Correcting Ring Errors

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Part of

The SegMaster Series

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Written By

The SegMaster

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Correcting Ring Errors

Sometimes, despite our most careful errors, the last segment does not fit exactly. There are ways to deal with this. We can fix the current ring and we can adjust our segment cutting sled if the errors are consistent. This tutorial will tell you how to do both.

Error Sources

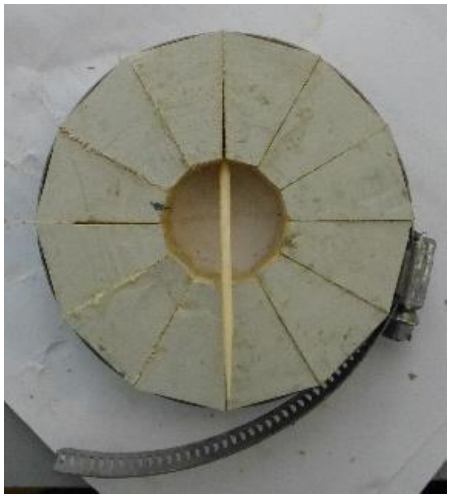
Where do these errors come from? If you figure it out, please let me know. I have been struggling with this for years. The first and most obvious answer is the segment cutting sled. That is what I always thought, but there must be more to it than that. When I use a sled and find that most rings are coming out with similar errors, then I blame and correct the sled – as described later in this tutorial. But there must be more to it than that. I have come up with three possibilities:

- Left-over glue between segments. If the segments are not rubbed together cleanly and enough to squeeze out all the excess glue, some glue could remain and be thicker at one end of the joint than at the other.
- Perhaps the stock was not held tightly against the sled during cutting.
- Perhaps the stock was not pushed tightly against the stop block though significant errors of this type would be visible as the ring is being assembled.
- Perhaps the stock is slightly warped. Sometimes I see this while cutting, I am always careful to make sure the end nearest the saw blade is flat against the guide bar. This does not do much when cutting with the concave side on the guide bar, but we do the best we can.

Fortunately, I usually get my segments “close enough” that when the clamp is tightened, they look fine. I am continually surprised how those gaps seem to close while tightening. This supports the *extra glue* hypothesis.

But what if the errors are so bad that there are visible gaps between segments after clamping.

Correcting Gaps in Rings



What if we notice gaps in our rings after gluing and clamping? While we certainly prefer not to have this, there is a relatively easy way to correct it. See the photo.

Sometimes all the error shows up on one gap with the other joints appearing to be tight. If that is the case it can be easily corrected. Sometimes, you can insert a toothpick or other shim into this largest gap to force the other spaces.

Sometimes, the gap is too large for one toothpick. While the glue is still pliable, loosen that clamp and create gaps in two joints on opposite sides of the ring. Insert tooth picks, matches, or other small shims to hold these gaps open while you re-tighten the clamp. Make sure that the joints between all the other segments

have closed. If not, redo this with larger or smaller shims as required or adjust the shims in the gaps to make it happen. Once you are satisfied, tighten the clamp and let the glue harden for 6 or more hours.

Meanwhile take out or build a 90 ° Sled. I suggest starting with a base from high quality ¾" plywood having dimensions 16" long and 12" deep. Cut a 1" piece of the same plywood and glue / screw this onto the base. Screw this to your 90 ° miter fence positioning it so that 8" or so of the base will be on the right side of your saw blade.

Next prepare 4 GH-201B hold-down clamps or equivalent. Mount these onto 2x3 pieces of ¾" plywood. Drill holes near the ends so that 1 3/8 sheetrock screws will go into them without too much force (9/64" drill).

TBD Photo – clamps on wood blocks.

Put this on your table saw and make a blade cut to within 2 inches of your reference bar as shown below: THB Photo

When the glue has set on your ring, remove the clamp and place the ring on your 90 ° sled. Look at the sled carefully from the top and align it so that the gaps are exactly over the cuts in your sled. Remember that there are two places opposite each other where the gaps exist.

Install the four hold down clamps in positions where they will be able to hold your ring securely in position – two on each side. Don't think you can get away with fewer than four clamps. I never managed to. Take another look to make sure the gaps are still over the blade cut hold and adjust as necessary.

Now cut your two rings apart. There are two sides to each gap. You want your table saw blade to make cuts on both sides of both gaps. The ensures that both cuts are perfectly flat and straight. If you can't hit both sides with a single cut, or if you somehow miss one of the sides, finish the cut. Pull the sled back. Push the two halves together and reposition them over the blade cut in your base. Make another cut. I have found that two tries usually gets it.

Glue the two halves of the ring together and clamp it well.

True, your ring will now be slightly elliptical, but nobody is going to notice and I won't tell if you don't.

Testing your Segment Cutting Sled

It is a good idea to test your cutting sled. Obtain some stock from ¾" high quality hardwood or hardwood plywood about an inch wide. I have some maple plywood from dismantled shelves that I like for this. You want a piece that is perfectly straight. To test a sled for 15 ° angles (for a 12-segment ring) cut a dozen segments from this with the outer segment length an inch long.

Glue these pieces very carefully into a ring. Make sure that you are very careful to rub the sides of all joints against each other to remove any excess glue. If the last piece will exactly fit in or is very close to fitting (within ¼" in either dimension) put it in and clamp the ring. You are probably not going to get any better than this.

I did this to test the sled I built to go with the Tutorial on *Segment Cutting Sleds*. I assembled 11 segments and before applying glue, I realized that the final segment would not quite fit.

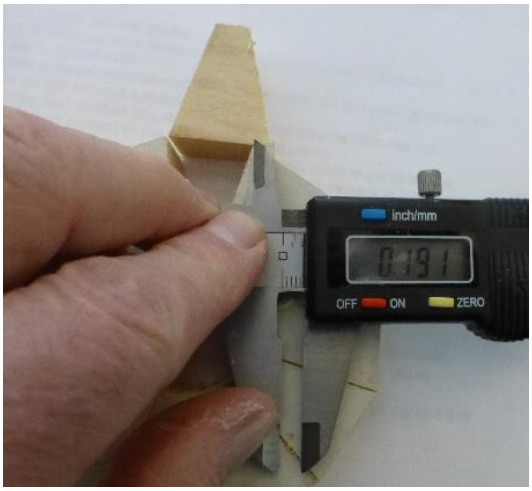
I had already noted the segment length as .953”.

I measured the available space as .757”.

Alternatively, I could have turned the segment backwards and measured the difference between the segment and the space which in this case shows .191” of error.

If the final segment had fit and left a gap, then I would have measured the gap which would be the error.

The next section tells you how to adjust your sled by adding shims next to the ends of your miter gauge.

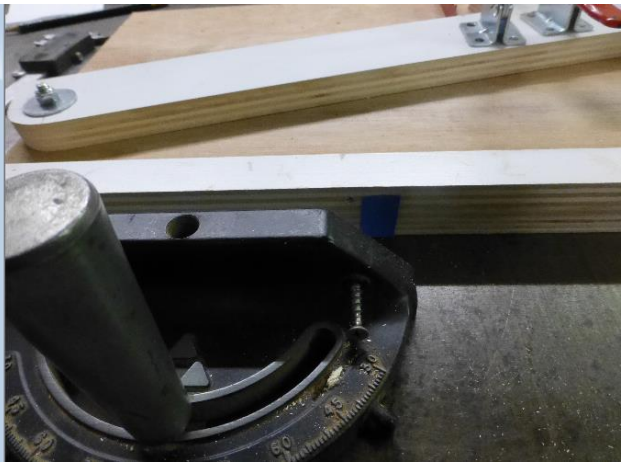


Correcting Segment Sled Errors

The next step is to add shims between the sled to the left or right side where it touches the miter fence.

If there had been extra space after placing the final segment, we would refer to this as a positive error. We would want to increase the cutting angle. To increase the cutting-angle we would want to place shims between the right side of the miter fence and the sled. Since our space was too small, we are

calling this a negative error. Our shim would be between the left side of the miter fence and the sled. Our shims will be very thin. I use blue painter's tape which is about .1 mm thick – the same as a piece of paper. See it applied on the left and right sides in the illustration below:

But how many of these shims will I need?

You have just measured an error of about 0.19 or 0.20 inches.

The formula for the number of sheets of paper in the shim is:

254 * Π * Error * GuideFence / (N * N * SegLength)

- Error is measured error in inches
- Π is Π or 3.14
- GuideFence is the width of the miter gauge fence in inches
- N is the number of segments
- SegLength is the length of the segments

This will give you the number of sheets of paper needed for your shim – about 8 in this case.

If your error was positive, stick the shim onto the right side of the guide fence. If it was negative, stick it to the left side.

How Good Can You Get?

The answer is that I do not know.

I nearly always assemble my rings without dry-fitting them. They are almost always accurate enough that the clamp holds them together and there are no visible gaps. The exception can be small rings that are thick as often found at the base of bowls. I generally correct these using a 90 ° sled. I usually do not have much trouble with larger, thinner rings. The clamp usually seals these up easily and they always look good in the bowl.

Sometimes, after a while, I notice that the errors are consistent with a particular sled. I usually try to correct these with shims as calculated above.

Remember that you will not be perfect. The important thing is to get your rings so that they do not have gaps between the segments, and they are strong enough to hold up to the smoothing and gluing process.

Conclusion

I hope this helps. I have explained two ways to correct errors. One fixes the ring you have just cut and want to use as quickly as possible but will correct only one ring. The other corrects the segment cutting sled and should affect all rings cut using this sled in the future.