# 5-Cut Method to Square

Reference: William Ng: http://wnwoodworkingschool.com

This is an excellent reference. William shows set-by step how the 5-cut method is used and how to make a crosscut sled for the table saw and to square the fence. I highly recommend you visiting this site.

**Principles:**

- All 4 sided figures have 4 straight edges and 4 angles which total to 360°
- A 4-sided figure is square when each of the 4 angles are exactly 90°

Some possible 4-sided figures:

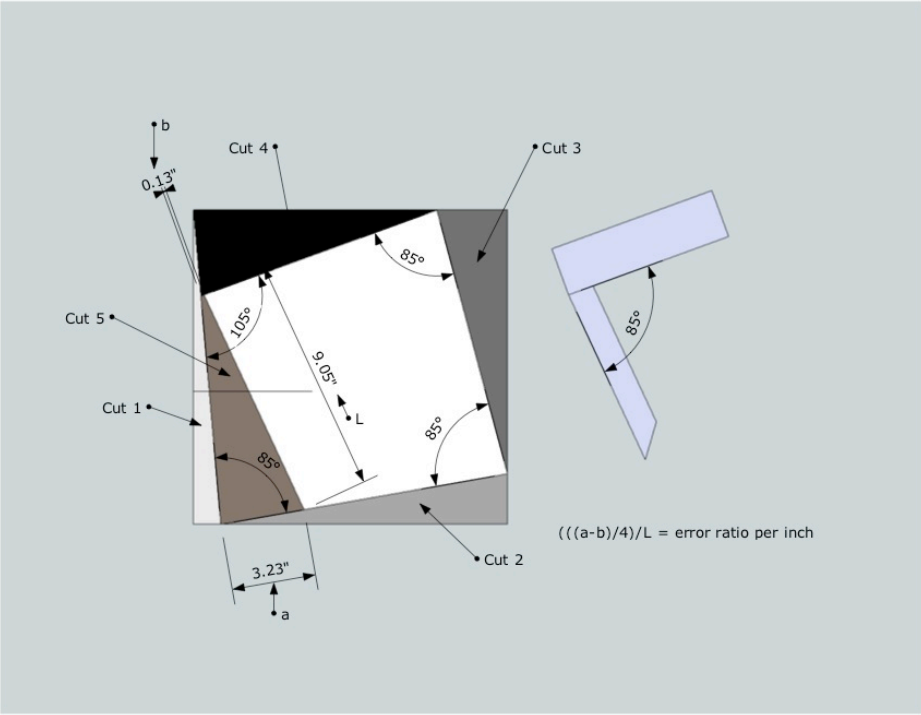
Since square is a fundamental relationship in woodworking, tools that are supposed to create square corners should be tuned to do so. Miter gauges, miter saws, a square, shooting boards, etc. are just a few of the many items that need to be able to produce a square corner. How then does one check for square, and if necessary, adjust the device to 90°?

One method is to cut a board and then flip one of the cut sides and then observe and measure the gap at the cut edge when placed against the other cut half. The error is magnified by the width of the board. Problem is how much to adjust the device to make the error zero.

Other ways? Using a known reference square. But is that reference really 90°?

The 5-cut method to square is an excellent method to measure square and to determine how to adjust the device to make it square.

An exaggerated visual representation of how the 5-cut process improves the way it can measure out of square is shown on the following figure.




**The Crosscut Sled**

One of the more, if not the most, useful jig to make safe, square cuts on a table saw is the crosscut sled. It is basically constructed of a platform, usually plywood, two fences and two runners that fit exactly into the crosscut grooves in the table saw top. The fence at the top of the sled holds the platform together after the saw blade is raised and used to cut through the platform. The fence at the base of the sled holds the work square to the cut.

Here's a typical sled

The fence at the base of the saw is last thing to be attached. Initially two screws attach the fence to the platform, one placed at either end of the fence and driven into the fence from below the platform. One of the screws becomes a pivot point for adjusting the fence square to the cut. The other screw is eventually removed and relocated to set the fence in the square position.

**Applying 5 Cut Method to the Crosscut Sled**

Starting with a 4-sided panel, preferably with the a long side that fits inside the sled fences, perform the following steps (Note, in the following, the pivot screw is on the right end of the fence and the cuts are made to the left of the blade):

1. Place the panel in the sled and make a cut on one of the long sides. Make a mark on the panel to indicate the edge of the panel that was first cut.
2. Rotate the panel (clockwise) so that the cut edge is against the fence and make a second cut. Usually a cut of a 1/16" will remove all of the edge, unless the fence is really out of square.
3. Rotate the second cut to the fence and cut the third edge.
4. Rotate the third cut to the fence and cut the fourth edge.
5. Rotate the fourth cut to the fence. The first cut side is back to the same position it was in the first cut. Slide the panel over towards the saw blade line and make a fifth cut to remove a narrow, say about ½ to 1 inch wide, piece from the edge. Mark the end (farthest away from the fence) as "a" and the end of the strip nearest the fence as "b".

6. With calipers measure the width of the cutoff strip at “a” and “b” and record them. Also, measure the length of the fifth cut.

Now for the math to determine the error ratio and how to adjust the fence:

1. Subtract “b” from “a”. Note whether this is a positive or negative number.
2. Divide the result by 4 (4 cuts, 4 angles) provides the error ratio and then dividing again by the length of the fifth cut provides the error ratio per inch.
3. Now, note where the pivot screw is relative to the face of the fence. Measure from the pivot point to a point at the opposite end of the fence where the correction to the angle of the fence will be made.
4. Take the result in step 2 and multiply it by the length determined in step 3. The result determines how much the fence should be moved in inches to make it square to the cut line. Note, if the result in Step 1 was positive, the fence is too far forward (toward the cut line) and needs to be moved back, if negative, the fence is too far back from the cut line and needs to move forward
5. Place a block, shaped like the following, with its point at spot where the adjustment to the fence will be made.

    a. If the fence is too far forward (positive), place the block against the fence at the adjustment point and clamp to the sled platform. Remove the screw for the fence and place a feeler gauge of thickness determined in step 4 between the block and the fence. Clamp the fence and then drive a screw from underneath the sled into the fence in a <u>different</u> spot than where the screw was removed.
    b. If the fence is too far back (negative), place the feeler gauge at the adjustment point and clamp the block against the feeler gauge. Remove the gauge, remove the screw from the fence, slide the fence against the block, clamp the fence and drive a screw into a new location as in step 5a.

6. Repeat the 5-step cut procedure to check for square and make any adjustments as needed. If the error ratio is .001” or less, the fence is square.

Example of the process:

- Starting panel, 24” by 12”. After 5th cut, the strip measures .562” at “a” and .585” at “b”. The length of the 5th cut is 23 ¾”. The difference is (.023)”. The error ratio is -.023/4 or -.00575. The distance to the pivot point to the adjustment point on the fence is 28 1/2 “. The adjustment needs to be (-.00575 /23.75) * 28.5 or -.007”. Follow step 5b above with the .007” feeler gauge.