Cross-cut sled

Cross-cutting on a tablesaw can be done safely as Michael T Collins explains

There are many situations in the daily work of a woodworker where the need arises to saw sheet goods and wide boards. Typically, sheet goods can be brought down to a manageable size by sawing on a table saw – a 1220 x 2440mm can be reduced to lengths of any width quite safely.

You could use a sliding mitre saw, which is great for cutting lengths but limited by the width that can be cut. In the past I've overcome this challenge by rotating the board and matching the saw cuts. Invariably, they never quite match and creates additional work by having to clean up the ugly 'saw step' with a plane. You could hand saw them, again producing a rough edge, but this is also time consuming.

Enter the cross-cut sled

The cross-cut sled is a relatively simple device consisting of a sheet of ply that rides on two bars that slide in the mitre slot of the table saw. A fence at the front keeps the wood at 90° to the blade and the whole sled is pushed through the blade.

Over the years I have seen many cross-cut sleds being made and used and all have what I see as a serious safety flaw. In order to use them, you need to remove the blade guard, which defeats the purpose of having a safe way to cut wide boards.

My design

I have used several designs in my woodworking career and all have included some sort of additional safety.

Cutting list

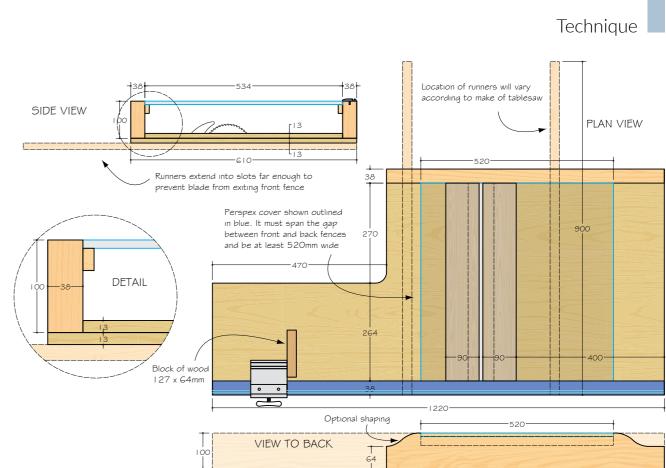
- 2 pieces 1220 x 610 x 13mm ply
- 2 pieces 1220 x 100 x19mm ply
- 2 pieces 750 x 100 x 19mm ply
- Material for runners
- 534 x 520 x 9mm Perspex

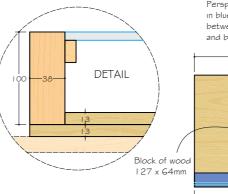
In this article we will make a cross-cut sled that will enable you to easily and safely cut boards up to 500mm wide.

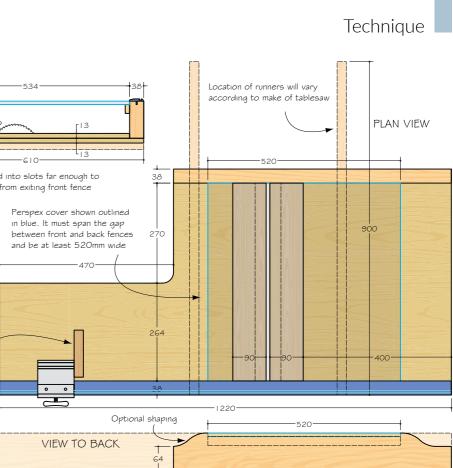
The making

The first step is to accurately cut a ↓ piece of the 13mm ply into a perfect 1220 x 610mm rectangle. If you do not have a means to do this, check with your local DIY store - they may offer a cutting service. If not, ask a friendly neighbour with a bigger workshop.

Next we need to make the front and **L**back fences. To do this, laminate two pieces of 750 x 100 x 19mm to form the back fence and two pieces of 1220 x 100 x 19mm to form the front fence. Clamp the laminates, making sure they remain straight and set aside to dry.







The runners

I have some old Corian counter top • That works great for runners. Rip a couple of pieces to the exact width of your mitre slots and about 1mm shallower than the slot. Make these runners 900mm long. The additional length will become obvious later. Test fit them in the mitre slots - you want them to be snug, but not so tight that it is hard to slide them. Sand or use a finely set plane to adjust the fit.

Levenly space three washers in each mitre slot, then place the runners on top so that the front of each runner is at the front of the table saw top.

5 Add a couple of pieces of double-sided tape to the top of each runner. This will hold the base firmly in place prior to securing it. Before pressing the base onto the runners, adjust the table saw fence to where you want the sled to run on the table saw. In my case, I want the longer capacity of the sled to be on the left of the blade.

Then place the 1220 x 610 x 13mm Opiece of ply on to runners with the right-hand edge hard up against the fence and the front of the base at the front edge of the table. Press down firmly. >















Remove the base and drill about four pilot holes down the length of the runner, counter sink and secure in place with screws.

Back to the fences

Shape the back fence and add a quarter round profile.

Align the back fence with the back edge of the base and secure with counter-sunk screws every 150mm or so, but avoid the area 60mm to the left of the blade. The front fence will carry the track. The track I used had a mounting flange that needed to be housed.

10To do this I used a circular saw to cut a 3mm slot to a depth of 20mm. The spirit level in the image gives me somewhere to rest the saw and keeps the fence straight as I make the cut.

1 1 also added a 45° chamfer on one side of the slot so that the track seated fully.

12Drill holes through the fence and flange of the track secure in place with screws driven through the wood and the track.

Attaching the front fence

The front fence must be attached so that it is as close as possible, at 90° to the blade – we will fine tune later.

13First secure the right end of the finite desired location, flush to the front of the base. This will be our pivot point.

14 Then with an accurate carpenter's square against the blade (make sure you are resting on the face of the blade and not skewed on the teeth), position the other end so that the angle between the fence and the blade is 90°.

15^{With a screw, secure the fence} in place on the left-hand end. This will be our adjustment screw.

Zero clearance inserts

Over the course of a project, I might change the blade a couple of times using a standard 3mm rip blade, cross-cut blade or even cut long mitres – doing so on this sled would immediately lose its zero-clearance. So this sled will have replaceable inserts. Position the sled over the blade and carefully raise it so that it just touches the underside of the sled.



















16 Now, turn the sled over and remove a section of the base 30mm either side of the kerf mark just created. The blade will now be in the middle of a 60mm gap in the base. Cut a second piece of 13mm ply to about 3mm less than the distance between the two fences. This will form the second layer of the base.

17Cut this sheet into two pieces so that it creates a ledge about 60mm either side of the blade. This is where the insert will lay. Secure these two boards in place with countersunk screws.

18Insert a piece of the offcut 13mm board, this will be the zero-clearance insert.

19Drill through both the inserted board and the base using an 8mm drill.

20 Remove the insert and re-drill the base holes using a 9.5mm drill. Now secure the threaded inserts into the baseboard.

21 Countersink the insert holes and secure to the base using the machine screws.

The guard

The vast majority of cross-cut sleds being used have no blade guard and some do not even keep the riving knife in place. However, on this sled the two fences support a Perspex guard that spans the gap.

221 pin nailed, then screwed a ledge to the front and back fence and cut the Perspex to length and screwed it to the back fence. The front fence needs to be adjusted before finally securing the guard.

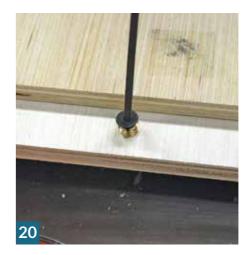
Fine tuning

Unless you are remarkably lucky, the fence will not be at 90° to the blade, and some fine tuning is required. To do this I will be using William Ng's simple 5-cut method.

23 Take any four-sided board that is at least 300 x 300mm and label the sides 1 through 4 and also label side 1 with a 5. With the board firmly held against the front fence, cut a sliver off side 1, rotate the board clockwise and cut a sliver off side 2 – repeat the cut/rotate until you are back at side 5. >









Technique











Technique



Then cut a 30mm piece off side 5 – label the top A and bottom B. Any angle error between the blade and fence has now been compounde four times.

Accurately measure the width of the piece at A and B.

Formula

The error = (A-B) \div 4 (the no. of cuts) \div length of 5th cut (this gives the error per inch) x distance between pivot point and the point of adjustment. So the error = -0.0639in

Therefore, the left-hand end of the fence needs to move out by approximately 0.0639in making the angle greater.

Take a feeler gauge and select the closest gauge to the error you found above, in my case 0.064in (slightly larger than ¹/16in)

Place a piece of wood securely on the base and resting against the fence at the location of the left adjustment screw. Now, remove the screw that was holding the left end of the fence in place.

25 Insert the feeler gauge between fence and reposition the fence against the feeler gauge. Screw the fence in place using a new hole. You have now moved the fence out by the 0.064", thus increasing the angle at the blade.

26 Repeat the process of cutting a board and testing for square. You should now have a cross-cut sled that cuts perfect right angles to the blade. Note: If you get a positive result the fence needs to be moved in – place the feeler gauge between the fence and the block, loosen the adjustment screw and move it forward the thickness of the feeler gauge.

Finally, secure the front fence in place again, avoiding the area within 60mm







to the left of the saw cut. This is so that you can cut 45° mitre on this sled.

The stop

27 Secure a self-adhesive measuring tape to the track so that the zero is exactly on the left of the saw kerf. Now, cut a piece of wood to an accurate length, say 300mm.

28 I cut a lot of thin pieces and because of the height of the fence I needed to add a block of wood to the stop to prevent the wood sliding under. Take the board you have just cut and place it against the blade. Position the stop against the other end and adjust the cross hair so that it is directly above the 300mm mark and secure in place.







29 Now cut a piece of wood on the sled, measuring should confirm that the sled is now ready to make accurate, repeatable 90° cuts.

30To reduce the mass of this sled I cut a section out of the base. You can also see the reason for the extra-long runners, they hit the end of the mitre slot in the outfeed table and thus prevents blade emerging out the front. If you do not have this option, you must add a few blocks of wood to the front of the fence.

There are lots of options but using the sled without a guard is not one of them!