

# How I Make A Six-Segment Knot

## By: Larry Wirt (aka ribanett)

This tutorial is how I make a six-segment knot. I do things a little different than most penturners by using a hand saw instead of a power saw. It has been said many times, "The way that works for you is the right way for you." If you can incorporate some of my ideas into your procedure or use my method to develop your own process, I will consider my time writing this tutorial well spent.

I have used this method for making 3,4,6,8 and 10 segment knots.

I will not cover basic penturning or finishing because I am assuming you have the basics down and it would be redundant to cover them again.

There are some things common to all knots:

1. The thickness of the inserts must equal the width of the saw kerf.
2. The hole drilled for the tube must be at the exact center of the blank.
3. The cuts must be the same distance from the end of the blank
4. The ends of the blank must be square to the sides of the blank.
5. All cuts must be made at the same angle.
6. All cuts must be equidistant around the circumference of the blank.

I use a Nobex Miter Saw with a 24tpi blade for a number of reasons:

1. The blade has a kerf of 0.04"
2. I can easily vary the cut angle.
3. I do not have to worry about getting my fingers close to a saw blade spinning at 5000 rpm.



### The Jig

This is the jig design I use to make the cuts. My reference is down the center of the blank instead of across the blank. I find that this reference makes it easier to make elongated knots. I have a number of these jigs, one for each cut angle I use.



I can move the knot up or down on the blank by shifting the sled left or right with relation to the blade. I could use a spacer to move the blank a distance from the back fence, but that would just add another element for misalignment. Once I have the blank in the right position and the blade at the right angle, both the sled and blade angle are locked down. I do not move them until all cuts have been made.



This shows the hold-down for the blank.  
This method applies pressure to four points on the blank



This shows the blank against the back fence

This is a six-segment knot for a Sierra kit. The total time to make this pen was about 1.5 hours, (not including the time for the adhesive to set)

The segments are made from white plastic and aluminum shim stock. The adhesive I'm using is Gorilla Super Glue (the same as thick CA). (Note 1)

The thickness of the plastic is 0.03" and the aluminum is 0.005". With the kerf of the saw being 0.04", this is a perfect fit after a little sanding,

To make a six-segment knot, you have to work with a round blank. Turn your blank between centers. Remove the minimum amount of material, just enough to make it round. Do not trim the blank after turning, you will need the center points for re-truing and drilling the blank after segmenting.

With a six-segment knot, you will have a cut every 60 degrees. I use an index made using my CAD program. (Note 2)

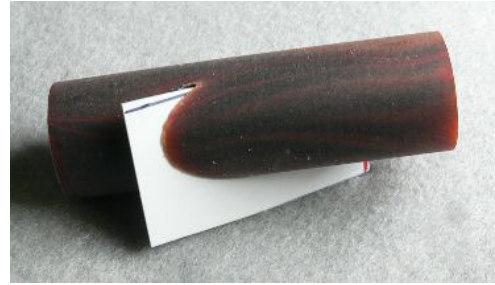
I attach the index to the end of the blank using a glue stick. Center the index as accurately as possible. If it is not centered, the cuts on half the blank will be too far apart and the other half too close together.

I find attaching the index marks to the end of the blank is better than placing them on the side. The reason, you may remove some of the index marks on the side while removing excess material after a glue-up.



The circle shown in the picture to the right I use as a reference when setting the depth of cut. The diameter is the finished barrel size plus 10%. The cut has to go all the way thru this circle or the segments will not meet.

If at all possible, do not cut your blank into two pieces. It is almost impossible to re-align the two parts during glue-up. One of the basic concepts of the knot is the relationship between the cuts. Each time you cut and re-glue, the alignment will be a little off and gets worse with every cut.



With a square blank, getting the two pieces back in alignment is possible, but with a round blank ....impossible!

I cut through the blank, leaving enough uncut to maintain the blank alignment.  
**Handle with care**, you do not want the blank to break into two pieces.

There are two cut patterns that I like. They are, 1-2-3-4-5-6 and 1-5-4-3-2-6. Each cut pattern changes the way the segments overlay each other. Do some experimentation and find the cut patterns you like.

The picture to the right shows the blank indexed to the jig. The black line is there just so you can see it. I use a knife to score the index mark. I want the index mark the same width as the index. Misalignment of the index has been the cause of a number of bad knots for me.



To build the inserts, I cut one piece of plastic and two pieces of aluminum to size. After sanding all pieces, I glue one piece of aluminum to the plastic. When the glue has set, I test-fit the insert into the kerf. You do not want the fit too tight or the glue will be forced out of the cut. If the fit is too tight, sand the plastic until the second piece of aluminum slides easily between the blank and the plastic. It will take a little experimentation until you get the "feel". After your satisfied with the fit and making sure to sand the aluminum, glue the second piece of aluminum to the plastic. After the glue sets, you may have to lightly sand both sides to remove any glue residue. When gluing-up inserts, I use two pieces of aluminum plate and a spring clamp to make sure the pieces remain flat. Glue the insert into the saw kerf.





After the glue has set, you will need to file off all the excess insert material. Run your finger over the insert and make sure you have removed all excess. Any material proud of the blank may cause the blank to be cocked in the cutting jig, throwing the cut angle off.



This completes the first segment. Index to your next cut number and repeat the process until finished.

After you have finished your cuts. Re-mount between centers and true-up the blank before drilling. The reason for this is because when filing to remove the excess material, you can cut into the blank causing the blank to be out-of-round. If you drill on the lathe as I do, without re-truing the blank, the hole may be off-center.



I use four drills to bore my center hole for a Sierra pen. 1/4, 9/64, 25/64 and 27/64. Spending over an hour segmenting a blank, just to tear out a segment during drilling is false economy to me.

I MM thru 12000 grit always wet (I work only acrylic). Use a backer for each grit. If you do not use a backer, ridges will form because of the different densities of the materials used. The backer I use is made from a piece of hard plastic with hard felt attached to it.

**Note 1:** The plastic is from a Garage Sale sign I bought at Wal-Mart for \$3.00 (14 X 18" you can make a lot of pens from that much plastic).

**Note 2:** If you do not have access to a CAD program. I have posted a PDF file in my photo library with indexes for making 3,4,6 and 8 segment knots.



Thanks for reading my tutorial. I hope it is informative to you. If you have any comments or questions, feel free to contact me by either PM thru IAP (ribanett), email: larry(at)inscribershoppe.com or 504-487-5606

Larry