Crosscut Sled Design Guide

The Goal

All the woodworking magazines periodically have a featured plan for building some sort of crosscut sled for the tablesaw. What they universally lack is an explanation of the design process for them, this is an attempt to cover that territory.

Miter Gauges

Every tablesaw comes equipped with a miter gauge to be used for crosscutting. However, even the best of these units quickly becomes more of a hindrance than an asset even for beginning woodworkers. The problems with miter gauges are induced by the slop between the bar and the slot in the tablesaw, the small distance between the components that set the angle of the device, and the very short "fence" section. While it is fairly easy to make the bar fit better and a piece of stock can be put onto it to give it a true fence, it still cannot support large pieces and the very important 90 degree angle setting is still hard to set accurately.

It is quite logical to want to remedy the problems of the OEM miter gauge by purchasing one of the several aftermarket miter gauges that solve the accuracy problems. However, with one exception even these will not support large pieces. These miter gauges are more costly than they appear since they are only a partial solution.

In order to crosscut large pieces accurately, a large support and fence system is required. A shop-made crosscut sled is the cheapest solution to accomplish this.

Crosscut Sleds

There are a few basic configurations for crosscut sleds along with a few basic requirements that dictate the design somewhat.

Sled Requirements:

- Glide smoothly across the tablesaw.
- Be sufficiently strong to support the work piece and hold up in the shop environment.
- Have a useable length of fence that can be set to or is built to be 90 degrees to the blade.

Sled Types:

- Double Runner.
- Single Runner.
- Double Runner and Bridge.

1. The Double Runner is quite popular and is fairly easy to build. It has a large deck surface to which two runners are installed onto the bottom. At least the rear fence (typically) is set to be 90 degrees to the blade. The forward fence (or support) does not have to be full length nor does is have to be 90 degrees to the blade - but it's nice if it is. The saw kerf runs somewhere down the center of the support deck providing workpiece support on either side of the blade. And at least when first constructed, the support deck provides a zero clearance cutting surface which minimizes chip-out. The two runners usually combine to give a tight enough fit that there is no discernable slop in its sliding action and should produce a very high quality cut.

   The deck surface can be made to accommodate other jigs or accessories including a set 45 degree fence system, a tenon support system. a pivoting auxiliary fence for miter cuts, replaceable deck in the cutting zone, and just about any other common tablesaw jig.

   The stability and accuracy of this design makes it a good choice for crosscutting large items. For this type of work, the minimum capacity should be 25 inches. Since most of this cutting will be in 3/4" thick material, the thickness of the deck required for support is not an issue.

   A minor variation of the design is just a smaller version. Since the large unit would be so much heavier and unwieldy, a small version provides a great deal of benefit. In a small version, the deck material should be as thin as possible.

2. The Single Runner is like the double runner except that as the name implies, it uses a single runner. In nearly all cases, there is no support deck to the right of the blade. This type of sled usually has a single fence located at the leading or trailing edge of the support deck. The guide bar is usually about 24" long, this in itself will usually make the travel more accurate than the OEM miter gauge. However, due to the single bar configuration, the travel accuracy is only as good as that one component. A variation on the design is to use a pivoting fence system.

   A benefit of the single runner design is that it can dispense with the second support fence. Without the second fence, the workpiece width is not limited by the jig itself. This type of design is also more easily converted to a pivot fence type. The down side of this design is the lack of support to the right of the blade.

3. The Double Runner and Bridge does the same function as two OEM miter gauges that share a common fence. By using two runners, it should perform better than an OEM miter gauge except that these "sleds" usually do not have a pivoting fence for miter cuts.

   Since this design uses two runners, it has almost as much potential for accuracy as a version with a deck. The primary benefit of this design is that the maximum cutting height is not limited by an additional surface over the saw blade. This design would be a good alternative to the small version of the Double Runner design mentioned above. The down side of this design is that the guide bars are unsupported on one end and it would be easier to inadvertently throw the system out of alignment.

Materials

The deck surface should be durable and the smaller the sled the more durable it should be. A large sled will not get used as often so you may be able to get by with 1/2" or 3/4" plywood, 5/8" MCP, or 1/2"MDO. A smaller sled could get by with 1/4" Tempered hardboard faced with laminate on both sides. That would provide a durable surface and only sacrifice about 5/16" or so of blade height cutting capacity. The sled will slide easier also if the deck has a few strips of UHMW plastic tape applied to the bottom.

Although I see wood recommended for the runners quite often, I've never had good luck with them; they are prone to changing dimension with changes in humidity. A superior material would be UHMW plastic, Nylon, or Steel bar stock. In addition, there are bars made specifically to fit the miter gauge slot that can be adjusted for fit.

Whatever the fence is made of should be straight. If solid wood is used, kiln dried quarter-sawn hardwood would be best. An aluminum extrusion could be used as well as plywood glue-ups or torsion box construction. The main fence should be 1 1/2" to 2 1/2 wide and 2" to 3 1/2" tall. The fence height may need to be higher in the area where the blade cuts through it.

Accessories

Any of the basic sled designs outlined here can benefit from a few useful accessories.

- A flip-type stop block along with a tape measure to directly set them greatly increases the utility of the sled.
- Adjustable vertical holding fixture. With a jig like this even angled tenons or bevel cuts in short stock can be made.
- Hold-down clamps. These can keep large pieces positioned securely on the sled during cutting.

The Solutions' Problem

Even though a cutting sled can solve the problems of cutting large pieces accurately, getting consistent 90 degree cuts, and maybe even accurate miters, this "solution" brings its own set of problems to the shop.

1. If the device doesn't have a pivoting fence, you will still have a hard time getting accurate miter cuts.
2. They can be heavy, this makes them unwieldy and inconvenient to take on and off of the saw.
3. They take up storage space when not in use.

4. Even if the tablesaw top is waxed and the bottom of the sled has UHMW plastic tape, there is still some difficulty crosscutting a 24 x 96 piece of plywood due to friction and balance.
5. When cutting large heavy pieces, the sleds are prone to tipping on the infeed and outfeed sides unless special precautions are taken.

To remedy the problems mentioned above, you could do the following:

1. Buy a better aftermarket miter gauge for small crosscuts and miters.
2. If sized for the largest crosscut, make a smaller lightweight version, this would suffice for about 75% of the typical cuts.
3. Sorry, nothing you can do about that!
4. You can keep the surfaces waxed but otherwise the problem remains.
5. Use an outfeed table.

The point of this section is to illustrate that even when you solve one problem, the solution can bring its own set of problems to overcome. As can be seen, if you choose to go down this path, you will probably be spending a fair amount of effort to arrive at an ideal system.

The Real Solution

There is a way to get ALL the benefits of the best crosscut sled, the best miter gauge AND NONE (or very few) of the associated problems these "solutions" have with them; that is to use a sliding table instead! Although these devices are not cheap, when compared to all the effort that can be put into building a few crosscut sleds and perhaps augmenting them with aftermarket miter gauge, they become inexpensive by comparison.

A sliding table attachment will cost between $300 to $800, even the cheaper ones are far better and useful than the best crosscut sled. The only down side to these attachments is that some require an additional amount of static floor space.

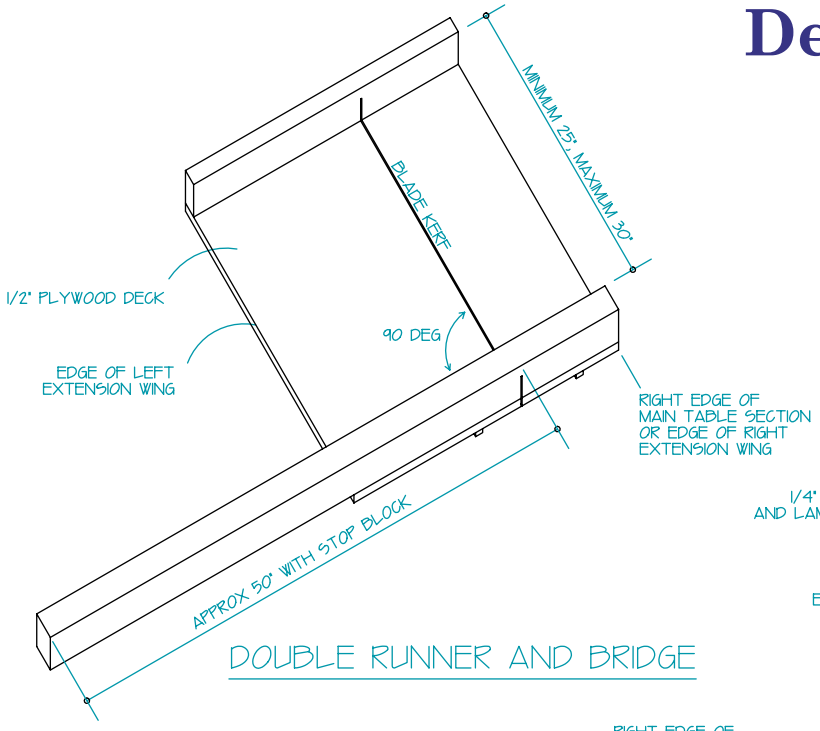
Recommendations

1. In my assessment the sliding table solution is so superior, a sled system should not even be considered. Although even at $300 this solution seems costly, they are one of the most beneficial accessories you could add to the tablesaw.
2. If you want to make a crosscut sled, you should make more than one. A large one can be used for large plywood crosscuts and special jigs. This sled would operate with a fixed 90 degree fence. I don't see any point in adding a miter fence to the large one because it will be so big and heavy, you won't want to put it on the saw anyway. For mitering, and smaller crosscuts you can continue to use the sloppy OEM miter gauge or build a pivoting fence sled similar to the Dubby.

   Having "been-there-done-that", I would re-recommend the Real Solution mentioned above. I would even go so far to say that the Real Solution can be more economical than building several sleds. One often neglected element of "building your own" is that you usually end up re-making the jig later because of some deficiency in the original "prototype".
3. If you want to buy a crosscut SLED solution, I would recommend the Dubby if you can locate one. It serves as a more accurate miter gauge, has a stop block, and a relatively wide support surface. The Dubby or something like it will probably serve acceptably well for about 80% of your needs.

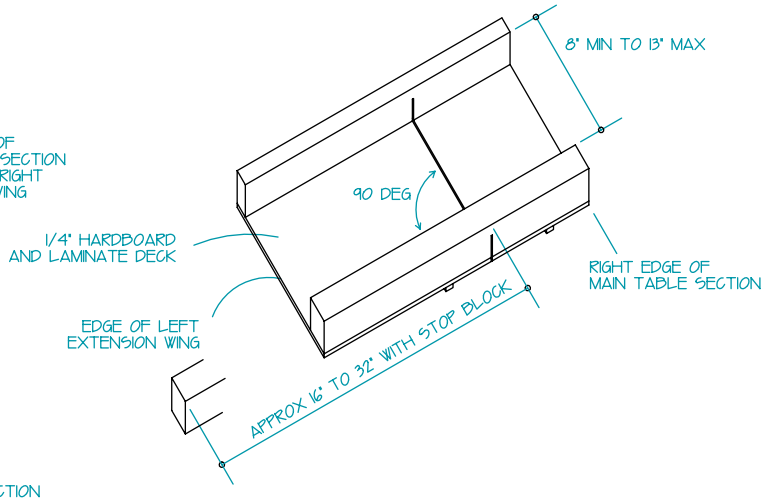
Crosscut Sled Design Guide

DOUBLE RUNNER

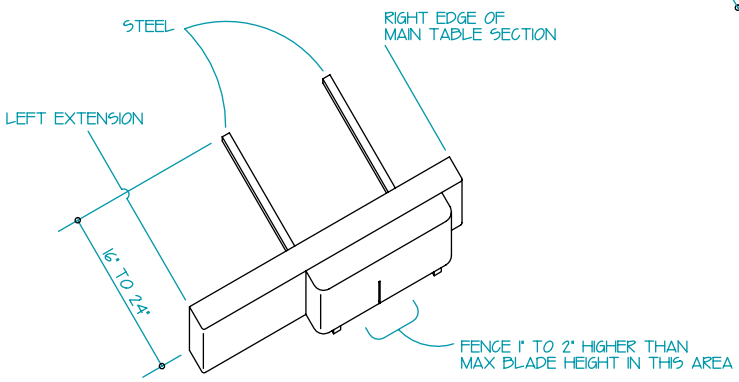


DOUBLE RUNNER

SMALL VERSION

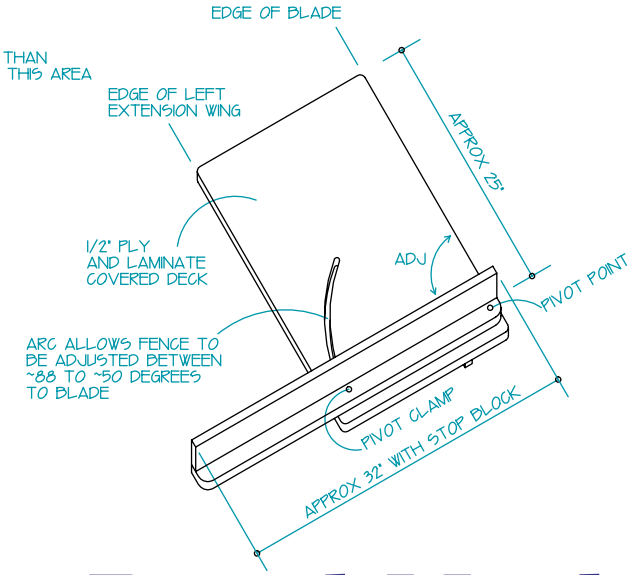


DOUBLE RUNNER AND BRIDGE

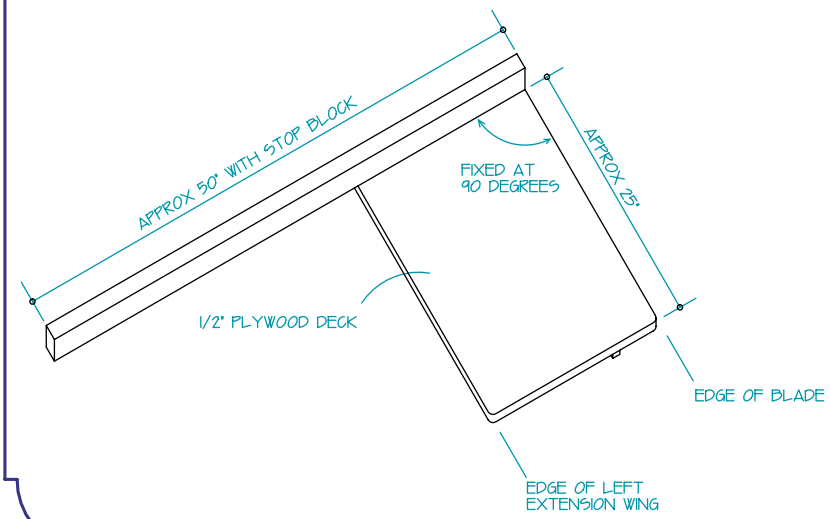


SINGLE RUNNER

WITH REAR PIVOT FENCE



SINGLE RUNNER



BenchMark

Crosscut Sled Design Guide

Philip Bumbalough

Nov 11, 2000 **Rev -B-**

http://benchmark.20m.com