like this dentil molding. The sawkerf in the fence also helps locate cuts in the workpiece. To make the fence, screw a 2-in.-wide strip of ½-in. MDF to the bottom edge of a ¾-in. piece.*

Make precise miters



Setting up an angled cut. *Use a pair of drafting triangles to set the gauge for a 45° cut. Also be sure the triangle is against the body of the blade and not a tooth, and set the gauge so the leading end of its fence points toward the blade.*

Shopmade Inserts

These smart upgrades will reward you with 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 your tablesaw and adjust the steps as needed. Make the inserts from ½-in. birch plywood. It's stiff and strong, and it won't change in width as the shop's humidity fluctuates. This means it won't get stuck in

Clean cuts. *A zero-clearance opening supports the workpiece next to the blade, eliminating tearout.*

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.*

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.*

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 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 to raise it up.

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.

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

Tom Begnal is a woodworker in Kent, Conn., and a former associate editor at Fine Woodworking.

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

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.*

All About Featherboards

These safety accessories keep workpieces on track and your hands out of harm's way

BY BOB VAN DYKE

A woodworker's third hand is often a featherboard—an accessory that guides workpieces through woodworking machinery. Featherboards are made of plastic or wood with thin fingers cut into an angled end. Mounted to a fence, they push a workpiece snug against the table. Mounted to a tabletop, they keep a workpiece tight against the fence. A workpiece fed past a correctly positioned featherboard will move easily toward the blade and is prevented from kicking back. Featherboards add accuracy and consistency to many types of tablesaw cuts. They also allow woodworkers to keep their hands away from the blade—and that makes for safer and cleaner cuts.

There's a variety of featherboards, some store-bought and others shopmade. If you have none, start with a shopmade featherboard—it will handle any situation. Adding the other two styles to your collection makes some operations even easier.

Three types

Store-bought and shopmade featherboards abound. The best choice for a particular machine setup depends on a number of factors.

MAGNETIC FEATHERBOARDS

Rare-earth magnets make these a go-to choice for metal tables.

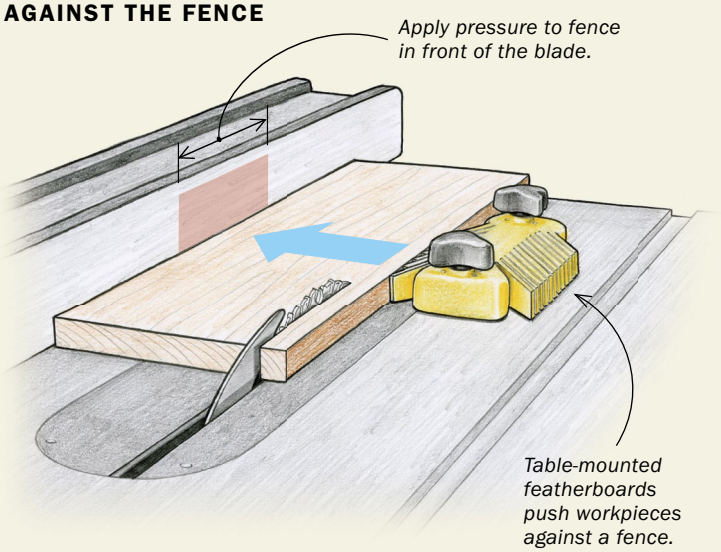
I use a dado blade to cut grooves and rabbets. A featherboard makes those cuts more accurate and consistent. For cutting grooves in a longer workpiece, add a second featherboard to the outfeed side.

When cutting rabbets—where the depth of cut must be consistent—clamp a shopmade featherboard to the rip fence to keep

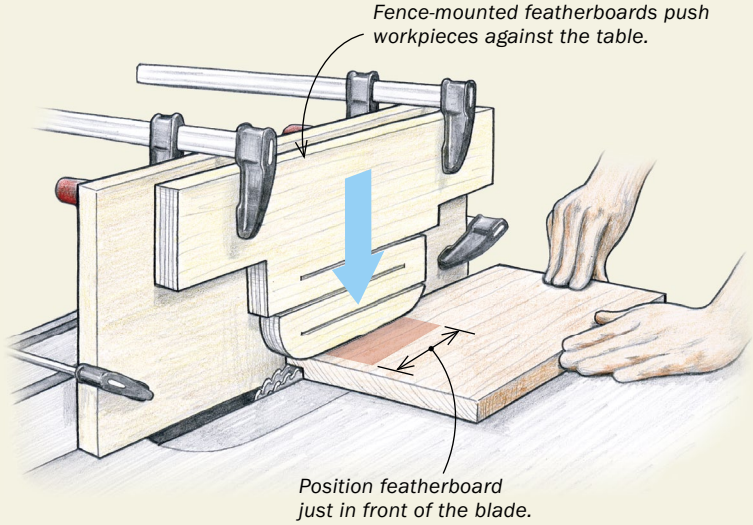
Featherboard basics

Place most or all of the featherboard ahead of or above a cutting edge, rather than over it or past it. This is critical on cuts like rabbets or molding. When no material is left against a fence or table to resist the featherboard's pressure, a workpiece can dive into the bit. When ripping, make sure that *all* of the pressure is ahead of the blade. Otherwise, it will jam the offcut against the blade, possibly causing the piece to kick back.

AGAINST THE FENCE



AGAINST THE TABLE



Photos: Ken St. Onge; drawings: John Tetreault

SLOT-MOUNTED

A good option for tables and fences with miter slots or T-tracks.

SHOPMADE

You have to make these yourself, but this three-cut type is quick and easy, and works for any situation.

the workpiece snug against the table as it moves. In this case, I prefer a featherboard made with just three cuts (above right). To cut rabbets on narrower pieces, start with a wider workpiece. Rabbet the edge and then rip the piece to width.

When ripping on the tablesaw, I use featherboards only for cumbersome or repetitive cuts, such as ripping 30 pieces of 6-in.-wide stock down to 4 in. wide. In those cases, a featherboard will prevent your hand from accidentally touching the blade if your attention wanders. Remember to set the featherboard directly in front of the blade to avoid kickback. □

Bob Van Dyke is director of the Connecticut Valley School of Woodworking.

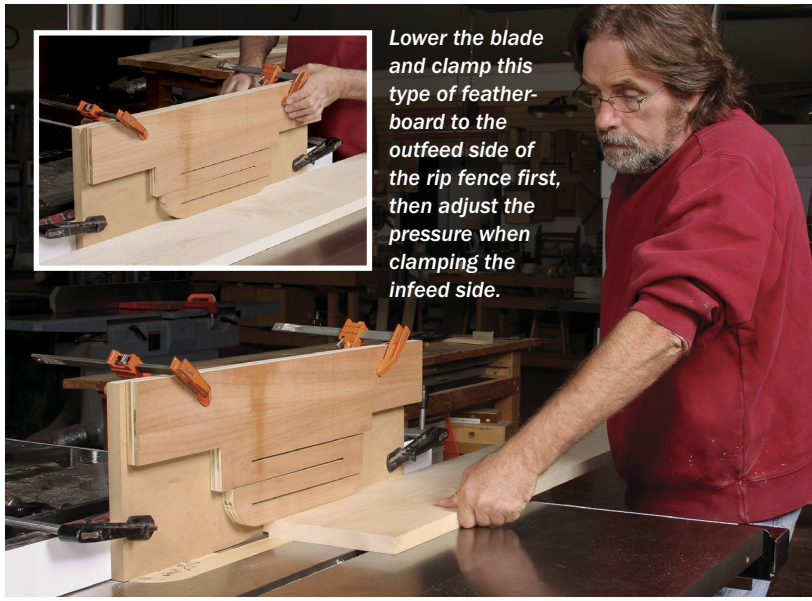
The third cut's a charm. *Van Dyke prefers three-cut featherboards to the traditional type with many "feathers." Make one by cutting two kerfs at one edge, stopping just shy of the end. Then cut a third kerf starting from the opposite edge, between the other two. Then cut a slight curve along the edge.*

Get the pressure right

RIP ACCURATE GROOVES

Set the workpiece against the rip fence and butt the featherboard against it. Use medium pressure: The workpiece should be snug against the fence but shouldn't stick or bind.

CUT CONSISTENT RABBETS

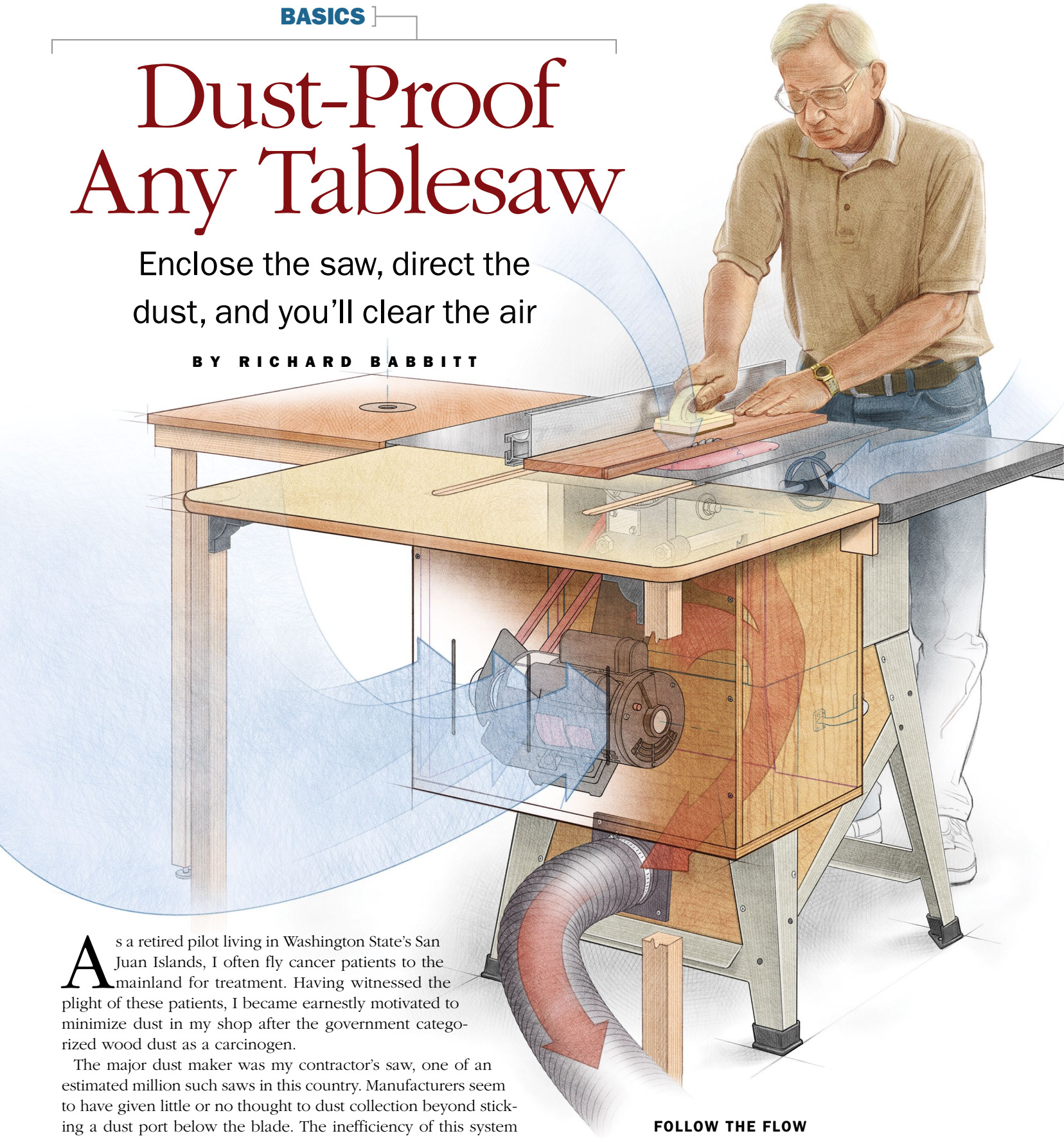


Lower the blade and clamp this type of feather-board to the outfeed side of the rip fence first, then adjust the pressure when clamping the infeed side.

Dust-Proof Any Tablesaw

Enclose the saw, direct the dust, and you'll clear the air

BY RICHARD BABBITT



As a retired pilot living in Washington State's San Juan Islands, I often fly cancer patients to the mainland for treatment. Having witnessed the plight of these patients, I became earnestly motivated to minimize dust in my shop after the government categorized wood dust as a carcinogen.

The major dust maker was my contractor's saw, one of an estimated million such saws in this country. Manufacturers seem to have given little or no thought to dust collection beyond sticking a dust port below the blade. The inefficiency of this system is obvious every time a piece of wood is cut and the operator becomes surrounded by a cloud of dust. To come up with a better solution, I put on my pilot's cap and began to think about airflow. By applying aerodynamics to my tablesaw, I was able to

FOLLOW THE FLOW

No matter which type of saw you have, the principle is the same: Close off most of the saw, allow rapid airflow in a few key areas, and you'll send the dust toward the hose and not into the shop.

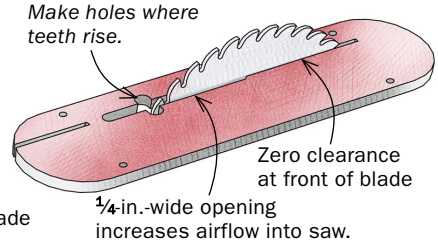
Photos: Mark Schofield; drawings: John Hartman

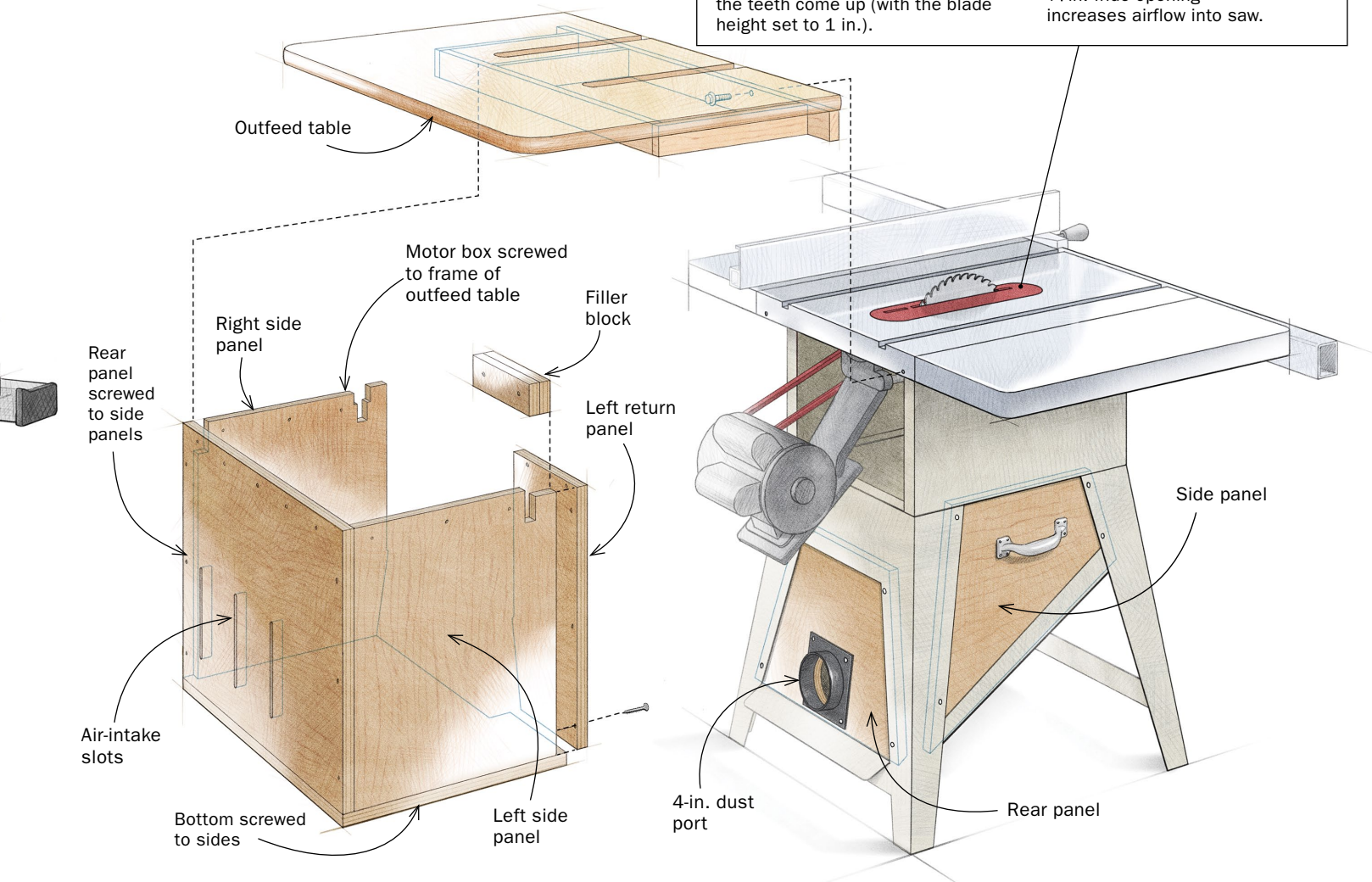
ENCLOSE A CONTRACTOR'S SAW

You need an outfeed table from which you can suspend a box to enclose the motor. The base of a typical contractor's saw already has a dust chute, so three small panels will close off the bottom; the rear one gets the dust port.

HOT-ROD THE INSERT PLATE

Widen the back of the slot in a zero-clearance insert plate to create suction where the dust usually shoots out. Increase the effect by adding a pair of holes at the point where the teeth come up (with the blade height set to 1 in.).





vastly improve its dust collection, and keep the motor cooler in the process.

While I'll focus on the contractor's saw, the principles and techniques work on any saw. Turn to pp. 34-35 to see how two other woodworkers dust-proofed a hybrid saw and a cabinet saw.

Dust goes with the flow—if you direct it

The average contractor's saw, with its open design, is equivalent to sticking the dust hose in the middle of the room. Some dust-laden air will be drawn in, but the majority will be too far from the hose and will float off into the shop. You need to increase the velocity by restricting and directing the amount of air entering the base of the saw. My plan uses three pieces of plywood to enclose the lower part of the saw, and five more to build a small box around the rear-hanging motor. This enables me to direct the airflow to the dust port.

This system requires a dust collector rated at a minimum of 1,100 cubic feet per minute (cfm). Most 1½-hp mobile dust collectors fit the bill, but if yours doesn't have a 1- or 2-micron filter, you should invest in one. The smallest particles are the most dangerous.

Begin by enclosing the motor—The motor enclosure is suspended from an outfeed table. The bracing under my Rockler table is placed almost perfectly for this installation, but if you have another outfeed table, you can either adapt the bracing or attach a shopmade frame to the underside of the table.

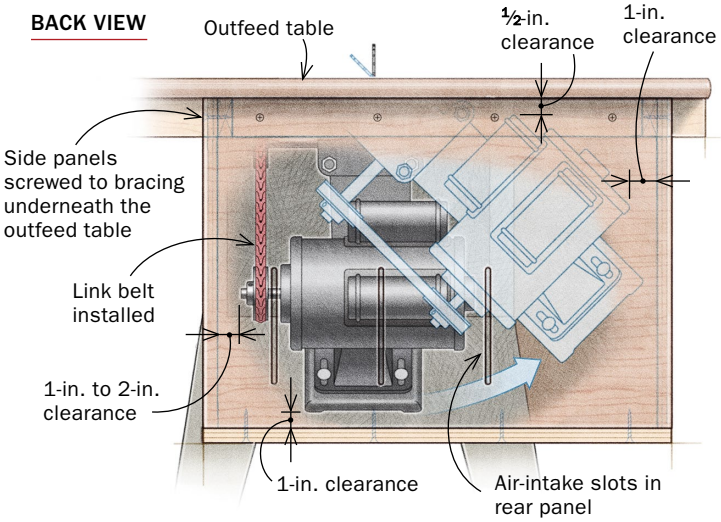
The first step is to calculate the size of the box required to enclose the motor at both the 0° and 45° blade settings. On most contractor's saws, the motor is mounted on a hinged plate and hangs down behind the saw, supported by the drive belt. To make the enclosure box as compact as possible, you'll need to pull the motor up slightly by shortening the belt. The easiest way to do this is to buy 4 ft. of link belt. Be sure to unplug your saw before working on it.

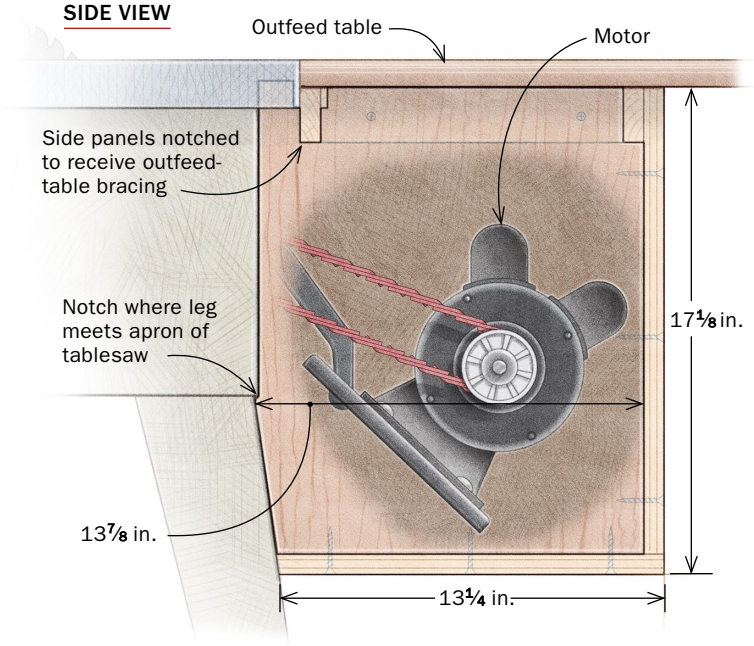
Because the motor will be completely sealed in, you can remove any belt guard. Now tilt the blade to the 45° position and adjust the belt length to give ½ in. of clearance from the motor's capacitor to the underside of the outfeed table. This in turn will

Measure the opening. *After installing a link belt to adjust the height of the motor, use a tape measure and level to find the height of the motor-enclosure box you need.*

AS SMALL AS POSSIBLE

To minimize the size of the box, the motor should be ½ in. from the outfeed table when the blade is tilted to 45°. The motor box dimensions refer to Babbitt's Delta contractor's saw. Your saw may need a different-size box.





Attach the motor-box sides. *The sides can be screwed to the bracing that supports your outfeed table. Cut the right-hand side of the box to fit the back of the tablesaw and notch the top to go around the bracing.*

Add the return. *On this right-tilt saw, the left-hand side of the motor box extends past the base of the saw to give the motor room to swing out when the blade is angled. To seal the box, a short return panel is attached.*

determine how far the motor hangs down at the 0° setting. To get the vertical dimensions of the box, reset the blade tilt to 0°, set a tape measure on the floor, run the tape up past the motor to the underside of the outfeed table, and lock it. Hold a level against the lowest part of the motor mount and across the tape, note the dimension, and add 1 in. for clearance. This will be the vertical dimension of the left, right, and rear panels (all references to right and left are from the operator's position). Hold the level vertically an inch away from the back of the motor and mark the underside of the outfeed table.

Begin with the right side panel—I have a right-tilt saw. For a left-tilt one, reverse the descriptions for the left and right side panels. The right panel must seal against the rear apron of the saw's base, plus a portion of the 7° splayed leg. I held a piece of cardboard tightly against the saw's side and scribed it. We know the height of the panel; for the width, measure from the top of the saw's base to the line you made on the underside of the outfeed table.

Depending on the design, your saw may have an indent where the vertical part of the saw meets the splayed leg. This is the widest part of the right panel. Cut the panel to height and width, then use the template to cut the profile to fit the tablesaw. Cut slots in

Look for gaps. *Use weather-stripping or duct tape to close off any gaps between the motor box and the tablesaw.*

Close the box. *Screw on the back. Slots in the back panel allow air to enter at high speed, cooling the motor and picking up the dust.*

the top edge to accommodate bracing under the outfeed table. Use drywall screws to attach the panel to the bracing.

Making the left side panels—When the blade is angled at 45°, the motor extends beyond the left side of the saw. To allow for this, the main left-side panel doesn't contact the back of the saw. It is the same height as the right panel but ½ in. wider and doesn't have to allow for the indent or the splayed leg. Locate the left panel an inch away from the tilted motor and attach it in the same way. The gap between the front of the left panel and the left side of the saw is enclosed by a short return panel. This panel's top edge will butt up against the underside of the left table extension. Scribe a piece of cardboard to measure the side splay of the saw's left rear leg and use this to bandsaw the return panel to the correct shape. Now screw the return panel to the left side panel.

The bottom of the motor enclosure will be attached later, but cut it to size now. Add ¾ in. to the length for a shelf to receive the rear panel. Cut a hole in the front edge for the power cord.

Create the dust-collection area in the saw's base

The base enclosure on my saw consists of two side panels and a rear panel that houses the dust port. Place a piece of cardboard

SEAL THE REST OF THE SAW

Close off the base. *Screw panels to the existing framework. Attach a 4-in.-dia. dust port to the rear panel.*

Allow for access. *The base side panels have handles attached. This makes them easier to install and to remove for saw access.*

Seal the underside of the table. *Large gaps between the saw's base and table are best filled with a foam sealant.*

Add a simple adjuster. *A shopmade magnetic panel covers the curved slot for the height-adjustment crank. Adjust the opening to achieve optimum airflow.*

How to dust-proof a hybrid saw

After reading Richard Babbitt's article, I was curious whether I could achieve the same results on my DeWalt hybrid saw. I knew the base was open to the floor, but a closer inspection showed huge gaps between the base and the tabletop, and even the legs and side panels did not have a good seal. Not surprisingly, dust collection was never very efficient. Working with Babbitt, I came up with a design that adopted the principle of directing the air.

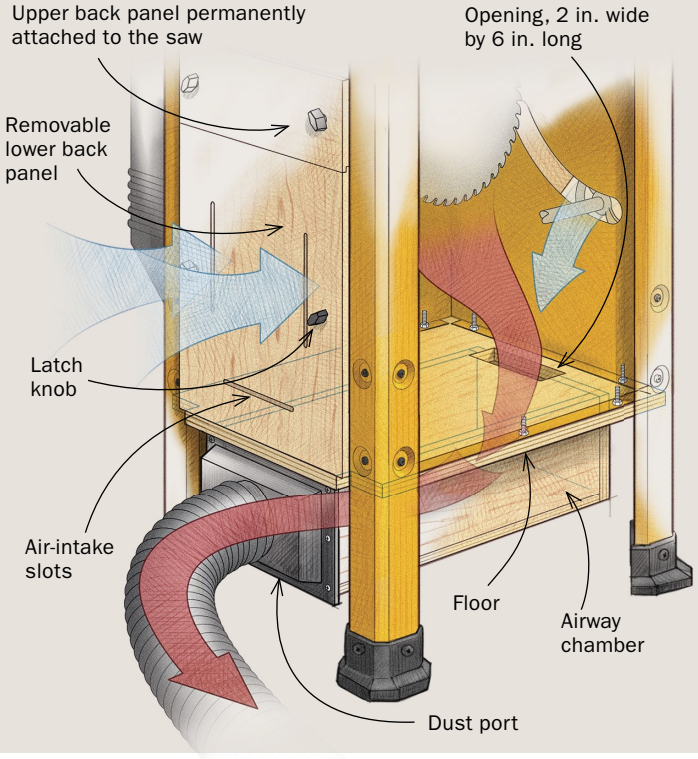
The first task was to remove the plastic combination blade-shroud and dust chute. Not having an easy way to create an angled dust chute, I installed a plywood floor in the base with a 2-in. by 6-in. opening at the front. From this floor I hung the airway dust chamber with the dust port at the rear. Not wanting to drill holes in the legs, I secured the back panel to the legs with latches that allow for easy access to the inside of the saw. The large gaps between the base and the table were filled with expanding foam sealant; weatherstripping filled the gaps between the sheet-metal legs and the side panels, and small pieces of magnetic sheet (refrigerator magnets) covered holes around crank handles, etc.

The improvement in dust collection has been dramatic. During several weeks of use that included cutting medium-density fiberboard and plywood, almost no dust escaped the saw. Inside, the motor and the mechanics remained remarkably clean.

—Mark Schofield is a woodworker in Southbury, Conn.

CONSTRUCT AN AIRWAY DUST CHAMBER

Like Babbitt's contractor's saw, this design draws in clean air through the back slots and the tilt-control slot. But, instead of an angled dust chute, a floor opens into a lower dust chamber linked to the dust port.



Air goes in, dust comes out. *Despite the semi-open base, this hybrid saw was successfully dust-proofed using the same principles employed on a contractor's saw. High-speed air enters slots in the rear panel, washes over the motor, picks up dust from the blade, and exits at the bottom via a 4-in.-dia. hose.*

over the rear opening in the saw's base and mark the opening on it. Add 1½ in. to the sides and transfer this outline to the plywood. The first cut should be on the bottom edge with the blade tilted to match the angle of the dust chute. After cutting the sides of the panel on the bandsaw, on center, draw a 4½-in.-dia. circle with its bottom 1¼ in. from the lower edge of the panel. Cut this out with a jigsaw. Now drill two clearance holes evenly spaced into each leg, staying ¾ in. from the inside edge. Screw the panel to the legs and seal the bottom of the interior with self-stick weatherstripping. Now that you are finished working on the back of the saw, you can install the bottom panel of the motor box.

Make the lower side panels in the same way, using a cardboard template. Stick weatherstripping on the top edge of the panels.

Use fridge magnets

Plastic magnetic sheet, often used for free advertisements, can be easily cut to close small gaps, like the one around the blade-angle crank.

Even cabinet saws can be improved dramatically

I was skeptical that dust collection on my old General 350 cabinet saw could be improved, for two reasons. First, it was already mostly enclosed. Second, I had already built a box to close off the one gaping hole in the cabinet—the square cutout that allows the motor to pivot when the blade is angled. But after seeing photos of my saw, Babbitt suggested a number of modifications.

The best upgrade was to cut three slots in the plywood box, located to send a stream of air across the motor, cooling it and helping to keep the gears and trunnions dust-free.

Then, starting at the bottom of the saw, I replaced a permanent pile of dust with a three-part plywood floor to funnel chips toward the port. The next task was to direct some air across this channel to push the dust to the port. A piece of plywood and a metal louver did the trick (below right). I then sealed other gaps with expanding foam and weatherstripping, used magnetic sheet to cover screw holes and gaps around handles, and fitted an adjustable cover to the tilt-control slot.

After several months of use, there is no buildup of dust around the base of the saw, I get almost no dust coming off the back of the blade, and when I remove the insert to look inside, the motor and trunnions are very clean.

—Asa Christiana is special projects editor at Fine Woodworking.

Add intake. *Christiana had a plywood box covering the motor opening. So he just routed three slots, positioned to wash cool air over the motor.*

Install a floor. *To channel dust toward the dust port, install a floor in the base, with two plywood side panels angled downward.*

Front and back panels control the airflow

We've now closed off all the conflicting air inlets except for the back panel and the large tilt-crank slot. This is where we start to direct the airflow. Cut the back panel to fit the opening in the rear enclosure. Note where the motor is positioned with the blade vertical, and align the high-velocity air-intake slots so that the air flows over and around the motor.

There are a couple of ways to seal the tilt-crank slot: If you live near a sign company, see if you can acquire a piece of magnetic sign board large enough to cover the slot. Alternatively, cut a scrap of ½-in.-thick plywood 1 in. wider than the opening. Drill two holes diagonally opposite each other and epoxy in two magnets.

Open and close this panel to find the most efficient airflow. Too small an opening may starve the dust collector of air and reduce the flow; too large an opening may reduce air velocity entering the rear of the saw. I generally keep mine open 1½ in. to 2 in., and a little wider when running a dado blade. After several hours of use, check for sawdust buildup inside the saw by removing the back panel or the insert plate. Some dust sloped on the sides away from the main airflow is normal. You aren't attempting to get all the dust out of the saw, just to get the vast majority into the dust collector, not your nasal passages. □

Woodworker Richard Babbitt attempts to keep the air clear in his shop on San Juan Island, Wash.

Let air sweep the floor. *A thin plywood panel blocks all of the louver slots in the access door, except the lowest. That slot is still several inches above the new floor, so install a sheet-metal louver to direct incoming air down to the floor. Attach the panel with construction adhesive.*

Tablesaw Techniques

Ripping and Crosscutting

An expert's tips on how to do these basic jobs safely and accurately

BY MARC ADAMS

Most woodworkers, including me, will answer yes to the following two questions, while looking sheepishly at their penny loafers. Did you ignore the "Using Your Saw" section in the owner's manual when you got your first tablesaw? Have you experienced kickback?

I have had workpieces kick back a few times. Fortunately, I wasn't hurt. For others, though, that instant on the tablesaw has been tragic and life-altering.

With hundreds of students passing through my school each year, I've developed firm guidelines

THREE CORE PRINCIPLES

Staying safe begins with these three core concepts. No. 2 is specific to the tablesaw, but the others are critical on any piece of machinery.

1. MAINTAIN CONTROL

Never cut stock freehand. The stock must be controlled at all times, using either a fence or a jig. Miter slots and fences must be aligned properly. Also, a workpiece must be straight and flat on its control surfaces: at least one face and one edge. Be sure to push it all the way past the blade.

2. USE A SPLITTER

Kickback is the primary danger on a tablesaw, and a splitter is the cure. Also called a spreader or riving knife, this thin tab of metal or wood sits right behind the blade. The slot (kerf) made by the blade slides onto the splitter, preventing the board from pivoting onto the teeth at the back of the blade. Without having to steer the board to prevent kickback, you can focus on keeping your hands out of harm's way.

3. LIMIT YOUR EXPOSURE TO THE BLADE

Keep the blade only about ¼ in. higher than the workpiece. Whenever possible, keep the cover attached to the splitter, acting as a physical barrier. Keep your fingers 3 in. away from the cover, or 6 in. away from the exposed blade. For many cuts, this means using push sticks or push pads.

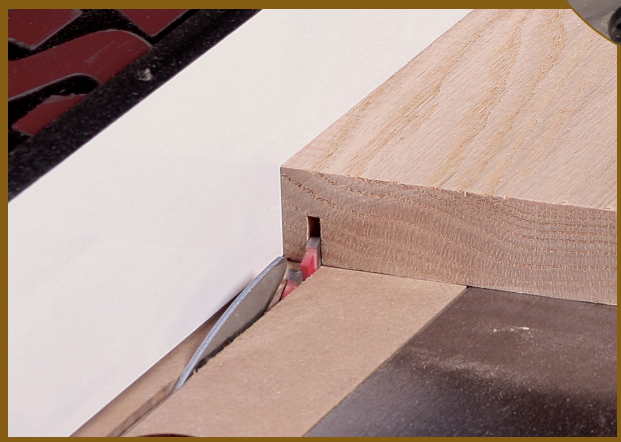
VIDEO WORKSHOP

Watch Adams demonstrate these techniques, plus cut a number of common joints in a members-only Video Workshop series.

Today's saws have better guards

A few years back, Underwriters Laboratories mandated that all saws sold in the United States have much-improved, European-style safety systems, and all North American manufacturers complied.

Better blade covers and splitters. *Today's blade covers are narrower, allowing a push stick to pass by more easily. And the riving knife, an improved version of the splitter, moves up and down with the blade, hugging it closely to prevent kickback.*

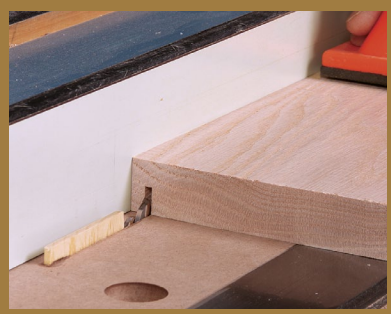


Low-profile option. *For very thin rips (far left) and non-through-cuts (near left), the blade cover comes off easily, and you can either adjust the riving knife downward or replace it quickly with a low-profile version (above).*

Older saw? You have options

Older splitter systems are inconvenient, and often discarded. But no worries—there are two good ways to replace them.

Buy a better splitter. *There are a number of aftermarket splitters available online. One example, the "Anti-Kickback Snap-In Spreader" from Biesemeyer (mikestools.com) is available for about $180. Designed for Delta saws, it works in many others, too. You install its holder in the throat of your saw, and then the splitter pops in and out quickly.*



Or make a stub splitter. *This little tab of wood goes into the saw slot (above left) on a shopmade throat plate (see p. 42 for how to make one), and can be cut short so it works for non-through-cuts too (below left). You'll need to lengthen the saw slot to accommodate it. If it binds in the sawkerf, just sand or plane the sides a bit. Be sure the grain runs vertically for strength.*

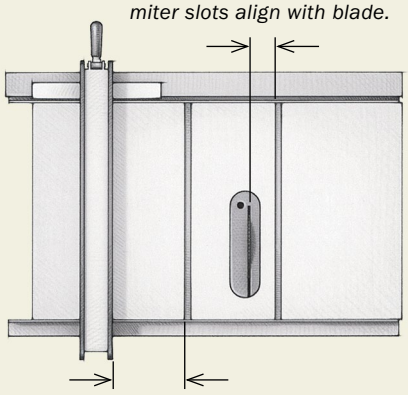
Ripcut basics

Set up for safety

When ripping boards, you need the fence to be parallel to the blade, and you need a few shopmade push sticks on hand.

ALIGN THE SAW IN TWO STEPS

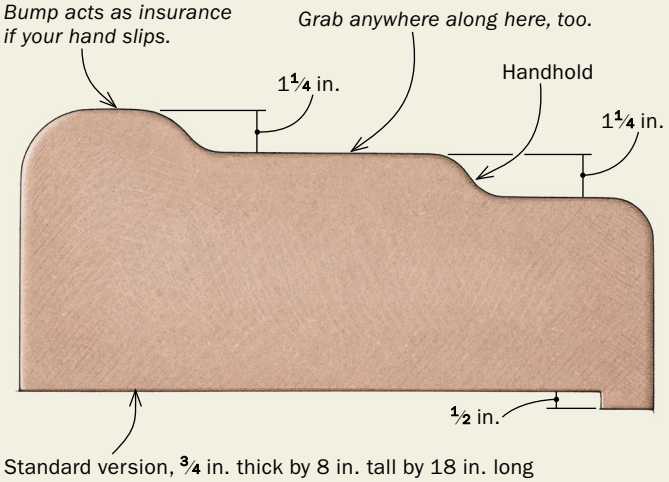
How you adjust the table is different on different saws, but you need the miter slots to be parallel to the blade for safe crosscutting. Then you adjust the rip fence parallel with the slots and you're set for ripping, too.



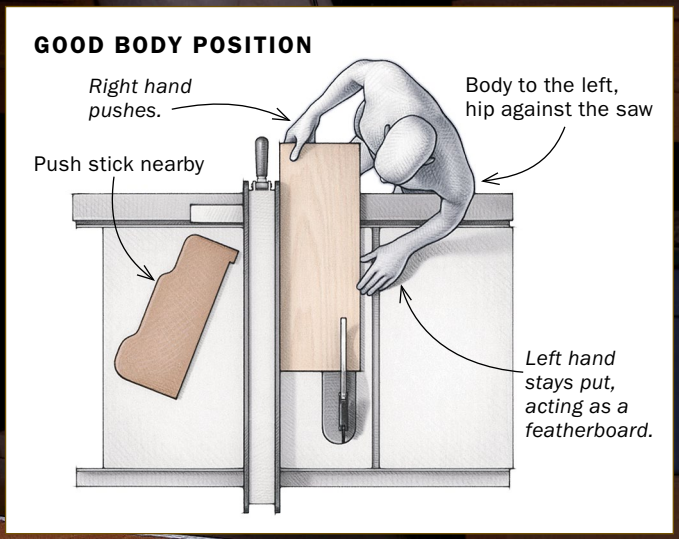
Rip fence is easy to correct. *Use the adjustment screws to align the fence with a miter slot, and it should stay parallel in any position.*

SMART PUSH STICK DESIGN

Adams's push sticks hook over the back of a board, of course, but also extend over the top of it for full control. He makes them in MDF in a number of sizes and thicknesses.



Safe ripping is a 3-step process



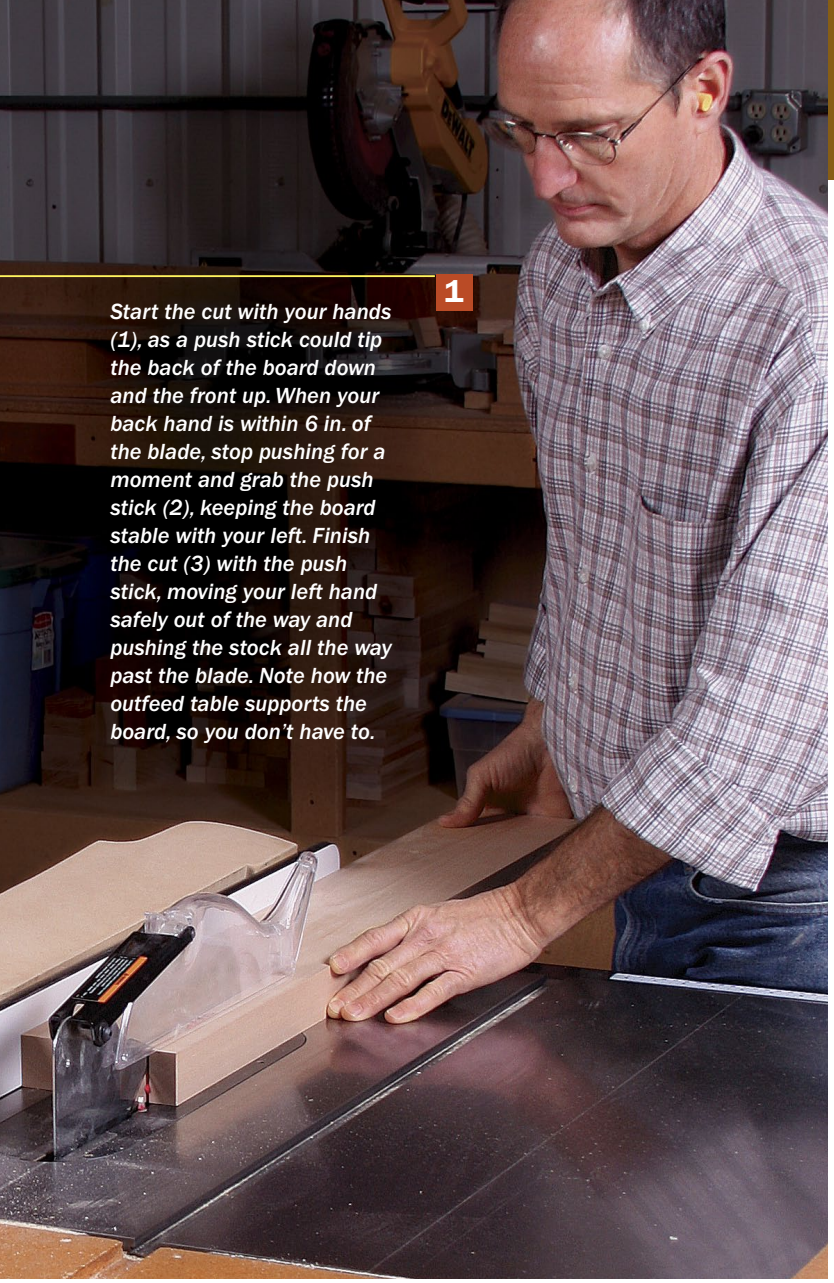
for safe tablesaw use, regardless of skill level. My first rule is to keep all 13 saws properly set up and maintained. But this article focuses on the second part of the equation: a knowledgeable operator. If you understand how the saw works and know the best practices for its use, the chance for a bad accident can be virtually eliminated. Machines don't think, but you can.

Kickback is the main danger

Kickback accounts for the majority of tablesaw accidents. Unfortunately, I encounter many woodworkers who don't understand the cause of kickback, or the cure.

Here's how it happens. The teeth at the front of the blade do the cutting, and they move downward, helping to keep the board safely on the table. But the teeth at the back of the blade are not your friend; they spin in your direction at over 100 mph. During a safe cut, the slot made by the blade brushes past the back teeth without incident. But if the back of the board pivots as you push it, or one of the halves is pinched into the blade somehow, only one

Photos: Asa Christiana; drawings: Christopher Mills



Start the cut with your hands (1), as a push stick could tip the back of the board down and the front up. When your back hand is within 6 in. of the blade, stop pushing for a moment and grab the push stick (2), keeping the board stable with your left. Finish the cut (3) with the push stick, moving your left hand safely out of the way and pushing the stock all the way past the blade. Note how the outfeed table supports the board, so you don't have to.

of those back teeth needs to grab the workpiece to set kickback in motion. And it happens in milliseconds, as the lifting action converts almost instantly to horizontal force aimed right at you. The projectile can hurt you, obviously, but it can also pull your hand into the blade. The good news is that kickback is easy to prevent.

Use a splitter whenever possible—Also called a spreader or riving knife, a splitter keeps a board from making contact with the teeth at the back of the blade. But the splitter has to be there to do its job, and until recently, most splitters were inconvenient and were therefore discarded. Older North American saws will have a crude splitter that extends high above the blade and too far behind it. These splitters have to come off the saw for all non-through-cuts, such as grooves. The big blade covers are just as inconvenient.

This outdated safety equipment is difficult to detach and reinstall, so most of these splitter/blade cover assemblies find a permanent home in a shop cabinet. If you have one of these saws, you still owe it to yourself to use a splitter (see "Older saw? You have options," p. 39).

HOW TO HANDLE PLYWOOD

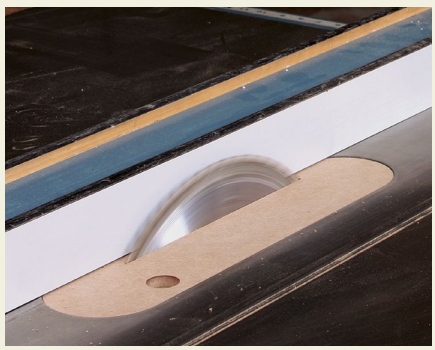
Safe and accurate. *Focus on the area where the panel rides the rip fence, but remain aware of your hands, too, keeping them clear of the blade. Again, outfeed support is critical.*

Crosscut basics

Set up for safety

MAKE A ZERO-CLEARANCE THROAT INSERT

Crosscuts produce the most tearout at the bottom edge, and a zero-clearance insert will prevent it. It will also keep small offcuts from diving into the throat of the saw.



Simple job. *Trace your stock insert plate onto a piece of MDF (above) of the right thickness to fit your saw, and then bandsaw it close, using a sander to work up to the line. On most saws, a 10-in.-dia. blade won't go low enough to let you insert the blank plate, so make a ripcut along the bottom to create clearance (above right). Then install the blank insert, place the rip fence on top of it, and bring the spinning blade up through it (right). Last, extend the slot with a jigsaw (below) or scrollsaw to accommodate your splitter or riving knife. You might also need to use tape or screws underneath to shim the plate level with the table.*

MAKE A MITER-GAUGE FENCE

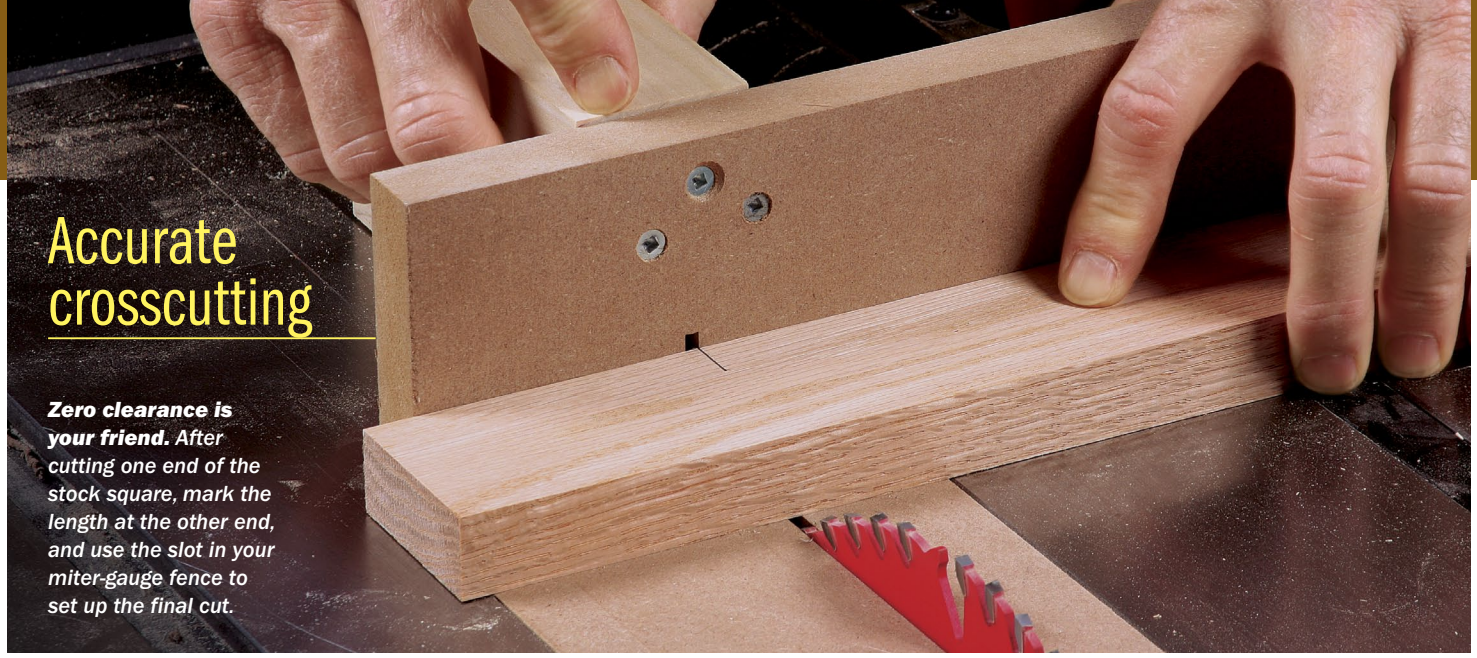
A standard miter gauge needs some help. A long fence will improve control and accuracy, tame tearout on the back edge, and push the offcut safely past the blade.

Smart, safe design. *Screw a long piece of MDF to your miter gauge, cut a slot through it, and then attach a wood block (as shown) on the back edge where the blade emerges.*

Stick trick. *The slots in your outfeed table, designed to accommodate miter gauges and sled runners, are the perfect spot for a simple stick that limits their travel, making sure the blade doesn't pass through the safety block (or box) at the back of the fence.*

A riving knife is a blessing—Fortunately, a few years ago Underwriters Laboratories (UL) proposed that all new tablesaws have a riving knife, a more versatile type of splitter borrowed from European tablesaws, and all of the North American tablesaw manufacturers complied. If you can afford a new saw, safety is much more convenient. The riving knife can stay on for almost every type of cut, and the new blade covers are narrower and come off the saw more easily when they get in the way. Unfortunately, today's riving knives still include "anti-kickback fingers," which are basically useless and often in the way, so I remove them.

One gray area is getting your riving knife or splitter to fit through a shopmade throat plate. On my saw, I extend the blade slot so



Zero clearance is your friend. *After cutting one end of the stock square, mark the length at the other end, and use the slot in your miter-gauge fence to set up the final cut.*

the low-profile riving knife can fit through. But the taller knife won't work because it is longer, and a longer slot would weaken the insert plate. So I use my zero-clearance throat plate for crosscutting only, where tearout is the biggest problem and where I need to use my low-profile knife anyway to fit through the fence on my miter gauge and crosscut sled. For ripping, I use the standard throat plate with the full-height riving knife and blade cover.

A few more tips

Even if a board is already jointed straight and flat, it might not stay that way as internal tensions are released during a cut. If a board jams during the cut, use one hand to turn off the saw, wait for the blade to stop, and finish the cut on the bandsaw. A short board is more likely to pivot onto the back of the blade. If you are not sure about a workpiece, rip it on the bandsaw. On some portable saws, the rip fence won't stay parallel to the blade when you move it, which can cause binding, so you'll need to check it each time.

When crosscutting, never use the rip fence as a stop. This traps the offcut, and the friction against the fence can cause it to pivot and bind, causing kickback. For more safety rules, see the photos and illustrations throughout this article.

Follow these basic safety guidelines and you'll turn the most dangerous machine in the shop into a trusted friend. In "Precise Joinery," on p. 50, I'll show you how to get even more value from this versatile tool, demonstrating a variety of fast, accurate joinery cuts. ☐

Marc Adams runs one of the largest woodworking schools in North America. Go to MarcAdams.com for more information.

Set the stop. *The long MDF auxiliary fence lets you set up a stop at the far end for cutting a series of workpieces to the same length.*

Perfect support. *With a big, stable bed, and two runners in the miter slots, a crosscut sled cuts big workpieces with unmatched accuracy. Again, you can clamp stops to the fence. For longer workpieces, clamp a hook-type stop above the workpiece (see above).*

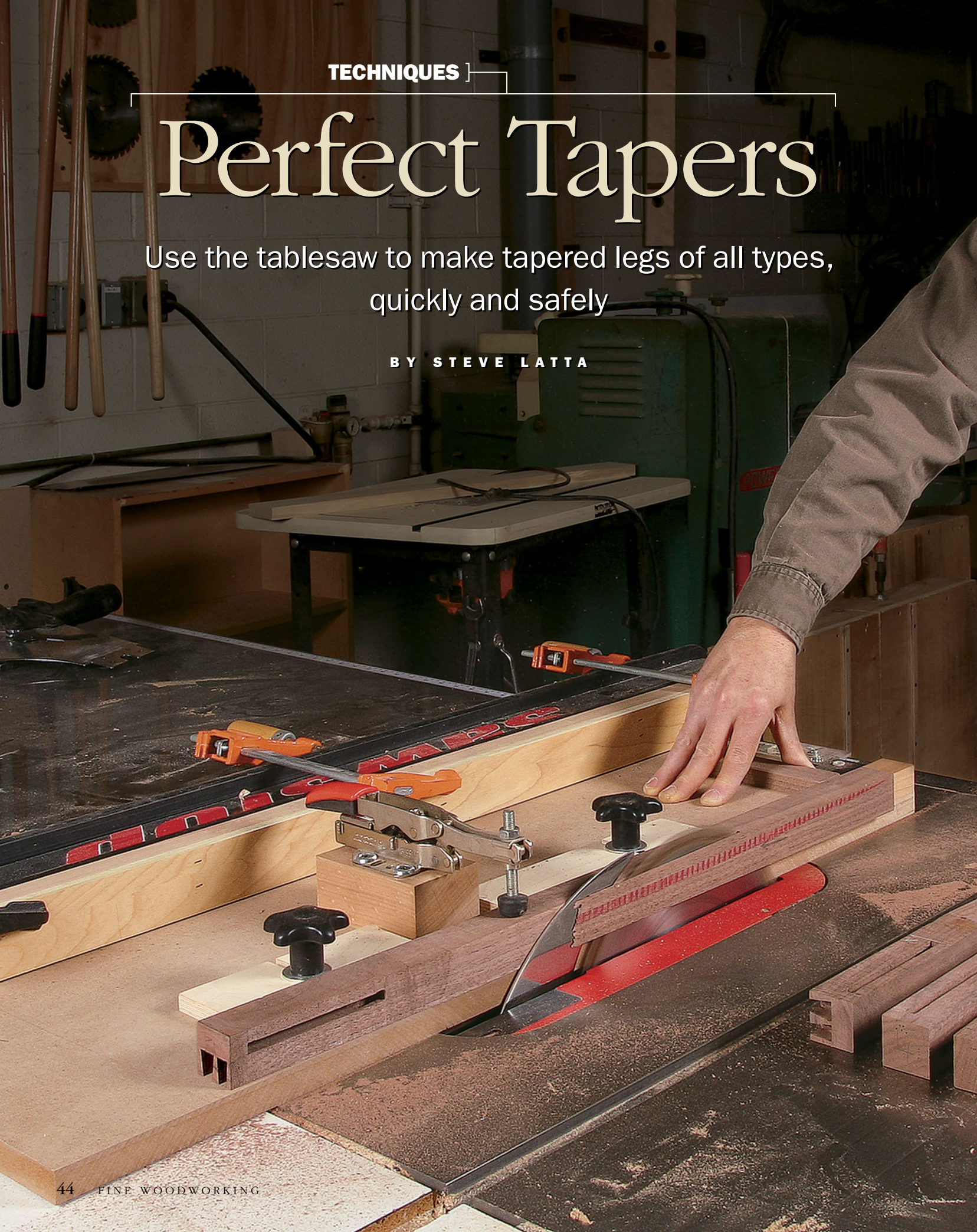
CROSSCUT SLED IS BEST

For the most accurate crosscuts of all, even on large panels, nothing beats a crosscut sled. To learn how to build one, check out FineWoodworking.com/tablesawtips for a free plan.

Perfect Tapers

Use the tablesaw to make tapered legs of all types, quickly and safely

BY STEVE LATTA



It's no secret why woodworkers taper the legs of tables and chairs: It improves the appearance of the entire piece. Tapering breaks up that boxy square look, lightens the visual weight, and helps direct the eye toward the center.

Tapered legs are found across the range of furniture styles. The majority have tapers on two adjacent faces that begin just below the apron or rail, keeping the joinery square. But you can also find tapers that extend to the top of the leg, and tapers on all four sides. What they all demand is a way to cut them accurately and safely.

While you can cut tapers on the bandsaw or the jointer, tablesaw cuts are cleaner and more accurate. However, the standard commercial tapering jig (two aluminum sections hinged on the end) has always scared me—strike that—terrified me. Because the workpiece isn't clamped to the jig, your fingers have to come dangerously close to the blade.

Why I favor foolproof

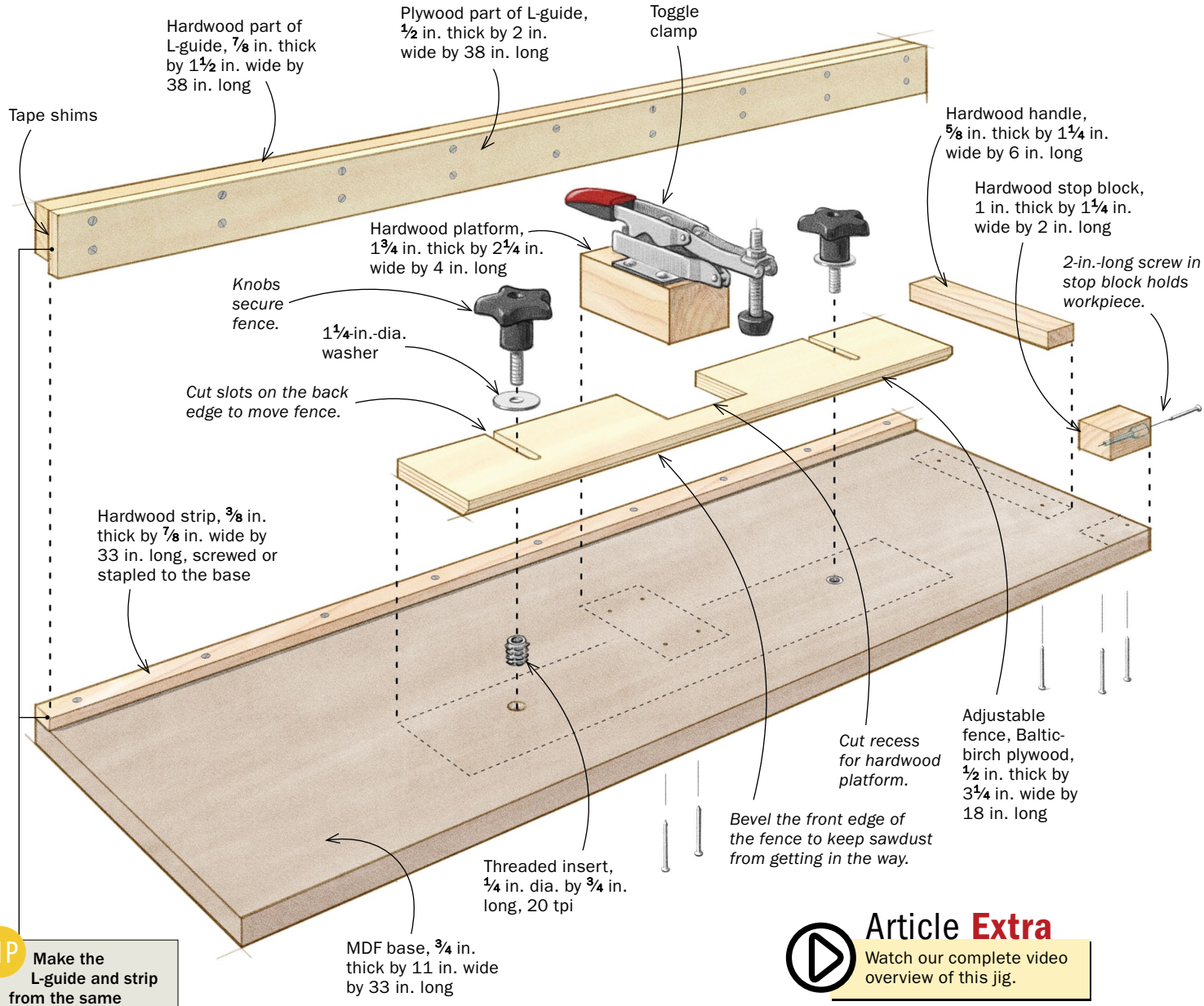
At the college where I work, many of my students are new to woodworking, so any jig has to be simple and safe to use. The jig we use to taper legs ticks both these boxes. It falls under the broader category of what I call carriage jigs, in that the work is carried on some sort of sled. Because one edge of the sled lines up with the path of the blade, setting the location of the workpiece is very easy, and with a built-in clamp to secure the workpiece, your hands remain well clear of the blade.

Instead of the sled being guided by the miter slot, as in most cases, I have it hooked to the fence. If the sled only rides in the

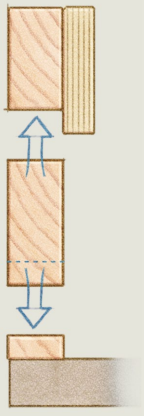
Tapered legs on fine furniture. *You need a jig that can make dead-accurate tapers on two, three, or four sides.*

A SMARTER SLED

The sled is guided simply and safely by an L-shaped guide that clamps to the rip fence, and a little hardwood strip that is nailed to the sled.



TIP **Make the L-guide and strip from the same piece.**



Article Extra
Watch our complete video overview of this jig.

miter slot, it wants to dip and come out of the slot before and after the cut. Some people try to use one knee to support the sled while doing an odd little one-legged dance in front of the spinning saw. Not with this sled. It is tied to the fence with an interlocking strip that keeps it flat on the table at all times.

What's more, one edge of the jig is near-zero-clearance, so it tells you where the blade will cut. That means you can simply align the layout marks on a leg with the edge of the jig, and cut with confidence.

Construction is straightforward

To make the jig, start with a piece of hardwood, roughly 7/8 in. thick by 2 in. wide by 38 in. long, rip off a 3/8-in.-wide strip, and cut it to 33 in. long. This strip will ride against the rip fence, so you want it just proud of the edge of the sled. To achieve this, place a piece of masking tape along the edge of the sled, place the strip and the sled base against the rip fence, and then glue and either screw or staple the strip to the sled. Peel off the tape, and you're all set.

The two long sides of the sled must be parallel, so with the sled riding against the rip fence, trim the opposite side. But before you do that, attach the stop block, so it gets trimmed flush, too. Afterward, attach the sled's adjustable fence, push handle, and toggle clamp.

An L-guide locks the jig parallel to the fence yet allows it to glide smoothly with no slop. To make the

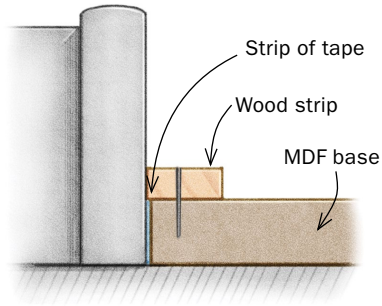
Photos: Mark Schofield; drawings: John Hartman

MAKE IT IN ONE HOUR

The guide strip and fence are easy to attach and fine-tune. The other parts go on quickly.

ATTACH THE GUIDE STRIP

To keep the wood strip just proud of the MDF, temporarily attach a strip of masking tape to a long edge of the base. Push both pieces against the fence as you screw or nail them together.

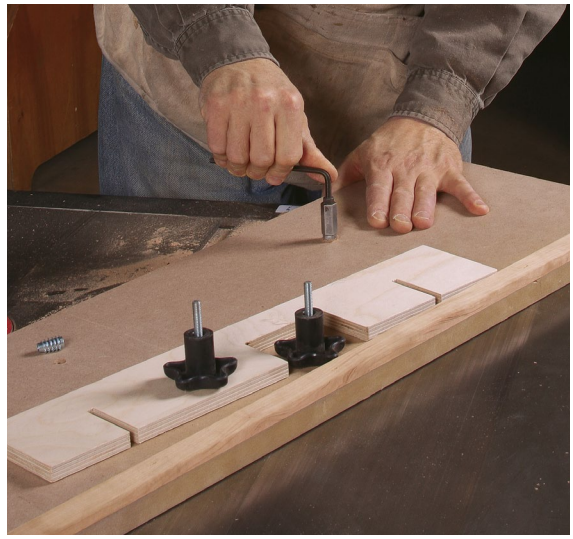


Trim the other edge. *After attaching the stop block, trim the edge of the sled and the block at the same time. Those surfaces will tell you exactly where tapers will be cut.*

guide, glue and nail or staple a 2-in.-wide by 38-in.-long strip of ½-in.-thick plywood to the remaining piece of hardwood that you ripped earlier. Place the side of the base with the maple strip adjacent to the saw's fence and clamp the guide to the fence. Check to see if the sled slides back and forth. If it is too tight, simply add a strip or two of blue painter's tape to the hardwood side of the guide before re-clamping it and testing the movement again.

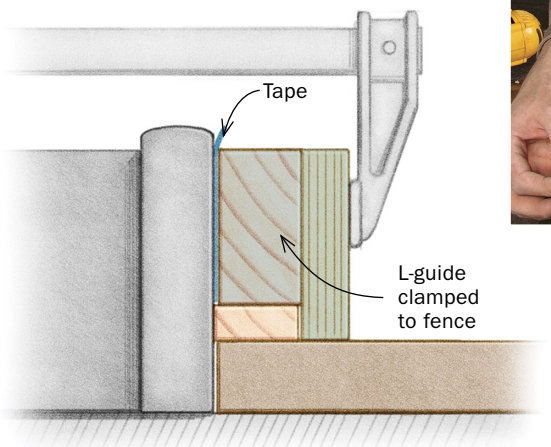
Two-sided tapers are the most common

On traditional furniture across a range of styles, there is a basic rule for which faces of a leg to taper: If it falls under the aprons, it gets tapered. A tapered leg lends a piece the lightness and grace mentioned earlier, plus



Add the adjustable fence. *Screw threaded inserts into the base of the sled. These will receive the knobs that secure the sled's adjustable fence. File the inserts flush with the underside of the sled to avoid scratching your saw.*

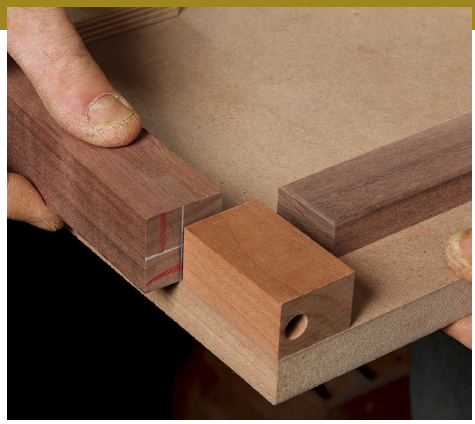
MAKE AND FIT THE L-SHAPED GUIDE



Smooth sledding. *Attach the sled to the fence via the L-guide and see how easy it is to push (right). You may need to add a strip or two of masking tape to the L-guide to allow the sled to slide smoothly but without slop.*

TWO-SIDED TAPERS IN MINUTES

You need to set up the sled only once to cut tapers on two adjacent sides, but lay out each leg to keep track of your cuts.



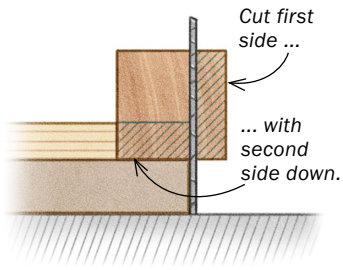
Align the foot. *Line up the layout mark with the edge of the sled and stop block, and push the leg gently against the screw in the block.*

Align the top. *You need only a small tick mark at the start of the taper. Line it up with the edge of the sled, then slide the adjustable fence against the back of the leg blank.*

Adjust the rip fence. *You want the edge of the sled to be about 1/32 in. away from the blade. In this way the taper is cut slightly proud to leave room for handplaning and sanding.*

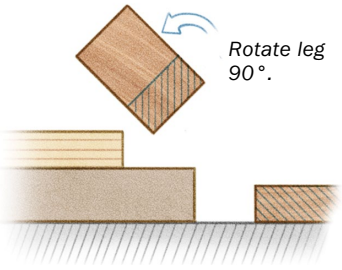
MAKE THE FIRST CUT

Adjust the jig and cut the first taper.



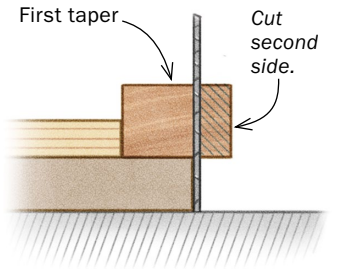
ROTATE FOR NEXT CUT

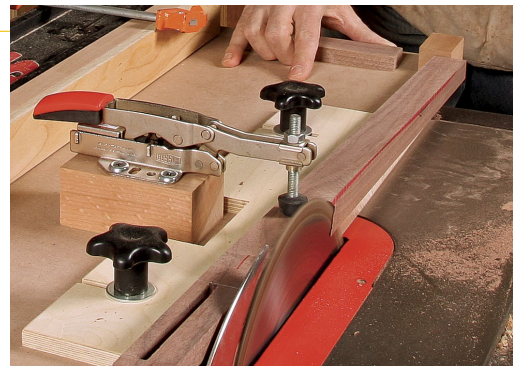
There is no need to adjust any setting; just reposition the leg and clamp it down.



CUT THE SECOND TAPER

With the first taper facing up, make the second tapering cut.





gives it a stable-looking stance without making it look splay-legged. On a typical four-legged table with a rectangular top, or even variations such as a bow or serpentine front, the two inside faces of the legs are tapered. Here's how the jig works.

First, cut any joinery on the leg while the blank has straight sides. Layout, or more accurately the lack of it, is another advantage to this jig. A line marking the start of the taper and another on the bottom of the foot are all you need. The taper usually starts where the bottom of the apron or rail intersects the leg. I use a combination square to set the lines on the top, being careful to mark only the sides to be cut. Too many lines leads to mistakes! If the taper has a finished dimension of, say 5/8 in. at the bottom, I cut a piece of stock that thick, line up the blanks, and mark the bottoms with one swipe of the pencil. I rotate each leg 90° and make a second mark. Finally, I use a wax crayon to highlight the faces to be tapered.

When using the sled, the thin end of the tapered leg should always be closest to the operator. This way not only are you cutting "downhill" with the grain, but the action of the blade helps push the blank onto the sled. You also want to rotate the leg clockwise after the first cut, so the leg is resting flat on a non-tapered face during the second cut (see photos, left).

To position the leg in the sled, align the mark on the bottom of the foot with the edge of the sled and push the foot into the tip of the screw protruding from the stop block. Now align the start of the taper with the edge of the sled and set the adjustable fence against the leg. Finally, deploy the toggle clamp. Leave a little extra material to handplane and sand by setting the saw fence so that the side of the sled is about 1/32 in. from the blade. Make the cut, using the handle to

FOUR-SIDED TAPERS? JUST ONE EXTRA STEP

Set up for tapers three and four. *After cutting the second taper, rotate the piece clockwise and align the marks with the sled as before (left). This time, because the opposite side of the leg has already been tapered, you'll need to move the adjustable fence (right).*

Cut tapers three and four. *There is no need to adjust the fence after the third cut, but you might need to adjust the toggle clamp or place a shim under it to maintain pressure on the thinner leg.*

push the sled so that your fingers come nowhere near the blade. Pull the jig back to the front of the saw, loosen the clamp, rotate the leg 90° clockwise, and secure it again. Cut the second taper. When cleaning up the saw marks, don't remove any wood above the taper because this will leave a gap between the leg and the apron. To sneak up on the line, I mark the area below the line with a crayon, and then plane up the marked area, stopping just before the line. A light sanding completes the job.

Three or four-sided tapers are no problem

On a round or oval period table with corresponding shaped aprons, the legs can be tapered on three or four faces. Further, on contemporary furniture, it is common to find legs tapered on four sides, often extending all the way to the top, or even inverted with the wider part at the base of the leg. Never fear, this jig can handle all of these tapers and then some.

For example, with four-sided tapers, cut the first two adjacent sides as above. To cut the last two sides, first adjust the sled's fence to take into account the tapered side of the leg that will now be against it. After cutting the third taper, you may need to place an offcut under the blank to support it during the fourth cut. □

Steve Latta teaches woodworking at Thaddeus Stevens College of Technology in Lancaster, Pa.

CLEAN UP THE CUTS CAREFULLY

Precise planing. *To avoid extending the taper too far, mark the surface of the leg a few inches below the layout mark with a wax crayon (right). This makes it easier to measure your progress and to stop before you reach the line (far right).*

TECHNIQUES

Precise Joinery

The tablesaw is perfect for grooves, dadoes, rabbets, tenons, and miters

BY MARC ADAMS

VIDEO WORKSHOP

Learn how to safely cut all of these joints, plus how to build this crosscut sled, in our members-only Video Workshop series.

Photos: Asa Christiana

In my other article "Ripping and Crosscutting" (p. 38), I demonstrated how to get better ripcuts and crosscuts—and stay safe in the process. But the tablesaw can do more than make rectangles. If you add a dado set and a few shopmade jigs and fixtures, it can become your favorite machine for cutting flawless joinery, too. The tablesaw offers an unmatched combination of accuracy, repeatability, speed, control, and endless jig potential.

To produce joint-quality cuts, both across the grain and with it, you'll need two types of blades. You can stick with your normal combination blade, but make sure you keep the teeth clean of pitch buildup. A clean blade will always cut better. For wider notches in wood, whether rabbets, dadoes, grooves, tenons, or lap joints, I use an 8-in. stack dado set. Quality is very important here. You need a set that cuts clean edges and flat bottoms.

A dado set's inside and outside blades have angled teeth designed to eliminate tearout at the edges of the cut. A variety of chipper blades go between, allowing ¼-in.- to ⅞-in.-wide dadoes. Thin shims go in to fine-tune the width, if necessary. Be aware that dado sets take big cuts and can cause underpowered saws to bog down, and that the shorter arbors on some portable saws won't allow the full stack to be used.

Add a few key jigs and fixtures

You can cut most of the common joints on the tablesaw with just four simple jigs and fixtures: a zero-clearance throat plate, a miter-gauge extension fence, a crosscut sled, and a sacrificial fence for rabbeting. I showed how to make the first three in my earlier article, and I'll cover the last one here.

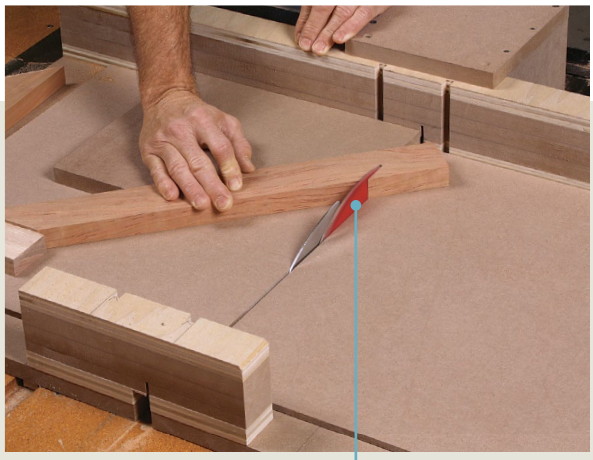
The cool thing about learning the fundamental joints, like dadoes and rabbets, is that the same techniques work for many others, such as laps, tongues, and bridle joints. In fact, the design of a tablesaw invites a host of joints and jigs. This article is just the beginning. Soon you'll be calling this versatile machine "the variety saw," like I do.

Marc Adams's woodworking school in Franklin, Ind., is one of the largest in the world. Go to MarcAdams.com for a course listing.

Two kinds of blades do it all

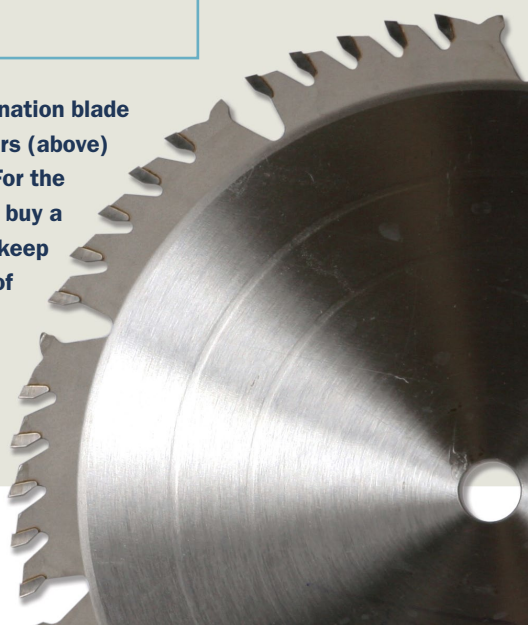
Dado

For many joinery cuts, you'll need a good dado set. Get the best stack-type dado set you can afford. It should cut slots with clean edges and flat bottoms.



Combo

A basic combination blade is fine for miters (above) and grooves. For the cleanest cuts, buy a good one and keep its teeth free of pitch.



The simple groove

Ride the fence. *Adams makes grooves with a single blade, using multiple cuts for wider grooves. A long push stick gives better downward pressure and control.*

Grooves are the easiest joint to cut. Since they are aligned with the grain, you can use the rip fence to guide the workpiece. I normally use my combination blade, adjusting the fence and taking multiple passes for a wider groove. If the bottom needs to be dead flat, you can also use your dado set.

The advantage of the single blade is that it lets you use a riving knife to prevent kickback. If your saw doesn't have one, you can use a shopmade stub splitter as I demonstrate on p. 39.

In any case, always use a push stick or push pads to maintain good control while keeping your fingers safe (you can't see the blade until it exits the board). Pay special attention to keeping the workpiece flat at the point of contact.

Use a push pad for short pieces. *On these shorter drawer sides, a push pad, lined with rubber and/or sandpaper, gives better control.*

Clean dadoes

A dado is a groove cut across the grain and is usually sized precisely for a second piece to fit into. Since dadoes are crosscuts, tearout can be a problem without a zero-clearance surface below the cut. If the back edge will show, you'll need zero clearance there, too. You can use a variety of fences to make a dado cut safely, but it depends on the size of the workpiece and location

NEAR AN EDGE, RIDE THE FENCE

Tame tearout. *You'll need a fresh throat plate to prevent tearout. Adams shows how to make these in his article on p. 38. Insert a blank one, position the rip fence to hold it down without getting in the way of the blade, and then bring the dado set up through it.*

Push pad stars again. *A push pad works better than a push stick to keep a big panel down on the table and tight to the rip fence.*

of the dado. On wide workpieces with the dado close to the end of the piece, you can run the stock against the rip fence.

But the crosscut sled is my favorite tool for dadoing, because it carries pieces with excellent control and great accuracy. That control is especially important because you can't use a splitter or riving knife in conjunction with a dado set on most saws. A crosscut sled also accepts all types of stops.

IN THE MIDDLE, USE A SLED

Refresh your crosscut sled. *To prevent tearout on a sled, tape down a piece of ¼-in.-thick MDF (above). Do the same on the fence (right), and then cut a zero-clearance slot through both.*

TIP

CARPET TAPE GRIPS BETTER

To add holding power to jigs, Adams uses double-sided carpet tape with mesh inside. It is thicker and far stronger than the thin plasticky type.

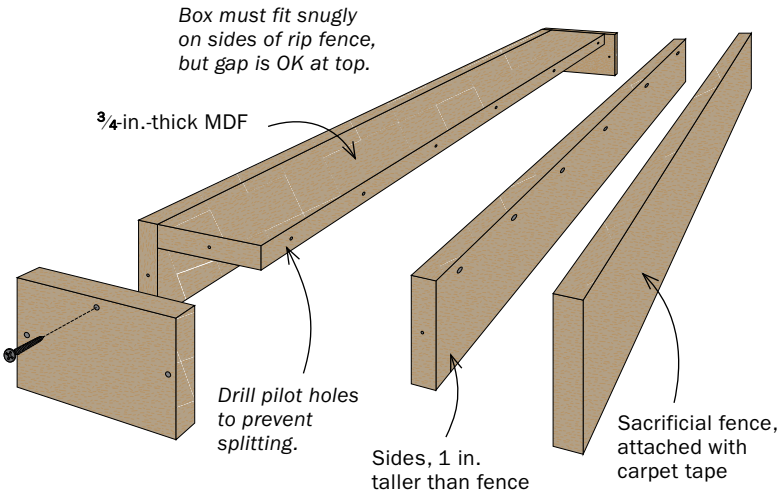
Why the sled is best. *A crosscut sled controls workpieces of almost any size, and is a must for the middle dadoes on these long bookcase sides. A hook-style stop offers a long reach and is easy to attach.*

Accurate rabbets

To cut rabbets, you should bury the dado set in a sacrificial rip fence. This makes it easy to adjust the width of the rabbet: You simply nudge the fence a bit instead of fine-tuning the width of the dado stack.

But a sacrificial fence can be hard to clamp to the short sides of a standard rip fence without the clamps getting in the way. My solution is to build a simple MDF box that fits snugly over the fence, and then tape the sacrificial piece to that. The box allows the sacrificial fence to be removed and replaced easily, on either side, so it works with the fence on either side of the blade. And a single piece of MDF can be positioned four different ways to extend its use.

BUILD A BOX TO BURY THE BLADES



How to get a snug fit. *Cut the sides 1 in. taller than the rip fence, and long enough to allow clearance for the lever at the end. Clamp the sides in place to measure for the top plate and attach it as shown. Drill pilot holes to prevent splitting. Keep the clamps on as you screw on the end caps.*

Add the fence and bury the blades. *Use thick carpet tape to attach a tall MDF fence (above), then move the fence over the top of the dado set and bring the spinning blades up into it (left), only as high as needed.*

Fast, accurate rabbets. *Whether the rabbets are along the edge (left) or end of a workpiece (above), you can run the workpiece against the fence. You'll need a zero-clearance throat plate to prevent tearout when working across the grain. Push pads do a good job controlling the workpiece, but you'll need to support narrow workpieces with the miter gauge.*

Drawings: Kelly J. Dunton

Quick tenons

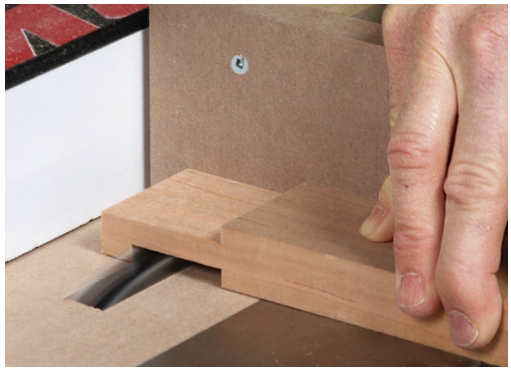
One way to cut tenons on the tablesaw is to first make shoulder cuts with the pieces lying flat, and then make the cheek cuts using a tenoning fixture. But my favorite method is to cut them with a dado set, which is faster and easier and works on larger workpieces. Long pieces are a problem on a tenoning jig, because they have to stand straight up in the air. With a dado set, the workpiece lies flat on the table, where it is easier to control.

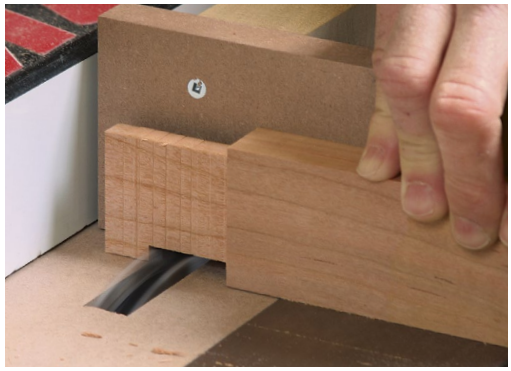
You can control the work with a miter gauge and use the rip fence as the stop. You'll need a zero-clearance throat plate to prevent tearout at the shoulders. I stack my dado set to about ¾ in. wide, and I always start with the stock against the rip fence for the first cut and then nibble away the rest. Do not lift the stock when you finish a cut; just keep a tight grip as you pull it back.

Start with the two opposite cheeks, testing the fit in one of your mortises as you dial in the setup. Then change the blade height to trim the tenons to width. You'll notice that the outside blades leave fine lines on the surface, but these will not affect joint strength. Some woodworkers leave the tenon a bit fat and finish the job with a shoulder or rabbeting plane. Using a test mortise, I am able to get a good fit right off the tablesaw.

TIP GET SQUARE FIRST

To get even tenon shoulders, you need a perfectly square miter gauge. You can place a square or drafting triangle against the blade to check, but inconsistencies in the fence or blade can throw it off. Instead, do this simple test. It works for squaring up fences and blades for all sorts of joinery tasks. Rip parallel edges on a long piece of scrap, and mark one side for reference. Make a crosscut (above) and then flip one of the pieces. Set both against a straight surface like the rip fence (below). A gap means you need to adjust the miter gauge and try again.





Tenons in minutes. *Set the rip fence to position the first cut at the shoulder (above), and make a series of nibbling cuts (center left) to finish the job. To cut the top and bottom of the tenon, change the height of the blades if necessary and just flip the workpiece on edge (bottom left).*

Tight miters on a crosscut sled

The most common type of miter is the flat type used to join frame pieces. They often surround a plywood panel to make a door or a tabletop, and standard moldings are cut this way, too.

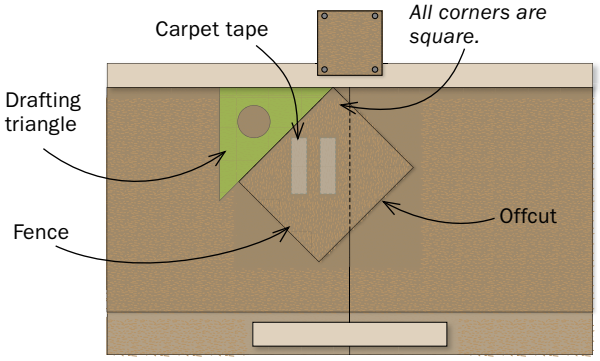
The challenge with flat miters is the wide cut, which makes it hard to end up with a 90° corner and no gaps. If you rely on your miter gauge, you will struggle with accuracy and repeatability. That's why I cut them on my crosscut sled using a simple 45° fence. You use the sled to make the fence, too, and the whole process is easy.

In this case, with flat stock and zero-clearance below the blade, you could keep the fence in one position for all of the miter cuts, simply flipping the pieces to miter the second side. But if the front of the stock is molded or you are getting chipout on the bottom edge, you'll want to flip the fence to the other side of the blade when cutting the second end of each piece, in order to keep the same side up.

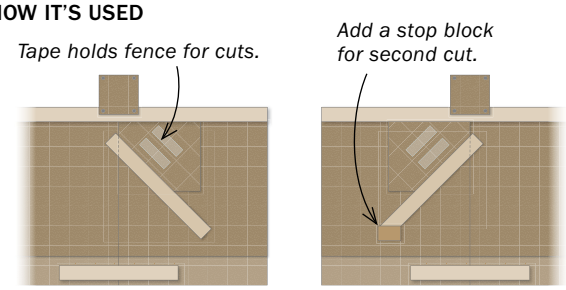
Aside from accuracy, what I love about this setup is how easy it is to attach a stop: You just tape it down.

MAKE AN ACCURATE FENCE

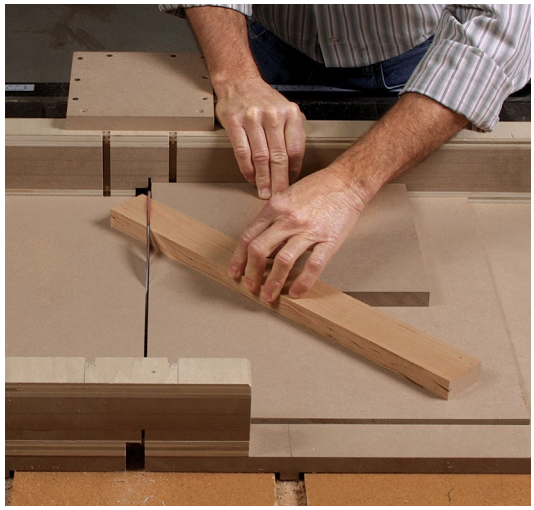
Start with a perfectly square piece of MDF and use your crosscut sled to turn it into an accurate 45° fence.



HOW IT'S USED



Easy to make. *Use a 45° drafting triangle to position the MDF fence on the sled. Use carpet tape to hold it down, but keep the triangle in place as you cut, to be sure the workpiece doesn't shift.*



Miter one end of each workpiece. *Put the fence on the left or right, pressing it down very firmly on the carpet tape, and then use it to miter one end of each workpiece. Hold the workpiece firmly to be sure it doesn't drift.*

Switch sides. *Flip the fence over to set it up on the other side. This time you'll need a stop to set the final length of each piece, but that's as simple as taping a block to the sled. The miters should come out perfect.*

TECHNIQUES

Dovetails on the Tablesaw

Make better, faster through-dovetails, with a trick for perfect half-blinds, too

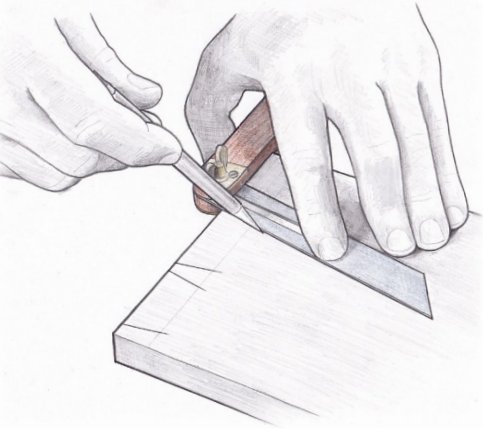
BY GREGORY PAOLINI

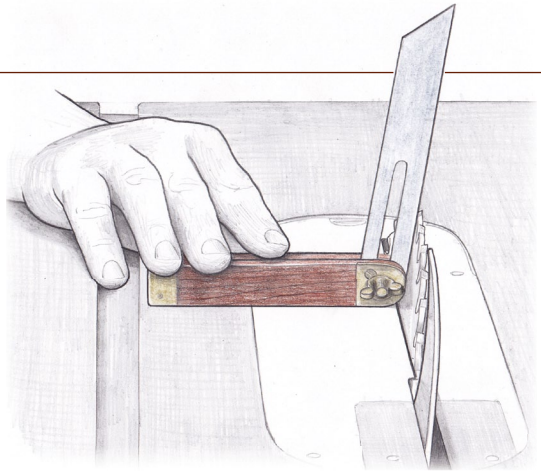
It takes an awful lot of practice to cut dovetails by hand and to do it well. Your sawcuts should be straight, at a consistent angle, and square to the board's face. And you can't cut into the baseline. Later, when you're paring and attempting to make up for bad sawcuts, you can make things much worse.

There are ways to cut dovetails that bypass those challenges. With a router and jig, you'll get straight and square tails and pins that have consistent angles. Unfortunately, they won't look as nice as hand-cut dovetails. It's difficult

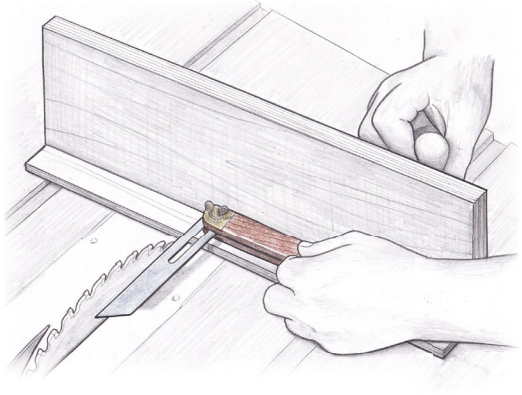
BEVEL GAUGE GUIDES THE WAY

To take advantage of the tablesaw's accuracy, you need to set it up precisely. Using a bevel gauge is the secret.





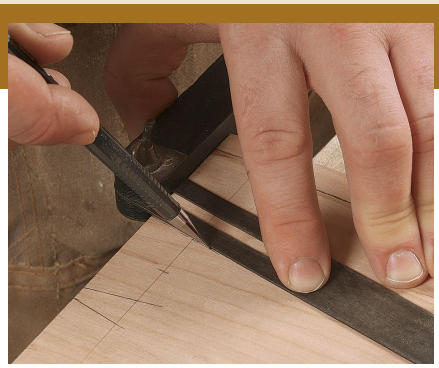
Mark the tails, setting the gauge at your favorite dovetail angle (left). Paolini likes 10°. Then use the same bevel-gauge setting to angle the blade (above) to cut the tails.



With the blade at 90°, angle the miter gauge for the pins. Don't change the setting on the bevel gauge, and the pins are sure to match the tails.

Angle the blade to cut the tails

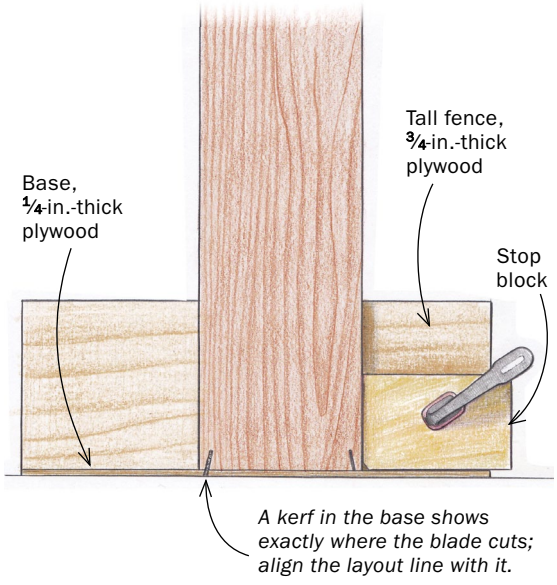
The tablesaw locks in the cutting angle and a stop block allows you to make eight cuts from a single layout line. So all you need to do is lay out the tails at one end of one board.



Scribe the baselines, then lay out the tails. *Scribe all the boards (left), wrapping the marks around the edges on the tail boards. You can space the dovetails any way you want (right), but they should be symmetrical around the centerline.*

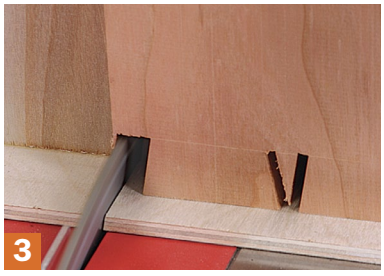
Angle the blade. *Make sure the bevel gauge's setting hasn't changed and that it's flat against the blade's plate, coming up in a gullet between teeth.*

GET ACCURATE WITH AN AUXILIARY FENCE AND STOP BLOCK



Four cuts from a single setup. *Flip the board to make two mirror-image cuts, then rotate it end for end to make the same two cuts on the opposite end. When you've done the same with the second tail board, you've made eight cuts without moving the stop block.*

The mirror effect. *As you work across the board, moving the board (and stop block) to a new layout line and making all four cuts each time, you naturally begin to cut the second side of every tail.*



Nibble the ends. *A few eyeballed cuts knock off most of the waste at the ends.*

Clean out the waste. *After defining all of the tails at the tablesaw, cleanup goes quickly. Work to your scribe lines.*

Angle the miter gauge for the pins

Move the blade back to 90°. One side of every pin is cut with the miter gauge angled in one direction. Angle it in the other direction to cut the second side.

CUT THE FIRST SIDE OF THE PINS

Transfer the tails to the end grain. *Do this on all your boards. Paolini uses a 0.5mm mechanical pencil because of its very fine line.*

Wrap the line onto the face grain. *You can't see the end grain when the board is standing on the auxiliary fence, so you'll need these lines to align the board for cutting.*

Adjust the miter gauge. *Use the bevel gauge, still set to the angle used for the tails. Paolini attaches a new auxiliary fence so that the kerf for this cut doesn't overlap the one used for the tails.*

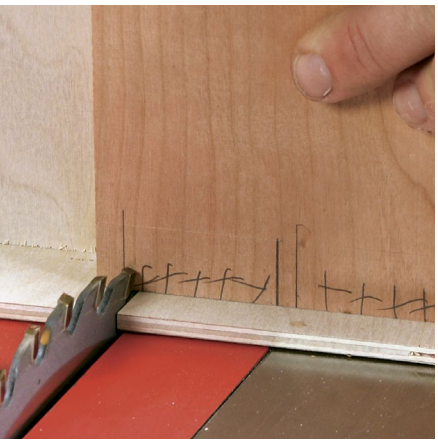
to reproduce the wide tails and narrow pins that make the hand-cut version so appealing.

However, there is one power tool in your shop that excels at cutting straight and square, and can easily maintain the same angled cut for both tails and pins: the tablesaw. What's more, because tablesaw blades are no more than ⅛ in. thick, you can reproduce hand-cut dovetail spacing, too.

Of course, because both the tails and the pins are cut at the tablesaw, you're limited to through-dovetails. That's great for case joints and the back joints on a drawer, but what about the half-blind dovetails we all use to join the drawer front to the sides? No problem. I have a trick that turns a through-dovetail into a half-blind, with added benefits you can't get the traditional way. But let's start with the basics.

Use a rip blade and auxiliary fence

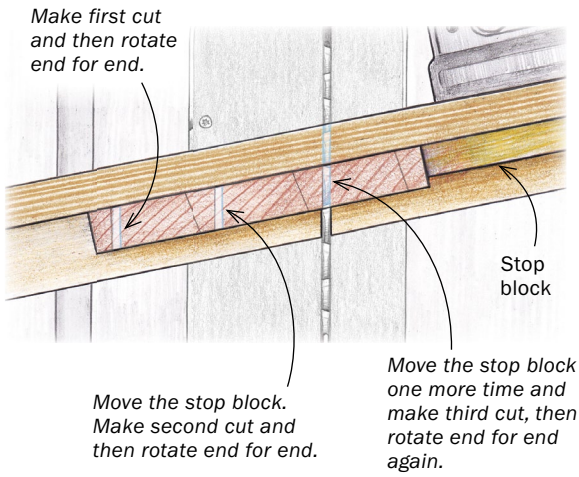
To cut dovetails this way, you need only your stock miter gauge and a blade. I use a rip blade because these are ripcuts and because it has a flat-top grind, which leaves a flat shoulder when I cut the pins, with no paring needed. However, any standard blade will leave a bit of material between tails, so you'll still have some



Don't cut into the pencil line. *If you do, the pin will be too narrow and you'll have gaps in the joint. Take advantage of the zero-clearance kerf, aligning the board so that the pencil line is right next to the kerf, but not in it.*

MAKE ALL THE CUTS YOU CAN

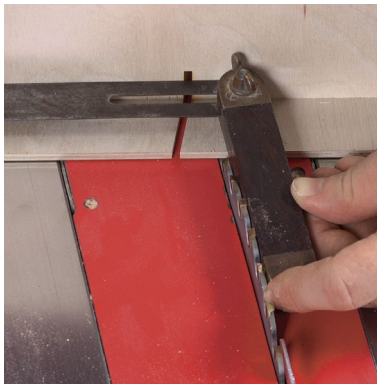
You can't flip the board this time to make a mirror-image cut on the same end, but you can invert it. Keep the same face out.



Photos: Matt Kenney; drawings: John Tetreault

Clean out the waste between the pins

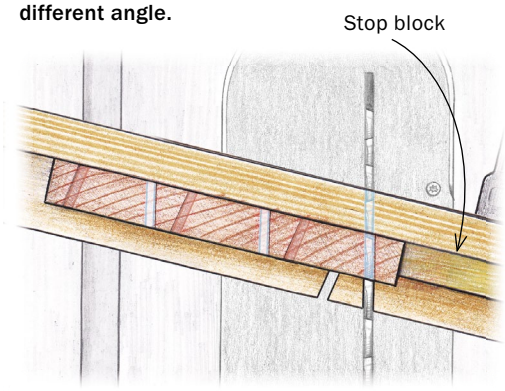
CUT THE SECOND SIDE OF THE PINS

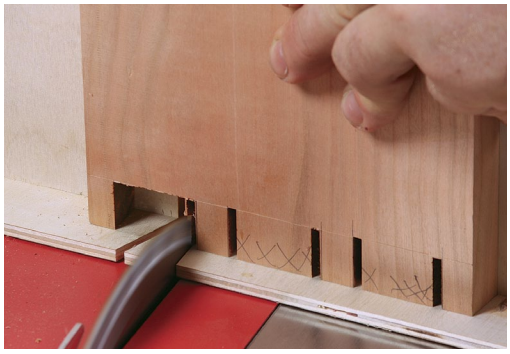


Reset the miter gauge. *There's no way around it to cut the second side of the pins. Be sure the bevel gauge is still locked into its original setting.*

OPPOSITE ANGLE FOR SIDE TWO

This is just like cutting the first side of the pins, except the board goes through the blade at a different angle.





Nibble the waste by eye. *Most of the waste can be cut out with the fence at the second setting, but you'll need to move it back to the first setting to get all of the waste.*

paring to do. If you're going to cut dovetails this way all the time, get a blade with the teeth ground to match the dovetails' slope. Any saw-sharpening service can do it. Use it for the tails and you won't have any paring to do in the corners, either.

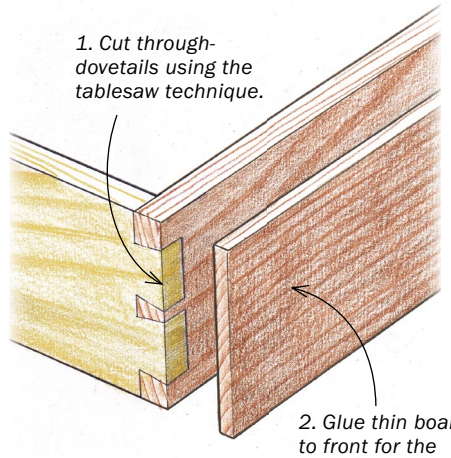
You also need two L-shaped fences for the miter gauge—one for the tails and one for the pins. They should be at least twice as long as the drawer sides are wide, so the sides always have support as you move them to cut the pins and tails. After the fence is attached to the gauge and a kerf is cut into it, it's easy to align layout lines with the kerf so the blade cuts exactly where you want it to. □

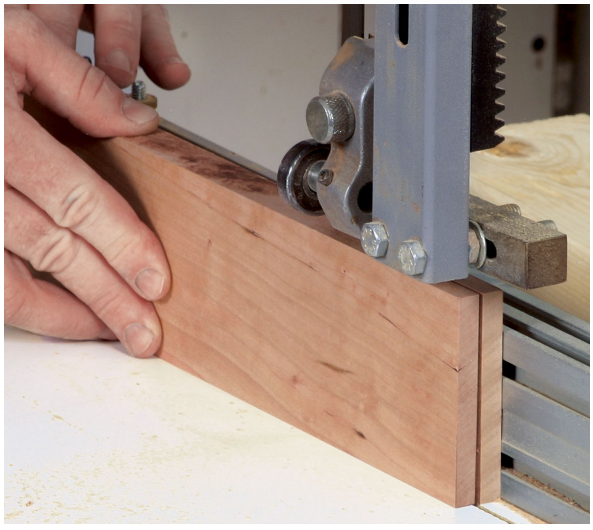
Gregory Paolini is a professional furniture maker and teacher near Asheville, N.C.

Payoff is perfect joints. *Clean up the baseline of the pin board with a file. The joint should come together square, without gaps, and without much persuasion.*

Use the same technique to make half-blind dovetails

You can use through-dovetails in lots of places, but typically not drawer fronts. There, you want half-blind dovetails. But you can still use this dovetailing method by gluing a thin board (⅛ in. to ¼ in. thick) to the front of the drawer box after it's glued together. That allows you to use through-dovetails for all of the joints, but still get the half-blind look. As a bonus, you get more mileage from your best lumber, which you can resaw to get book- and slip-matched fronts.





Cut the fronts. *Resawing from a thicker board lets you spread a beautiful board over several drawers.*

Brads lock it in place. *Cut them off short and they'll stick into the front and prevent it from creeping under clamping pressure.*

Don't skimp on clamps. *Paolini uses a caul made from melamine-covered particleboard to protect the front and help spread the pressure over the entire surface (for a tight glueline around all four sides).*

Just rout it flush. *Routing is faster than a handplane and makes it easier to keep the edge square to the face. Do the ends before the long edges, and use a pin in your router table to help you enter the cut safely.*

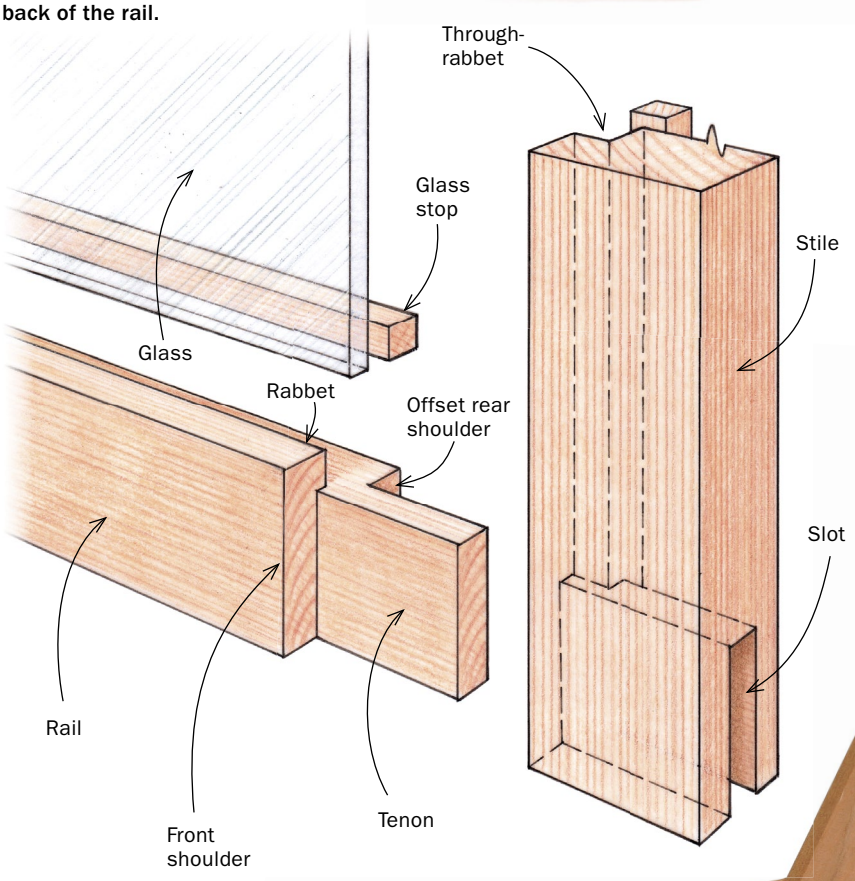
Joinery for Glass Doors

Rabbets and bridle joints are easy at the tablesaw

BY DOUG STOWE

RABBETED GLASS DOOR

Forget the tedium of stopped rabbets. Cut a through-rabbet in the stile and fill the gap with an offset shoulder on the back of the rail.



I live in Eureka Springs, a small town in northwest Arkansas that's home to many artisans and art collectors. And so I've made several cabinets with glass doors to house art collections. Glass doors are also great for kitchen cabinets, allowing you to display decorative dishes while protecting them, and for enclosed bookshelves. But many people build them in a tedious way, by making a normal mortise-and-tenoned door and then rabbeting the pieces for the glass in a separate series of steps. I've learned that the best way to make those doors is with a bridle joint. Not only is the joint easy to make—I do it with a tenoning jig at the tablesaw—but by shortening the length of the tenon cheek on the back face of the rails, I can cut through-rabbets for the glass at the same time. That saves you the hassle of routing stopped rabbets and squaring their corners after the door is glued up.

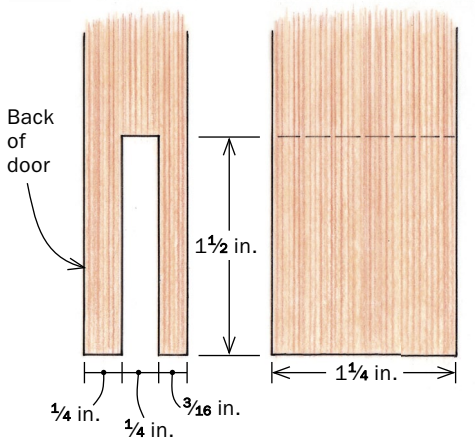
As simple as this joint is to make, it is one of those assemblies—like the dovetail—that can be hard to wrap your mind around, at least at first. That's because it can be difficult to imagine how the offset tenon shoulder on the back of the rail fills the rabbet on the stile. But don't worry, it does. And the steps are easy.

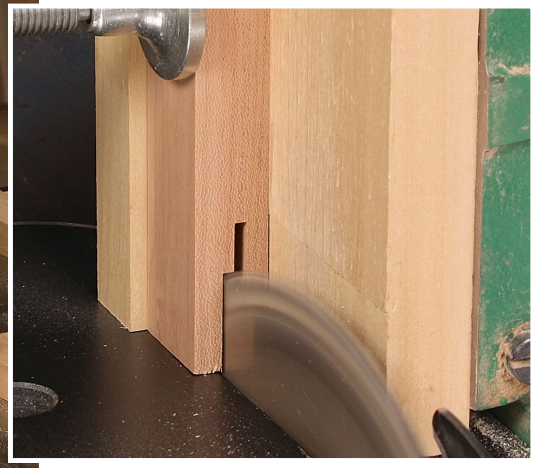
Make the bridle joint first

There are two parts to the joint. A slot is cut into the end of the stile, and a tenon onto the end of the rail. On a door with a wood panel, both of the tenon's shoulders

START WITH A SIMPLE SLOT IN THE STILES

Offset it toward the front to allow room for the stops that hold the glass in place.





Use a tablesaw tenoning jig. *Set up the jig so that the blade cuts the side of the slot closest to the jig first. The slot is ¼ in. wide, so with a standard blade, the second cut will complete the slot.*

are the same distance in from the end of the rail. However, in order to cut through-rabbets on the back of the parts, the cheek is shorter on the back than it is on the front so that the shoulder on the back fills the rabbet on the stile after the door is glued up. That means there are no unsightly gaps in the door frame from the through-rabbets.

Before you make the joint, lay the parts on the bench and mark their faces and inside edges to help keep them properly oriented as you cut the joints and rabbets. Also, I start with rails and stiles that are about ⅛ in. longer than final size. I cut the joints so that the ends of the tenons and slots are 1/16 in. proud after assembly and then trim them.

Start with the slots on the stiles. I use a tenoning jig to hold the stile on end as I run it through the tablesaw blade. Use a blade with a flat-top grind, like a ripping blade. Some combination and crosscut blades leave a V-shaped notch in the bottom of the kerf that would be visible after assembly.

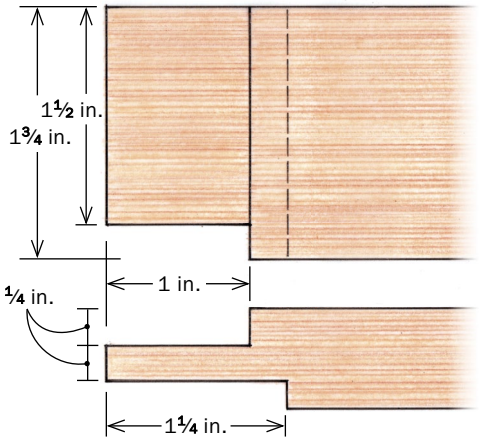
Put the back face of the stile against the jig and clamp the stile in place. Cut the first side of the slot. Make the same cut for the remaining three slots. Adjust the fence to align the blade with the other side of the slot and make that cut for all four slots. I use a blade that's ⅛ in. thick, so those two cuts form the entire slot. A thinner blade requires a third cut to clean out the middle.

Now it's time to cut the tenons on the ends of the rails. This joint will seem strange at first, because the tenon's cheeks

Photos: Matt Kenney; drawings: Vince Babak

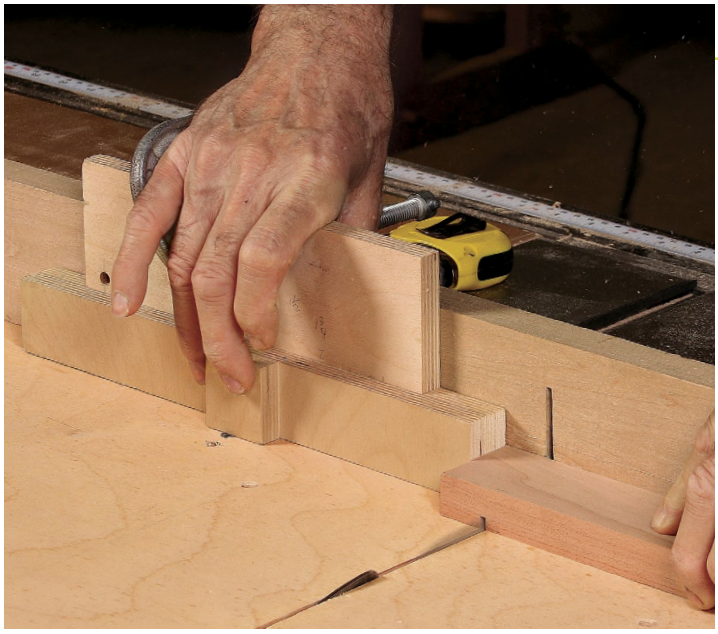
CUT SHOULDERS ON THE RAILS

Use your tablesaw sled to cut the offset shoulders.



TIP

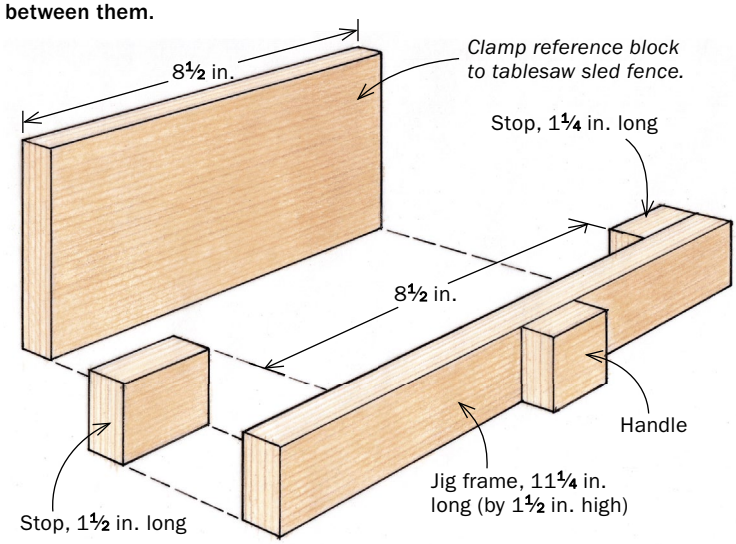
Set the blade height directly from the stile. *It's quicker and more reliable than transferring a measurement from the slot.*



Cut the short shoulder first. *Use the end with the longer stop to make the shorter side.*

TWO-SIDED STOP BLOCK MAKES PRECISE CUTS

For this joint to work, the shoulders' offset must be precise. That's no trouble with this jig. Flip it end for end to create the ¼-in. offset between them.



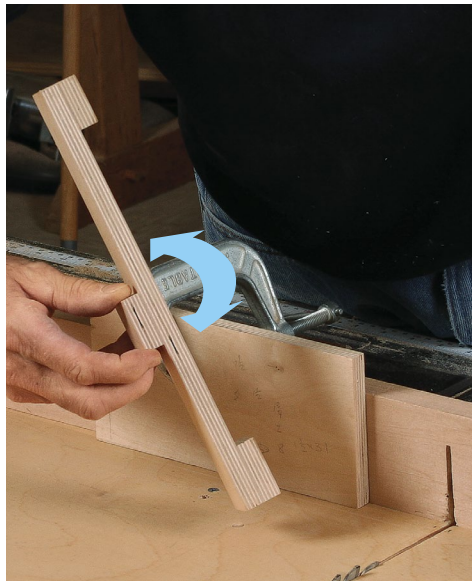
All parts made from ½-in.-thick plywood.

are different lengths. But after you put the joint together, it makes perfect sense.

I cut the shoulders at the tablesaw with a crosscut sled and a jig that has two different stops built into it. One stop lets me cut the shoulder for the shorter cheeks on the rail's back, and the other is set to cut a shoulder for a cheek that is ¼ in. longer. Cut the back shoulders of the rails first. Then switch the stop to its second position and cut the front shoulders.

Now cut the cheeks using the tenoning jig. Because the cheeks on the front are longer than those on the back, cut them first. Put the rail in the jig with its back against the main fence and cut all of the front cheeks. Then lower the blade and cut the cheeks on the backs.

Finally, trim the tenons to their final width. This is more critical than usual for a tenon, since the fit will show on the

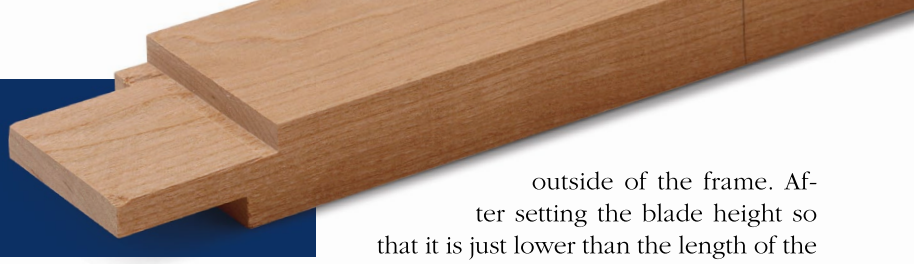


Flip the stop. *The reference block ensures that it ends up in the right place.*

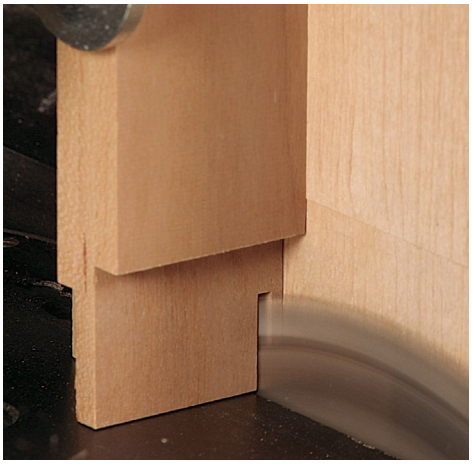
Then cut the long shoulder. *The second stop is ¼ in. shorter than the first, so the second cheek is ¼ in. longer.*

NOW THE CHEEKS

Using the right jigs, you can cut these quickly, accurately, and safely at the tablesaw.

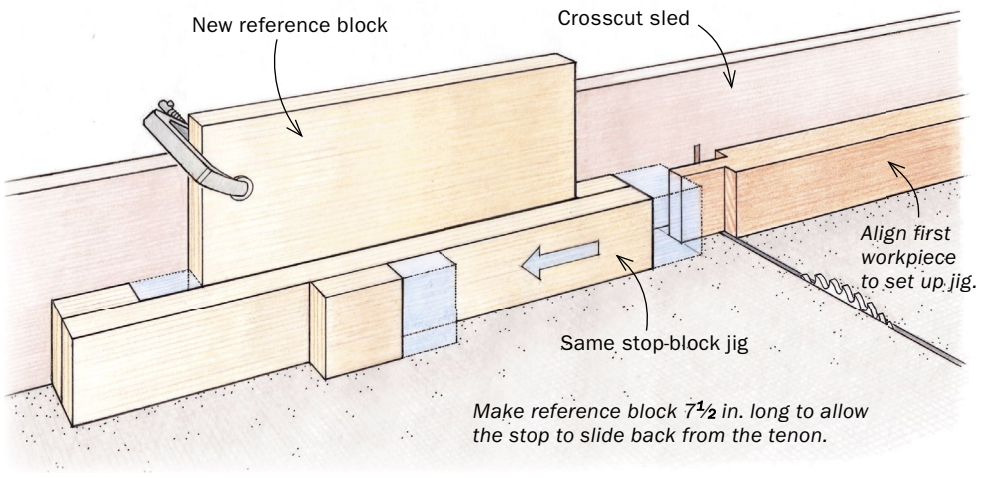


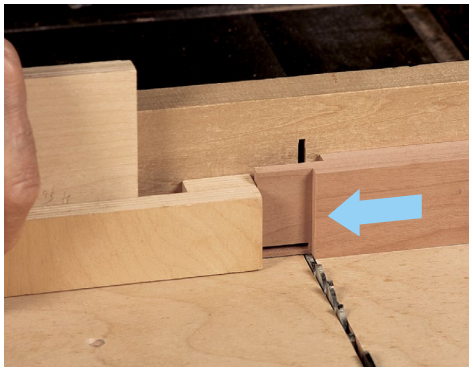
Pull out the tenoning jig again. *Set the blade to cut the shorter cheeks first. Then adjust the jig, raise the blade, and cut the longer cheeks.*



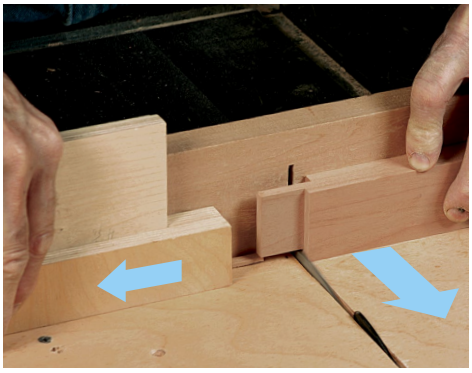
Use the jig to cut the tenon's width, too. *Set the blade height to the lower (rear) shoulder.*

ALTER YOUR STOP SETUP FOR THE FINAL CUT





Position the workpiece. *Push the stop block toward the blade, and the workpiece toward the block.*



Move the stop and make the cut. *This allows the waste piece to move away freely.*

outside of the frame. After setting the blade height so that it is just lower than the length of the tenon, I clamp the rail into the tenoning jig with its inside edge against the main fence. I then define the final width of the tenon with a single cut of the blade. Then I use a crosscut sled with a stop to make the shoulder cut that frees the waste piece. The stop ensures that the shoulder aligns with the shoulder on the front of the rail.

Cut the rabbets and assemble the door

Now that the bridle joints are finished, you can cut the rabbets that hold the glass. Because of the way the bridle joint is cut, these are through-rabbets, made quickly at the tablesaw.

Set the blade height to ⅜ in. Set the rip fence so that the outside edges of the blade's teeth are ¼ in. from it. Lay the rail back down on the saw's table and cut the first side of the rabbet. Next, lower the blade to ¼ in. and adjust the rip fence so that the outside teeth are ⅜ in. from it. Stand the rail on its inside edge and cut the second side of the rabbet. The blade can push the waste back toward you after it's cut free, so don't stand directly behind the blade.

After the rabbets are cut, the joint fits together and you can see why the tenon's cheeks are different lengths. Now I dry-assemble the door and rout a slight chamfer on the inside edges of the rails and stiles, using a chisel to square the rounded corners left by the bit. The joint fits tightly enough that you don't need clamps, which would get in the way at the router. Disassemble the door and sand the inside edges of the parts, which would be more difficult to do after the door is glued together.

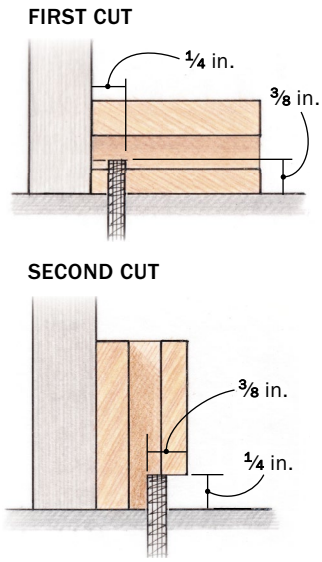
Now glue up the door. Apply glue to the tenons only and push them into the slots. If you put glue in the slot as well, the tenon will push most of it out, creating a mess on the outside edge of the joint. You should be able to bring the joint completely together with hand pressure. Then use a C-clamp and cauls (to protect the door from the clamp heads) to hold the joints together. No other clamps are needed.

After the glue has dried, trim the rails and stiles to length and sand the frame, but don't re-sand the inside edges.

CUT THE RABBETS AND ASSEMBLE

None of the rabbets (for the glass) are stopped, so you can cut them all quickly on the tablesaw.

TWO CUTS TO RABBET



The first one is made with the rails and stiles face down, the second is with them on edge to free the waste.

One clamp for each joint. *If the frame is square and the joints tight, you don't need clamps across the width and length.*

I use glass that is ⅛ in. thick, so the stops (wood strips) that hold the glass in place are made from ¼-in.-square hardwood. After milling them, I sand them and then fit them to the frame, using butt joints at the corners. Fit the sides first, and then the top and bottom. That way, if you make a mistake cutting the sides, you can cut them shorter and use them for the top and bottom.

I hold the stops in place with ½-in.-long #20 gauge brad nails. To prevent the stops from splitting, pre-drill for the nails at the drill press. Now apply a finish to the frame and stops. Clean the glass and put it in place. Use a tack hammer and nail set to drive the nails into the stops, placing a piece of cardboard between the hammer and glass so that it doesn't get scratched or broken. The nail set helps you direct the hammer's force and keep the nail moving straight in. Once a small brad nail begins to bend, there is no correcting it, so just cut your losses by pulling it out and starting a new one. Finally, I install hinges. I generally use knife hinges because they are less visible, but butt hinges will work fine, too. □

Doug Stowe, a furniture- and boxmaker in Eureka Springs, Ark., is the author of Building Small Cabinets *(The Taunton Press, 2011).*

THEN INSTALL THE GLASS

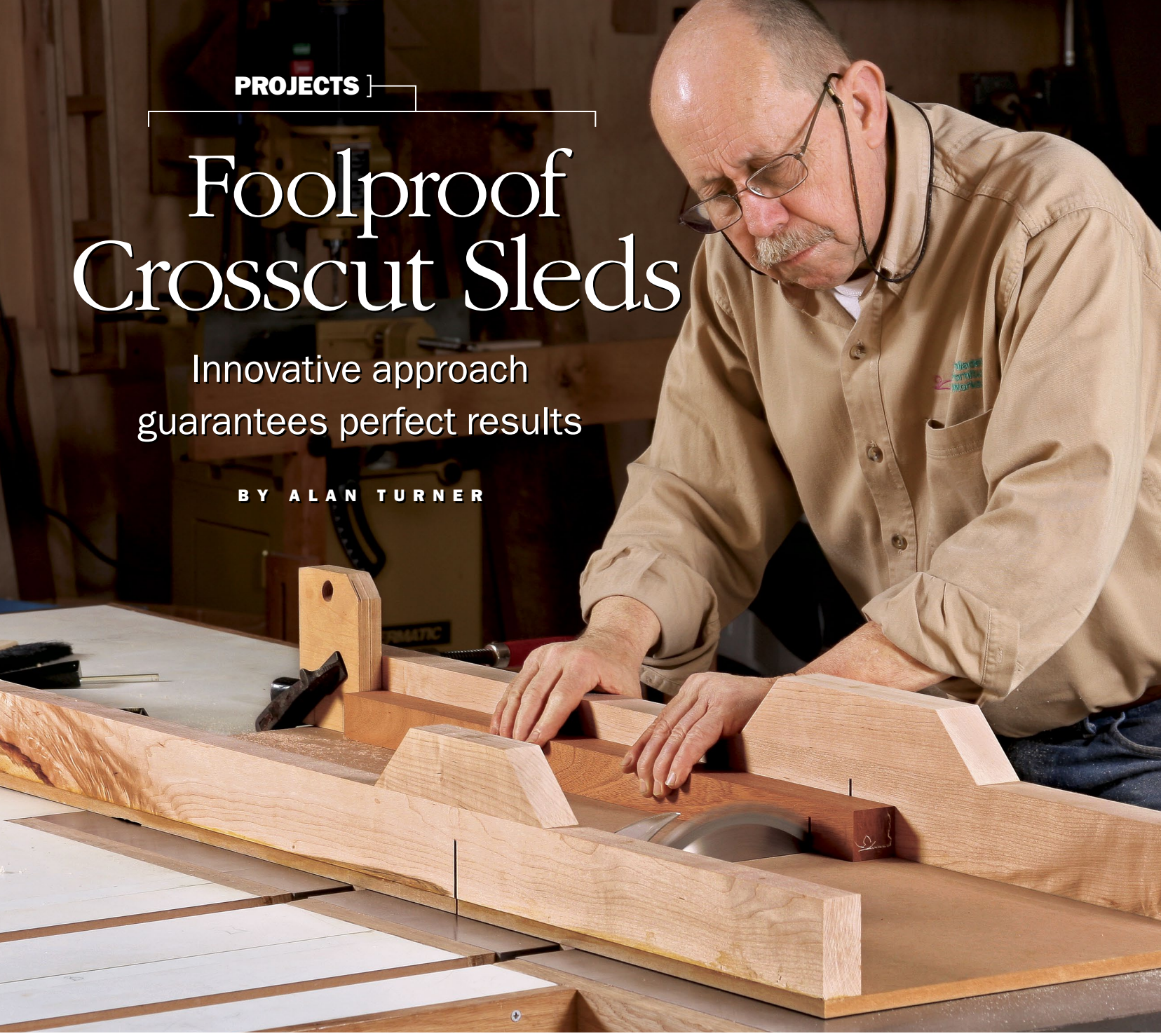
Hold it in place with stops. *Stowe predrills clearance holes in these thin wood strips and nails them in using a hammer and nail set. He uses a piece of manila folder to protect the glass. Use butt joints between the stops, not miters, so they are easy to remove for repair.*

Tablesaw Projects

Foolproof Crosscut Sleds

Innovative approach guarantees perfect results

BY ALAN TURNER



The tablesaw may be your shop's most valuable cutting tool, but for precise, repeatable crosscuts it needs a little help from a sled. The sled holds the work securely with its long edge at a precise right angle to the blade, so you get perfectly square ends when cutting pieces to length, the key to gap-free joinery. With a zero-clearance slot cut through it, the sled even prevents chipout at the edges.

The trick to building an accurate sled has always been to get the runners to fit the miter slots snugly without any wiggle room, and to attach the rear fence perfectly square to the blade—neither is easy to pull off. The technique I use at the Philadelphia Furniture Workshop simplifies both tasks and ensures dead-accurate results.

For starters, I assemble the base in two pieces, first attaching the runners at the bench. Then, with the runner in the miter slot, I trim each individual base piece with a sawcut that creates a zero-clearance edge that is perfectly parallel to the blade.

To help ensure that the runners don't wiggle in the miter slots and yield inaccurate cuts, I lightly clamp them snug against the inside edge of the slots when gluing on the front fence.

And, at the critical step of attaching the rear fence, I found a way to easily fine-tune the angle during glue-up so that it is perfectly square to the blade and stays that way. Armed with these simple techniques, you can crank out a number of sleds suited to specific tasks, instead of struggling to make just one. Instead of the typical medium-size sled, which is undersized for plywood cuts but too bulky for narrow crosscuts in solid stock, you really want the

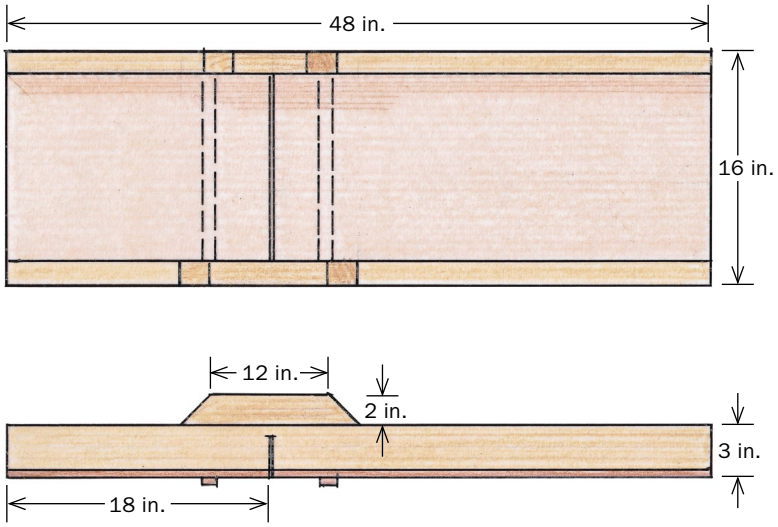
Photos: Steve Scott; drawings: Vince Babak

So simple, you'll want to make two

The truth is you really need at least two different tablesaw sleds, and this method is so straightforward that now you can have them.

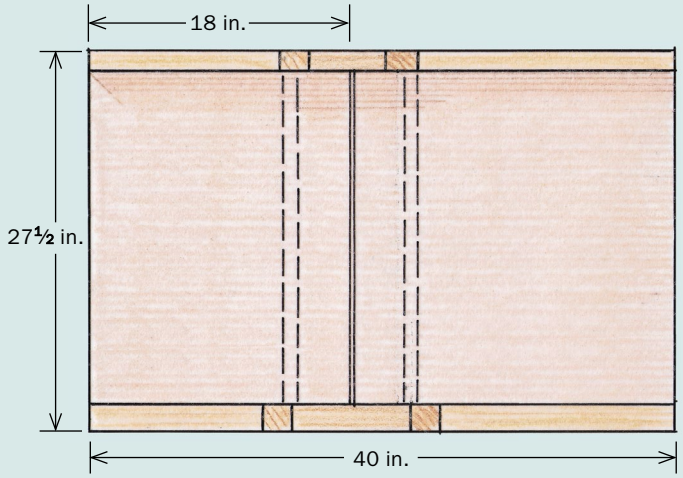
NARROW SLED HANDLES MOST TASKS

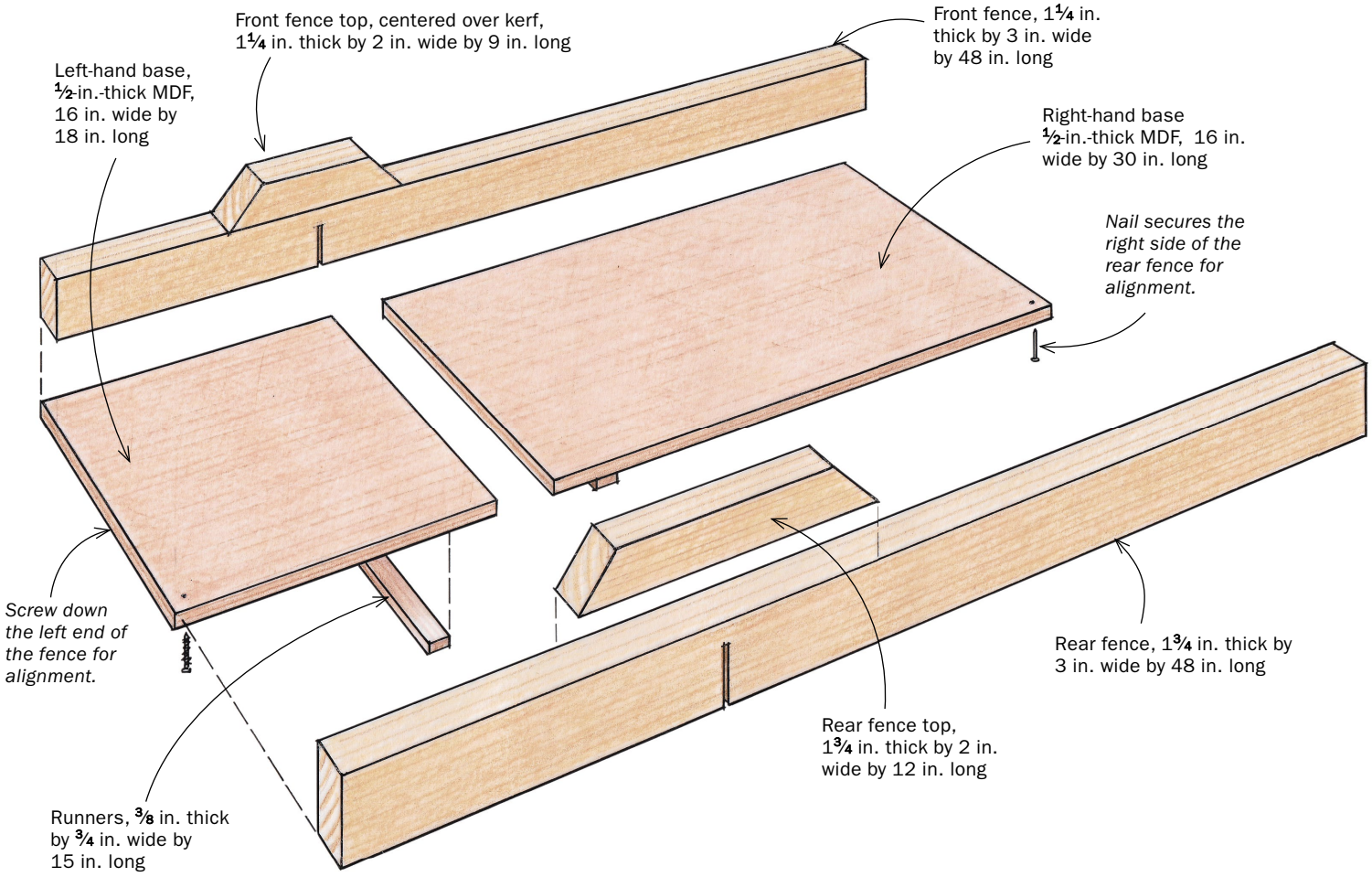
The advantage of this sled is its compact size. At 13 in. between the front and rear fences and 48 in. wide, it is light and convenient for everyday use. The space between the fences is narrow to minimize bulk and weight while still offering enough room for most solid stock. There is extra length on the right to support longer pieces like table legs and shelves.



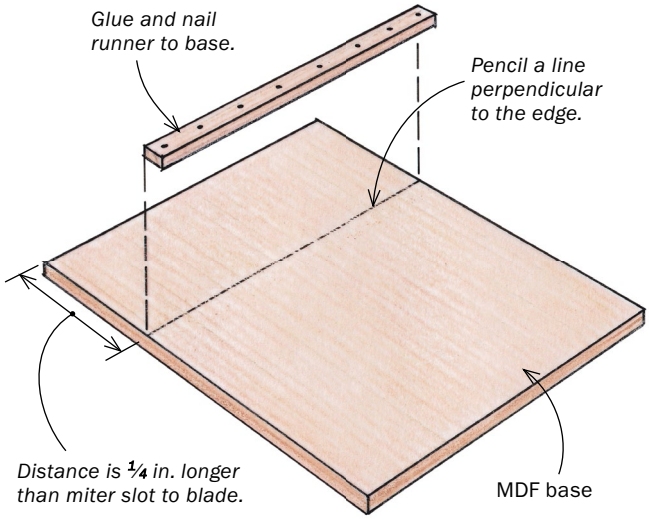
FOR SHEET GOODS, A DEEPER VERSION

To handle sheet goods for cabinet projects, you need a sled that will handle a 24-in.-wide piece of plywood. Most home woodworkers will use this sled far less than the one shown at left, but they'll need one eventually.





Make the base in halves



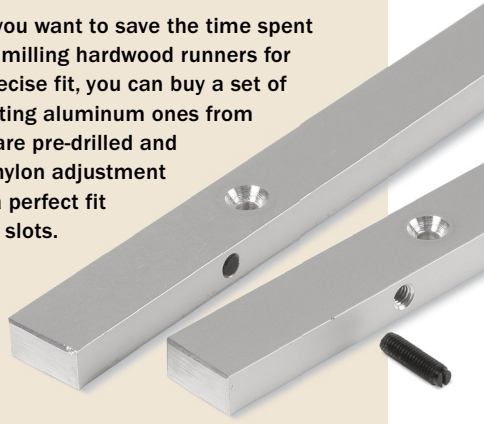
Mill the runners. *Start by cutting the pieces oversize to relieve internal stresses that might cause the wood to move. Then trim them to final dimension. Orient the grain as shown so that most of the swelling or shrinking will be vertical and will not affect the runner's fit in the slot.*

Glue the runner in place. *Turner uses an MDF template clamped to the sled's base (above) to help locate the runner and ensure it is straight. While pulling the runner against the MDF template, Turner secures it with 18-gauge nails (right).*

Trim each base for a perfect fit. *With the runner in the miter slot, cut away the excess MDF. The resulting edge is a perfect zero-clearance fit against the saw's blade.*

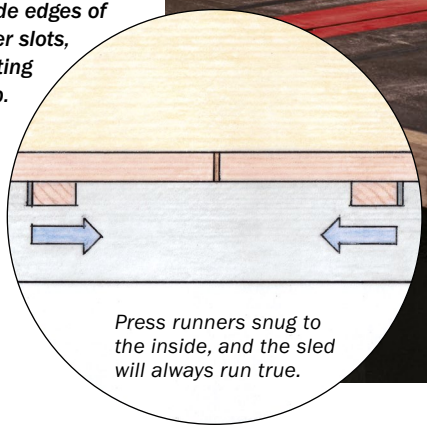
TIP

If you want to save the time spent on milling hardwood runners for a precise fit, you can buy a set of longer-lasting aluminum ones from Kreg. They are pre-drilled and come with nylon adjustment screws for a perfect fit in the miter slots. A 30-in. bar that can be halved to make the smaller sled is $28 at amazon.com. Attach the bars using the procedure for the hardwood runners, but substitute cyanoacrylate glue with accelerator for the yellow glue, and use screws with a centering bit instead of nails.



Add the front fence

Lightly clamp the base together. *When gluing the front fence in place, a clamp keeps the halves aligned and holds the runners snug against the inside edges of the miter slots, eliminating any slop.*



Press runners snug to the inside, and the sled will always run true.

two shown on p. 71. You might even add one with a wider slot for dadoes and bevel cuts. I'll build the smaller sled here, the one you'll use 90% of the time. Let's get started.

Build the base from two pieces

For the sled's two-part base, I favor ½-in. MDF for its flat surfaces and consistent thickness. MDF also takes a finish well, which lets wax work effectively as a lubricant on the sled's bottom.

For the runners, I suggest either maple or white oak, milled with the end grain running vertically to minimize the effect of seasonal swelling and shrinking. Mill the pieces slightly oversize, wait 24 hours, and then trim them to final dimension. Their final thickness should be less than the depth of the miter slots to leave room for debris in the bottom of the slots. Trim each runner to precise width for its slot and then mark them for right and left—the slots may vary slightly in width.

Attach the runners—With the runners prepared, it is easy to attach and align them.

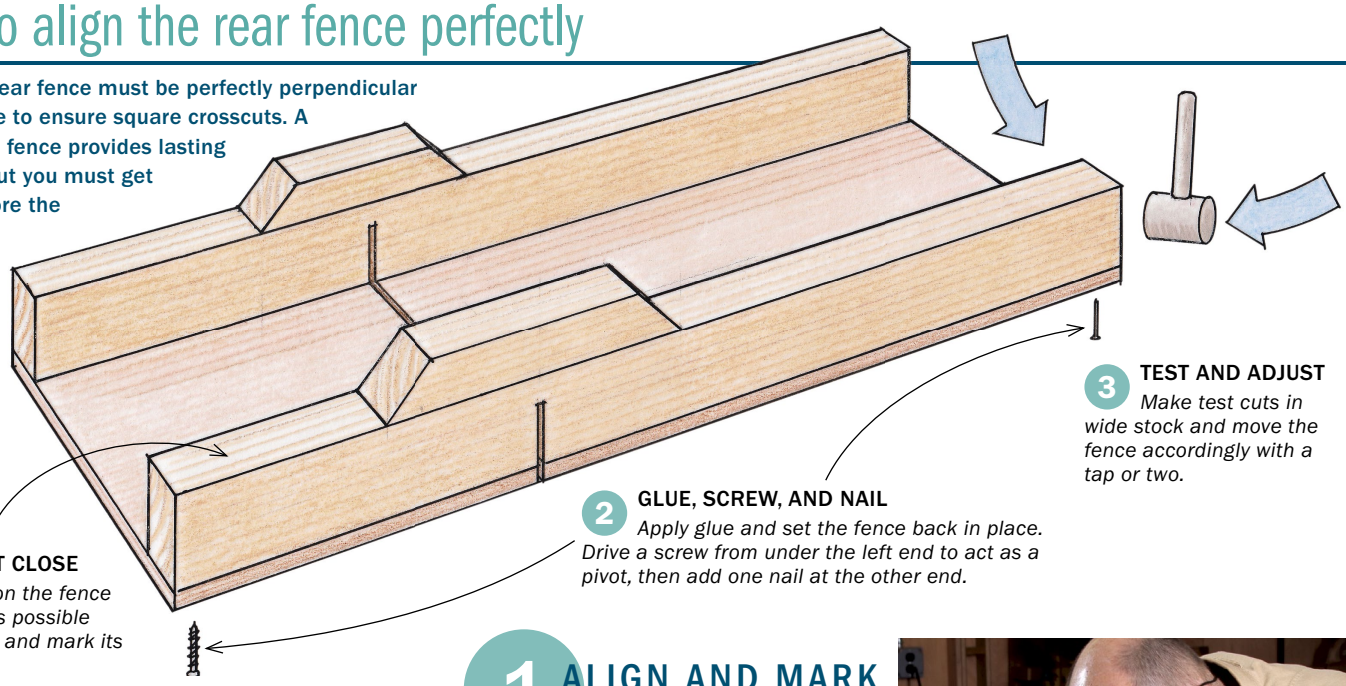
Measure the distance from the slot to the blade on each side of the blade, and then mount each runner with yellow glue so that each half of the base overhangs the sawblade path by at least ¼ in. I use a piece of MDF as a template to help locate the runner and to brace against to keep the runner straight. While the glue is still wet, secure the runners with a nail gun, or clamps.

When the glue dries, it's time to trim each sled half for a precise fit around the blade. For each piece, place the runner in the slot and use the saw to cut away the excess ¼ in. The inside edge of each panel now

Screws hold the fence. *With the front fence glued down, Turner drives a series of screws into pre-drilled holes to lock it in place. Its squareness is not critical.*

How to align the rear fence perfectly

The sled's rear fence must be perfectly perpendicular to the blade to ensure square crosscuts. A glued-down fence provides lasting accuracy, but you must get it right before the glue sets. Here's how:



1 GET IT CLOSE
Position the fence as square as possible to the blade and mark its location.

2 GLUE, SCREW, AND NAIL
Apply glue and set the fence back in place. Drive a screw from under the left end to act as a pivot, then add one nail at the other end.

3 TEST AND ADJUST
Make test cuts in wide stock and move the fence accordingly with a tap or two.

matches the exact path of the sawblade, one on the right and one on the left.

Attach the front fence and square the rear one

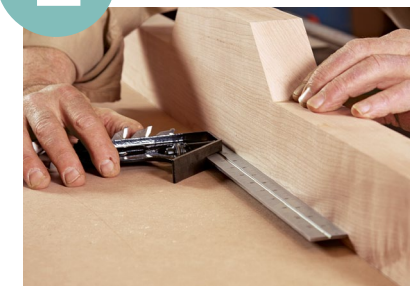
Use an accurate combination square to mark lines perpendicular to the sawcut edge for the front fence. Some 8/4 hard maple, carefully milled, is a good choice for the front and rear fences because it is hard and stable, and its light color reflects light well, making knife lines and other marks easier to see. To reduce weight but add stiffness, add a piece about 8 in. long to the center of the front fence where the blade comes through. The main section of the fence is about 3 in. tall; the added piece is 2 in. tall. To attach the fence, apply glue, pop in some nails to hold it in place, and then add screws for a better glue joint. It's only there to hold the halves together, so it doesn't matter if it is not exactly square to the blade.

Carefully prepare the stock for the rear fence. It has a built-up section similar to the front fence, but its surfaces must be flat, square, and parallel to one another. Milling in stages will relieve any internal stresses, so glue on the extra piece and then mill the fence oversize, letting it rest a few days before taking it down to final dimension. The front and rear fences don't have to be the same thickness; I used what I had on hand. Just be sure the front fence is at least 1 in. thick and the rear fence at least 1½ in. thick.

With the partially assembled sled on the saw, place the head of a combination square against the sawblade and use the rule to mark a line square to the blade where you will position the rear fence. Place the fence on this mark and pencil a line along the fence's entire length.

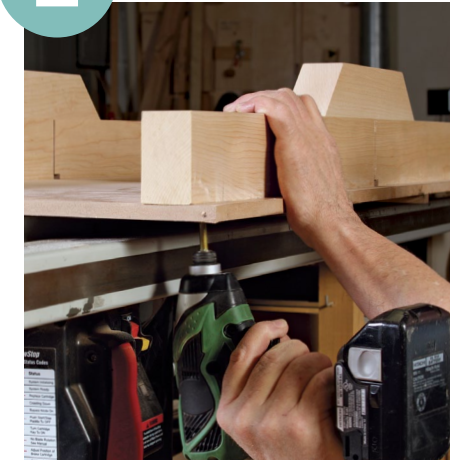
Now comes the most important part: attaching the rear fence dead-square to the sawblade path so that

1 ALIGN AND MARK



Square it. *Hold the combination square against a front and rear tooth and align the fence with the square's blade (above). Pencil a line on the base along the edge of the fence so you can keep track of its location (right).*

2 SECURE THE FENCE



Apply glue and one screw. *The fence will pivot on this screw while you adjust it to its final position.*

Nail the other end. *The nail will flex just enough to allow subtle adjustments to the fence's position, but will otherwise hold the fence in place.*

Make a test cut. *Right away, make a crosscut in wide stock to test whether the rear fence is square.*

you will be able to crosscut at exactly 90° for years to come. Here's how you do it.

Get everything ready. Rip a piece of MDF about 12 in. wide and 3 ft. long with straight, parallel edges. This will be used to test the accuracy of the rear fence. Now drill from the bottom for a screw on one end of the sled base, and be ready to shoot a single 18-ga. nail from the bottom on the opposite end. Apply the glue, set the fence on the line carefully, then drive the screw and nail. Now crosscut the MDF test piece.

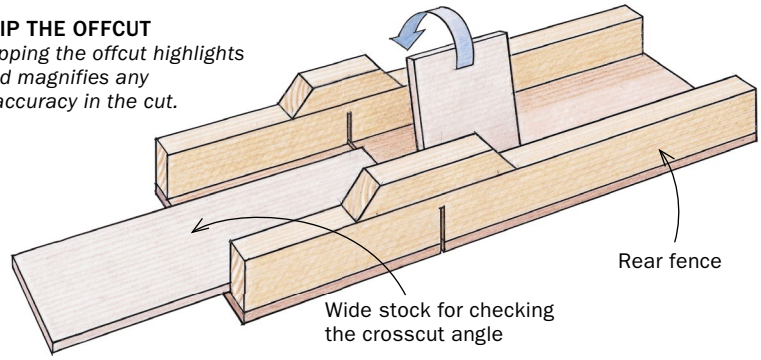
Pull the sled back and slide the two freshly cut edges together, keeping them snug against the fence. If the rear fence is straight, the edges should meet tightly, with no gap. Now, flip over one of the test pieces, keeping the same just-cut edges together, and put the two halves together against the rear fence. If there still is no gap, the cut is perfectly square. If there is a gap, this gap is double the amount the fence is out of square. With a steel hammer, tap the nailed end of the fence to correct, and test cut again, using the same procedure. Assuming that you've screwed down the left side of the fence and nailed the right, if the gap is at the fence, tap the right-hand end of the fence back. If the gap is away from the fence, tap the right side forward. With ordinary yellow woodworking glue, you should have about 3 to 5 minutes of open time to test and adjust, so work quickly.

When you have it dialed in just right, put clamps on to secure the rear fence to the sled base until the glue dries. Then go back and install screws from the bottom to be sure. You now have a sled that will cut dead square, every time, for many years to come. □

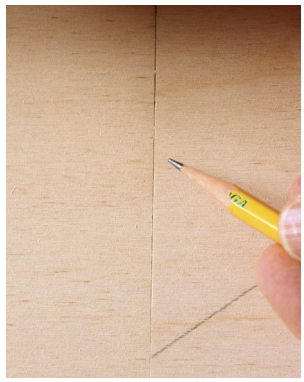
Alan Turner is an attorney, woodworker, and owner of Philadelphia Furniture Workshop, a woodworking school.

3 FINE-TUNE IT WHILE THE GLUE IS WET

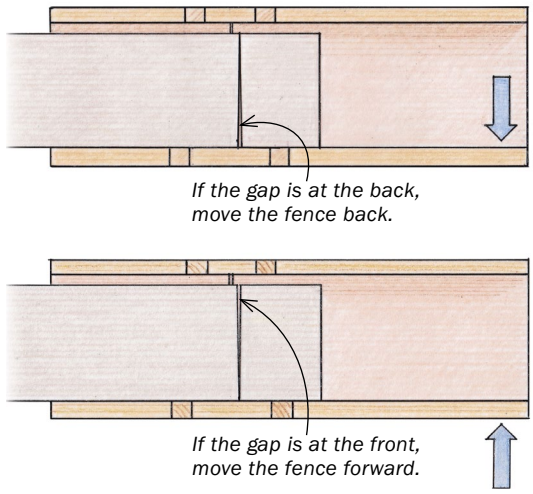
FLIP THE OFFCUT
Flipping the offcut highlights and magnifies any inaccuracy in the cut.

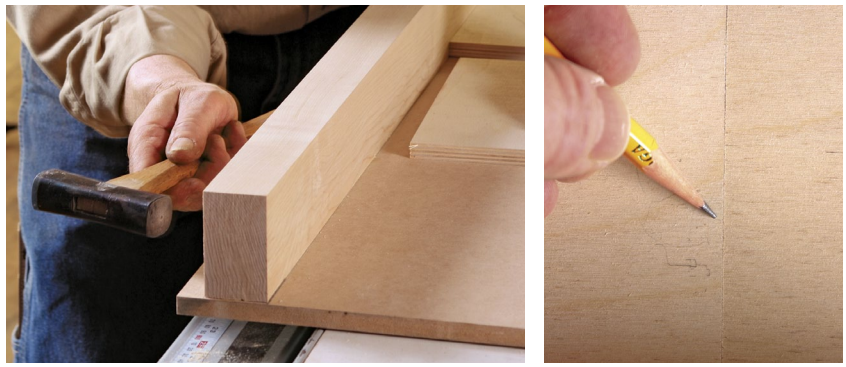


THE GAP DIRECTS THE ADJUSTMENT
Work quickly before the glue tacks up and tap the fence to adjust for square.



Butt the pieces together. *A gap indicates that the fence is slightly out of square.*





A tap closes the gap. *First mark the base with a pencil line to help show the fence's movement. A new test cut shows no space between the workpiece and offcut (right).*

Put the glue-up in clamps. *Then, after the glue dries, drive a series of screws from underneath to complete the assembly.*

Soup Up Your Crosscut Sled

Simple tricks to tame tearout and add accuracy

BY STEVE LATTA

Crosscutting furniture parts to length seems like an easy job, but—as with the entire milling process—small inaccuracies can lead to complications like openings that aren't square or joints that won't close. Most furniture makers make their critical crosscuts on the tablesaw, using either a miter gauge or a crosscut sled. I showed how to get more from your miter gauge in the article on pp. 22-24, but the best tool for precise crosscuts is the sled. A well-made crosscut sled carries the workpiece and controls tearout. It can handle much larger workpieces. And with a variety of stop blocks, it's also great for producing matching multiple pieces.

Once you've built a sled, you'll be on your way to making clean, accurate crosscuts. But there is more to the story, including tips on avoiding tearout and making multiple cuts accurately.

How to tame tearout

For any crosscut you make on the sled, there are a couple of steps you can take to reduce tearout dramatically. Because of the way the blade spins, tearout happens on the rear and bottom faces of the workpiece. So you need to ensure that the blade opening in the sled's deck and rear fence fits snugly around the blade that you are using.

If the blade opening is worn at all, or if you've switched to a narrower blade, attach a rear auxiliary fence made of ¾-in. MDF and a new deck made of ⅛-in. or ¼-in. MDF or plywood. I attach and replace these auxiliary pieces as needed to ensure the best cut. Cut a fresh kerf through them and the sled will virtually eliminate tearout. But just to be safe, try to position workpieces so that the most important surface is on top. For example, cut drawer fronts face up.

Cutting a single piece to length

When crosscutting a single piece, I follow one of two strategies to locate the cut. If the kerf slot on the sled's auxiliary fence still closely fits the blade I'm using, I'll use the slot as a reference point for the cut. After squaring one end of the stock, make a pencil mark on the top back edge of the workpiece and line it up with the edge of the kerf slot. After any crosscut, slide

Photos: Steve Scott; drawings: John Tetreault

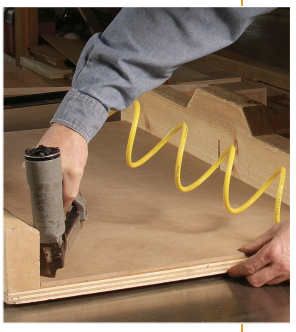
A well-kept sled eliminates tearout

PROBLEM

Over time, the blade opening becomes enlarged, leaving a gap around the blade. When this happens, the sled no longer supports the workpiece next to the cut. The result is tearout.

SOLUTION

New deck. *Tack in place a new base layer made of ¼-in. MDF or plywood.*



Fresh fence. *Make the auxiliary fence from ¾-in. MDF. Just clamp it on. Making the fence extralong (as shown) isn't necessary, but it accommodates a stop block for longer workpieces.*

The payoff. *The zero-clearance openings support the wood fibers where the blade exits the cut, helping eliminate tearout. As a bonus, you can trust the edge of the kerf when aligning your cuts.*

the workpiece away from the blade before pulling the sled back to you.

If the kerf slot is worn, I often make what I call a "sliding cut." After squaring an end, mark the length on the lower front edge of the stock where the blade will make first contact. Start the cut to the waste side of the line and make a shallow cut with the carbide tooth tips so that you can just see stock being removed. With the teeth still in the cut, slide the stock until the cut lines up with your mark; then complete the crosscut.

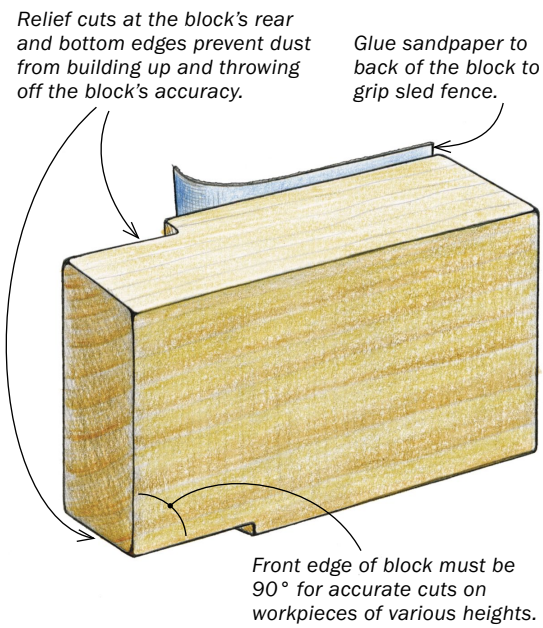
Cutting multiples: The magic stop block

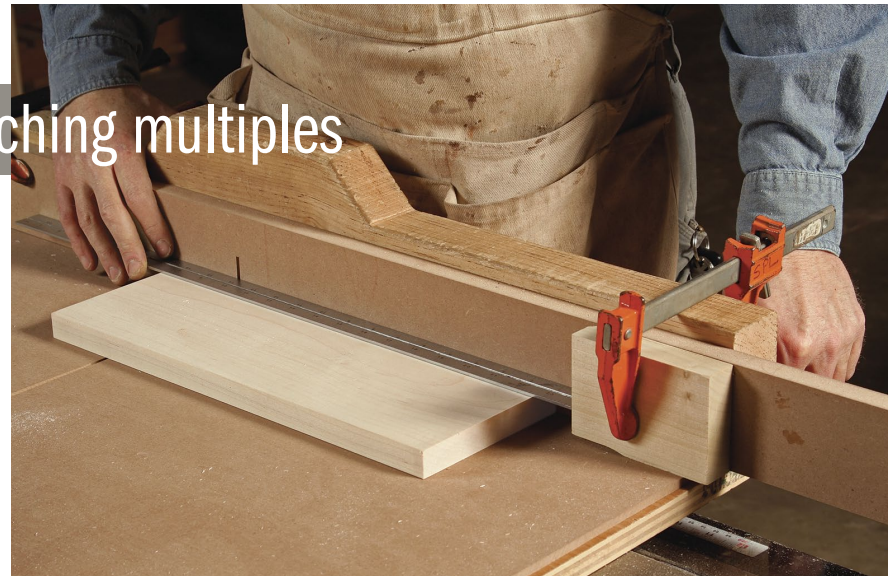
The idea when cutting multiple pieces to the same length is just that—making sure that each piece exactly matches its mates. Cut that second rail just a fraction of an inch too short, and your door frame will not go together squarely. Clamped securely to your sled's fence, a stop block holds the squared end of each workpiece at exactly the same distance from the blade, ensuring precisely matched parts.

It might seem like any piece of scrap would work as a stop block, but once again, the details matter. The block should come from milled stock, with flat faces and square

Add a stop block for matching multiples

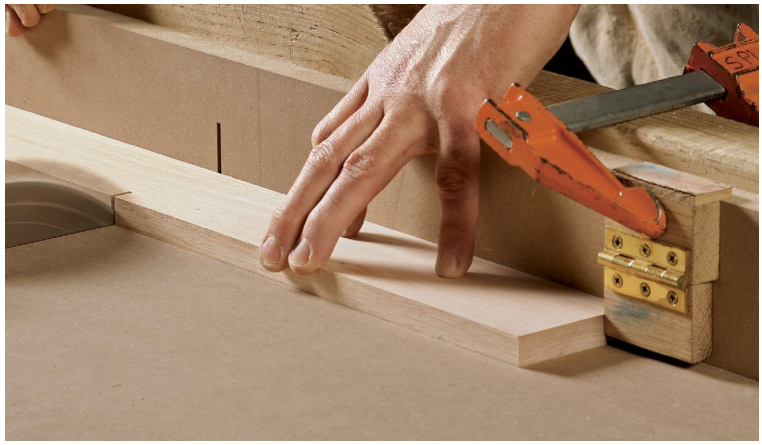
A BASIC BLOCK
for most work





A few tips. *Measure from the sled's kerf to locate the stop block, but elevate the ruler to avoid the relief cut under the block (above). Also, make sure the block is square to the sled's deck for accurate cuts in stock of any thickness.*

A HINGED BLOCK
for added convenience



The author's favorite. *A hinge lets you swing the lower half out of the way when squaring the first end of a piece, then drop it into place for cutting to final length. A lip at the top references against the top edge of the sled's fence, squaring the block every time.*

edges and corners. It should be no taller than the sled's fence and wide enough to accommodate a couple of clamps. Make the block thick enough (¾ in. to 1 in.) to provide a solid stopping surface. Relief cuts at the rear and bottom corners prevent dust buildup that could throw off a cut's accuracy.

Also, check that the block's stopping surface is square to the sled's deck. An angled block can give you an inaccurate cut, especially if you are cutting workpieces of varying thicknesses.

To help make sure that the block stays put, cover the back with adhesive-backed sandpaper. This helps the block bite into the sled's fence and resist sliding. Second, use two clamps to secure it to the fence. This limits any tendency for the block to slide or pivot, important when cutting large numbers of pieces. Last, remember to gently slide the workpiece into place. Don't bang it against the block or you risk altering the length of the cut.

To set the block in the right place, use a steel rule if possible (a tape is less accurate) to find the appropriate distance from the blade's teeth. When you have many workpieces to cut, make sure you organize them in a way that helps you keep track of the work. I always stack the workpieces to my right, with the squared end away

Hook-style block. *Two clamps hold this block in place. Latta adds a deep-reach clamp to help hold the long workpiece against the sled's fence.*

from me. I re-stack the cut pieces to my right but farther away than the working stack. You might organize your work differently. The point is to make your system consistent, so you can rely on it.

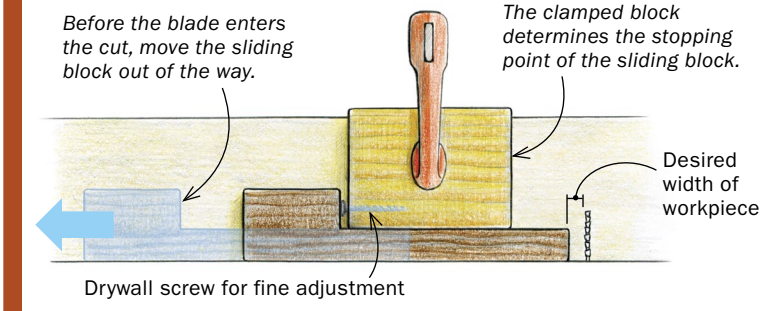
Special stop blocks: the long and short of it

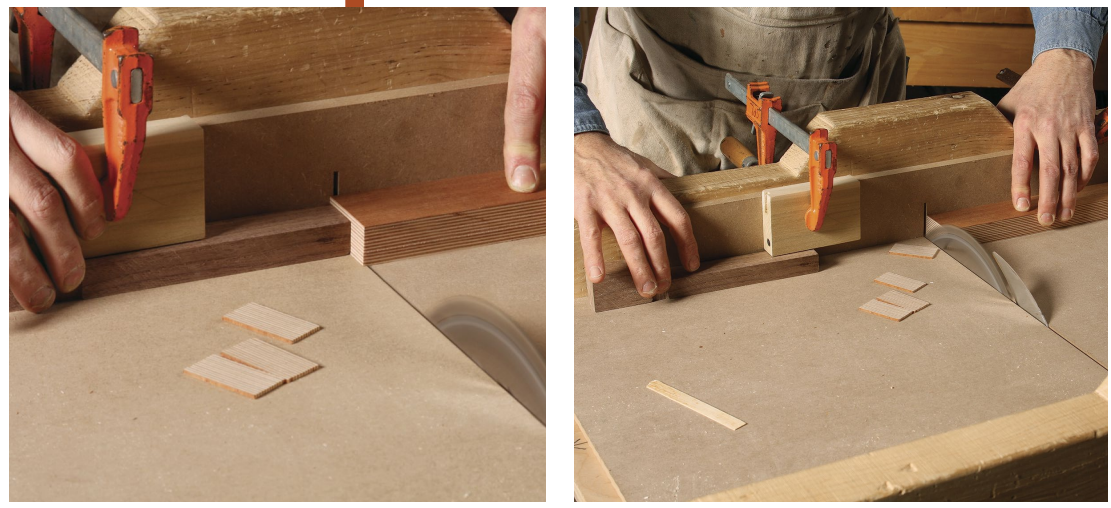
Sometimes you need to cut a workpiece to a length that is longer than your sled's width. This leaves you with no place to attach a conventional stop block. The solution is a hook type of block designed to extend beyond the sled's reach. The block, which can be cut on the bandsaw from ½-in. or ¾-in.-thick plywood, is notched at the far end to hook over the end of the workpiece.

To locate the block, lay out the cut on the workpiece, align the mark with the kerf, and secure the work temporarily by clamping it to the sled's fence. Now set the stop block in place and use a pair of clamps to hold it fast.

I use a different type of stop block when doing certain types of small work, such as cutting material for bandings. For this type of work, the block acts to precisely control the length of the offcut without trapping it next to the spinning blade.

To accomplish this, I use a stopping jig on the right side of the blade. This jig lets me slide a stop block precisely into place while locating the workpiece and then slide it back out of the way before beginning the cut. With this jig, I can make multiples of very thin pieces. □





Cut short pieces safely. *This sliding block controls the length of the offcuts, ensuring slices of equal thickness, but allowing them to fall freely away from the blade. Put the sliding block in place, and bump the workpiece against it (left). Then pull the block away before making the cut (right).*

Steve Latta teaches woodworking at Thaddeus Stevens College in Lancaster, Pa.

PROJECTS

The Incredible L-Fence

Take your tablesaw to another level with this simple shopmade fence

BY BOB VAN DYKE

Adding jigs and auxiliary fences is a common way to increase your tablesaw's capabilities. But the most clever tablesaw add-on might be one you've never heard of. The "L-fence" makes rabbets, tenons, and straight flush-cuts a breeze, and it will change the way you think about miters. Once you grasp the basics, the L-fence will become an indispensable fixture in your shop.

In its simplest form, the L-fence is two boards fastened along their edges at a right angle. One side is clamped flat to the rip fence; the other side extends horizontally for a workpiece or template to ride against. It's not hard to build (see opposite page) but once you do, it will make your tablesaw much more versatile.

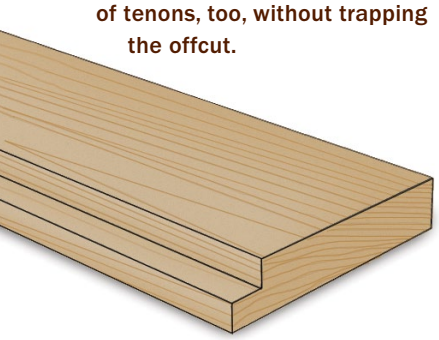
Easier rabbets and tenons

The L-fence excels at partial cuts into workpieces. As opposed to a sacrificial rip fence, an L-fence remains undamaged, and

Photos: staff

Fast rabbets and safe tenons

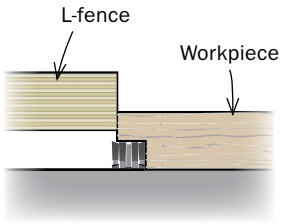
With the L-fence, you bury the dado blade under the fence—not in it—so you can use the fence repeatedly. It makes quick work of tenons, too, without trapping the offcut.



Set it straight. *Set the L-fence 1/16 in. to 1/8 in. above the blades. Shims hold the fence parallel to the table as you tighten the clamps.*

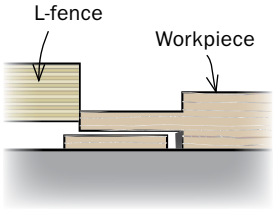
Adjust the rip fence. *The width of the exposed dado set establishes the width of the rabbet. Measure from the edge of the L-fence to the outside of the blade's teeth.*

RABBETS



Run your rabbets. *Keep the edge of the workpiece tight against the edge of the L-fence as you make the cut.*

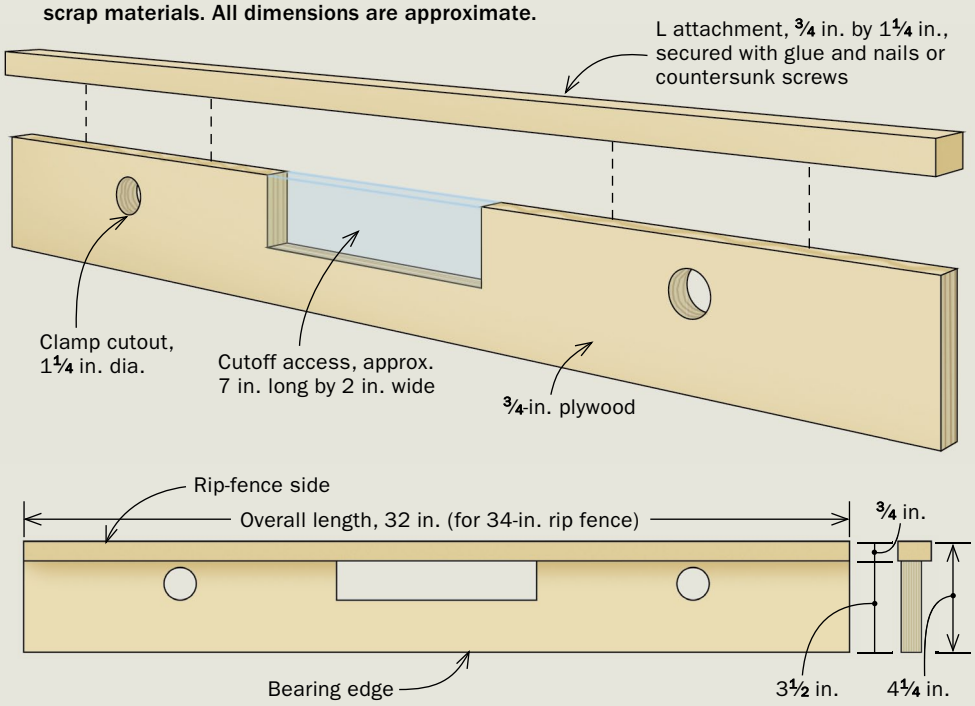
TENONS



Tenons, too. *After the cheek cuts, cut the shoulders with the tenon riding against the L-fence. The cutoff falls away safely.*

L-fence is easy to make

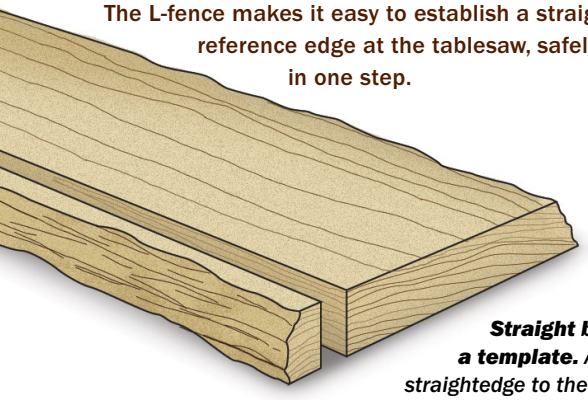
You can put together this handy jig in no time, with scrap materials. All dimensions are approximate.



Pop, pop. *Attach the two pieces with a bead of glue and a few nails (or countersunk screws).*

PUT A STRAIGHT EDGE ON ROUGH LUMBER

The L-fence makes it easy to establish a straight reference edge at the tablesaw, safely, in one step.



Straight board is a template. *Attach a straightedge to the workpiece with double-sided tape.*

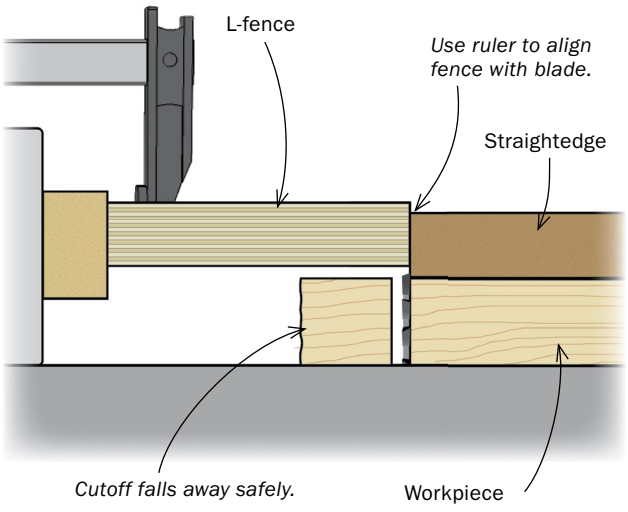
Set up for a flush cut. *Use a ruler to align the edge of the L-fence with the outer edge of the teeth. The L-fence should be a little above the blade, and parallel to the table.*

allows the offcuts to drop away harmlessly. To cut a rabbet, raise the dado blades up to the depth of the rabbet and clamp the L-fence to the rip fence, positioning it 1/16 in. above the blade, parallel to the table. As with a sacrificial fence, the width of the exposed blades equals the width of the rabbet. But unlike a sacrificial fence, the L-fence doesn't need to be replaced.

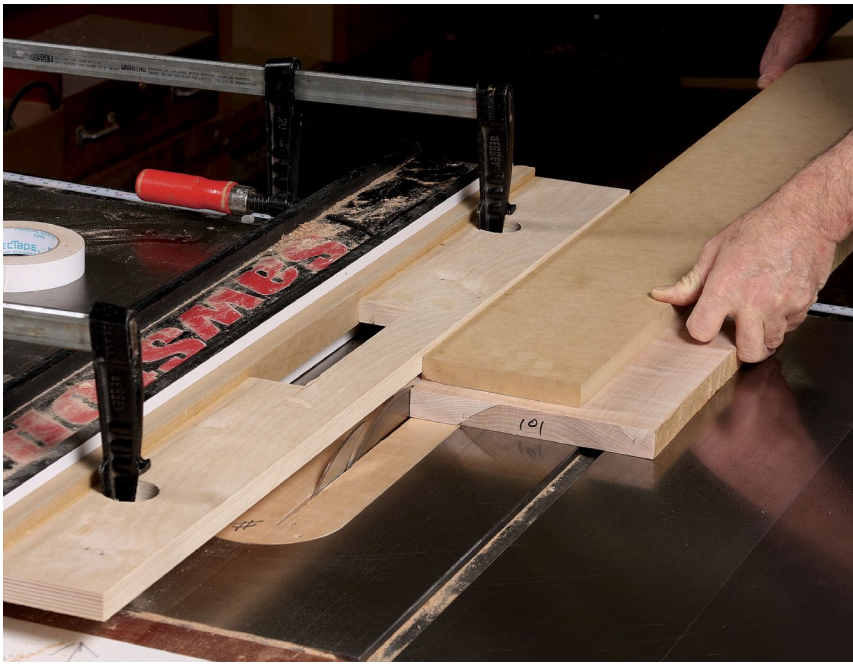
You can make shoulder cuts on tenons the same way. Use the L-fence with a miter gauge (or push blocks, for wider tenons) to cut the shoulders, and the freed cutoff will fall away safely.

Add a straight edge to a waney board

Putting the first straight edge on rough lumber is usually a two-step process: Bandsaw close to a line, then run that edge over the jointer to clean up the cut. With the L-fence, you can do both steps at once. Lay out your cut line on the workpiece, then fasten a straight piece of wood on the line. Set the L-fence just above the



Rip it flush. *Push the workpiece through, letting the template bear against the L-fence. The beauty of the L-fence is that if you bobble the workpiece, you're cutting into the waste, not the work. If you make a mistake, just run it again.*

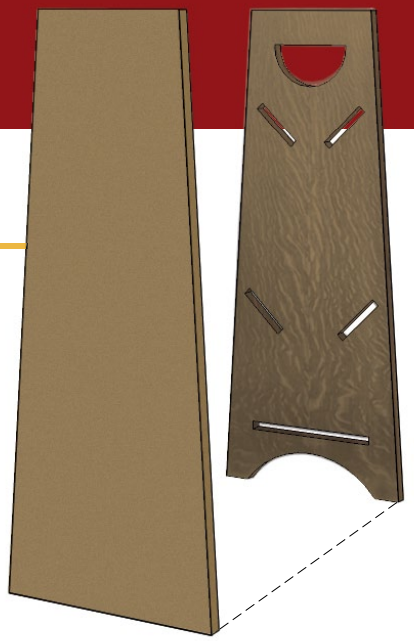


Drawings: Kelly J. Dunton

Trace it out. *Lay the template on the workpiece and trace around it. Plywood and MDF make better templates because their dimensions stay stable over time.*

CUT OUT A COMPLETE PROFILE

With the L-fence, you can use templates to reproduce any straight-sided shape. The sides of this bookcase are trapezoidal. Without parallel edges or square corners, you'd probably cut the rough shape at the bandsaw and then clean up the edges. But with the L-fence, you can cut both workpieces accurately in a fraction of the time.

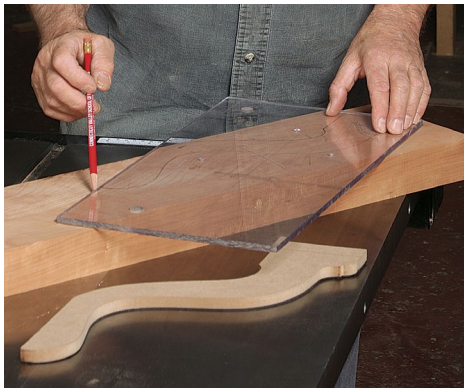


Cut flush to the template. *Here, instead of using double-sided tape, the template is attached with screws, located in an area that will be cut away.*

Crosscuts are easy, too. *Use a push block to keep the template tight to the fence as you work your way around the pattern.*

MAKE PRECISE CUTS ON AWKWARD PARTS

The foot of this tea table leg must be perfectly square to the edge that will be joined to the pedestal. Using a square template (in this case, clear plastic) to cut the two straight edges on all three legs ensures that all three feet will land flat on the floor.



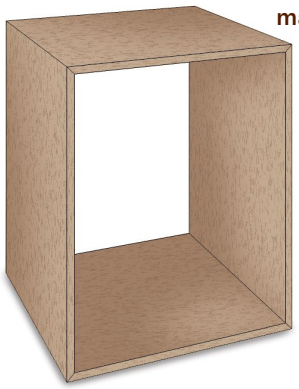
Two templates. *Trace the leg pattern onto a square Lexan template. Then use the clear template to locate a leg on the blank and mark the straight edges.*

Cut the critical edges. *After bandsawing away most of the waste, reattach the Lexan template (left) and use it with the L-fence to trim the critical edges (right). Afterward, use the leg pattern to mark the curves, and shape them any way you choose.*

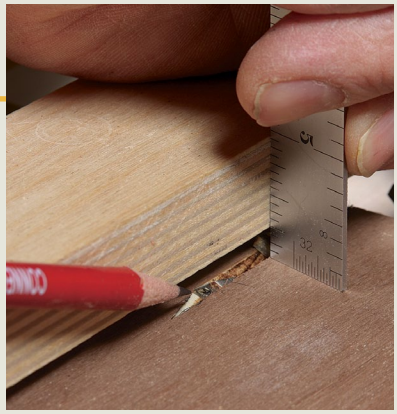
Perfect miters

ON BIG CASES

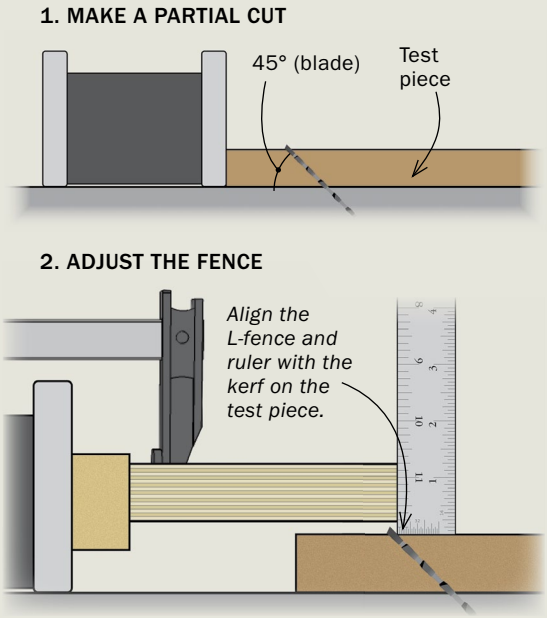
An L-fence takes the headaches out of case miters by allowing you to make cuts without trapping the case sides between the blade and the rip fence—eliminating the burning and scarring that can interfere with a clean, tight fit.



THE SETUP IS CRITICAL



Test cut sets up L-fence. *Tilt the blade to 45° toward the rip fence. Run a scrap from the case side stock halfway into the blade and hold it as you shut off the saw. Move the L-fence over the blade so its bearing edge is aligned with the kerf as shown.*



Attach straightedges flush. *With the case sides cut to their final dimensions, attach straightedges flush to the edges of the workpieces (above) with double-sided tape (use thicker carpet tape). The other sides of the straightedges are cut at 45° so they can serve as clamping cauls during assembly.*

Perfect miters come together quickly. *The clamping cauls make glue-up a breeze. When the glue sets, remove the cauls. A solvent rag cleans up any lingering residue from the double-sided tape.*

blade, where it will make solid contact with the straightedge. To cut flush to the straightedge, set the L-fence's bearing edge in line with the blade's teeth. Keep the straightedge tight to the L-fence as you make the cut.

Replicate any straight-sided pattern

Routers are great for pattern-cutting and trimming flush to a template, but for a pattern with straight sides, using the L-fence is often faster and more accurate. In fact, it's often the best tool for making the template in the first place.

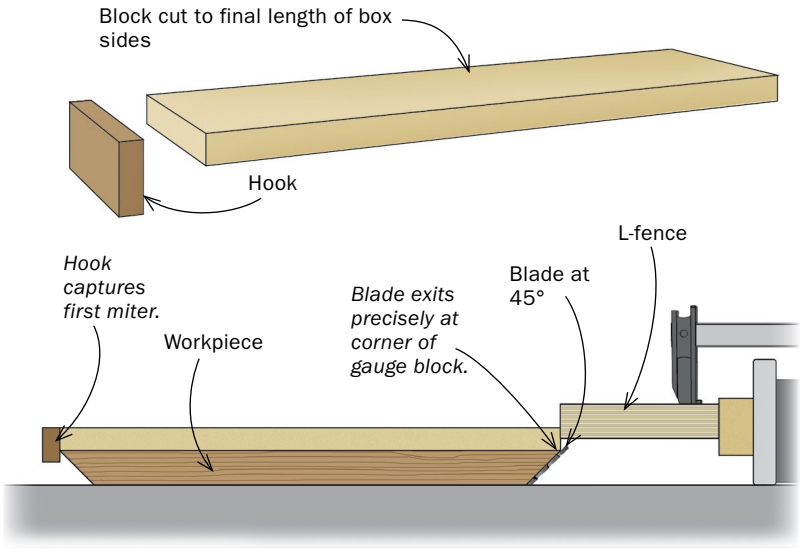
Once you've laid out your pattern on the template stock, use a straightedge as described above, but this time reposition the straightedge multiple times for multiple cuts, until the shape is complete. Now that you have your template, you can use the L-fence—again, set up for flush-cutting—to duplicate any straight-sided part. Trace the template on the workpiece, then use a bandsaw or jigsaw to trim the waste to within ¼ in. of the line. No need to be fussy, but keep in mind that the waste side of the cut can't be wider than the L-fence itself or the rip fence will be in the way.

AND SMALL BOXES

Using the same L-fence mitering setup and a simple "gauge hook" as a template, you can make endless identical box sides.

Miter one side. *Before you introduce the gauge hook, cut the first miter on each workpiece with just the miter gauge.*

GAUGE HOOK ENSURES PERFECT BOX SIDES



Get the hook. *With the L-fence set for a mitered flush cut (see opposite page), use the gauge hook to make the second miter. Use the miter gauge and let the end of the gauge hook ride the L-fence.*

Big offcuts take up more space between the blade and the rip fence and need to be cleared out more often to eliminate the risk of kickback. You can use double-sided tape to attach the template, but I use screws when possible, placing them in areas that will be cut away later—like the through-mortises for the Arts and Crafts bookshelf on p. 83.

Article Extra
Learn a variety of techniques using the incredible L-fence.

A foolproof approach to case miters

The setup for case miters is really just another kind of flush cut. Provided you used care setting up, the L-fence will help you produce accurate miters that come together effortlessly.

Cutting case miters exactly to a final dimension can be tricky, but when using the L-fence you start by cutting the parts square, then add the miter in a second step.

Once you have the fence set up as shown on the opposite page, and you've cut the sides to final size, you attach straightedges flush to the edges. I cut the opposite side of my straightedges at 45° so they'll work as clamping cauls during assembly. With the fence and blade set up as shown, run the case sides so the straightedges bear against the L-fence.

Identical box miters made easy

For a quick and easy way to cut identical box sides, start with the same L-fence setup. Rough-cut the box sides close to the approximate final length, and use a miter gauge to miter one end. Cut gauge blocks to the finished length of the pieces you need. Tack a lip to one end of each block to create a hook. This will grab the knife edge of the first miter on each workpiece, and the block will bear against the L-fence as you make the cut on the other end.

The sides will be cut to the exact length of the block. Repeat the process with the other block, and your boxes will come together perfectly. □

Bob Van Dyke is founder and director of the Connecticut Valley School of Woodworking.

Best-Ever Outfeed Table

Versatile workstation stores all your tablesaw gear and then some

BY JOHN WHITE

Shelve your sled. *A dedicated shelf keeps the crosscut sled out of the way but easily accessible.*

No wasted space. *You can do glue-ups and other bench tasks on this table, so you'll need tools and supplies nearby.*

Blades at the ready. *The bottom drawers are deep enough to store blades vertically, making them easier to identify and pull out.*

Stow your fence. *A well-placed rack keeps the rip fence close at hand.*

Photos, except where noted: Matt Kenney; this page: John Tetreault

A good outfeed table is essential for safe woodworking, because it allows you to control the workpiece as it moves past the blade and off the back of the tablesaw.

Without it, you'll have to push down hard on the back of long boards, which makes it difficult to guide them safely past the blade. An outfeed table also naturally doubles as a work surface for assembly and finishing. But the space beneath the table often lies unused, a wasted opportunity for efficient storage.

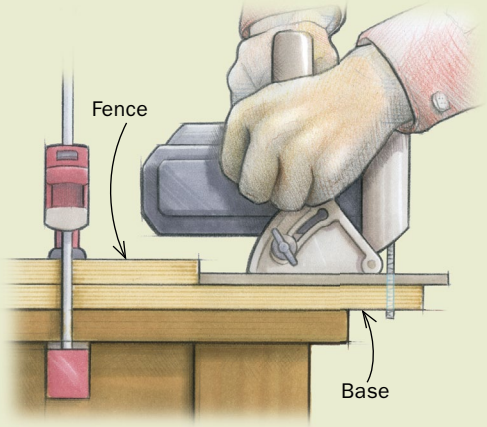
This outfeed table has a cabinet below that takes advantage of that space, with dedicated storage areas for the rip fence, miter gauge, crosscut sled, blades, and several big drawers for jigs. And there's plenty of shelf space for general storage, as well as room on the end panels for clamps. The large phenolic-plywood top is great because it's so slick that materials almost float across it. And because the surface resists stains and glue, it's perfect for assembly and finishing. I let the top overhang the base for easier clamping.

It's easy to adjust the table's height and level it, too. So if you move to a new shop, you won't need a new table.

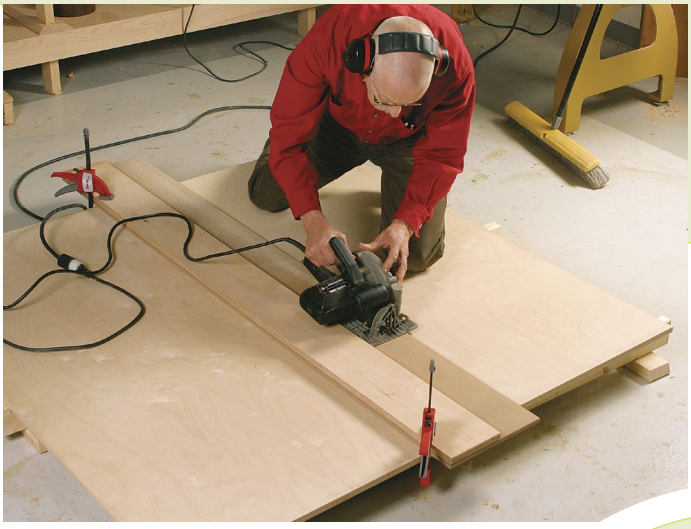
Best of all, this outfeed table is not difficult to build. The hardest part may be dealing with the large sheets of plywood, but I'll offer tips that make breaking down and squaring the material easier. All of the joinery is simple. The cabinet itself is joined by butt joints held together by screws (I'll offer pointers on assembling the joints accurately). The drawers are joined by a rabbet-and-groove joint that requires only two tablesaw setups.

PRECISE PLYWOOD PIECES

Use a circular saw and guide to square up factory-cut edges and to cut parts to a manageable size for the tablesaw.



Make a cutting guide. *Attach a fence to a slightly oversize base. Then trim the guide with a circular saw to establish a dead-accurate reference for lining up cuts.*



How to use it. *Align the guide so that the first cut not only gives you a straight side, but also a square corner.*

Materials improve function and ease construction

This cabinet is built entirely of sheet goods, except for two Douglas-fir runners. The top, drawer fronts, and kick plates come from a single 4x8 sheet of phenolic plywood. The cabinet is ¾-in.-thick Baltic-birch plywood and the drawers are ½-in.-thick Baltic-birch plywood.

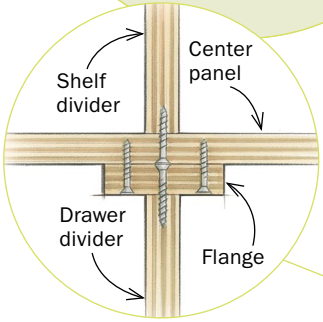
The entire table can be made more economically from medium-density fiberboard (MDF) or ordinary plywood, but you'll have to use connecting bolts with barrel nuts to make strong joints in the softer MDF. With plywood, you can use screws. And you'll need to apply a finish to the tabletop to toughen it and seal it against stains and glue.

TIP

Bar-clamp handle. *When trimming the panel square, use a bar clamp to help hold it against the fence. A block at each end helps keep the clamp in position.*

BASIC ANATOMY

Baltic-birch and phenolic plywood combine for good looks, a sturdy base, and a low-friction top. Adjust the height shown here to fit your saw.



Top, ¾-in.-thick phenolic plywood, 42 3/16 in. wide by 53 in. long

Subtop and bottom, 36 in. wide by 42¼ in. long

Shelf, 16¾ in. deep by 19⅝ in. wide

Joint-connector bolt, 7 x 60mm

Skirt, 1½ in. wide by 19⅝ in. long

Drywall screws

Drywall screw

Divider, 40 in. long by 8 in. tall

Sled shelf, 35¼ in. wide by 40 in. long

Drawer divider, 16½ in. wide by 19¼ in. tall

Drawer box, ½-in.-thick Baltic-birch plywood

Shelf for rip fence

Drawer front, ¾-in.-thick phenolic plywood

Kick plate, ¾-in.-thick phenolic plywood, 3¾ in. tall

Side cleat, 1¼ in. wide by 15½ in. long

Center panel, 40 in. wide by 19¼ in. tall

Runner, Douglas fir, 2½ in. square by 37¾ in. long

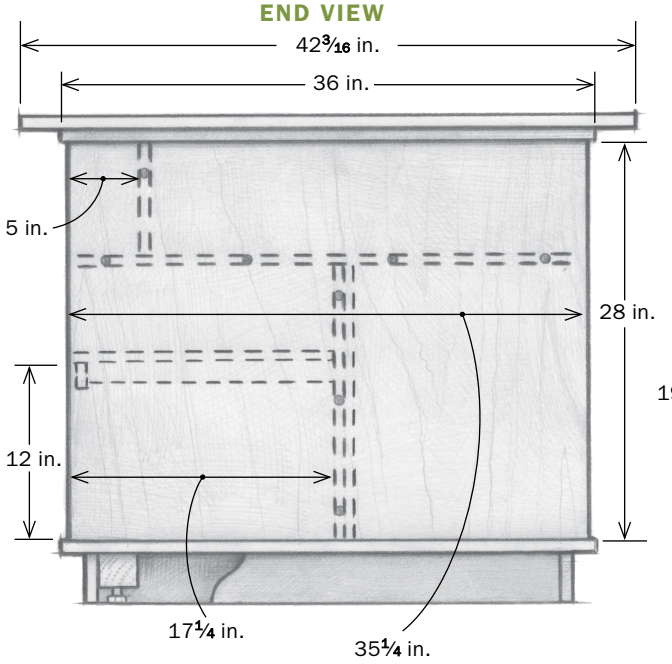
Lag bolt, ½ in. dia. by 3 in. long

Flange, 3 in. wide by 19¼ in. long

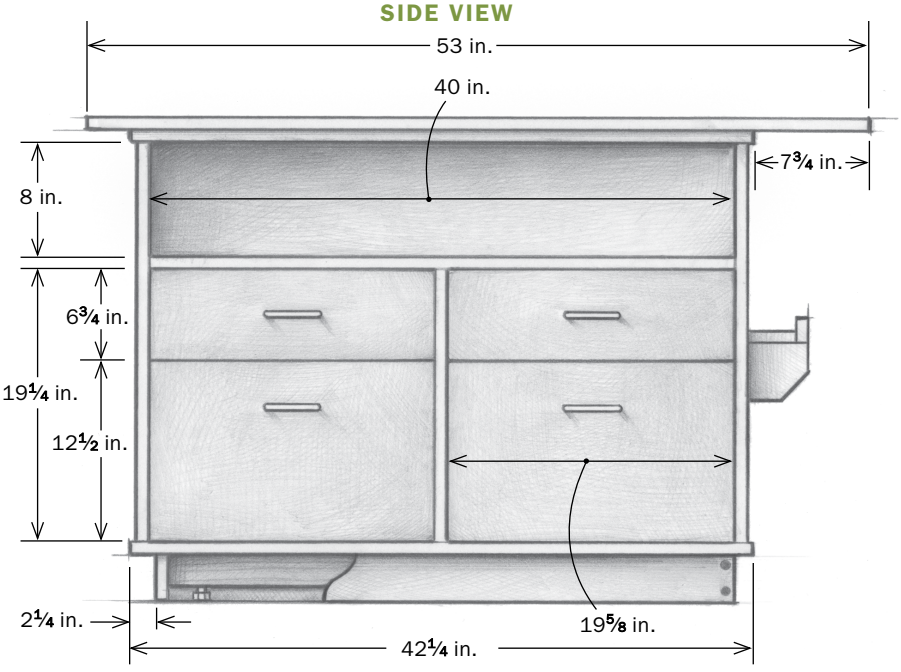
End panel, 35¼ in. wide by 28 in. tall

To purchase expanded plans for this outfeed table (including plywood cutting diagrams) go to FineWoodworking.com/PlanStore.

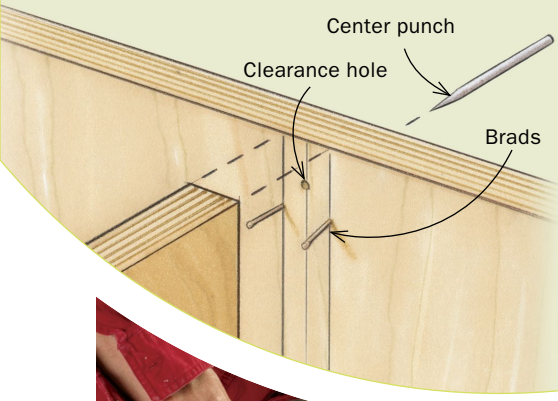
END VIEW



SIDE VIEW



Drawings: Bob La Pointe



JOINERY TIPS

Careful layout of joint locations and a few well-placed brads take the fuss and frustration out of butt joints. The layout lines show you where to drill, and the brads act as a third hand to hold the panels steady as you mark screw locations.

Drill along the centerline. *Two lines show the edges of the intersecting panel. The third line marks the centerline for the clearance holes.*

Brads are helping hands. *Brads driven in along the edge lines will hold the intersecting panel in place as you transfer the location of the clearance holes. A pair at the top and at the bottom is all you need.*

Transfer the pilot-hole locations. *With the two panels aligned and held in place, slide a center punch through the outer panel and tap it to mark locations for the pilot holes. Disassemble the parts and drill the holes.*

A guide for square panels

You can't rely on the factory-cut edges being square to each other, and full sheets are hard to handle on the tablesaw anyway. Solve both problems by using a circular saw and cutting guide to break down the sheet into smaller workpieces.

Set the guide so that it cuts an edge square to a factory edge. Use a sanding block to clean up the two square edges and then measure and mark the panel's final dimensions. Trim it to size on the tablesaw, running the square edges along the fence.

Bevel all edges on the panels with a chamfer bit. This prevents damage to the panels and adds a bit of safety. A square phenolic edge is very sharp and easily can cut you. Beveled edges also create crisp shadow lines at the joints, which I like.

Screw joints are solid

All of the table's joints, except those in the drawers, are simple butt joints held together with screws. Where they wouldn't be visible, I used drywall screws. Where the screw heads are exposed, I used joint-connector-bolt wood screws, which have

Use a drill to start the screws. *Drive in the joint-connector bolts, leaving them about ⅛ in. proud of the panel.*

Hand torque brings them home. *Use an Allen wrench to drive the bolts flush with the panel. A drill might over-drive the head or strip the pilot hole.*

LOGICAL ORDER FOR ASSEMBLY

Start with the center and end panels because everything else is built around them. The bottom keeps these parts square and stable while you attach the rest of the components.

Start with the core. *Assemble the end panels and center panel, and trace their locations onto the bottom. Mark centerlines, drill holes for the drywall screws, and then attach the bottom.*

Add the dividers. *Attach the shelf divider first. Then install the flange (see drawing, p. 88) and drawer divider.*

The sled shelf is next. *Drive joint-connector bolts through the end panels into the sled shelf. Use drywall screws to secure the shelf to the drawer and shelf dividers.*

Flip the cabinet to attach the feet. *Lag bolts screwed into Douglas-fir runners make easily adjustable feet. After flipping over the cabinet, attach the runners with drywall screws.*

large, bronze-colored heads that look good on shop furniture. Although these are called bolts, they're actually hefty wood screws that need aligned clearance and pilot holes drilled before you drive them home (see photos, p. 89).

Butt joints can be hard to align and assemble, so I use a couple of tricks to make things easier. First, I mark where one panel butts against the other. With these lines drawn, it's easy to tell where the joint is located and to drill accurate clearance or pilot holes along the centerline.

Once the clearance holes are drilled, you need to transfer their centers onto the edge of the intersecting panel so that you can drill pilot holes. But it's not easy to hold everything in

alignment when you do that, so I drive a few brads into the edge lines drawn earlier to trap the panel and hold it steady while I transfer the centers. I pull out the brads with a claw hammer when the joint is together. The layout lines and small nail holes left behind are hidden inside the case.

Assemble the table in stages

I built my table in stages to avoid accumulated errors, but some parts should be cut in groups for uniformity. The cabinet's center panel can be cut at the same time as the drawer and shelf dividers because they need to be the same height.

Begin by assembling the end panels and the center panel. Once they're joined and square to one another, get the dimensions for the bottom and subtop by measuring the assembly and adding ¾ in. to its width and length. The bottom and subtop overhang the core assembly by ⅜ in. on all four sides, which makes it easier to fit them because the alignment of the edges won't need to be exact. Attach the bottom, but not the subtop.

The drawer and shelf dividers are next. The shelf divider is simply screwed to the center panel. The back of the drawer divider, however, has a strip of plywood attached to it. Screws are then driven through the resulting flange to attach the drawer divider to the center panel (see detail, p. 88). This is necessary, because once the shelf divider is installed, you won't be able to drill through the center panel to attach the drawer divider.

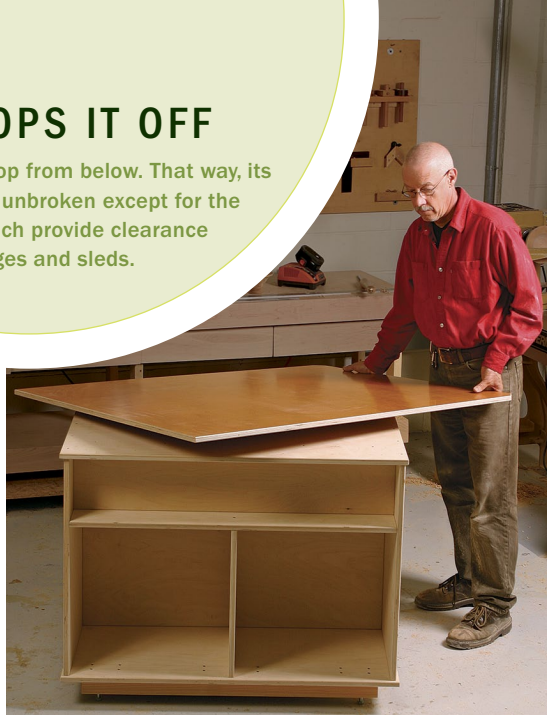
After the dividers are in place, install the large shelf that provides storage for the sled. When you screw it down, keep the drawer and shelf dividers square to the center panel. Next, add the divider that serves as a back to the shelf.

You're now ready to attach the subtop, which adds stiffness to the phenolic top and makes it easier to screw it on. Before you attach it, drill and countersink a series of holes for the screws that will attach the phenolic top to the base. Drill them 6 in. apart around the subtop's perimeter and about 2 in. from the edge. Do the same around the center. Now, attach the small shelf on the side of the table. To keep things simple, I screwed the shelf to a pair of cleats, which are hidden by a skirt on the front edge.

Flip over the base and attach the two runners that receive the table's lag-bolt feet. These runners are made from Douglas-fir 4x4s trimmed to 2½ in. square. Drill pilot holes for the lag-bolt feet and screw them in, leaving them about 1 in. proud of the runners. The lag bolts allow you to adjust the

TABLE TOPS IT OFF

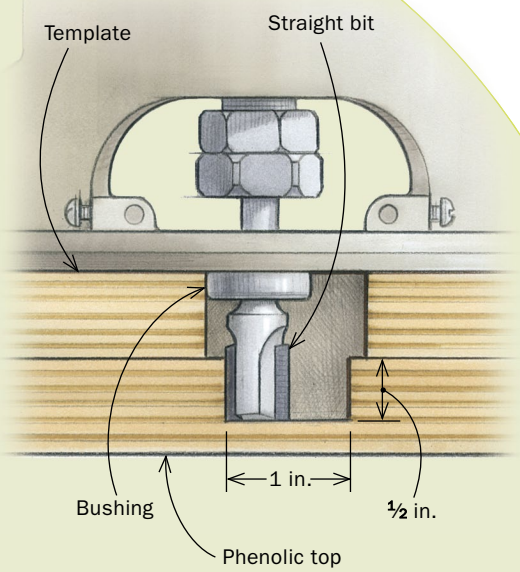
Attach the phenolic top from below. That way, its smooth surface is unbroken except for the miter slots, which provide clearance for gauges and sleds.



Screws shouldn't show. *After the table has been righted and the subtop attached, you can put the phenolic top in place. Secure it from below with drywall screws.*

Make way for the miter gauge. *Put the outfeed table in place—leveled and adjusted to the right height—and use the saw's miter gauge to locate the clearance slots.*

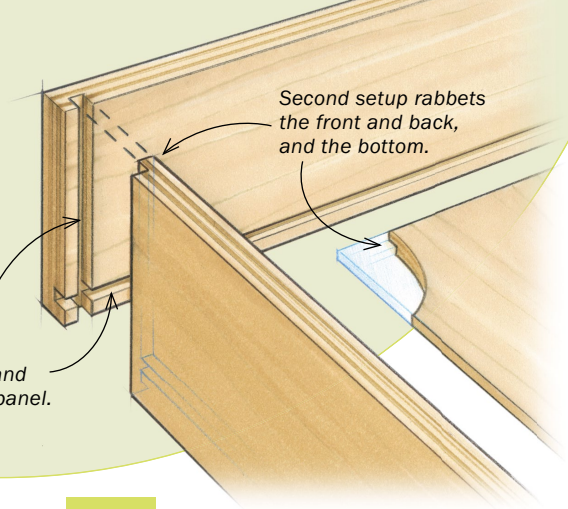
ROUT THE CLEARANCE SLOTS



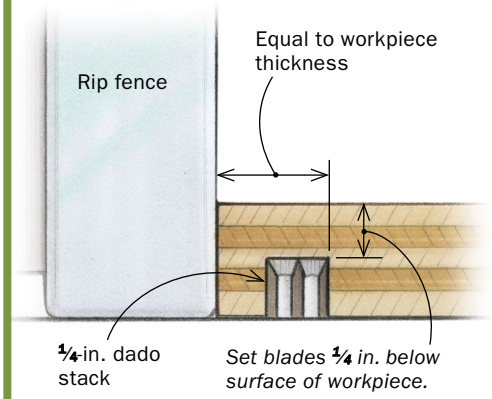
Jig makes quick work of wide slots. *White used a router equipped with a guide bushing and straight bit to cut the clearance slots. His method produces a wide, accurate slot without having to move a straightedge for multiple passes.*

SIMPLE JOINERY, STURDY DRAWERS

Build the whole drawer box with just two tablesaw setups, one for the grooves and one for the rabbets.



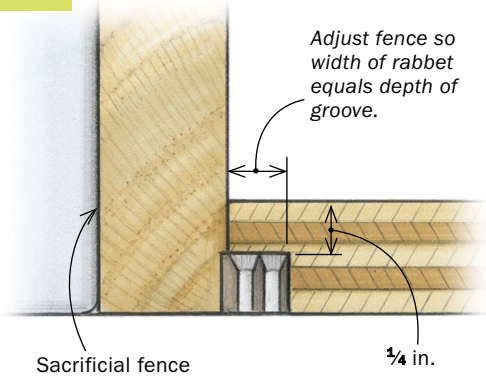
1 DADOES AND GROOVES



Dadoes in the sides. *Use a miter gauge to guide the drawer sides safely along the rip fence.*

Grooves for the bottoms. *Run the bottom of the sides, fronts, and backs against the fence to cut the groove for the bottom panel.*

2 RABBETS



Rabbet the fronts and backs. *With the dado head buried in a sacrificial fence, cut the rabbets for the corner joints.*

Rabbet the bottom panels. *All four sides of the bottom panels are rabbeted to fit into the grooves running around the bottom of the drawer box.*

table's height and to level it. Attach them 2¼ in. from the edge of the bottom.

Flip the base back over and attach the phenolic top. In addition to beveling the edges of the panel, I trimmed the two corners opposite the saw at 45°, which is easier to do with the top attached.

Next, level the cabinet and bring the top in line with the saw's table. Then transfer the location of the miter slots directly from the saw table and mark them out on the top. Mine are ½ in. deep by 1 in. wide by 20⅝ in. long. To cut the channels, you only need a router, a straight bit, and a straightedge, but I made a template and used an offset guide bushing, which allowed me to rout the entire channel without having to adjust a straightedge to get the full width.

For dust clearance, I drilled a ¾-in.-dia. hole about 6 in. from the end of each channel. The dust falls into the gap between the back of the saw and the outfeed table.

A fast drawer joint that lasts

You can build the drawer boxes in a variety of ways, but I recommend a rabbet-

Assembly is easy. *Go easy on the glue to avoid squeeze-out. Use brads to hold things snug as the glue dries.*

and-groove joint that requires only two setups on the tablesaw. These drawers are quite strong and can be made in short order.

The drawer boxes are made from Baltic-birch plywood that's just a hair under ½ in. thick, but that doesn't mean the joint is harder to cut. You'll cut all of the dadoes and grooves with the first setup, and all of the rabbets with the second (see photos, facing page). The dadoes, grooves and rabbets are cut with a ¼-in. dado stack set at the same height, so you'll only need to reset the fence between setups.

The easiest way to assemble the drawers is to brush a small amount of glue on the rabbets (you want to avoid squeeze-out) and tack the joints together with two or three small brads. The brads will hold the joint snug as the glue dries. Clamping is time-consuming, and the weight and pressure of the clamps can throw the drawer out of square.

I used standard ball-bearing, full-extension slides from a home center to mount the drawers in the outfeed table.

Attach the drawer fronts and kick plate

Fit the fronts with the table in place and adjusted for height and level. The table might twist a bit as a result of the adjustments, and you'll get a better fit after them.

The four pieces of the kick plate are screwed to one another at the corners, but aren't attached to the cabinet. This makes them easy to remove should you need to tweak the table's height if you move the saw and table.

A few coats of shellac on the Baltic-birch plywood will give it some protection.

Your newly minted outfeed table will make your shop safer and better organized. And that will make your woodworking more enjoyable. □

A former shop manager at Fine Woodworking, *John White is now a freelance writer living in Vermont.*

ADJUST THE HEIGHT

The lag-bolt feet let you adjust the table to be level and just the right height.

Check for a consistent gap. *The outfeed table should be a hair below the saw table. Hold a straightedge firmly down on the tablesaw to check.*

Quick adjustments. *The coarse thread of the lag bolts makes for speedy height adjustments.*

CAP IT OFF

Phenolic drawer fronts and kick plates are durable, but also give the cabinet a unified look and subtle pop.

Add a kick plate. *The plate hides the feet and stops things from rolling under the cabinet. It's easy to remove to make height adjustments.*

Install the false fronts. *Use shims and double-faced tape to position each drawer front, and then screw it on from the inside.*

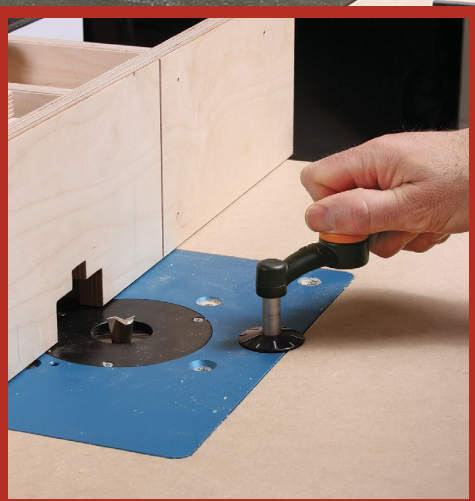
Add a Router to Your Tablesaw

It's a perfect fit for space-challenged shops

BY JOHN WHITE

VERSATILE FENCE

GREAT DUST COLLECTION



UP-TOP ADJUSTABILITY

Photos: Matt Kenney

I've seen many tablesaw extension wings turned into router tables, and it's not a bad idea on paper. You get an indispensable woodworking machine without consuming an extra inch of shop space. And, you can take advantage of the solid, accurate fence already in place on the saw (or so you think). But it's not enough to simply drop a router plate into the melamine extension wing. For one thing, the rip fence is not ready for routing. Not only is it too short for vertical jobs like sliding dovetails, but the bit must be buried in the fence for most tasks, and screwing a couple of scraps to the back of the rip fence just doesn't cut it. Dust collection also is a problem, because there's no efficient way to collect from above the table. And single-layer tables eventually begin to sag under the weight of the router.

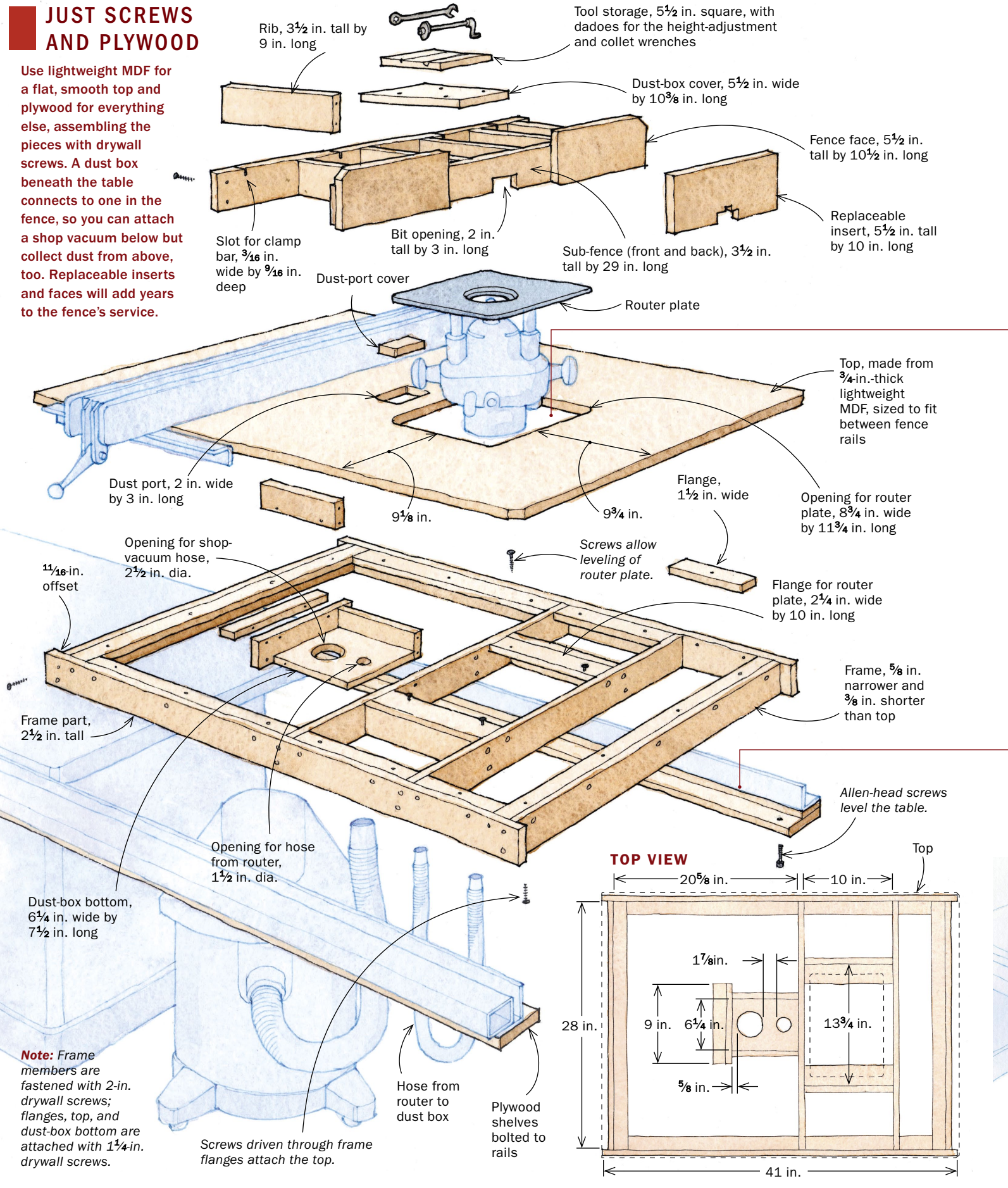
This router table solves all of those problems and a few more. First, it has a simple but effective fence that is tall enough for vertical routing. There is a replaceable insert, so you can bury bits in the fence and get zero-clearance routing when you need it. The fence clamps to the tablesaw's rip fence, so adjustments are easy. Plus, it's a snap to put on and take off. Above-the-table dust collection is integrated into the fence—and it really works. Finally, a rigid plywood frame under the table eliminates sag.

The router matters, too

Choose a router that specializes in table-routing. It also should allow above-the-table bit changes and height adjustments, which will save you hours of hassle. Make sure it has great dust collection of its own, so you can catch dust from beneath the table, too, making most jobs practically dust-free. To avoid the hassle of attaching the router directly to the table, I used a predrilled router plate (rockler.com, $60). I used Baltic-birch plywood for the table's support frame and fence because it is stable and holds screws very well, and I used lightweight MDF for

JUST SCREWS AND PLYWOOD

Use lightweight MDF for a flat, smooth top and plywood for everything else, assembling the pieces with drywall screws. A dust box beneath the table connects to one in the fence, so you can attach a shop vacuum below but collect dust from above, too. Replaceable inserts and faces will add years to the fence's service.



Note: *Frame members are fastened with 2-in. drywall screws; flanges, top, and dust-box bottom are attached with 1¼-in. drywall screws.*

Drawings: Jim Richey

the top because it routs well and makes a smooth, durable work surface. One sheet of each is more than enough to make the entire table.

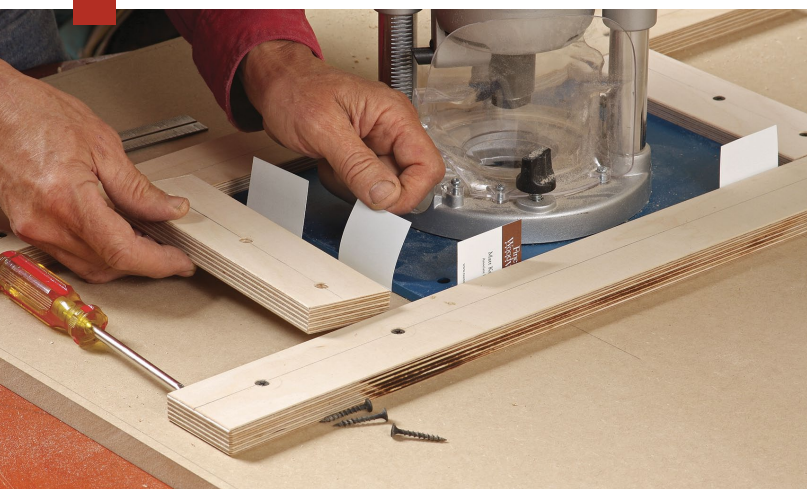
Make the table first

The table has two parts: a large top and its underlying frame with integrated dust collection and support for the router plate. Make the frame and then the top.

The frame is a simple affair. Strips of plywood—all ripped to the same width—are butt-joined and held together with 2-in.-long drywall screws. The joint is strong and no glue is needed. After assembling the basic frame, attach the flanges. Use 1¼-in. drywall screws, driven in from the outside of the frame, and pre-drill clearance holes and countersinks. Finally, assemble the frame for the dust-collection box. The box's bottom gets two holes: one for the hose that runs to your shop vacuum and one for the hose that runs from the router to the box. Running both hoses into this box means that a single shop vacuum can collect dust from above the table (through a port routed in the top) and below it without joining three different hoses to one another.

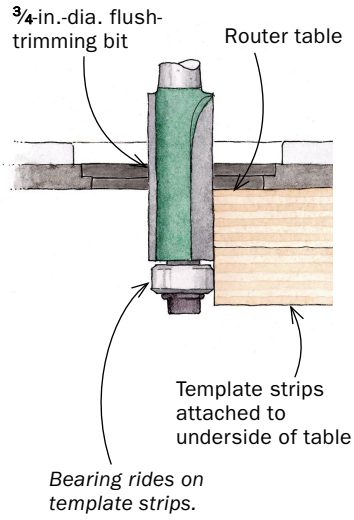
You'll need to rout two openings in the table, one for the router plate and one for the dust port, but neither is difficult. Begin by laying out their locations on the underside. For the dust port, simply attach template strips on your layout lines, rough-cut the opening, and rout it flush to the strips. The opening for the router plate must be more precise, but I have a great trick for that (see photos, below).

MAKE AN ACCURATE OPENING FOR THE ROUTER PLATE



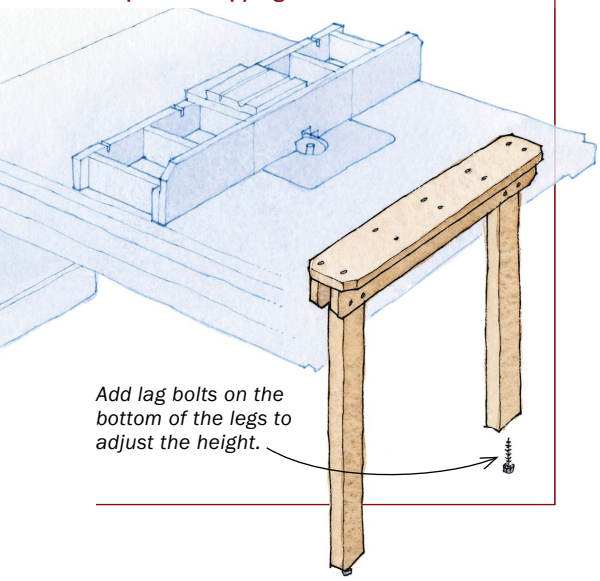
Build a routing template around the plate. *Press the plate firmly against two sides, but use business cards between the plate and the other two sides. The extra space makes it easier to get the plate in and out.*

Rout the opening flush to the template. *Cut away most of the waste with a jigsaw, leaving about ¼ in. to be removed by a bottom-bearing, flush-trimming bit. Use a ¾-in.-dia. bit so that the corner radius matches the radius on the plate's corners.*



ADD LEGS FOR SUPPORT

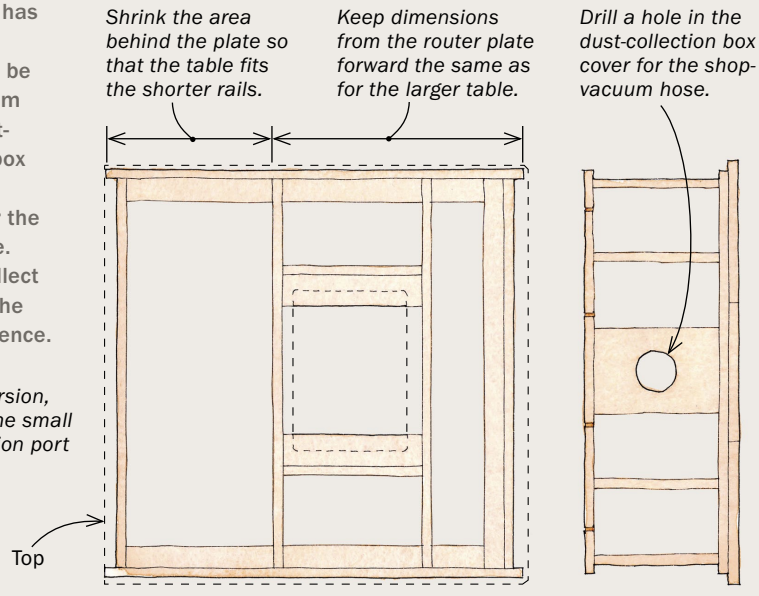
If your extension table doesn't have legs already, you might need to add some. The table's cantilevered weight could be enough to make your saw prone to tipping over.



HAVE A SMALLER TABLESAW EXTENSION?

If your saw has 30-in. rails, there won't be enough room to fit a dust-collection box behind the opening for the router plate. Instead, collect dust from the top of the fence.

**For this version, don't rout the small dust-collection port in the table.*



MAKE THE FRAME AND ATTACH THE TOP

Solid assembly. *The flanges serve double duty here. Not only do you screw through them, but they also provide a good bearing surface for the top, which helps to keep it flat.*

Plywood shelves support the table. *Use nuts and bolts to attach the plywood shelves to the fence rails (left). Lower the table into place (right). It rests on the plywood shelves and gravity holds it in place.*

After both openings are routed, attach the frame to the top.

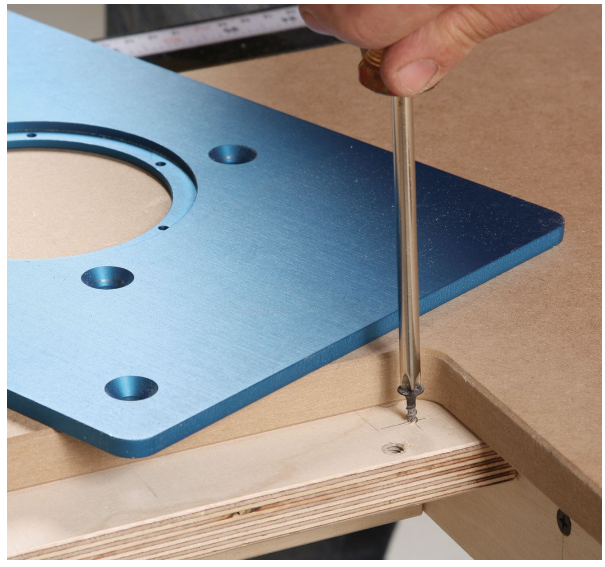
Make the fence and install the table

The fence is assembled just like the frame, with butt joints and screws. Before you screw it together, cut a bit opening in the front sub-fence and slots for the clamp bars in the rear one. The fence faces are screwed to the sub-fence with 1¼-in. drywall screws, six per face. The replaceable insert fits between the two faces and is screwed in place. To create suction at the bit opening, attach a cover over the center bay created by the ribs, which sits over the dust port. Finally, cut two dadoes in a square of plywood—for storing the wrenches—and screw it to the cover.

To ease installation, I bolted plywood shelves to the underside of the fence rails. Next, I drove four Allen-head screws up through the shelves—one for each corner—and set the table in place. I then laid a 6-ft. level across the saw's table and the router table and adjusted the screws until they were level. I leveled the router plate in a similar way, resting its corners on the heads of drywall screws driven into plywood flanges at either end of the opening in the table. After attaching the plate to your router and dropping it in place, attach the dust-collection hoses, clamp the fence to the saw's rip fence, and you're ready to do great work and do it faster. □

A former shop manager at Fine Woodworking, *John White is now a freelance writer in Vermont.*

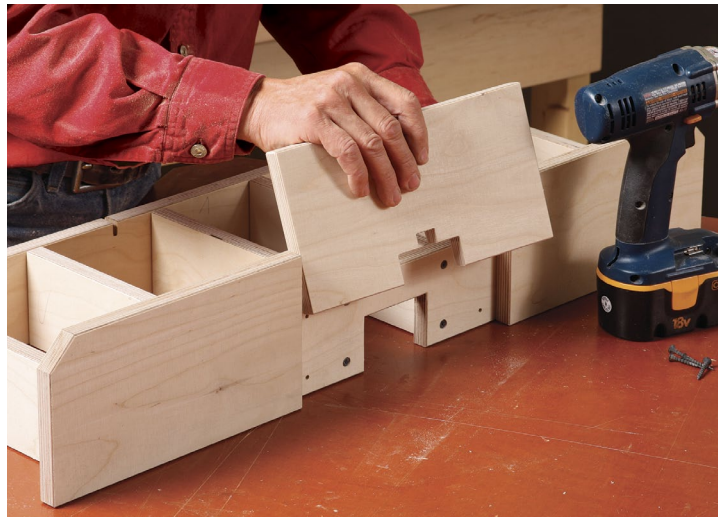
A screw in each corner fine-tunes the height. *A long level lets you know when you have it right. White filed a notch in the tip of an extra screw to cut threads in the plywood.*



Same trick for the router plate. *To level the router plate, White uses a drywall screw in each corner. The drywall screw will thread its own hole.*

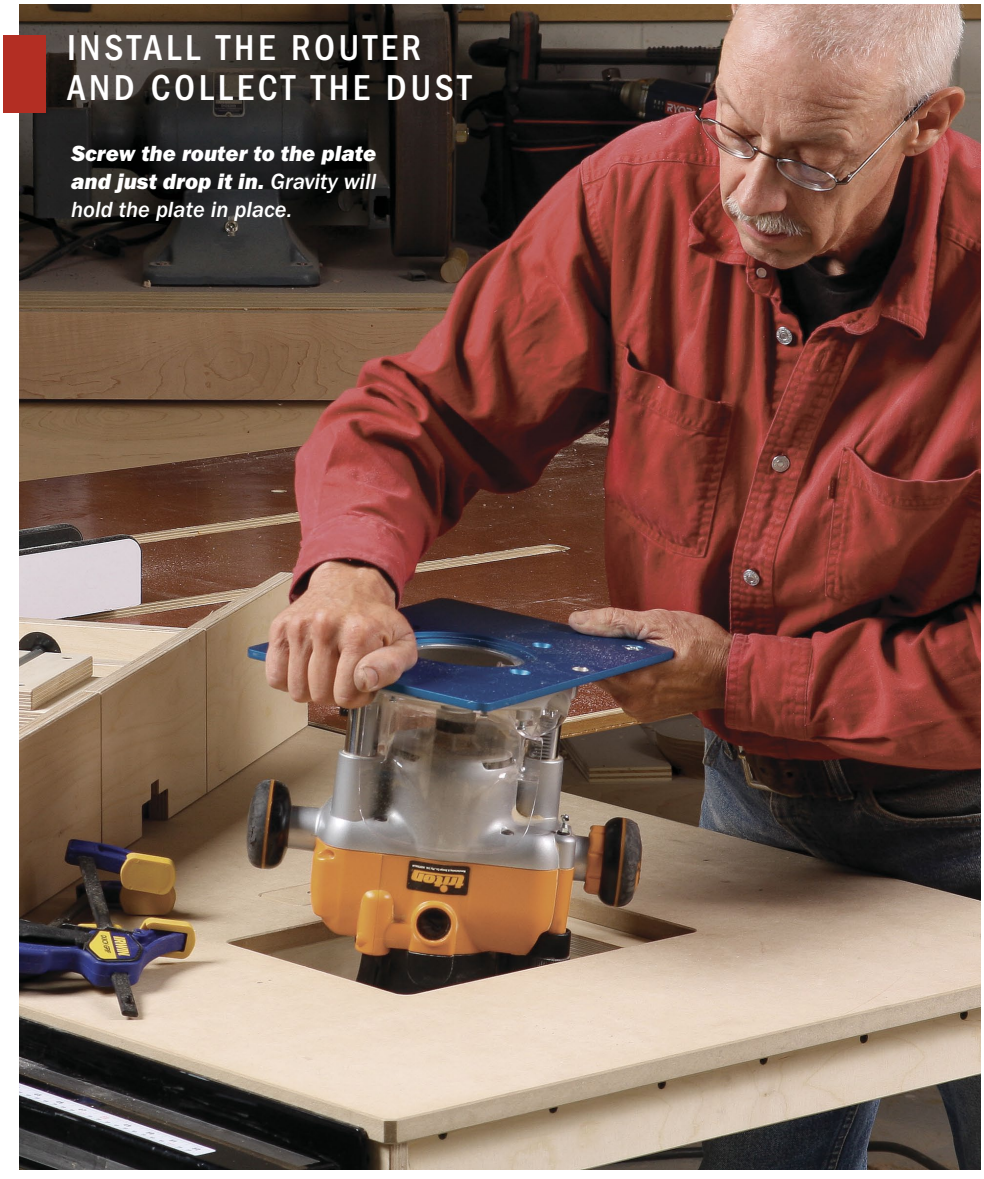
ASSEMBLE THE FENCE

Ribs make the fence rigid. *Clamp a plywood spacer next to the rib so that it remains vertical as you screw it in place.*



Insert is replaceable. *Four screws hold it in place from behind. Make one for each of your most common bits to eliminate tearout. The tall fences on both sides can be replaced, too.*

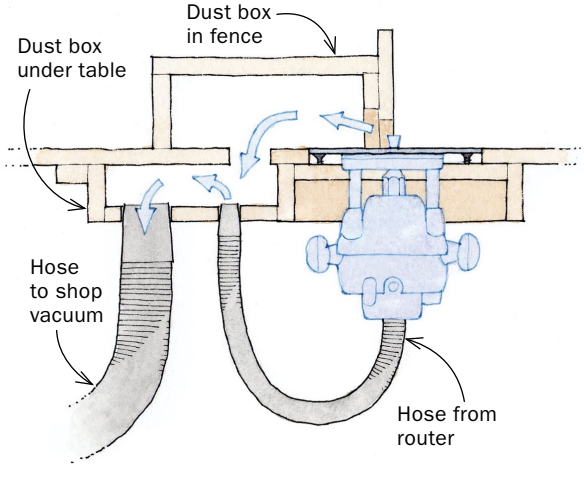
INSTALL THE ROUTER AND COLLECT THE DUST



Screw the router to the plate and just drop it in. *Gravity will hold the plate in place.*

Hook up the dust collection. *A shop vacuum is strong enough to collect dust from above the table and from the router at the same time, leaving very little behind.*

DUST COLLECTION



Pivoting Plywood

Never wrestle with sheet goods again

I build a variety of furniture using solid wood, veneer, and plywood, and since I work in a one-man shop, I constantly look for ways to make the experience as easy and efficient as possible. One of these ways is my panel cart. With this cart, I can stop struggling with 4x8 sheet goods such as medium-density fiberboard (MDF) and plywood, and easily move them about the shop. And because I built the cart to the height of my tablesaw, I can tilt the sheets horizontally to feed them directly from the cart onto the tablesaw.

Large swivel casters, a brake, and a steering handle make for easy maneuvering. A simple design and very basic joinery, tied together with bolts, make this a project that easily can be built in a day, so you can get right back to making furniture. Next to its usefulness, the best thing about this cart

MOVE AND CUT LARGE PANELS WITH EASE

Roll. *Large wheels and a pull handle help you tow a heavy load (left). Note that the back side can hold a pile of rough lumber. A foot brake locks the cart in place (above).*

Photos: Anissa Kapsales

Cart

BY MICHAEL PURYEAR

is that the materials are relatively inexpensive. Because you can use dimensioned construction lumber and/or scraps you have kicking around the shop, the cost is limited and mostly for the hardware.

Using the cart

I load 4x8 sheets on the panel carrier side and rough lumber on the other. I can then move the cart around the shop wherever it is needed, and it doesn't disturb the lumber when I tilt the sheet goods to the horizontal position. The swivel casters allow me to push the cart in any direction without having to turn it around, and the handle lets me tow the loaded cart.

The cart lets me store, move, and rip up to eight 4x8 sheets. With multiple sheets stacked on the cart, the top sheet will be higher than your tablesaw when you tilt the sheets up into position. But you can still slide it onto the saw table and cut it safely. When you lift the pivoting frame, two latches lock it into position.

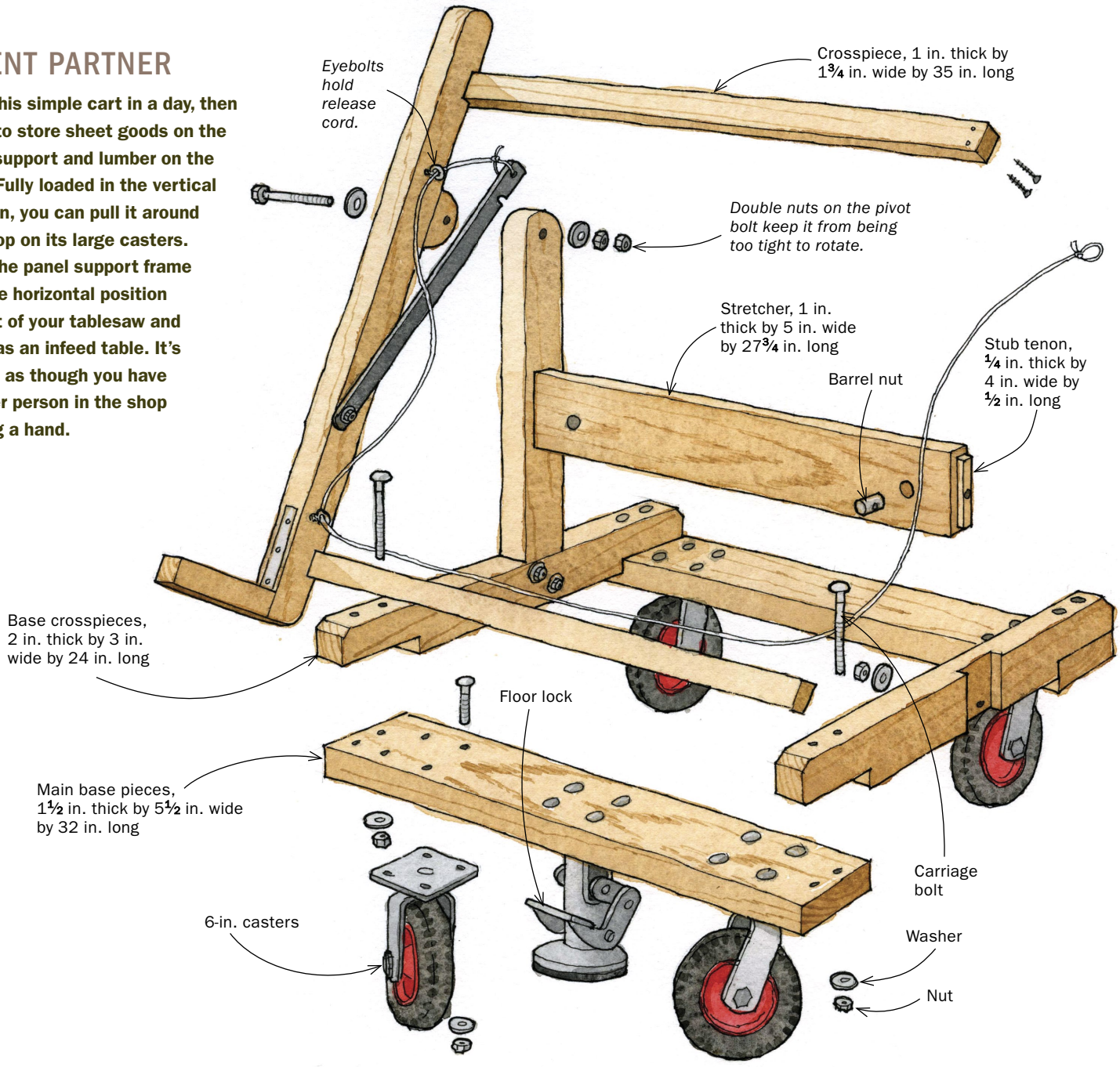
To lower the pivoting frame, you pull a cord to release the latches and lower the

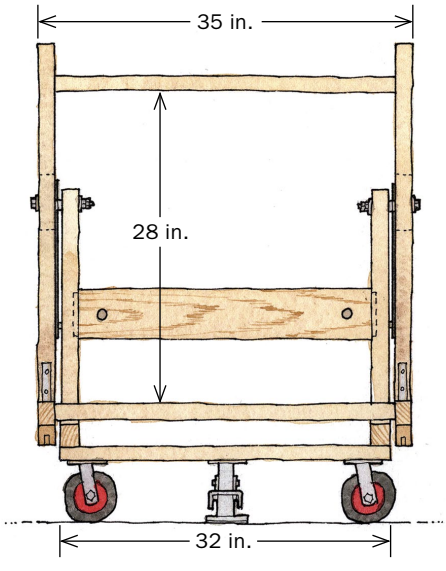
Pivot. *Tip the support frame that holds the sheet goods into the horizontal position, where it locks automatically. Then move the cart into position and apply the brake.*

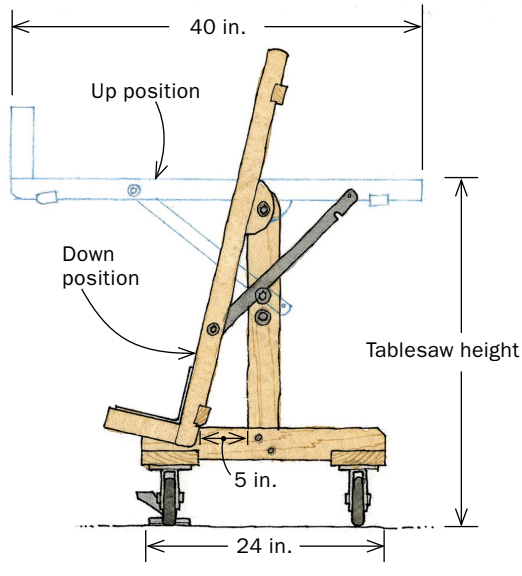
Push. *The cart supports the back end of the plywood, freeing you up to feed the material and apply pressure against the fence.*

SILENT PARTNER

Build this simple cart in a day, then use it to store sheet goods on the panel support and lumber on the deck. Fully loaded in the vertical position, you can pull it around the shop on its large casters. Pivot the panel support frame into the horizontal position in front of your tablesaw and use it as an infeed table. It's almost as though you have another person in the shop lending a hand.







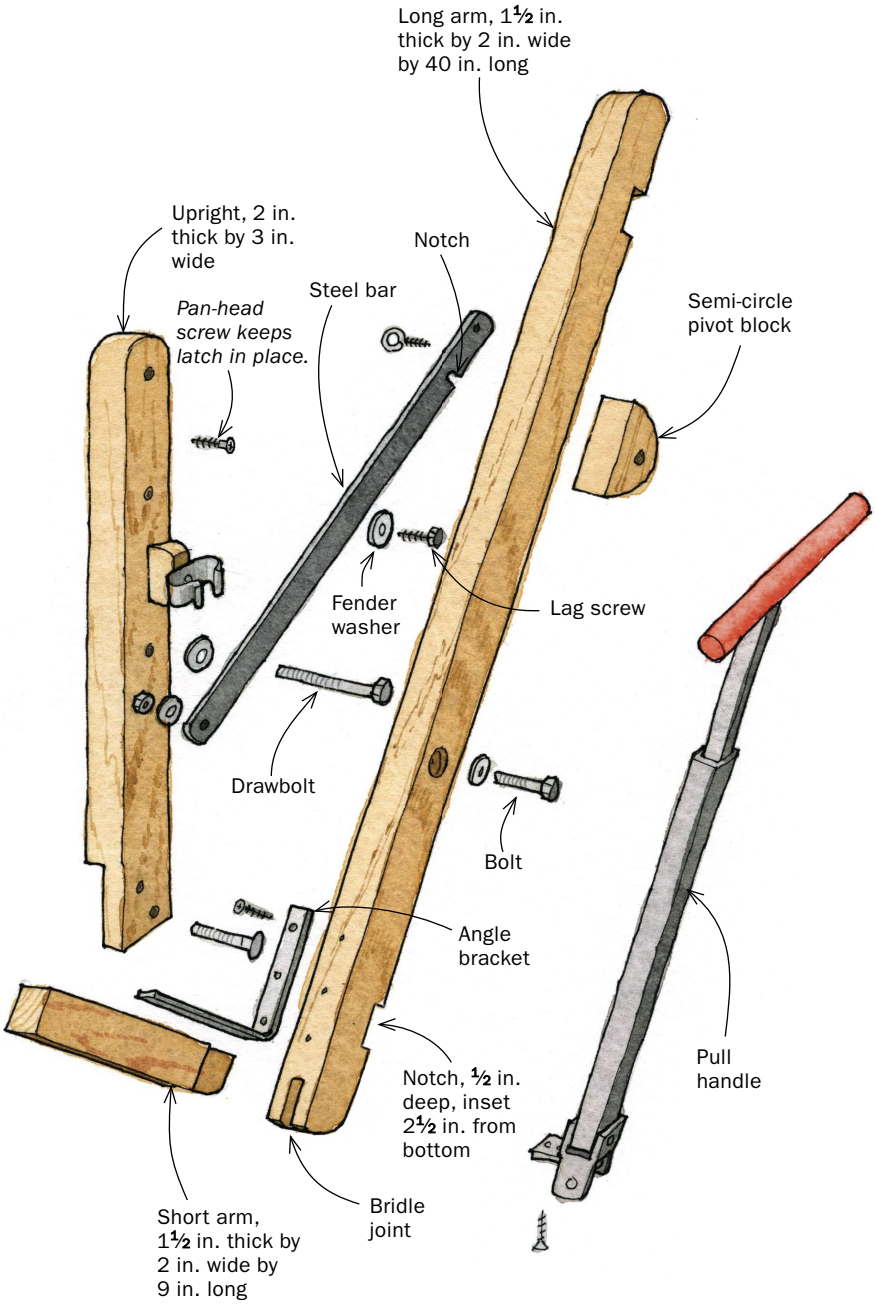
SOURCES OF SUPPLY

DRAWBOLTS AND BARREL NUTS
leevalley.com (No. 05G07.01)

PULL HANDLE
harborfreight.com (No. 94354)

FLOOR LOCK AND CASTERS
globalindustrial.com (No. CJ241851, lock; No. WB601122, casters); harborfreight.com (No. 41565, casters)

Drawings: Jim Richey



structure. What a pleasure not having to wrestle sheet goods onto the tablesaw when working alone.

A very basic base with casters

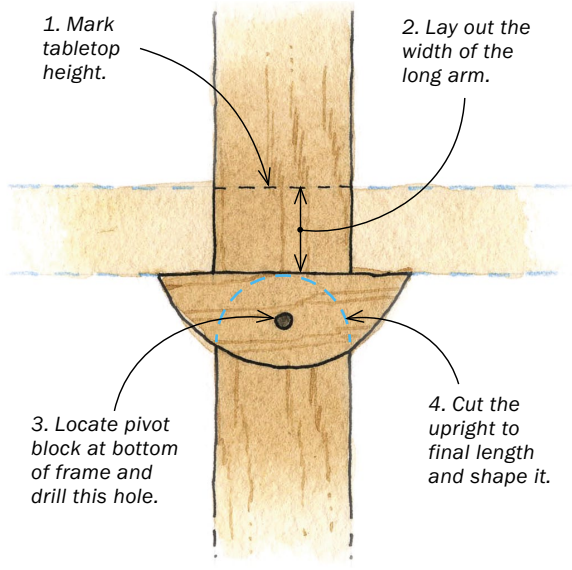
The base construction is simple. Except for the mortises in the uprights, I cut all of the joinery on the tablesaw. To line up everything perfectly, cut both crosspieces at once, clamping them together and using a miter gauge and dado blades with multiple passes. The uprights that hold the tilting panel support frame determine the final height of the cart in its horizontal position. Base their length on your caster height and the height of your tablesaw. Right now, cut them longer than you will need until you settle on a final height (a little later in the process).

The bottom of each upright gets a half-lap that corresponds with the half-lap in the base of the crosspieces. Each upright also

SET THE PIVOT HEIGHT

The frame's height is important. It can be a little higher than the tablesaw height, but not lower.

Take time to get it right. *Once the base frame is built, add the casters and clamp an upright to the base. Adjust a marking tool to the tablesaw table. Puryear uses an Accuscribe from FastCap, and then he transfers that mark to the upright.*



PUT THE PIECES TOGETHER

The final assembly is straightforward. Work from the ground up.

FINISH THE BASE

Assemble the base. *Connect the four base pieces, attach the casters, and add the stretcher and two uprights.*

LOCATE THE PANEL SUPPORT

One L at a time. *After making the two L-shaped pieces and notching them for the crosspieces, but before gluing in the crosspieces, you need to locate the Ls on the uprights. To do this, bolt a semi-circle pivot block to its upright, and clamp one of the Ls to the base (above) so its lower crosspiece will hit the base about 5 in. from the upright. Mark the block's location on the L.*

gets a centered mortise (cut with an edge guide on a router) to hold the stub tenon of the stretcher. I reinforce this joint with a drawbolt. I clamp the stretcher to the uprights and drill through both for the drawbolt and barrel nut. Once this joinery is cut, bolt the casters and the crosspieces to the main base. Don't attach the uprights yet.

This is a good time to talk about the casters. The loaded cart can get heavy. I use four heavy-duty 6-in. swivel casters rated at 330 lb. each, which are not available with total locking brakes. In lieu of brakes, I added a floor lock. I prefer all four casters to swivel because it makes maneuvering around the shop easier. I wouldn't use casters smaller than 5 in., because small obstacles on the floor will stop them dead.

Tilting panel support affects the height of the uprights

To build the panel support frame, start by making the two L-shaped pieces. Cut the notches for the crosspieces using a dado blade. The elbow is a bridle joint that I reinforced with angle brackets because they will carry all the weight of the 4x8 sheets.

To determine the height, clamp an upright to the base. Roll this assembly up to your tablesaw and mark the height of the table on the upright.

Glue on the pivot block. *With the pivot blocks marked for position, glue and clamp one to each L. Now you can glue in the crosspieces to complete the panel support frame.*

ATTACH THE PANEL SUPPORT AND RELEASE

Connect the panel support frame to the base. *Nuts and bolts with washers on either side keep things together (far left). The notch in the latch rests on a lag screw between a washer and the upright (left). An extra screw will act as a stop and keep the latch from jumping out of line. The washer guides the bar back in place.*

Simple release. *A cord that runs from the end of one latch around the frame through eyebolts and to the end of the second latch is pulled to lift the latches, releasing the panel frame so it can pivot into the vertical position.*

Then move to the bandsaw and cut two semicircular pivot blocks from 1½-in.-thick lumber and drill a hole centered between the corners and 1 in. from the flat side. Clamp each block to its upright with the flat side parallel to and 2 in. below the line marked as the tablesaw height. Center the hole in the block on the upright, and drill through it into the upright. Repeat for the second upright. Now the pivot blocks are located on the uprights so that they will hold the support frame level with the top of the tablesaw when the frame is tilted to the horizontal position.

Cut the uprights to length, radius their tops, and bolt each one to the base. For aesthetics only, round over the top and bottom of each. Then insert a bolt through one pivot block and into its upright. Rest one of the Ls on the block and adjust it so that the bottom of the lower crosspiece will land on the base 5 in. from the upright. Clamp the L to the base and then to the pivot block and mark the block's location on the L. Transfer the marks to the other L and glue the blocks in place.

Latch system holds panel support horizontally

For the latch system, I use two steel bars (available at most hardware stores). I drill holes on each end and use a hacksaw to turn one hole into a notch (I also drill a smaller hole for the release cord). One end gets screwed to the L of the support, and the notched end hooks over a lag screw in the upright. To mark the latch's bolt hole on the L, pivot the panel support horizontal and level and place the latch notch over the lag screw on the upright. Drill the bolt holes, then bolt the latches loosely in place so they move easily using locking nuts. Place pan-head screws on the uprights above each latch so that the latches can disengage but not rise above the fender washer. Leave ⅛ in. between the head and the upright.

Because I can't unhook both of those bars and hold the cart support while it's pivoting, I attached a cord that runs between the bars and allows me to unhook them at the same time. Finally, attach a pull handle to one end of the cart. □

Michael Puryear is a furniture maker in Shokan, N.Y.

House Your Tools in

Plywood cabinet and simple tablesawn joinery speed construction time

BY CHRIS GOCHNOUR

A tool cabinet is a great shop helper. It keeps hand tools and small power tools well organized and off the bench but within reach. And perhaps more importantly, it saves valuable floor space. But a tool cabinet doesn't have to have the cold feel and look of MDF, or the piecemeal appearance of a cabinet made entirely from scraps. Rather, it can have the look of fine furniture, giving tools an attractive home and your shop an aesthetic boost.

I collaborated with the editors at *Fine Woodworking* to design a useful, attractive tool cabinet. It can be built with the most basic shop tools in a short amount of time, and it will beautify your shop as it has mine.

The carcase, made of ¾-in. walnut plywood, is built with simple dado joinery cut with a tablesaw. The six interior drawers employ a similar setup. The attractive doors couldn't be easier to make. They feature stub-tenon and groove joints for the frame, a veneered plywood panel glued in place, and divided glass panes that can be done in no time at all. Construction starts with the case.

High Style

Photos: Thomas McKenna

Case is a lesson in tablesaw joinery

All of the main components of the case (including the adjustable shelves) can be built from one sheet of ¾-in.-thick walnut plywood. The back is ½-in.-thick walnut plywood. Some suppliers may be reluctant to sell a partial sheet of hardwood plywood. If your supplier won't, and you don't think you'll use the cutoff in the future, you can make a solid-wood back (or make two cabinets).

Begin with the case sides. Cut them to length but leave them ¼ in. extrawide. Glue ⅛-in.-thick solid walnut caps to the bottom edges and trim them flush. After that, rip the sides to their final width. The fixed shelf also is edged with solid walnut that's trimmed flush prior to cutting the joinery.

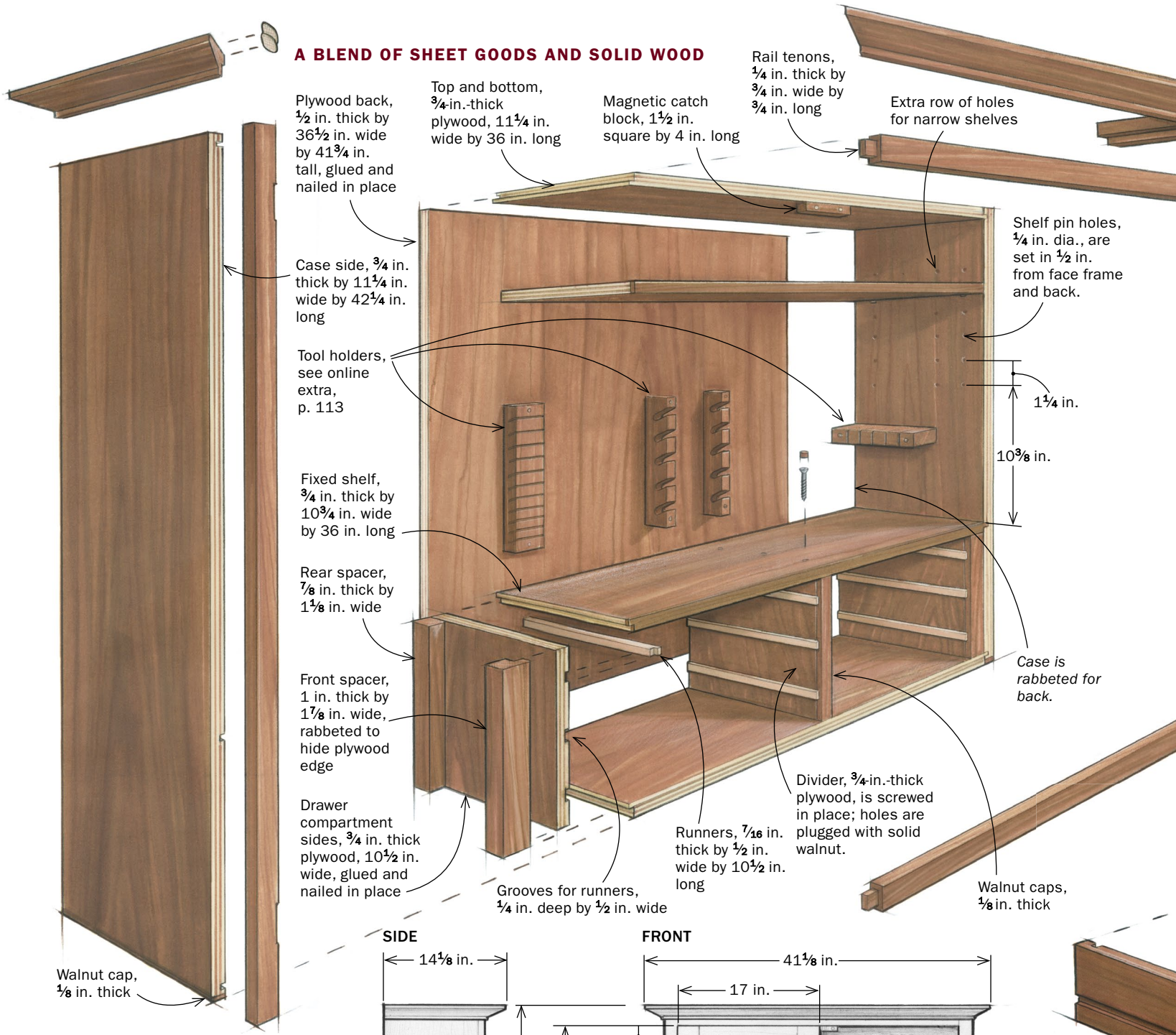
The case dado joints are cut on the tablesaw with a ¼-in.-wide dado blade. Adjust the blade for a ¼-in.-deep cut and make the dadoes in the sides for the top, the bottom, and the fixed shelf. Then, without changing the height or width, cut the ¼-in. tongues on the top, the bottom, and the fixed shelf. Now cut the rabbets that will house the cabinet back. I do this on a router table using a straight bit and a fence to guide the cut. The rabbets on the case sides are stopped, while those on the top and bottom run all the way through.

With all the joints cut, you can dry-fit and then glue up the assembly. Gluing in the plywood back as you assemble the carcase will help keep things square. Reinforce the assembly with brad nails.

Face frame and crown are solid walnut

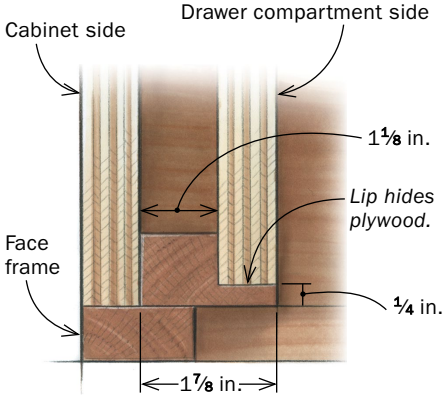
I make the face-frame parts a hair oversize in width so they overhang the case by about 1/32 in. all the way around. This makes it a bit easier to get the frame aligned and squared

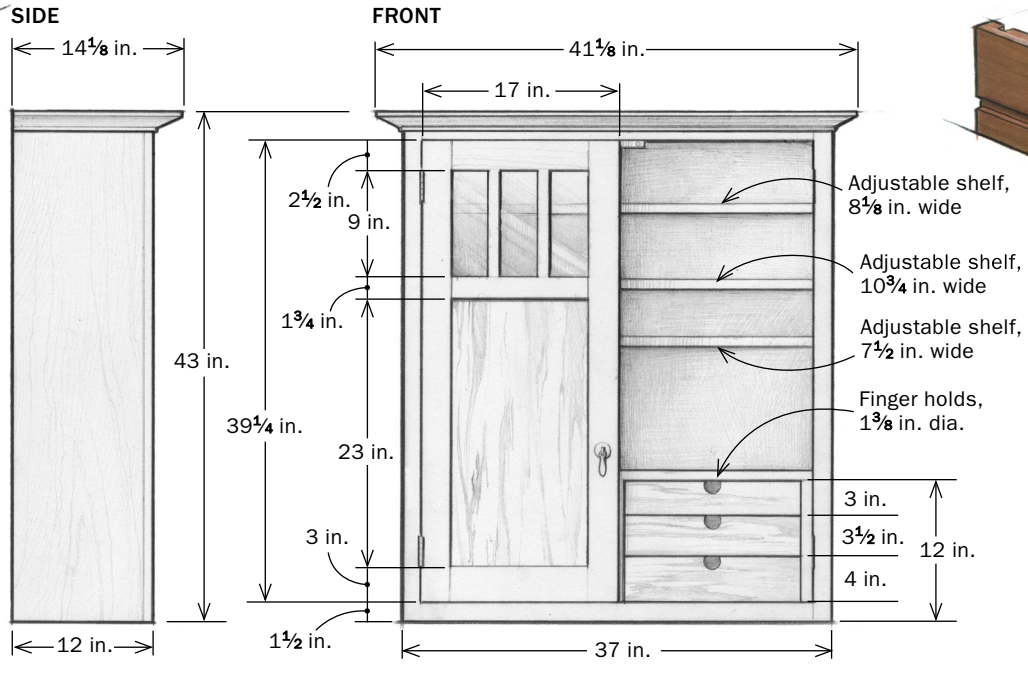
A BLEND OF SHEET GOODS AND SOLID WOOD



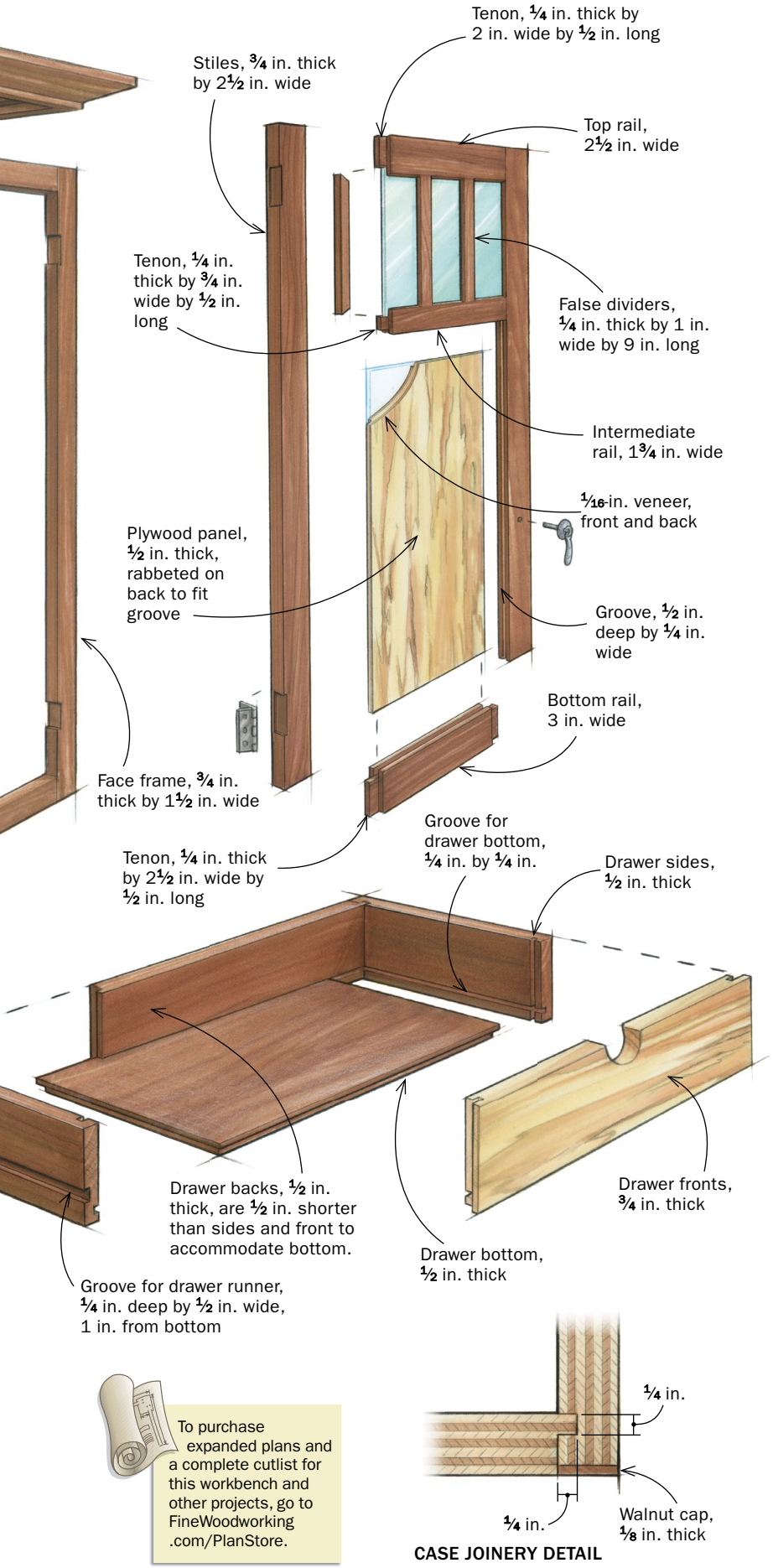
FRONT SPACER DETAIL

Spacers move compartment sides in so that drawers can clear the face frame in front.





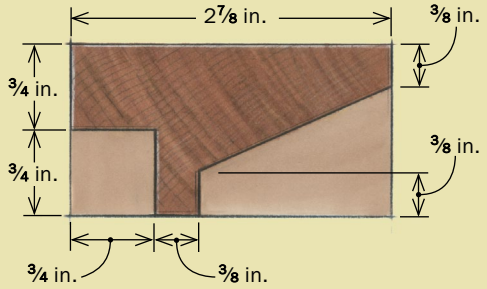
Drawings: Bob La Pointe

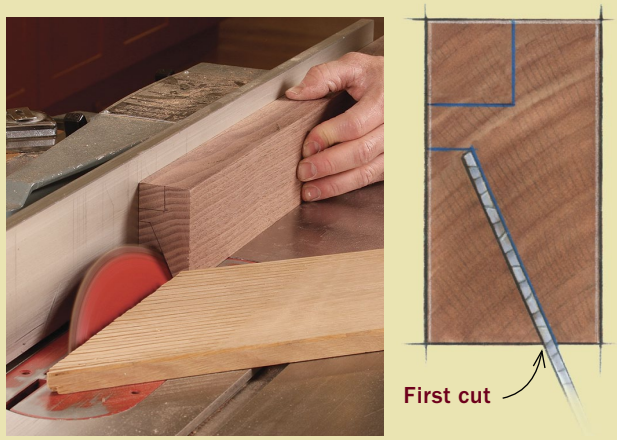


To purchase expanded plans and a complete cutlist for this workbench and other projects, go to FineWoodworking.com/PlanStore.

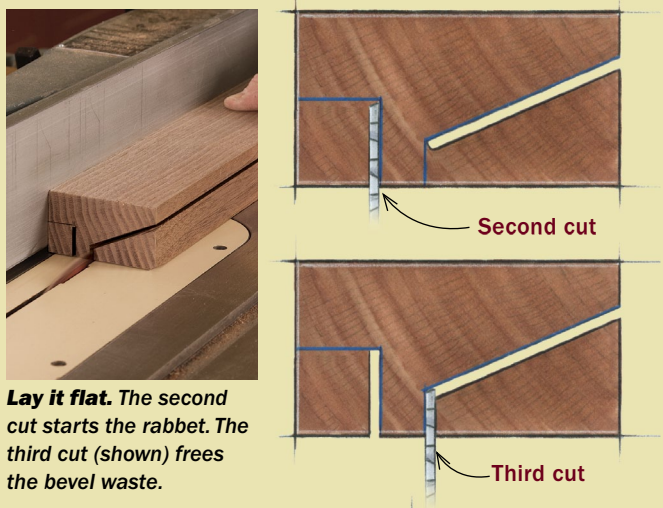
CASE JOINERY DETAIL

CROWN MOLDING IN FOUR CUTS

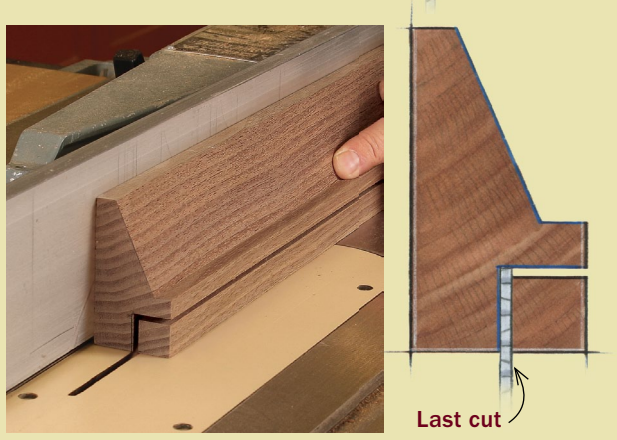




The first cut is the deepest. *Make the bevel cut first. Use a featherboard to keep the piece tight against the fence.*



Lay it flat. *The second cut starts the rabbet. The third cut (shown) frees the bevel waste.*



Stand it up. *The fourth cut finishes the rabbet and lets the waste fall away safely.*

SIMPLE JOINERY IS SOLID AND SPEEDY

No help needed. *The case is large, but with carefully fitted joints, the glue-up shouldn't require more than two hands.*

perfectly. The stiles and rails are joined using mortise-and-tenons. I remove the bulk of the mortise waste at the drill press and finish with chisels. The tenons are cut on the tablesaw using a dado blade.

Glue up the frame and then glue it to the case. Once the frame is aligned the way I want, I drive four brads, one in each corner, to ensure that the frame doesn't shift as I clamp it. After the glue has set, flush-trim the frame to the case.

The crown molding is very easy to make and apply. It is made using four different tablesaw setups (see p. 109). Make the profile and clean up the cuts with scrapers and sandpaper, then cut the miters and fit the molding. I reinforce the miters with #10 biscuits, and then glue and nail the molding to the case. The adjustable shelves are plywood with solid walnut edging. I made

Face frame is last. *After gluing and nailing in the back, attach the face frame to the front (left). Trim it flush with a router (above) after the glue dries.*

Build the drawer compartment. *Install the spacers and compartment sides after cutting the dadoes for the drawer runners. The center divider is screwed in from above and below. Temporary plywood spacers on each side (top and bottom) keep the divider aligned vertically.*

two of the shelves shallower to make it easier to access tools without banging a shelf edge.

Dirt-simple glass doors

The frame-and-panel doors have three divided lights in the upper section, but their construction isn't complicated: It's all tongue-and-groove joinery, with the plywood panel glued in place for strength.

After milling the frame material, cut the panel grooves on all the inside door parts. The grooves also receive the rail stub tenons, which are cut using a dado blade on the tablesaw.

The ½-in.-thick plywood panel on my cabinet doors is covered with spalted sycamore veneer. But you can substitute a nice hardwood plywood. Cut the panel to size and rabbet the back on the tablesaw to form a tongue that is captured by the groove of the door frame. Once all the parts are cut and fitted, glue up the doors.

The glass in the top of each door is an eye-catching detail, and my method of installing the single pane of glass is easy. First, rout a rabbet for the glass using a bearing-guided rabbeting bit and square the corners using a chisel. The false dividers are butt-joined to the frame rails. Cut them to width, and then carefully fit them lengthwise. The butt joint is reinforced from behind with a ½-in.-dia. long-grain plug.

Center the grooves. *The door frames are grooved for the glass and the wooden panel. To make sure the groove is centered, cut it in two passes with a dado blade, flipping each workpiece end for end after the first pass.*

Don't change the blade. *Reset the height of the dado blade to cut the stub tenons. Dial in the tenon with a test piece, then crank out the tenons on all the parts.*

Spacers help the glue-up. *Because the glass is installed later, the intermediate rail is hard to align and keep square. Gochnour uses spacers to align the piece before clamping it (above). The panel is glued all around, adding strength to the door (left). To avoid squeeze-out, brush glue into the grooves but not on the panel.*

Scraper trick gets the reveal just right. *Before tightening down the clamps, use a card scraper as a lever to adjust the reveal all around the rabbet on the back of the door panel.*

GLASS ADDS CLASS

Glass sits in a rabbet. *With the door facedown, remove the wood behind the groove, using a bearing-guided rabbeting bit riding on the wood in front of the groove. Square up the corners.*

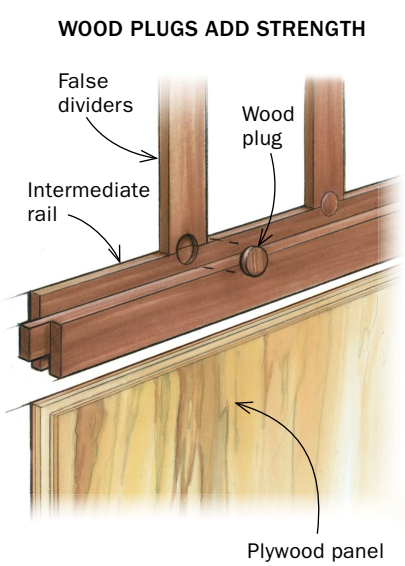
Spacers again. *The false dividers are cut for a tight fit and butt-joined to the frame. When gluing them in, use spacers to align them correctly.*

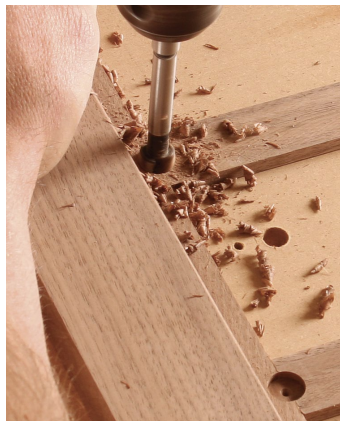
The opaque glass I use is called "domestic seedy," purchased from a local glass dealer. It is held in place with adhesive caulk and a thin mitered frame.

Drawers are quick to make

The six drawers in the cabinet are side hung and require a couple of extra vertical panels on both sides of the drawer compartment. Those pieces, ¾-in.-thick plywood, are blocked out from the case sides so the drawers clear the face frame.

Cut the side panels and the center divider to size at the same time, and then cut the dadoes for the drawer runners. Now add the solid-wood edging to the center divider and trim it flush.





Holes for the plugs. *Gochnour uses wood plugs to reinforce the small butt joints. Drill ⅛-in.-deep mortises for them using a ½-in.-dia. Forstner bit.*

Cut and release. *Use a plug-cutter to make a row of ½-in.-dia. plugs in a walnut blank and then rip off a thin strip on the bandsaw to free them.*

Glue them in. *Align the plug's grain with that on the dividers and trim the plugs flush after the glue dries. The frame is attached with brads.*

Add the glass after finishing. *It is held in place with a small bead of adhesive caulk below the glass, and a thin mitered frame (left) attached with brads. Drill pilot holes for the brads, and use a sheet of thin cardboard to protect the glass as you drive them home (above).*

Now you're ready to assemble the drawer compartment. Cut and fit the spacers and glue and nail the pieces to the sides. Next, glue and nail the compartment sides to the spacers. Finally, screw the center divider in place from above and below. The screw holes are countersunk and plugged.

Once the internal case is assembled, make the maple drawer runners and fit them in their dadoes. The runners have some front-to-back play and, when dry-fitted, can slide back and forth. They butt against the back of the drawer fronts and, when glued in place, also serve as the drawer stops.

The drawers use simple dado joinery at the back and front. I made the drawer bottoms from ½-in.-thick solid alder, but you could substitute plywood there. The bottom is screwed into the drawer back, with a slot in the bottom to allow for movement.

The drawer pulls need to be flush because of the close proximity of the drawer fronts to the doors. I use a simple 1⅜-in.-dia. hole drilled into the edge of the drawer front using a Forstner bit.

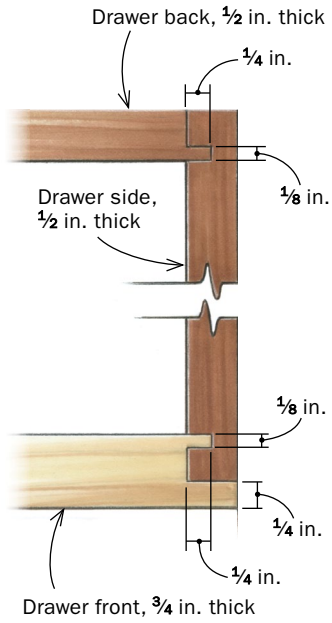
Once the drawers are complete, make the tool holders and finish the piece (I used a sprayed lacquer). To hang the cabinet, simply screw right through the back, being sure you hit the wall studs. Now if only I could find the time to put away all my tools ... □

Chris Gochnour is a busy furniture maker near Salt Lake City, Utah.

SIX DRAWERS IN A DAY

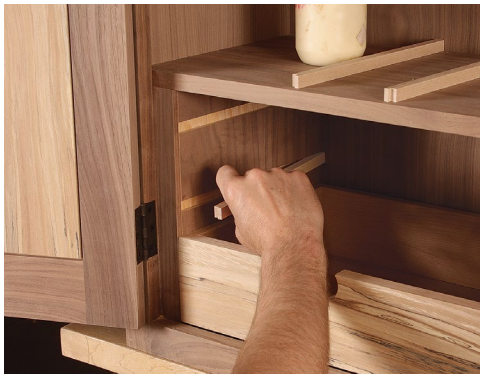
More tablesaw joinery. *After cutting the grooves for the side runners, cut the narrow dadoes for all of the drawer backs. Keep the blade at the same height but adjust the fence to cut the dadoes for all of the drawer fronts.*

SIMPLE DRAWER JOINERY



Hold it steady. *The tongues on the drawer backs are cut flat on the with a dado blade. To cut the tongue and rabbet joint in front, hold the workpiece upright as shown, using a featherboard and tall fence to keep the piece from tipping.*

Bite the tongue. *After dialing in the setting, trim the tongues on all the drawer fronts.*



No fitting required. *The runners have enough play front to back to allow you to adjust the drawers perfectly flush in front. Glue in the runners (above) one pair at a time. Then, before the glue dries, install the drawer and tap it so that the front is perfectly flush (right). Leave it that way until the glue dries.*

Article Extra

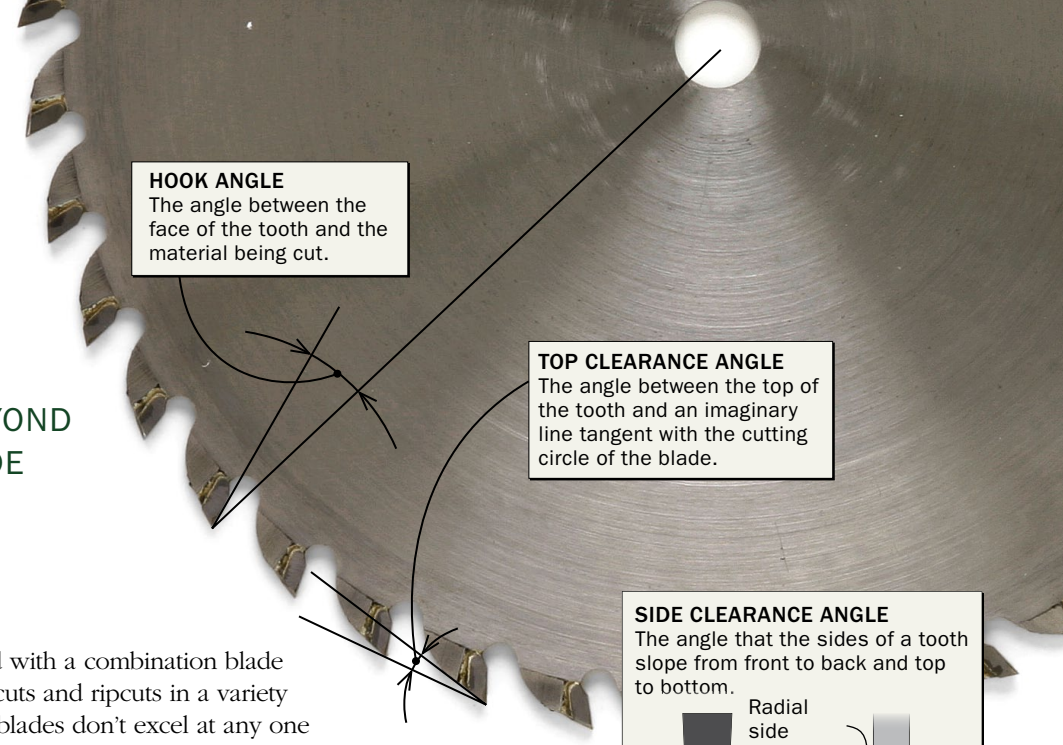
Learn how Gochnour outfitted his cabinet with a variety of custom tool holders.

a closer look

Sawblades

FOR CLEANER CUTS, LOOK BEYOND THE BASIC COMBINATION BLADE

BY TOM WALZ



Most tablesaws come equipped with a combination blade designed to make both crosscuts and ripcuts in a variety of materials. However, those blades don't excel at any one task, which is why manufacturers make blades designed specifically for crosscutting or ripping, and for cutting chip-prone materials such as melamine-coated plywood.

With one of these specialized blades, you can get cleaner cuts with less effort. But before you buy one, you need to understand some basic sawblade geometry, which blades match up to the woodworking you do, and what to look for when buying a blade.

Rip blades

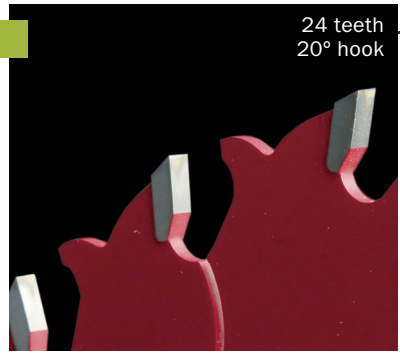
NEED FOR SPEED

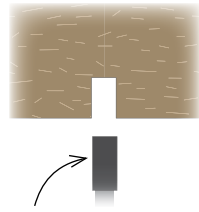
Ripcuts are easier to make than crosscuts, so they can have a faster feed rate. To help clear chips, the typical 10-in.-dia. rip blade has 24 teeth, leaving wide gullets between the teeth to accommodate the chips while the tooth is still in the cut. The top edge of each tooth is flat (perpendicular to the plane of the saw plate). Known as a flat-top grind (FTG), it is durable and relatively economical to sharpen. It has the advantage of cutting both sides of the kerf simultaneously, which reduces sawblade stresses and vibration and leaves a cleaner cut.

To accommodate a higher feed rate, the teeth have a hook angle of 20° to 25°, meaning that each tooth leans forward. This helps pull the wood into the blade.

To counteract tearout, many rip blades have low clearance angles that cause the chips to drag on the side of the teeth, creating friction, heat, and residue buildup. If you tend to make one or two ripcuts at a time, this may not matter. But in a production shop, this blade will need cleaning more frequently than other blades. A rip blade will help anyone get cleaner cuts, but where time is money, a rip blade pays for itself very quickly.

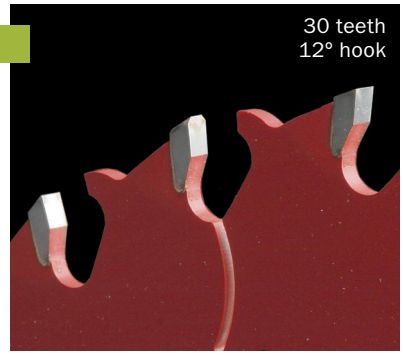
GENERAL RIPPING

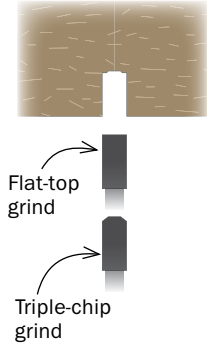




Big teeth, far apart. *A typical 10-in. rip blade has 24 teeth, each with a flat-top grind (FTG) and a hook angle of 20° to 25°, which helps pull the stock into the blade. The deep gullets help clear the large volume of chips created by ripping. A rip blade will cut thick stock far quicker than a combination blade and with less user effort.*

FOR PANEL GLUE-UPS





Ready for glue. *The Glue-Line Rip Blade from Freud (item No. LM74R010) is designed to leave supersmooth edges that won't need jointing—but only on boards up to 1 in. thick. The 30 teeth alternate between FTG and triple-chip grind (TCG).*

Photos: staff; drawings: Kelly J. Dunton

Crosscut blades

MORE TEETH MEAN CLEANER CUTS

When crosscutting, the problem is not getting rid of chips, but minimizing tearout and chipout. Everything else being equal, while few teeth mean a faster cut, lots of teeth equate to a smoother cut. And the first thing you'll notice about a crosscut blade is the number of teeth. A typical blade has 80 teeth packed together with only a very small gullet between each one. The hook angle is low—usually in the 5° to 15° range—to accommodate the slower feed rate used in crosscutting.

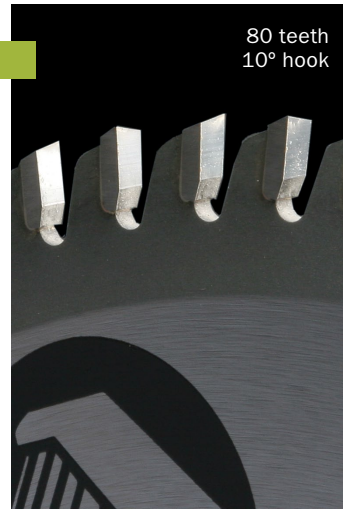
The teeth are ground with an alternate top bevel (ATB). One tip comes to a point on one side while the next has its point on the opposite side. This profile allows the teeth to cut with a scoring action, reducing the cutting pressure and almost eliminating tearout.

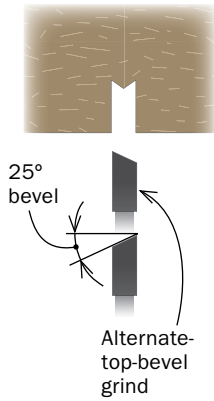
The ATB design has its disadvantages. There is a greater likelihood of damage to the leading points of the teeth. That could mean more frequent sharpening, which is more expensive because it is difficult to maintain an equal bevel and equal diameter across the points of the teeth around the blade. ATB blades are generally used for crosscutting wood, and for all cuts on plywood, veneer, hardboard, fiberboard, and particleboard.

If you work with large quantities of expensive, hardwood-faced plywood, an ATB crosscut blade is certainly worth buying.

CROSSCUT SOLID WOOD

Lots of teeth. *The teeth of a crosscut blade have alternate top bevels to score the cross-grain fibers for a tearout-free cut. Because each tooth creates relatively little dust, only small gullets are needed. The hook angle ranges from 5° to 15°.*





Laminate blades

ELIMINATE CHIPS IN MAN-MADE MATERIALS

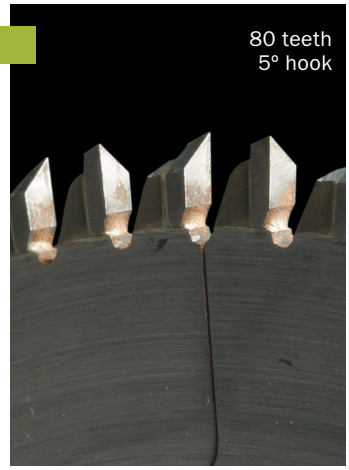
When cutting brittle surfaces, such as veneered plywood, laminates, or phenolic plywood, even an ATB crosscut blade has trouble preventing tearout. To cater to this need, manufacturers offer two modified versions of the ATB blade. One, called a high ATB, has teeth ground to a higher bevel angle, around 40°. The other has teeth ground to an angle on their tops and on their faces. With this alternate top, alternate face (ATAF) grind, you get a sharper, more pointed cutting edge to slice the most brittle materials.

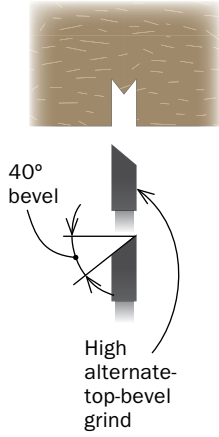
You also can get a blade with a triple-chip grind (TCG). The first, or lead tooth, has a 45° bevel on each corner that leaves a kerf with sloped corners. This is followed either by a pair of beveled teeth that square up the corners, or by a flat-topped raker tooth ground slightly lower than the lead tooth. In this way, tearout or cracks from the lead tooth are removed by the teeth that follow.

If you work extensively with brittle sheet goods, it is well worth buying one of these specialist crosscut blades. You'll get a durable blade and clean cuts, and you'll save wear and tear on your combination blade.

SHARP TEETH, NO TEAROUT

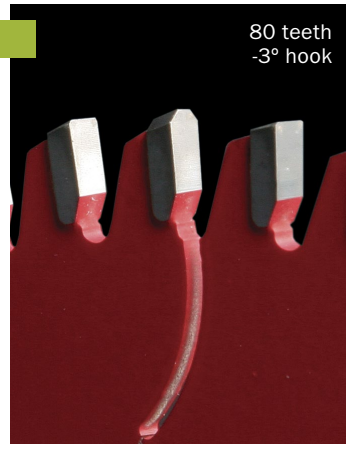
No tearout. *Some sheet goods are notoriously difficult to crosscut cleanly. A high-ATB blade cleanly shears the most brittle of veneers. However, the sharp tips on the teeth are more easily damaged.*

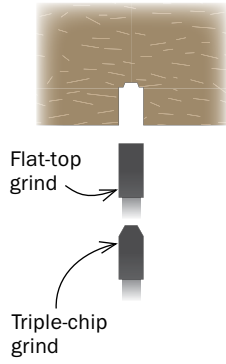




MORE DURABLE OPTION

Clean cuts for the long haul. *The 80-tooth TCG blade makes clean cuts in double-sided laminate or melamine. The TCG grind makes the blade more durable than a high-ATB blade.*



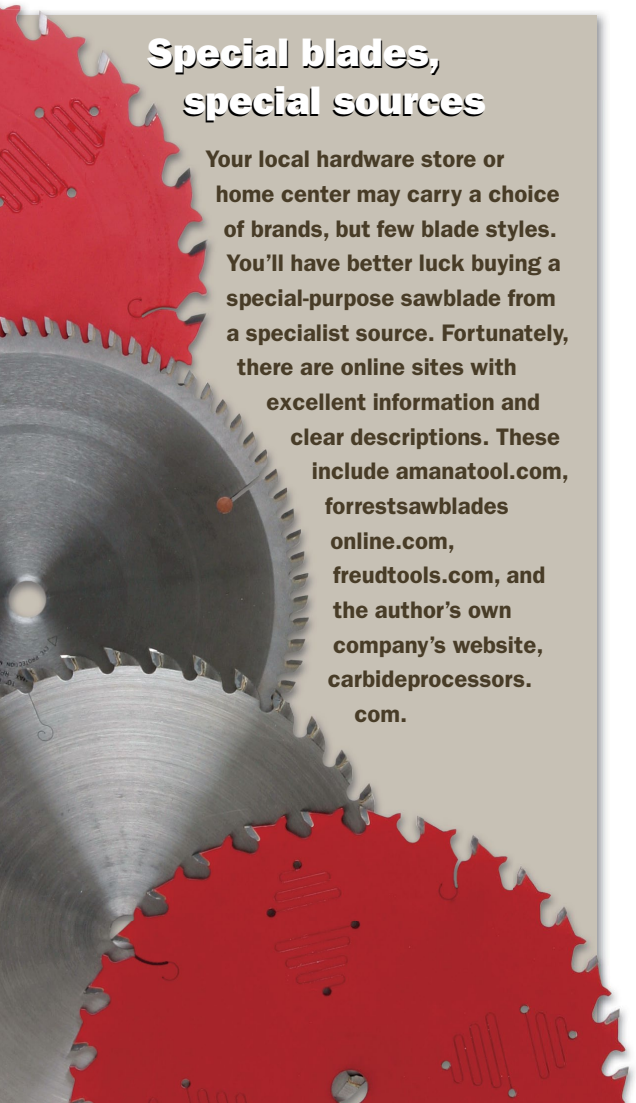


Combination blades

TWO GREAT OPTIONS

Most woodworkers use a combination blade for convenience. But you don't have to settle for sloppy results. Better blades have a combination grind (also known as a planer combination) that is a mixture of ATB and FTG teeth (40 in all). Four ATB tips cut a kerf with minimal tearout but leave a V-shaped ridge down the middle. A square-tipped raker tooth—slightly lower and narrower than the ATB teeth—follows to remove the central ridge. The raker also helps make cleaner cuts by keeping the blade running straight and square in the cut.

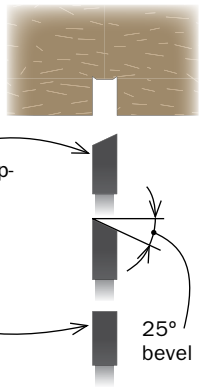
If you work mostly with solid wood, a planer combination blade will fit your needs. But if you mostly use plywood, a Plymaster combination blade is a better choice. This combination blade has 10 ATB teeth followed by a single raker tooth. Although it will crosscut better, it will not rip as fast and freely as other combination blades.



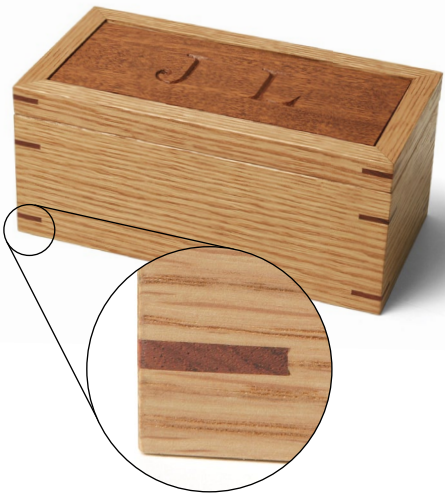
Special blades, special sources

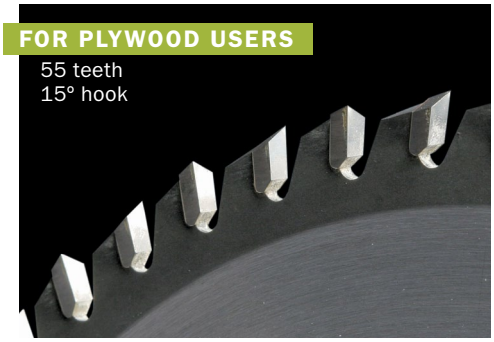
Your local hardware store or home center may carry a choice of brands, but few blade styles. You'll have better luck buying a special-purpose sawblade from a specialist source. Fortunately, there are online sites with excellent information and clear descriptions. These include amanatool.com, forrestsawblades online.com, freudtools.com, and the author's own company's website, carbideprocessors.com.

Cleaner cuts. *Most all-purpose blades have only ATB teeth. A combination-grind blade has one FTG tooth between four ATB teeth, which reduces vibration.*

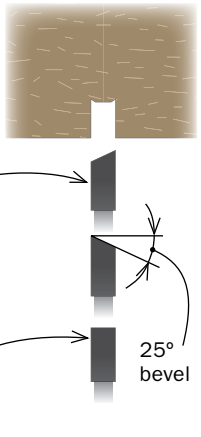


Good for joinery. *Made for ripping and crosscutting, a blade with a combination grind (ATB and FTG teeth) will leave a kerf with a nearly flat bottom. This is useful for joinery. In this example, it leaves no visible gap between the spline and the box.*





Plymaster combination blade. *The sequence of 10 ATB teeth and a single FTG tooth leaves clean cuts on plywood, particularly crosscutting.*



One blade for plywood. *If you use mostly sheet goods and don't want to switch blades, the Plymaster blade may suit you.*

Protect against rust

NEW PRODUCTS THRASHED OLD FAVORITES IN OUR TESTS

BY TOM McKENNA

If you live in a humid area of the country, you are more than likely familiar with the menacing presence of rust, especially if you work in an unheated basement or garage shop. To help protect your expensive woodworking tools, you need to take steps to prevent rust. One way is to coat iron and steel surfaces with a rust inhibitor. But which one?

Look on any woodworking forum or website, and you'll see a lot of recommendations about which products to use. To end the debate, we put 19 of these commonly available preventers—from waxes to natural oils to petroleum-based products—through a torture test to see which ones work best. Here we'll share the test results, along with some basic strategies for fighting rust. Before you can go to battle, however, it's important to understand how rust forms.

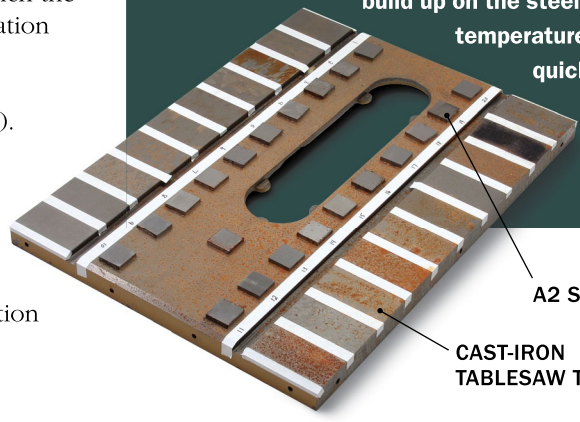
Water is the instigator

Rust (iron oxide) is a form of corrosion that occurs when both iron and oxygen are exposed to moisture, whether in the air or on the surface. That moisture is the medium through which the players that chemically cause corrosion travel. Rust formation can be accelerated with the addition of a stronger oxide or acid—the salt in sea air, for instance, or the moisture from your fingertips (ever see prints on your hand tools?). The process also speeds up with temperature variations that cause condensation. The corrosion starts on the surface and spreads like a rash. As corroded metal flakes away, fresh iron surfaces are exposed to the oxygen and water, and the process begins anew until the metal disintegrates. The key to stopping the degradation is to prevent water from mixing with iron and oxygen. And that's what these various coatings are meant to do.

Tough test

To test the rust preventers, we applied them to a cast-iron tablesaw top, leaving the center portion untreated to serve as the control. We spritzed water on the top, put it outside under an overhang, and waited. Our goal was to accelerate what happens over an extended period in some unheated garage spaces, where the top would be subject to the extreme temperature ranges of the outside air that would cause condensation.

We also applied the coatings to A2 steel samples. We placed the samples in a freezer for a few hours, removed them, and put them in a lidded plastic container. We repeated the freeze-thaw process once daily, to allow condensation to build up on the steel as it reached room temperature. The rust showed up quickly on some samples, making our job pretty easy.



WOODWORKERS MART

THE BEST OF THE BEST

We picked CRC Industrial 336 from the top seven performers as the Best Overall because it worked well on both cast iron and tool steel and did not leave an objectionable sticky or slick residue on the chisel. However, it does have a petroleum odor. Though the smell dissipates, some may find the spray offensive to use on hand tools. For those people, we recommend using the CRC for machines and Moovit for hand tools.

10 days of hell

We tried the rust preventers on a cast-iron tablesaw top and some samples of A2 tool steel (an iron alloy) and subjected them to extreme environments. The rust came on strong. We started seeing it on the tablesaw top after only one night, and on the tool steel within 48 hours. After 10 days, it was clear which products were working.

The top seven performers were CRC Industrial 336, LPS 3, Moovit, Rust Block, WD-40, WD-40 Long-Term Corrosion Inhibitor, and 3M Rust Fighter-1. However, a rust preventer is useless if it interferes with your work. So we did further tests so see if any of the top picks would discolor wood, or interfere with finishes or glue adhesion. We applied the top six products to A2 steel samples, rubbed them across some sample boards, and applied oil- and water-based finishes on top of the boards. None showed any discoloration of the wood, and there were no problems

Tool steel samples courtesy of The Steel Store, Waterbury, Conn.

FAMILIAR PRODUCTS FADED FAST

Waxes and natural oil-based products have often been touted as rust preventers on machines and hand tools. But they didn't fare well in our testing.

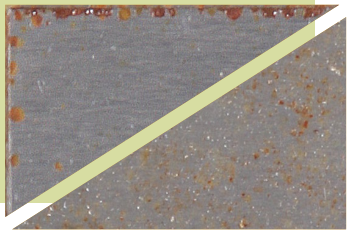
WAXES WANED

Waxes work well as lubricants, especially on the bottoms of planes and on machine tops, but they don't offer much protection against rust.

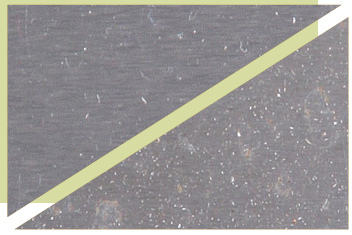
OILS SLIPPED UP

Camellia and Jojoba oils are natural products (made from vegetable oil), so they have a pleasant odor. That quality is partially why they are used often by hand-tool aficionados as a protectant. But in our tests, the products were marginal performers.

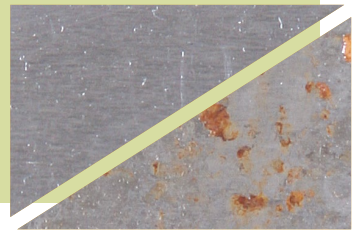
JOJOBA OIL
$12 (8 oz.)



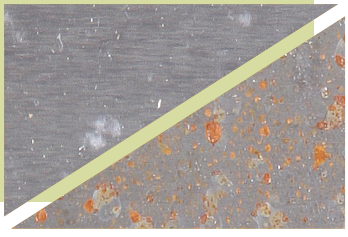
LPS 3
$15 (11 oz.)



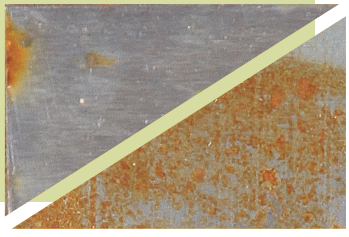
MOOVIT
$10 (10 oz.)



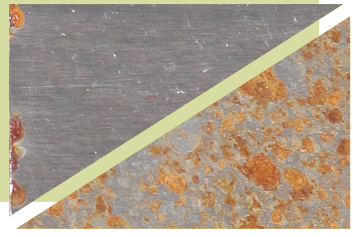
RUST BLOCK BY EVAPO-RUST
$9 (16 oz.)



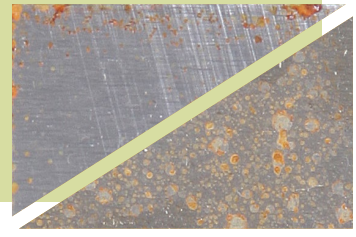
RUSTERIZER ARMOR
$16 (32 oz.)



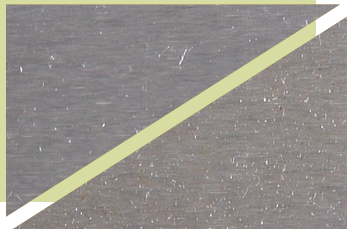
RUST-OLEUM STOPS RUST RUST INHIBITOR
$7 (10.25 oz.)



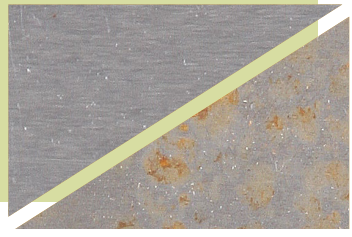
SC JOHNSON PASTE WAX
$7 (16 oz.)



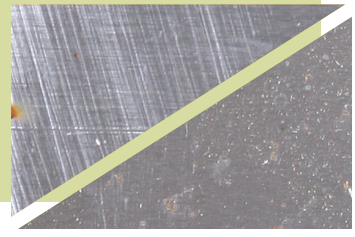
WD-40
$5.50



WD-40 LONG-TERM CORROSION INHIBITOR
$16 (6.5 oz.)



3M RUST FIGHTER-1
$21 (18 oz.)



Photos: Michael Pekovich

with finish adhesion.

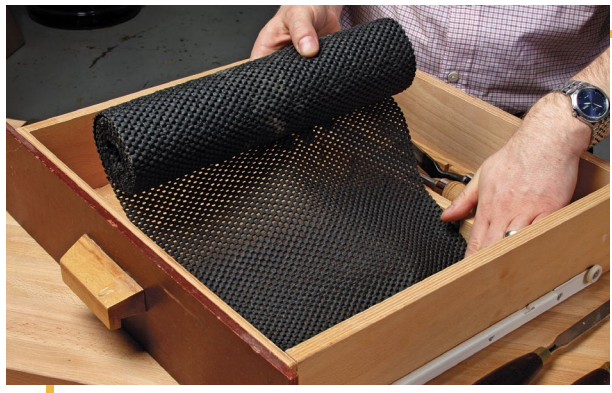
Last, to find out if any products left an objectionable residue on hand tools, we applied them to some chisels and then basically felt them, comparing an untreated chisel with the treated ones. The CRC Industrial 336 and Moovit were the favorites here. Each of these products were very close in feel to the untreated chisel. We also applied the products to a jointer table and gave them a feel for any objectionable residue. Most of the products left a slick surface on the cast iron, a plus for machine tables. The only two that left a visible and tactile residue were 3M Rust Fighter 1 and LPS 3.

The best defense

Two products, 3M Rust Fighter 1 and LPS 3, performed perfectly in both torture tests, but we didn't like the sticky feel of the coating that both left behind. Other products did well on one steel but showed kinks in the other. In the end we picked CRC Industrial 336 as Best Overall. If you prefer a non-petroleum product for your hand tools, we recommend Moovit.

But the best defense against rust has multiple prongs. Aside from weatherproofing and heating the shop, we also recommend using a dehumidifier to help control moisture. And because none of the products we tested can be applied to the inside of power tools (rust can degrade motor components), we recommend keeping desiccants or corrosion inhibitors in tool cases. □

Tom McKenna is the editor of Fine Woodworking.



Dry the air. *You also can curb moisture with a dehumidifier—just remember to empty it regularly. For basement shops, a masonry waterproofing paint keeps moisture from migrating through the porous concrete walls. Garage floors should be sealed as well.*

Other ways to manage moisture

The wipe-on or spray products we tested aren't the only weapons available in the battle against rust. Aside from heating the shop or using a dehumidifier, two other options are desiccants and volatile corrosion inhibitors (VCIs). These products prevent corrosion of critical components in contained spaces, such as boxes, drawers, and cabinets. Each does the job differently.

Desiccants are made from a number of porous minerals, including calcium and silica, as well as manmade compounds. They help prevent rust by removing moisture from the air via the process of *adsorption* (vs. absorption). When a substance is adsorbed, it remains separate from its host, which essentially works as a storage drum. And that storage area is limited. A desiccant compound can become saturated, or full. Some desiccants, such as silica and a few calcium-based products, can be recharged, or reactivated, with heat to remove the stored moisture and used again.

VCIs emit molecules that settle on metal surfaces, forming a protective layer that repels moisture. VCIs are made by a number of manufacturers from proprietary chemicals and often are infused into a porous carrier material, such as foam. They are disposable and cannot be recharged—some last six months, others work for up to five years.

Desiccants and VCIs both are designed to work in enclosed spaces, and you purchase them based on the square footage of that space. To get the most protection from both products, the storage space needs to be as airtight as possible. If a drawer is left open, the protective tool coating emitted by a VCI will dissipate, while a desiccant will become saturated quickly.

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Fine Woodworking contributing editor, will teach three seminars:

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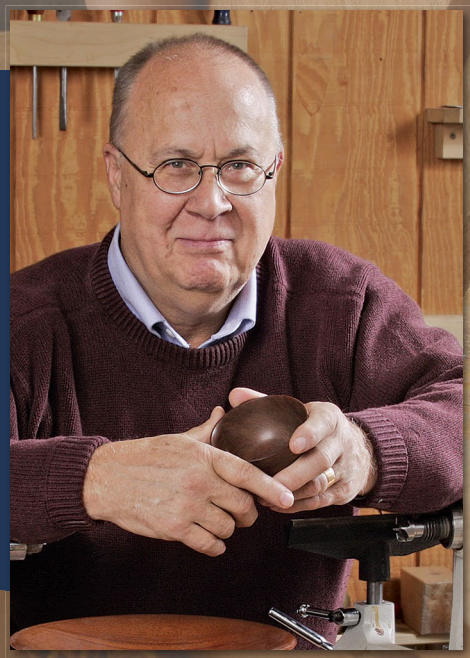

David Heim,

former associate editor at *Fine Woodworking*, will demonstrate how to make the most of the SketchUp® 3D design program. Woodworkers of all skill levels can learn how to use this popular tool in their shop or for their business.

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Tablesaw

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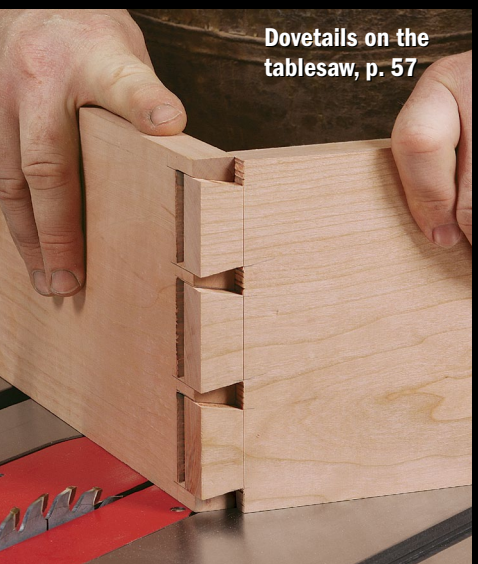

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