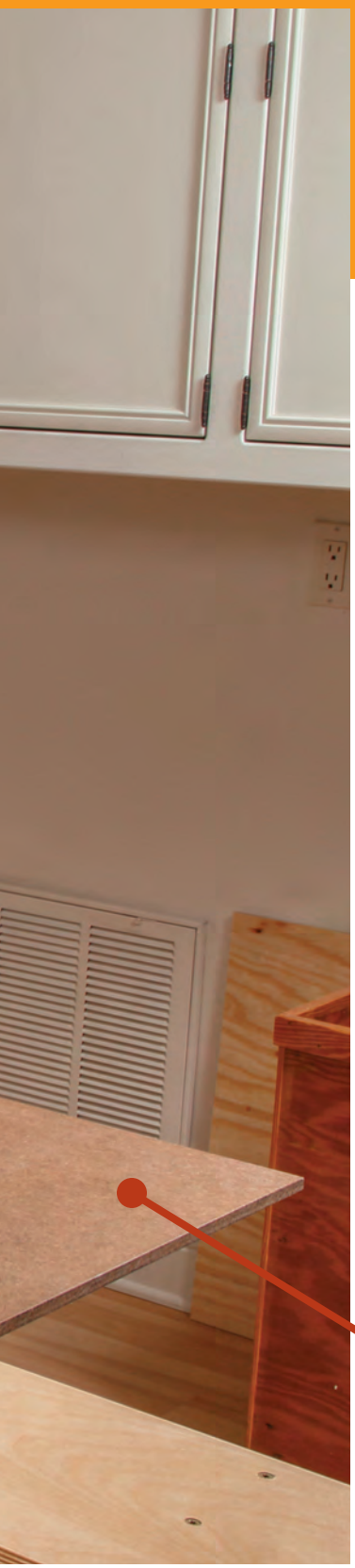
Lightweight Crosscut

Photos: Asa Christiana

Sled for Big Panels



Clever design includes a steel runner and a thin, honeycomb base

BY STEVE FIKAR

I cut out large plywood parts pretty regularly for a variety of woodworking projects, including cabinets for the house and shop. Ripping these big pieces on the tablesaw is easy enough, but crosscutting them accurately is a challenge. A tablesaw crosscut sled will do the trick, of course, but if you stick to the usual design, a large-capacity sled tends to be very heavy. So I decided to start with a clean slate and engineer something unique.

My solution is an extralarge sled that runs along one side of the blade—instead of straddling it—guided by a single runner in one of the miter slots. To add size and capacity to the sled without adding weight, I borrowed a common engineering solution—torsion-box construction—to create a ⅜-in.-thick base that is very lightweight yet remarkably stiff and strong.

As they are on all crosscut sleds, the fence and base on this sled are trimmed by the blade, creating zero-clearance support for chip-free cuts and easier alignment. An advantage of a one-sided sled is that only one fence is needed, attached at the front edge.

Steel runner ensures accuracy

The main disadvantage of a one-sided sled, especially a large one with heavy cargo, is the single runner that guides it. If it were made from wood, it would tend to wear and get sloppy over time. So I used a steel bar for this sled—"cold-rolled" at the factory to precise dimensions—which will deliver a lifetime of accurate cuts.

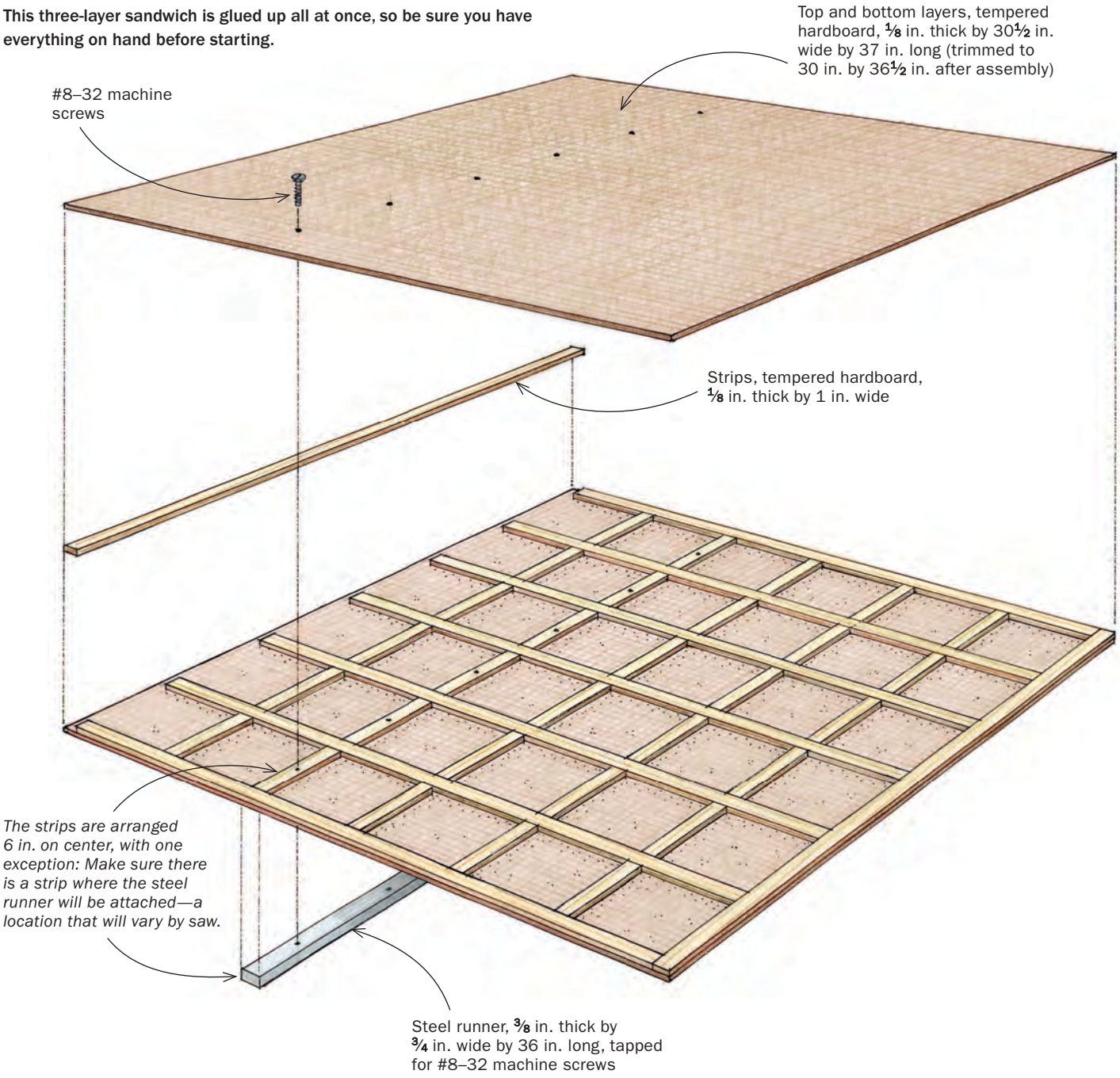
Most tablesaw miter-gauge slots are milled to fit a straight bar exactly ¾ in. wide by ⅜ in. thick. You can buy a steel bar with these precise dimensions

Torsion box base is the key

Fikar used three layers of ⅛-in.-thick tempered hardboard—two full outer layers with a grid of strips between—to create a large base that is both stiff and lightweight. The resulting three-layer sandwich is much lighter and more rigid than a comparable sheet of plywood.

BASE IS A LIGHT, STRONG HONEYCOMB

This three-layer sandwich is glued up all at once, so be sure you have everything on hand before starting.



Gluing up the base. *Start by clamping two long strips along adjacent edges, and build out the grid, applying a bead of glue on each piece. Run a bead along the top of the strips and drop the top in place. If you don't have a vacuum bag, you can clamp this big glue-up by laying a piece of plywood on top to distribute pressure, and then piling on every heavy object you own, spread out as evenly as possible.*

Drawings: Vince Babak

Attach the steel runner

To resist wear and ensure accuracy for years to come, Fikar uses a steel bar to guide his one-sided sled. Here's how to drill and tap it for machine screws, and fit it precisely to your miter slot.

Drill and tap the screw holes. *Start with a smaller drill bit before stepping up to the full-size #29 (or 9/64-in.) bit. Lubricate a #8-32 tap and twist it slowly until it starts to cut, trying to keep it square to the bar as you go. Twist until you encounter stiff resistance, then reverse the tap to break off the chips and continue. Then test the threads with a screw. If it's too tight to turn by hand, run the tap through once more. Then deburr the holes with a countersink or deburring bit.*

TIP Adjusting the fit of the bar

If the steel bar is loose in the miter slot, improve the fit by dimpling the sides at regular intervals, using a center punch, then filing the dimples as needed. You can check to see which dimples are rubbing by putting ink on them before trying the fit.

from a variety of online retailers, in a 3-ft. length that's perfect for this project.

Just to be sure, though, measure your miter slots with a dial caliper and read the specs carefully on the bar you're considering. The one I found at McMaster-Carr is perfect for my saw, with a tolerance range from a few thousandths undersize up to 0.750 in. on the nose. If there's any doubt, err toward a slightly undersize bar and dimple it to fit, as shown above.

Offcuts are supported too—The other disadvantage of a one-sided sled is the lack of support for cutoff workpieces. Whenever this might be an issue, I place a simple 3/8-in.-thick support piece on the right side of the saw table.

Start by building the torsion-box base

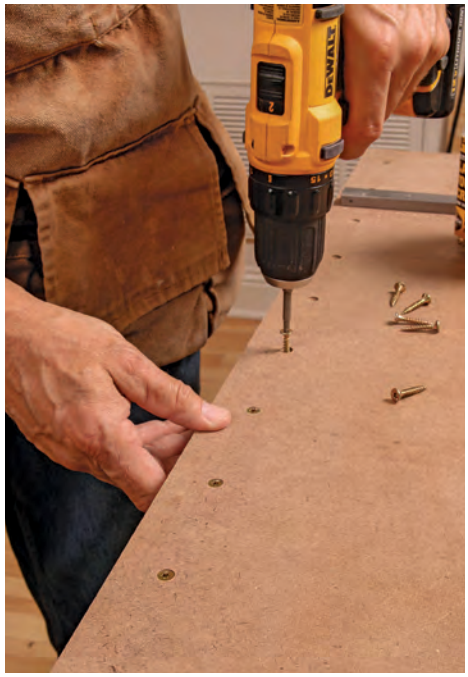
The top and bottom layers of the base are full sheets of hardboard, while the middle layer is a grid of 1-in.-wide strips with open spaces between, making the base somewhat hollow yet extremely stiff.

Screw the bar in place. *After clamping the bar to the base, drill through each tapped hole with a bit that just clears the threads, then remove the bar and enlarge the holes with a 5/32-in. bit. Flip the base over, and countersink the holes on the top side. The #8-32 machine screws pull the bar tightly to the base. If they stick out past the bottom of the bar, grind or file them flush.*

Squaring the fence

To square the fence, create a pivot point by driving a screw through the base and into the fence at the right end. Then simply clamp the left end while you make test cuts and dial in the fence position.

Start by trimming the base. *Drop the runner into the miter slot, and cut the edge of the sled flush to the blade. Then use a circular saw and guide fence to trim the front edge square. The other edges can be ripped parallel on the tablesaw.*



Test cuts ensure squareness. *Drive a screw through the base into the right end of the fence, and clamp the left end. Using a large piece of plywood with its two long edges ripped parallel, make a test cut (above). Then flip the piece so the opposite long edge is against the sled's fence and feel along the blade side of the base to see if the sled and test cut still align (above right). If they don't, adjust the clamped end of the fence and make another cut. Once the fence is square, drive the full row of screws.*

To get ready for the glue-up, cut the top and bottom pieces slightly oversize, and cut up all of the strips, both the full-length and 5-in.-long ones. Now lay out the grid on the lower layer.

The grid is 6 in. on center with one exception: You need to make sure there is a hardboard strip where the steel runner will be mounted, based on your particular saw design. To keep track of the bar location, I place a strip of blue tape under that area, which I wrap over the edge of the glue-up later. When locating the bar, make sure the right side of the base will bypass the blade by at least ⅛ in., so the blade will trim that edge.

The glue-up is straightforward but you have to do it all at once. So make sure you have everything ready to go beforehand, including the plywood and weights for the top layer, and a full bottle of Titebond III (allows 15 minutes of working time).

Find or create a firm, flat surface large enough to support the pieces, and start by gluing the gridwork of strips to the bottom layer. A wide bead of glue on each strip is all it takes.

To keep the pieces from sliding around as you press them into place, start by clamping two full-length strips along two adjacent edges. Then push the others against those as you build out the grid from there. None of the rest require clamping.

Once the strips are all down and aligned, lay another bead of glue along their top edges, and wait a few minutes to let the lower gluelines stiffen a bit. Now lay down the top sheet of hardboard carefully, making sure that all the strips stay flat with no overlaps. Lay a piece of plywood on top as a clamping caul, and then add as much weight as you can, keeping it even and well-distributed.

Fit and attach the bar and fence

The only good way to attach the steel runner to such a thin base is with machine screws that pass through the base and thread into the bar. So you'll need to drill eight evenly spaced holes down the center of the bar and cut #8-32 threads in them. See photos, p. 47, for how to tap and fit the bar.

Before attaching the bar, check that it's at least ½ in. shorter than the front-to-back length of the sled. That's important because you'll cut the base to final size only after the bar has been attached. Once the bar is screwed on you'll trim the edge of the

Using the sled

Here are some techniques and accessories that will ensure clean, accurate cuts..

Align and clamp. *After the tablesaw blade cuts through the fence, it becomes a zero-clearance indicator for lining up cuts. To make sure large workpieces don't shift, Fikar clamps them to the fence.*

Keep the sled from tipping. *This long, straight board clamps to the left, front edge of the saw table, supporting the sled and keeping it level when it overhangs the front edge of the saw.*

base that passes the blade; then you'll use a circular saw and a fence to trim the front edge square. You can rip the other edges parallel on the tablesaw.

Attaching the fence perfectly 90° to the path of the blade is easy if you follow the directions in the photos on p. 48. I applied a clear oil finish to my sled for looks and durability, and I wax the bottom and the runner periodically.

Get the most from your new sled

Since the sled starts well in front of the saw table for large workpieces, I add a special support board to my saw, to help keep the sled level. It clamps to the left edge of the table, extending back several feet toward the user.

To maintain the zero-clearance base and fence, I always use the same blade with this sled. But if the edge ever needs refreshing, you can cut it back a little, add a solid-wood strip, plane it flush on the top and bottom, and re-cut the edge. The fence can also be renewed or replaced if necessary. □

A former fighter pilot and retired software engineer, Steve Fikar lives in Shalimar, Fla.

Support large offcuts. *Fikar uses this simple jig—equal to the thickness of the sled base—to keep offcuts from dropping off the sled and chipping.*