# Turning Between Centers

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# Turning Between Centers - Another Way By George Butcher aka texatdurango

There has been a fair amount of discussion of turning between centers and questions always pop up and it seems like we've never really sat down and discussed the process from start to finish. Many folks are still confused as to what exactly is required to turn "center to center". So, I took the time to photograph some steps today as I turned a pen and hopefully the following photo guide will help some to better understand what is involved and how simple this method of turning pen blanks really is.

As with anything else, this is not *THE WAY* of doing this, it's just *ANOTHER WAY*.... my way! Take from it what you will, modify as you see fit and hopefully this will be of some benefit. This is designed as a guide to turning center to center not just showing my personal methods.

1. To turn between centers will take a few tools you may not have, namely a 60 degree "dead center" (lower right) and a 60 degree "live center" (also lower right). Other tools that you may find handy are the Beall collet chuck and a Sorby "steb" center (both shown lower left). Here are most of the tools I will be using for this demo.

2. First, mark a center on each end of your blank. This tool is called a "Pen Pal" from bestwoodtools.com. It is SO handy! The round thing you see is a magnet I glued to it because it hangs on the side of my shop fridge.


3. I use an automatic center punch to mark a dimple in the blank for the centers to zero in on.

4. Mount the square blank between the steb center (left) and a live center (right). Here I use a 6" tool rest.

5. Through the magic of the internet, the blank is now round. That was SO easy! I turn all my blanks to just under .750" so they fit nice and snug in the 3/4" collet and don't allow for any wobble.

6. A benefit of rounding the blank before drilling is that I can see exactly what the pen will look like as I decide how to position the tubes before cutting. Here I decided I want the darker pattern on the cap.

7. Again, the blanks mysteriously cut themselves on the band saw and one of them hopped into the Beall collet chuck for drilling. I find this method of drilling to be very accurate and it allows me to drill larger holes in narrower blanks than I would on the drill press. The bit shown is a 37/64" but I drill 39/64" holes into 3/4" blanks with no worry.

   To aid in accuracy **I always start the hole with a center drill** which is shown in photo one just under and to the left of the twist drill bits. These specialized short bits allow for no wobble or flexing when finding the dead center of a blank. It's nice to see a hole dead center at the entry side AND be dead center at the opposite end.

8. After drilling I square up the ends with a little sanding tool I made. I made it out of a solid piece of steel and simply take an adhesive backed sanding disk, cut a strip then punch some holes with an old leather punch. I don't even bother rounding the pads, just stick one on. The white inserts are made from Delrin rods and turned down to fit the ID of the tubes I use. The center hole provides a SNUG fit on the sander shaft. I make little Delrin bushings for every pen kit I make. The little bushings keep the blank centered on the sander post.

9. Now we have a squared up blank ready to mount on the lathe and turn to size. Oops, I need to remove my little bushing first!

10. Here we have a top and bottom blank with their bushings inserted, ready to turn. Note the red markings on the blanks, these make sure I keep the top and bottom oriented. It's hard to see in the first photo but these bushings have 60 degree holes in the ends which allow the 60 degree centers to center up the blanks when turning. These special bushings are available from several forum members but I just take a 60 degree center drill and drill out the bushings I buy from my kit vendors or make my own on my metal lathe.

11. Here we go turning a blank mounted between a dead and live 60 degree center. The blank is snugged up with the tailstock and not much pressure is required to hold the blank and to keep it from slipping. You have to have it snug enough to at least put tension on the center and make it spin but I have mine loose enough that a heavy hand during sanding would stop the blank. You may recognize the tool I am using; it is my favorite for turning down a blank but use whatever you are comfortable with. Also note the short tool rest, which I think is a key tool in turning between centers since it allows you to get up close to your work without fowling on the centers. Rick Herrell aka “rherrell” on the forum makes this neat little tool rests.

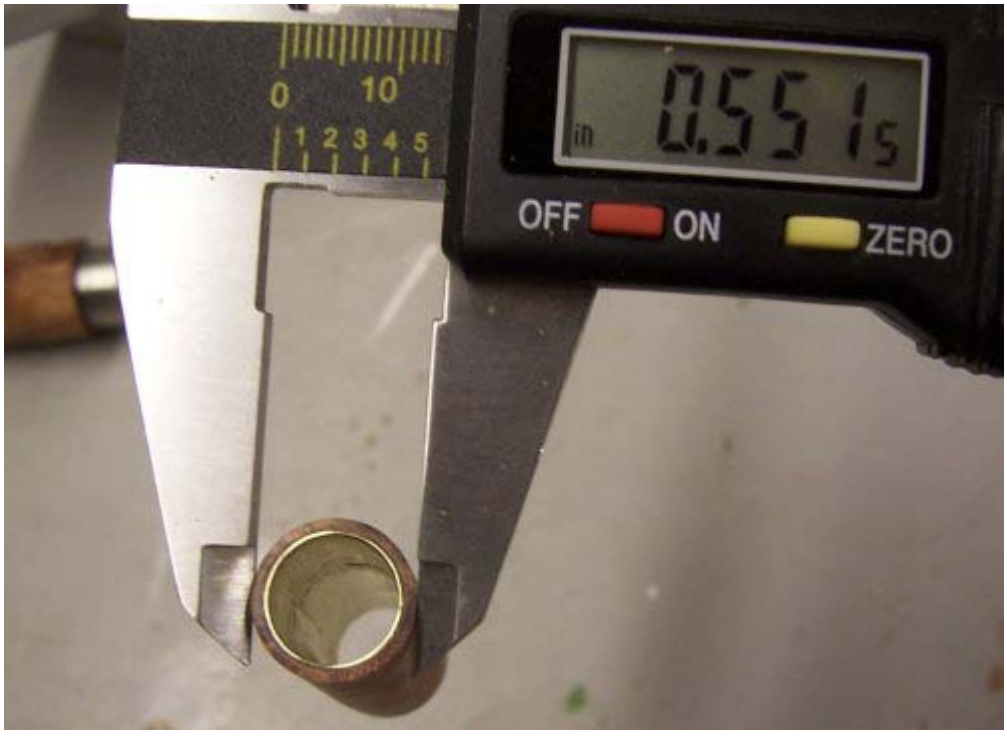
12. Here we are with the blanks turned down just proud of the bushings. The blank now comes off and we say adios to the bushings.

13. With the blank mounted back on the lathe between the two centers, I sand the blank down to size.

    Please note that sanding this way keeps any metal dust from contaminating the blank since the sand paper doesn't even touch any metal. I like Abranet and will sand the blank starting with 400 then 600 before removing.

    **Note:** I apply only enough pressure to make sure the live center rotates freely as it doesn't take much to hold the blank between the centers. DO NOT over tighten the tailstock else you might stretch the brass so it doesn't fit properly over mating kit parts.

14. Since kit parts can vary from kit to kit and rather than rely on bushings, I measure the mating kit parts then check the blank to make sure it is where I want it to be. When doing a CA finish I will sand the blank slightly undersize then build up the blank with CA.



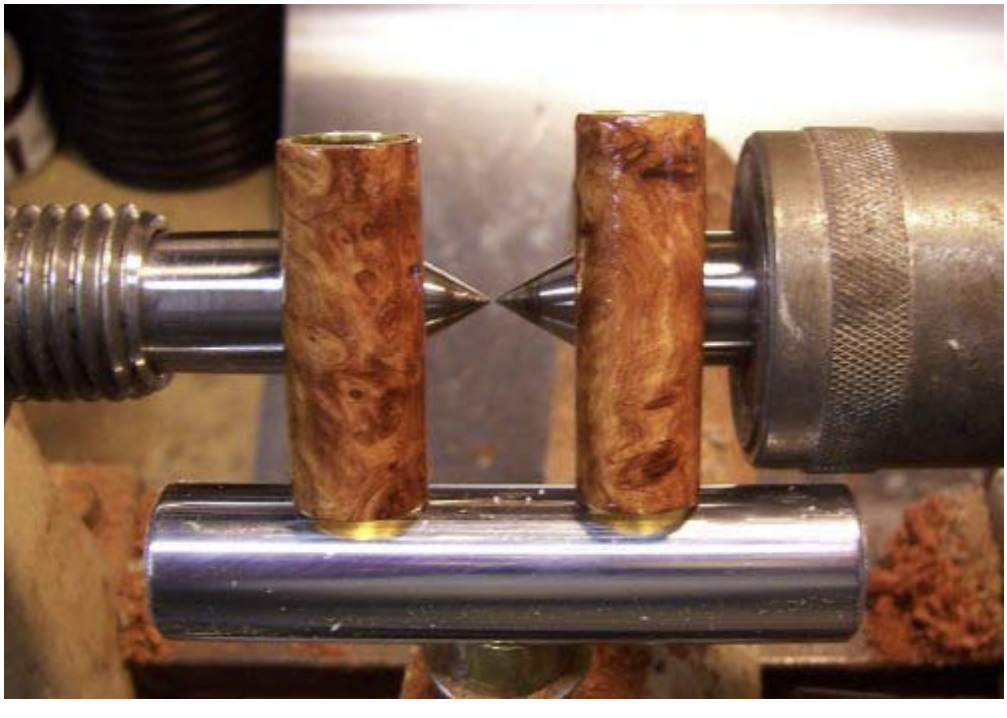

15. When I'm satisfied with the diameter, I clean the blank with alcohol and do a quick wipe with Mylands Sanding sealer which REALLY brings out the colors of the wood. Again, notice that the towel comes nowhere near the metal centers.

16. Now for the CA and thanks to Don Ward aka “it's virgil”, they are Bounty towels! Again... Look ma, no bushings! No bushings for the CA to stick to, neither metal nor Delrin! The Delrin bushings fall into the 'to each their own" category, personally I don't see the need since they just add a bit of hassle with the CA trying to stick to them and I want this to be as hassle free as possible.

17. Here we go a few good coats of CA and ready to sand. At this point I have learned to sit the blanks aside and cure for at least a day before sanding. I got to thinking one day that if CA outgases enough to fog over plating on a kit a day or two after assembly, then the CA is still curing. I have a theory that sanding freshly set CA causes deeper scratch marks in the soft CA than letting it sit and get harder. So I believe that letting the blank sit a day or two before sanding makes the blank harder and doesn't get scratched as easily. so you get a better finish with less deep scratches to remove.

18. In my opinion, applying CA without bushings also allows CA to roll over the edge, and soaking up into the blank thus sealing the ends of the blank as well. This *MIGHT* help in the long run by keeping moisture out of the blank during actual use but has not been clinically proven!


19. So, here we go, two blanks turned, sanded and a snappy finish applied each between two centers.



20. Before sanding the CA, here is a little step I like to do and it REALLY smoothes the blanks out allowing me to start sanding with 600 grit rather than coarser grit paper. Running a skew across the CA turns away many of the ridges left from applying the CA and allows you to start with finer grits thus doing away with the deeper coarser scratches left by the coarser grits. This only works if you build up the CA a bit over the finished diameter then trim and sand it down to the final diameter. I find that this gives a killer DEEP looking finish to the pen. After skewing the blank I'll hit it with dry 600, 800, 1000 Abranet, plastic polish (to check for minor scratches) then off to the buffer.

    Smoothing the CA “ridges” on a blank with a skew after applying CA has made my finishes look so much better and I think it has a lot to do with the fact that I start sanding with 600 grit rather than 320 or 400 like I used to. I sneak up on the blank so carefully that taking **thick** fuzz off is too much at a time! If you think about shaving **thin** fuzz off rather than cutting the CA off, you will do a lot better at it than you think. YES, I have cut through the CA into the wood and it's easy to tell because white fuzz is CA, colored fuzz isn't. If I cut through to wood I simply stop and apply more CA!

21. Now and then I get carried away with my paper towels and get a little CA on the centers. I insert a 7mm bushing between them and using a knife, clean the glue off. The bushing between them also rotates the live center for cleaning.

22. Use a little 400 grit Abranet to clean the centers and they'll be shiny as new!

23. Here is the result of my efforts, another nice pen and I didn't even have to stop and try to remember where on earth my mandrels are hidden these days! Hope you enjoyed reading but more importantly I hope this will provide some answers for someone.

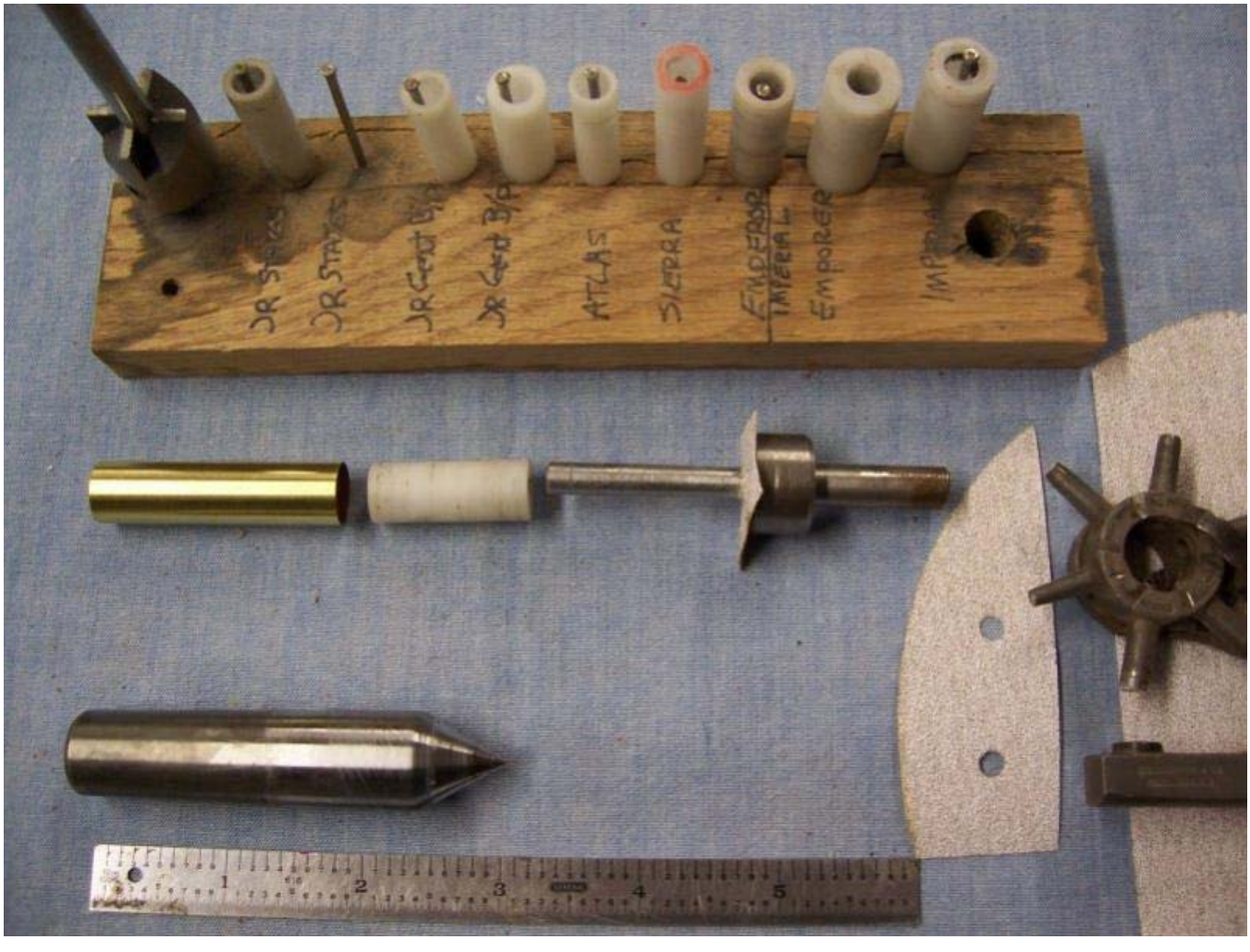
## Additional Comments and Notes:

***Member Question:***

*Could you post some information about your sander and busing adapters?*

**My Answer:**

I made mine out of a solid piece of steel and simply take an adhesive backed sanding disk, cut a strip then punch some holes with an old leather punch. I don't even bother rounding the pads, just stick one on. The white inserts are made from Delrin rods and turned down to fit the ID of the tubes I use. The center hole provides a SNUG fit on the sander shaft. See the photo below.




***Member Question:***

*In Step 10 you show the upper and lower blanks with bushings installed but in Step 11 it looks as if you are only turning one blank. Is this correct - you turn each blank individually? Is there a way to turn and finish both blanks at the same time as is done using a mandrel, or is this one of the downsides of TBC?*

My Answer:

No, you are not missing anything; I just put both blanks together for the photo. When turning between centers I turn one blank at a time. I've never given any thought to mounting two blanks at once since I guess I have done it this way so long, I see no benefit to trying two at once.

To be honest, I don't make that many kit pens any more so when I do, I'm never in a hurry and to keep from getting bored I will change my routine around now and then. One time I will turn and sand both blanks before finishing, other times I will turn, sand, and apply the finish to one blank before doing the second one since it doesn't matter.

After turning center to center for a while you will get into a routine and soon will start finding your own little favorite tricks and short cuts. With all the positives of turning between centers, turning two blanks at once isn't a downside in my mind, it's a hassle.

**Comment:**

While talking about steb centers we need to remember that the center point of a steb center **is spring loaded** and the center point itself will not be the part of the steb center while it is applying the pressure on the blank when you tighten it up. The **outer teeth** will be applying most if not all of the pressure while the center only aligns the blank initially. But as a member points out, the end of the blank that faces the tailstock is most commonly held by just the 60 degree live center which is applying all of the force to the center of the blank.

***Member Question:*** *Do you use drill centers?*

**My Answer:**

The only time I use a center drill is on very fragile blanks where the spring loaded center punch itself might cause a piece to chip out when I mark the initial center. Then, I will use either a #1 or #2 center drill shown below, that way I will have a 60 degree chamfer for the steb center point to fit into rather than just the edge of a hole from a spiral drill bit, but I don't believe much pressure is being applied at the center of these drives, I can push mine in half way with my finger.

***Member Question:*** *I would like to know about the tool you use to turn your blanks.*

**My Answer:**

It is one of those carbide insert turning tools that was all the rage around here earlier this year. I made this one and ordered a slew of carbide tips for it this summer. Due to the angle of the very sharp carbide cutter it cuts rather than scrapes. At first I thought... what a piece of crap, what's everyone so excited about?" I soon found the proper angle of attack and where the "edge sweet spots" were and found that it was perfect for Truestone blanks as it cut through them like a warm knife through margarine and I didn’t have to stop and re-sharpen every few minutes like I did with my skew! Now it is the tool I grab when I start turning a pen blank, bowl or just about anything.