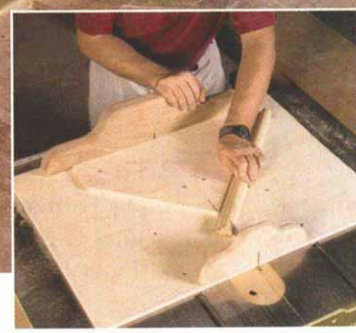
A Tablesaw Sled for Precision Crosscutting

An indispensable jig that makes accurate miters, crosscuts and tenons a cinch

by Lon Schleining



Miters

Crosscuts

Tenons

Crosscutting with a standard tablesaw miter gauge can be frustrating, inaccurate, even hazardous. Adding an extended fence helps, but the miter gauge still will be limited and imprecise. Don't bother with it. Instead, take the time to make a super-accurate, super-versatile and far safer crosscut sled.

A crosscut sled is a sliding table with runners that guide it over the saw in the miter-gauge slots. It has a rear fence set perpendicular to the line of cut to hold the workpiece. Because it uses both miter slots, the sled is remarkably and reliably accurate. It also easily accepts any number of stop blocks, auxiliary fences and templates, allowing miters, tenons and many other specialty cuts. Nearly every small commercial shop I know uses some variation of this sled. I use mine primarily to square the

Photos: Strother Purdy

ends of 12-in.-wide stair treads.

Your sled should fit your work. There's no sense in making a huge, unwieldy sled if you'll use it mostly to cut 3-in. tenons. The one I use is 30 in. wide and 21 in. deep. It's capable of crosscutting a board up to 2 in. thick and 18 in. wide (see the top photo on the facing page). With a miter template (see the box on p. 68), the sled can cut a 45° miter on the end of a 3-in.-wide board. The rear fence is 5 in. high in the middle, 2½ in. high on the ends. Though I rarely crosscut a board thicker than 2 in., the fence needs to be at least 4 in. high to accommodate the height of the sawblade. The extra fence height also supports workpieces on end when I cut tenons.

Start with a solid platform of Baltic-birch plywood

I build jigs like this from what I call not-yet-used materials (some call it scrap). I used void-free ½-in. Baltic-birch plywood for the platform. Baltic birch is often mistaken for Finnish birch—its waterproof and much more costly cousin. Baltic birch is not as high quality, but for the price (about a dollar per square foot), it's perfect for making stable, durable jigs. But any plywood you have around the shop will probably work fine as long as it's flat.

The first step is to cut the platform to size. Make the platform as square as you can get it. You can check for square by measuring diagonally across the comers: The measurements should be the same across both corners. But before you make the sled, it's a good idea to make sure your tablesaw is tuned up.

For the sled to perform well, your saw's blade must be precisely parallel with the miter-gauge slots, and the table must be flat (for more on tuning up your tablesaw, see *FWW*#114, pp. 60-64).

Quartersawn hardwood runners for smooth sliding

I prefer to make runners from oak, instead of buying steel ones, because I can control their fit in the miter slots. Wood runners pose a few problems, however, that should be taken into consideration. Expansion from seasonal humidity can cause them to bind in the miter slots, so I choose the material and its grain orientation carefully. They also need to be milled precisely.

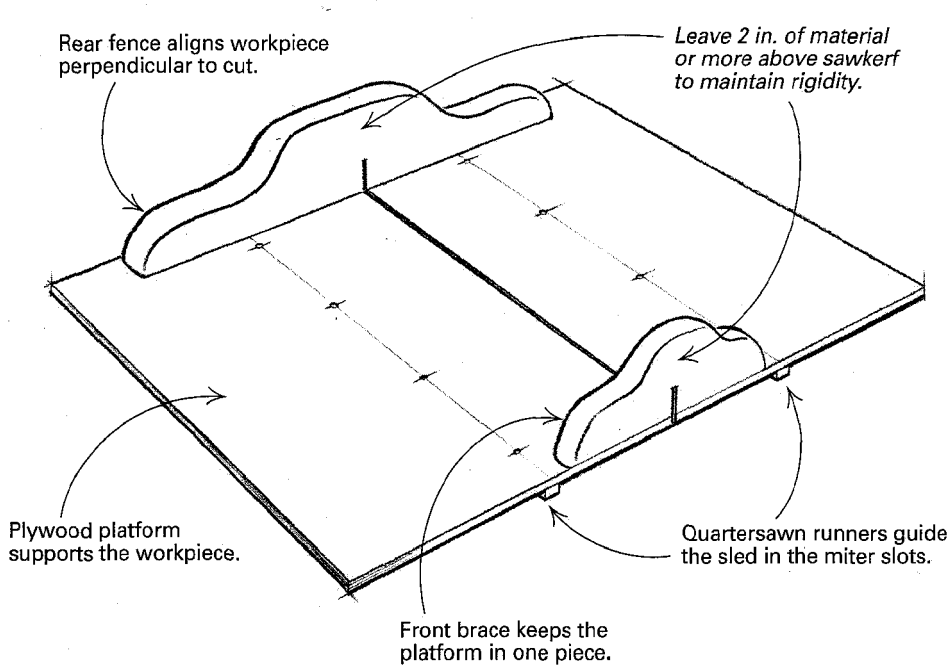
Start with a close-grained flatsawn maple or oak board. Mill the thickness of the board to the width of the slot using a planer. Test the fit as you go, planing off a little material at a time. It should slide easily in the slot, but without slop (see the photos below). Next rip two runners from the board to a thickness slightly less than the depth of the miter slots, then cut them to length. By ripping strips off a flat-grained board, you have made quartersawn runners, which will be very stable. The idea is to make runners that don't rub against the bottom of the slots and raise the sled off the table, but that still engage as much of the miter slot as possible.

The first construction step is to fasten the runners to the platform. To make sure they are right where they should be, attach them while they're in the miter slots. Lower the blade out of the way, and center the platform on the table, using the rip fence to keep the platform square on the runners (see the photo at left on p. 68). Lay out the holes for the screws so they're centered on the runners, and drill them in the platform only. The screws should pass freely through the holes in the plywood.

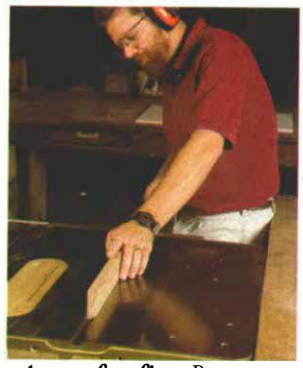
The size of the drill bit you choose for the pilot holes in the runners is very important, Thin runners will bulge or split if the pilot hole is too small. Even a small bulge will

A basic crosscut sled

Tailor the size of the sled to fit the work you do. The crucial features are a rear fence perpendicular to the line of cut and runners that slide easily without slop.



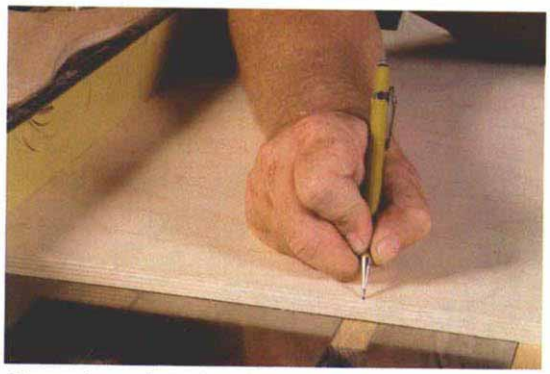
START WITH THE RUNNERS

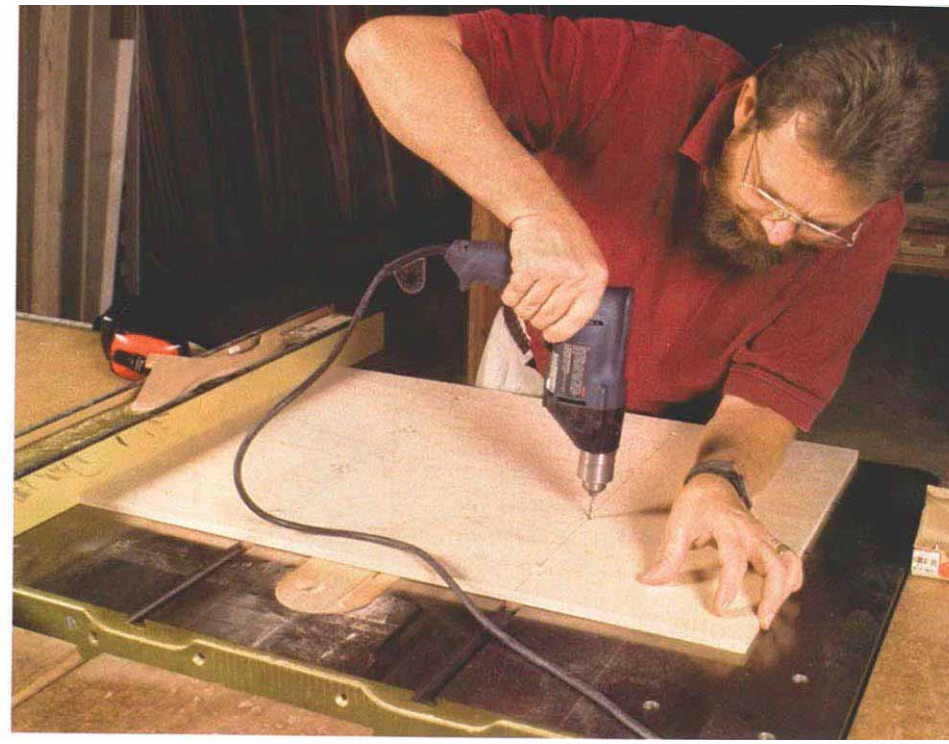


***A perfect fit**—Runner stock should slide freely in the miter slots (above). Finished runners should be just below the level of the table (right).*

Drawings: Michael Pekovich

ATTACH THE PLATFORM TO THE RUNNERS





Use miter slots to align runners under platform. *The rip fence keeps the platform square and centered while you lay out (above) and drill the pilot holes (right). To avoid splitting the runners, the holes should be slightly larger than the shank diameter of the screw.*

make the runner bind in the miter slot. The holes should be slightly larger than the shank diameter of the screw. I use a dial caliper to measure the shank, and then I select the correct drill bit. On this sled, I used ⅝-in.-long #8 screws that have a shank diameter of 0.122 in., so a ⅛-in. drill bit (0.125 in.) was perfect.

First drill just one pilot hole in each runner, and insert a screw in each. These screws keep the runners firmly in place while you drill the other pilot holes. Remove the two screws, deburr all the holes, apply a small bead of glue to the runners and screw the platform to the runners. Clean off any glue that might have squeezed out.

Now take your incomplete sled for a test drive: move it back and forth in the miter slots to see if it runs smoothly. It's easy to tell just where the oak runners are binding because they'll be shiny and gray from rubbing against the sides of the steel slots. While the glue is still soft, it is possible to move the runners slightly. You should only be concerned at this point with how smoothly the platform slides.

Make front brace and rear fence

The front brace's only job is to keep the platform in one piece. It doesn't much matter what size or shape it is (I add some gentle curves to mine) as long as it is a few inches higher than the sawblade's maximum cut—about 2 in. above the platform. I made this brace from 1¼-in.-thick red oak, 3¾ in. high, and about as long as the width between the miter slots. Shape it, smooth it, glue and screw it to the front of the table from the underside of the platform.

This is also the time to make the rear fence. I used some 2-in.-thick white oak 5 in. wide and 23 in. long. The rear fence should be pretty stout to hold the sled table together. If you don't have 8/4 lumber, laminate two 4/4 pieces together. Make sure the board is perfectly straight on the inside face, and square with the edge that will be attached to the platform.

Keeping things square becomes critical when you attach the rear fence. The most important thing to remember when making a sled is that, for the cut to be square, the rear fence must be square to the line of cut. If it's not, you have a useless sled.

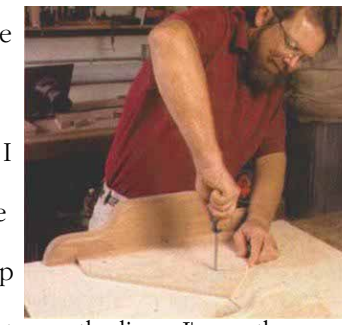
Before you attach the rear fence, put the sled on the saw, raise the blade slightly

From 90° to 45° cuts with a simple template

With this template, you'll be able to make accurate miter cuts on your tablesaw. The template is nothing more than a piece of Baltic-birch plywood with two sides at 90° to each other and a back side that registers against the rear fence of the sled. This template sits far enough forward so that long workpieces clear the ends of the rear fence.

There are any number of ways to make such a shape. I used the opportunity to test the accuracy of my sled. First I laid out and rough cut the template from a corner of a sheet of plywood and got one of the sides straight on a jointer. This can also be done on the sled by aligning the edge over the sawkerf and nailing the template to the sled (don't let the nails go all the way through). I then cut the opposite side at 90° to the first using the rear fence.

To cut the base at 45° to the two sides, I cut to the layout line on the base by aligning it over the kerf and nailing the template to the sled. I've rarely gotten a base perfect the first time.



To find out which way it's out, I center the point of the template on the sawkerf and align the base against the rear fence. Then I scribe its outline on the sled. I flip it over and check it against the scribe marks. If it sits perfectly between the lines, I'm on the money. If not, I recut the back of the template as required. Finally, I attach it to the sled with a few screws, make some trial miters and adjust accordingly. —*L.S.*

above the thickness of the platform and cut through the platform about two-thirds of the way from back to front, being very careful not to cut all the way through the platform (see the photos at right). Drill and countersink the holes in the platform, then securely clamp the fence to the platform so that it is square to the cut you just made. Use an accurate framing square to align it, checking from both sides of the fence. Now drill two center pilot holes (of four total) into the fence, and install the screws from the bottom side.

Before you can attach the rear fence once and for all, make some trial crosscuts and check the results. The position of the fence will almost certainly need fine-tuning. It's easy to rotate the rear fence back and forth a little with hammer taps or a bar clamp, even with the two screws snug. This is where patience is important. Keep making test cuts and adjusting as necessary until the cut is perfectly square. Don't, however, cut all the way through the platform at this time. Leave just enough plywood at the rear of the platform to hold the sled together; if you cut all the way through, the rear fence will be harder to align.

Attach the rear fence, and make more trial cuts

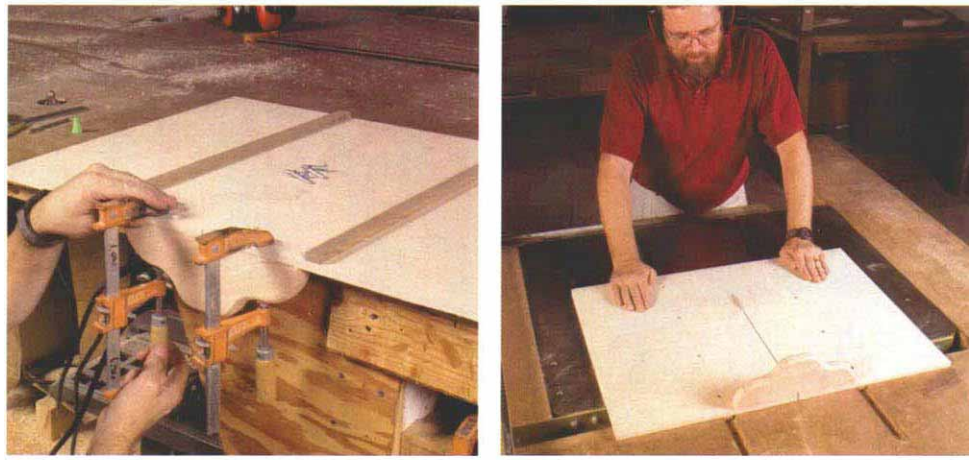
When the sled makes true 90° crosscuts, it's time to attach the rear fence permanently. Clamp a long 4-in. by 4-in. block to the sled platform so that it fits tight against the rear fence. It will keep the fence's place. Remove the two screws that are temporarily holding the fence. Apply glue and reinstall the fence with the rest of the screws. Carefully check its position against the block. Remove the clamps and the block, and immediately make a trial cut, still without cutting all the way through the platform.

Adjust the fence if necessary with hammer taps or clamps. Even though the sled is screwed and glued together at this point, it's still possible to make fine adjustments, but only for a few minutes after glue-up.

Before you spend too much time admiring your handy work, sand all the sharp edges and coat the bottom with a lubricant such as spray silicone or TopCote. Even then, you're not done. You still have guide blocks and templates to make. They will let your sled cut perfect tenons and miters. □

Lon Schleining has designed and built stairs in Long Beach, Calif., for 19 years. He also teaches woodworking at Cerritos College in Norwalk, Calif.

USE THE KERF TO SQUARE THE FENCE



Don't cut that sled in half. *After you attach the front brace (left), cut only two-thirds of the way through the platform (right). The kerf is a reference to set the rear fence.*

Square the fence to the sawkerf. *Check the fence's alignment from both sides of the kerf. Attach the fence with only two screws before you make trial cuts.*