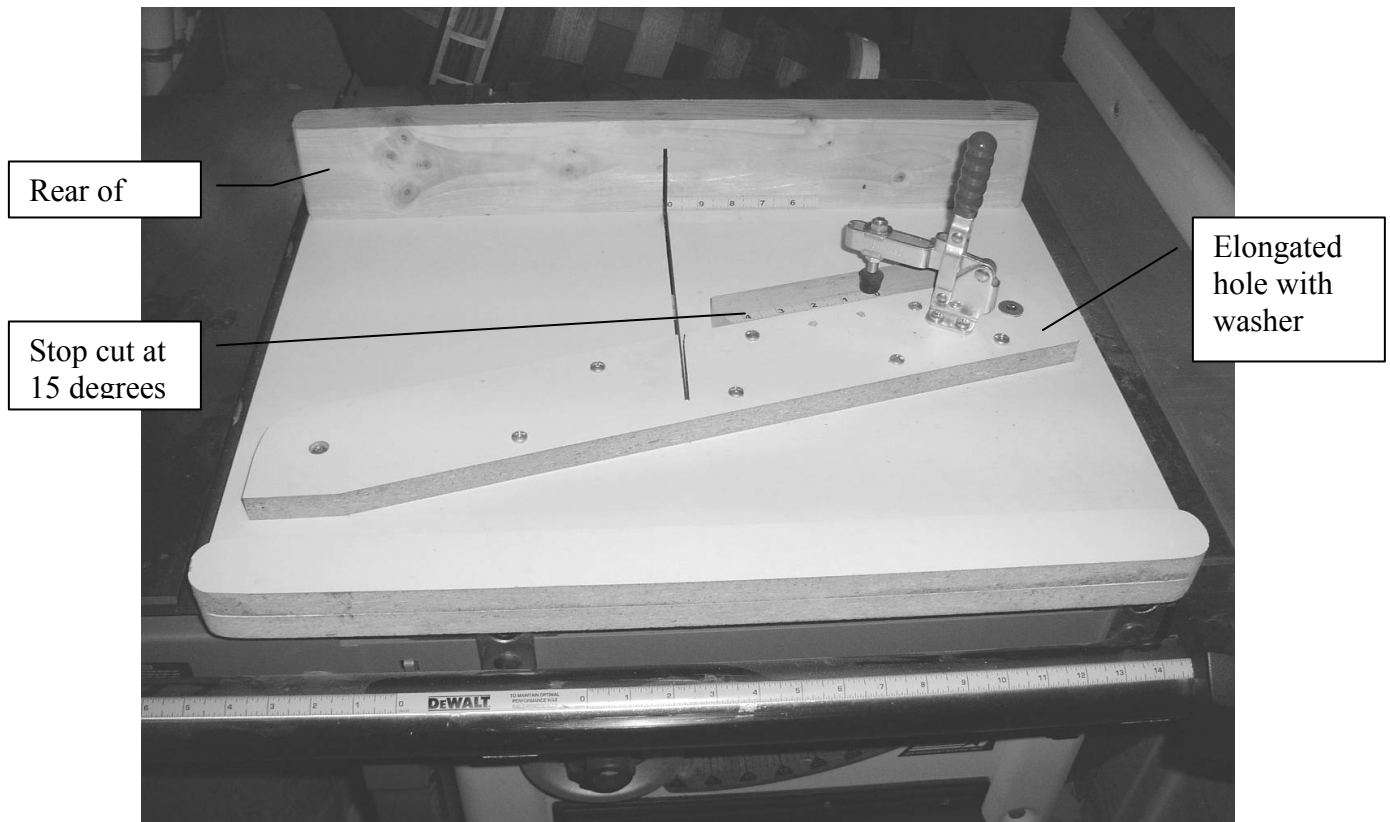


Build a Tablesaw 15-Degree Segment Cutting Sled

By Jim Rodgers

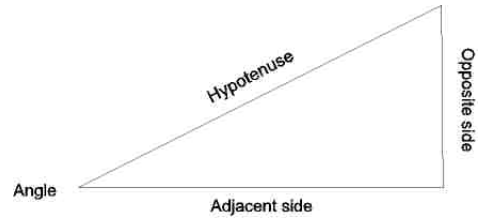
- Stock required
 - 24 x 24 sheet of $\frac{1}{2}$ -inch plywood (Baltic birch quality or similar)
 - $\frac{3}{4}$ x 3 x 24-inch hardwood for miter guides
 - 2 x 4 x 48-inch (construction grade, KD) for cross supports
 - $\frac{3}{4}$ x 3 x 24-inch hardwood for miter fence
- Prepare stock
 - Cut stock to size
 - 1 each $\frac{1}{2}$ x 18 x 24-inch plywood cut dead square
 - 2 each $\frac{1}{2}$ x $\frac{3}{4}$ x 24-inch hardwood strips for miter groove guides
 - 1 each $\frac{3}{4}$ x 3 x 24-inch hardwood segment fence
 - 1 each 2 x 4 x 24-inch rear cross support brace
 - 1 each 2 x 2 x 24-inch front cross support fence
 - Collect additional supplies
 - 2 each $\frac{1}{4}$ x20 x1 $\frac{1}{2}$ -inch panhead bolts with $\frac{3}{4}$ -inch or less head diameter, washers and nuts
 - 20-#8x1-inch flathead wood screws
 - $\frac{3}{4}$ -inch-diameter Forstner bit
 - Woodworker's yellow glue
 - Toggle clamp with $\frac{3}{4}$ -inch mounting screws
 - One each stick-on measuring tape (RH)
 - Fine ink pen
 - Square
 - Vernier caliper
- Assemble sled
 - Sand 18 x 24 base on both sides
 - Place miter guides in tablesaw miter slots on top of spacer (to raise them above tablesaw surface)
 - Bring tablesaw fence to 12-inch setting, lock in place
 - Place glue on miter guides and set 18 x 24 on top aligned with fence
 - Add weight and allow glue to dry
- Add cross supports
 - Carefully align front and back cross support braces
 - Glue and clamp front and back cross support braces
- Add saw kerf
 - Clean up any glue and scrape slides until there is a smooth operation on the saw table
 - Wax the back
 - Raise saw blade and cut a kerf through the rear cross support and 12 inches into the sled
- Mount hardwood segment fence
 - Clamp Miter segment fence accurately in place using a protractor to set at approximately 15-degree angle to saw kerf, clamp firmly
 - Flip sled over side-to-side (rear fence is still in the rear) and drill one hole in each miter guide through which to attach the hardwood segment fence
 - RH hole is 4 inches from front edge of sled and LH hole is 7 $\frac{1}{2}$ inches from front edge. Drill only through the hardwood miter guide
 - Continue holes with smaller drill (diameter of the bolts) completely through clamped fence
- Complete segment fence assembly
 - Turn sled right side up remove the segment fence
 - Elongate one of the drilled holes to 1 inch long
 - Bolt segment fence in place readjusting accurately to 15 degrees
 - Add toggle clamp to the segment fence approximately 6 inches to the right of the saw kerf
 - Cut a short strip of hardwood with the sled to use as a segment stop
- Calibrate sled
 - Set tablesaw blade to an accurate 90 degrees vertical with a good straight edge

- Rip several strip of hardwood to 1-inch wide
- Clamp stop in place with the toggle clamp
- With sled, carefully cut six segments
- Snugly assemble the six pieces against a straight edge and check; there should be no gap
 - If there is a gap on the outside of the semicircle of segments, the angle is too oblique
 - Adjust the segment fence towards the rear of the sled (away from the operator) to increase the angle
 - If the gap on the inside of the semicircle, the angle is too acute
 - Adjust the fence rearward (towards the operator) to decrease the angle
- Repeat by cutting another 6 segments and retesting
- When the six segment test appears perfect, cut a set of 12 segments
 - Assemble a full ring by clamping the segments together with a hose clamp
 - Check for gaps
 - Readjust fence as needed to decrease the gaps to zero
- When calibration is complete, screw segment fence firmly in place with several wood screws on both sides of the saw kerf
- Complete the project
 - Recut the stop with the newly calibrated sled
 - With vernier calipers, set the position of the stop at exactly 2 inches from the right-most tooth of the saw blade, clamp firmly with the toggle clamp
 - At a convenient location on the stop, place a fine line with an ink pen and square
 - Align the stick-on measuring tape's 2-inch mark with the line drawn on the stop
 - Stick the measuring tape in place



TRIGONOMETRY FOR SEGMENTED TURNERS

Angle functions are useful in calculating the setup of sleds for specific angles. When accurately determined the calculations can set the segment fence precisely. The longer the measured line the more accurate the set up will be. To calculate the proper angle you need to use the appropriate trig function; here they are:

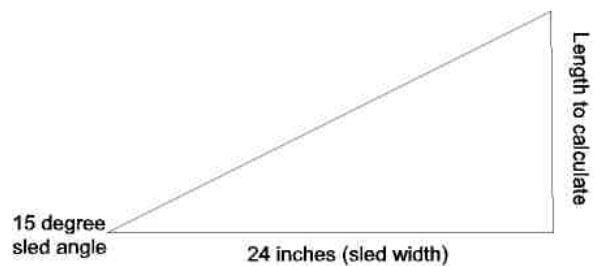


Sine = Opposite/ Hypotenuse
Cosine = Adjacent/Hypotenuse
Tangent = Opposite/ Adjacent

Angle	Sine	Cosine	Tangent
30 degrees (6 sides)	.5000	.8660	.5774
22.5 degrees (8 sides)	.3827	.9239	.4142
18 degrees (10 sides)	.3090	.9511	.3249
15 degrees (12 sides)	.2588	.9659	.2679
11.25 degrees (16 sides)	.1951	.9808	.1989
7.5 degrees (24 sides)	.1305	.9914	.1317

Setting up a new segment fence

- Draw a horizontal line across the full width of the sled.
- Calculate the distance up the RH side of the sled by using the tangent of the desired angle
- Measure up the right hand side of the sled the exact number of inches from your calculation and mark.
- Draw a line from that mark to the beginning of the horizontal line.
- Align the sled fence to that line for the proper angle.



Example:

12 segments requires a 15° segment cutting angle

Sled with is 24 inches

Tangent 15 degrees x 24 inches = RH length to calculate

0.2679 x 24 inches = 6.43 inches