

Notes for Making Wood Rings With Stainless Steel Insert Centers

Background

These notes describe how to make a ring with a stainless steel (SS) insert and a wood exterior band. They also include information on how to make the necessary tools and jigs that are required to turn the wood exterior band.

A wooden ring without the SS insert can be made using many of the same techniques, however, the ring will be weak, even if the wood is stabilized, and probably crack either during construction or while wearing it. Also, with the SS insert, the ring can be made much thinner and is more attractive and comfortable to wear.

When choosing wood for the ring, spindle blanks are best because the grain will run across the ring and there will be no end grain showing on the ring. In the case of burls, it does not matter, since there generally is no pronounced grain direction. Also, choose a wood that has a grain pattern that is small relative to the ring size, otherwise there may only be a couple of grain lines showing on the ring. Good woods also have a lot of contrast in the grain lines. Good examples are burls, dyed burls, cocobolo, zebrawood, some highly figured maple and spalted wood if the spalt lines are close together.

Stainless steel inserts can be purchased on-line by searching for “stainless steel rings”. The ring blank should have a flat surface on the outside diameter. Etched decorations and grooves are OK, but beveled or decorated edges will not give a smooth edge when finishing the wood. Rings may be sold as either US sizes (typically 5 to 13) or in millimeters. Also, a “contoured” and polished inside makes the ring more comfortable to wear. Note that most sites have a pretty big minimum order so shop carefully.

Examples of finished rings are shown in Figure 1.



Figure 1. Dyed burl, cocobolo and spalted maple rings

Materials Needed

1. Wood for rings
2. Stainless Steel insert
3. #2 Morse taper drill chuck, centering bit and ½" bit
4. Dial calipers
5. Flexible CA glue or epoxy
6. Thin CA glue for finish
7. CA accelerator
8. Various grades of sandpaper and silicon carbide paper
9. White diamond and carnauba buffing wheels
10. Wood for fixtures
11. Small sharp spindle gouge
12. Sharp parting tool

What You Will Make

1. A ring mandrel that holds the SS insert with wood blank glued to the outside so it can be turned, sanded and finished.
2. A finished ring.

Ring Construction

1. Loosely chuck one end of a ring spindle blank diagonally in the chuck jaws using a live center in the center hole on the opposite end to center the blank. Tighten the jaws and remove the live center.
2. Select a SS insert size and measure the outside diameter of the insert with dial calipers.
3. Set the dial caliper to half the SS insert diameter, and using the sharp points of the dial caliper, put one point in the center hole and press the other into the wood blank to make a small mark. Use a sharp pencil to make a circle on the blank while rotating the chuck by hand.
4. Drill a ½" hole in the wood ring blank about 3/16" deeper than the width of the SS insert.
5. Using a small square end scraper (if necessary, make one from a ¼" square tool bit), widen the hole almost to the line. Using the dial calipers to measure the hole diameter, sneak up on the correct diameter for the SS insert to just fit in the hole with minimal slop. Figure 2 is a very rough drawing showing the hole for the ring blank. **NOTE – The sides of the hole should be straight and not angled. Also, the bottom of the hole should have a slight ledge in the bottom of the hole so the SS insert has something to sit against when it is glued in the hole. If the SS insert is not perpendicular to the hole axis, it will not be easy to part off or square the edge of the wood to the SS insert later.**
6. Clean the outside of the SS insert with acetone to remove oil from fingerprints. If the wood is oily (i.e. cocobolo) clean the hole also.

7. Using gloves, apply flexible CA or epoxy to the sides of the hole and the outer diameter of the SS insert. Push the SS insert into the hole, making sure it is against the ledge and does not wobble as the chuck is turned by hand. Do not worry about the glue squeeze out as it will be cleaned up in subsequent steps.
8. Use accelerator to cure the CA or let the epoxy dry overnight.
9. Round the outside of the wood blank until it is about 1/4" thicker than the SS insert and turn back the wood flush to the right side of the SS insert. You can lay the ring side on sandpaper and polish the ring side and wood. **Note – you want the right side of the wood to be flush with the SS insert so it will be held square against the shoulder on the ring mandrel and will not wobble.**
10. Part off the ring assembly just beyond the left side of the SS insert.
11. Scrape the excess wood and glue out of the inside diameter of the SS insert with a utility knife and polish the inside of the ring with silicon carbide paper. If your chuck jaws will hold the outside diameter of the ring, you can use it to cut out any wood and glue left from parting off, and to polish the inner diameter.
12. Mount the ring assembly on the ring mandrel with the flush side towards the headstock (against the shoulder) and bring up the live center to expand the mandrel until the ring will not turn on the mandrel. **Note - Make sure the ring does not wobble when the chuck is turning. If it does, remove the ring and clean up the flush side with sandpaper on a flat surface and remount on the mandrel.**
13. Turn the right side of the ring until the wood is flush with the SS insert. Polish with sandpaper on a flat surface if necessary.
14. Turn the outside diameter to 1/8" thickness or less and the desired profile, being careful not to turn the wood too thin. **Note – This is not the time to get a catch given all the effort that has gone into the ring so far. It may be best to turn thicker and sand to the desired thickness. You can embellish the ring further at this point by cutting a groove and back filling with colored epoxy or Inlase.**
15. Sand to 1200 grit. The smoother the wood surface, the easier the CA finish will be.
16. With the lathe running slow, wipe the sanded surface with a paper towel moistened with accelerator.
17. With a separate folded paper towel, apply the CA with a quick wipe across the ring surface. DO NOT go back over it or make multiple passes. The goal is to prevent lines or grooves in the finish.
18. When dry, repeat Steps 16 and 17 until you have applied at least four coats.
19. Remove the ring from the mandrel and GENTLY hand sand the ring with 800 grit sandpaper until the entire surface is uniformly frosty looking. Take care not to sand through the CA finish. If you think you have done so, apply a couple of more coats of CA and resand.
20. Replace the ring on the mandrel and apply two more coats of CA. Hand sand up to 1200 grit and then sand on the mandrel with 2000 and 4000 Abralon. Be careful, as fresh 2000 Abralon can sand through the finish. You can also burnish with old worn out Abralon until a shine is achieved.
21. Buff with white diamond and then carnauba. You should have a high gloss finish with no marks.

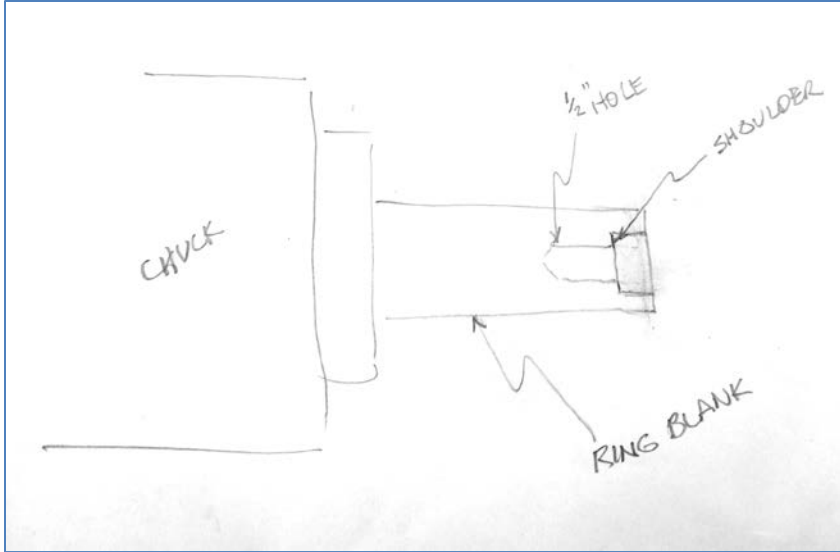


Figure 2. Drawing Showing Cutout for Ring Blank

Mandrel Construction

The ring mandrel is used to hold the ring for final turning, sanding and finishing. One end is held in a chuck with a tenon and the other end is turned to fit one or several specific ring sizes. The mandrel is split with two cuts perpendicular to each other about 3/4ths of its length and expanded using a live center to hold the ring. You can turn diameters for about four ring sizes side by side on a single mandrel before the mandrel will not expand enough to hold the leftmost ring without breaking. However, it is best to size them for diameters that skip a ring size so there is a shoulder that the ring can reference against. For example, do not make a mandrel for sizes 6, 7, 8 and 9. It is much better to make a mandrel for sizes 6, 8, 10 and 12. You should be able to cover all common ring sizes by making a second mandrel with sizes 5, 7, 9 and 11. Figures 3 and 4 are pictures of an example mandrel. Figure 5 is a very rough drawing attempting to show the steps in making the mandrel.



Figure 3. Ring mandrel Side View



Figure 4. Ring mandrel End View

1. Prepare a maple spindle blank that is thick enough to make a tenon for your chuck and mark the centers on both ends. Typically 1½" X 1½" square to 2" X 2" square and 3" - 4" long is about right. The blank should have straight grain since you will be expanding the mandrel and do not want it to crack because of grain runout.
2. Mount the mandrel blank between centers, rough turn it round and then turn a tenon to fit your chuck on one end. It is best to size the tenon so that the chuck jaws are almost closed when gripping the mandrel tenon.
3. Remove the drive center, install a chuck and mount the mandrel using the tenon. Mark jaw #1 so that when you remount the mandrel it will run true.
4. Using a centering bit, drill a 60° hole about ¼" in diameter so there is a small cone.
5. Rough turn the first 2½" of the end of the blank opposite the chuck to about 1" in diameter. You can use the live center to stabilize the blank.
6. Using a parting tool, cut grooves slightly oversize for the four ring diameters that you selected, going from the smallest on the right end to the largest towards the chuck. The left side of the first slot should be about 3/8" in from the end of the blank with the 60° centering hole. The left side of the second slot should be about 1/4" in from the left side of the first slot. Repeat for slots three and four each with 1/4" distances from the previous slot. The inside diameters of US ring sizes in inches are shown in Table 1.
7. Starting with the first groove on the right end, turn the diameter from the groove to the end down to the first groove diameter as a smooth cylinder. Then, accurately size the cylinder to the dimensions of the smallest ring size for this mandrel. Measure with dial calipers to get the dimensions accurate. Also make sure the left shoulder is square so the ring will have an something to reference against and turn without any wobble. Repeat for the other three ring sizes.
8. Turn a smooth transition starting about ¼" from the chuck jaws down to the minimum of 1/16" larger than the last (largest) ring size. This will give that ring a shoulder to reference against. You can turn a small cove between the last ring shoulder and the chuck so there will be enough flex in the mandrel at that point when chucking up the largest ring size.
9. Remove the mandrel from the chuck and cut two slots perpendicular to each other from the 60° hole about 3/4ths of the length. These allow the mandrel to expand to lock the ring to the mandrel. A bandsaw is the best way to do this, however, make sure the cuts are centered or the mandrel will expand unevenly and will wobble. This completes the ring mandrel.

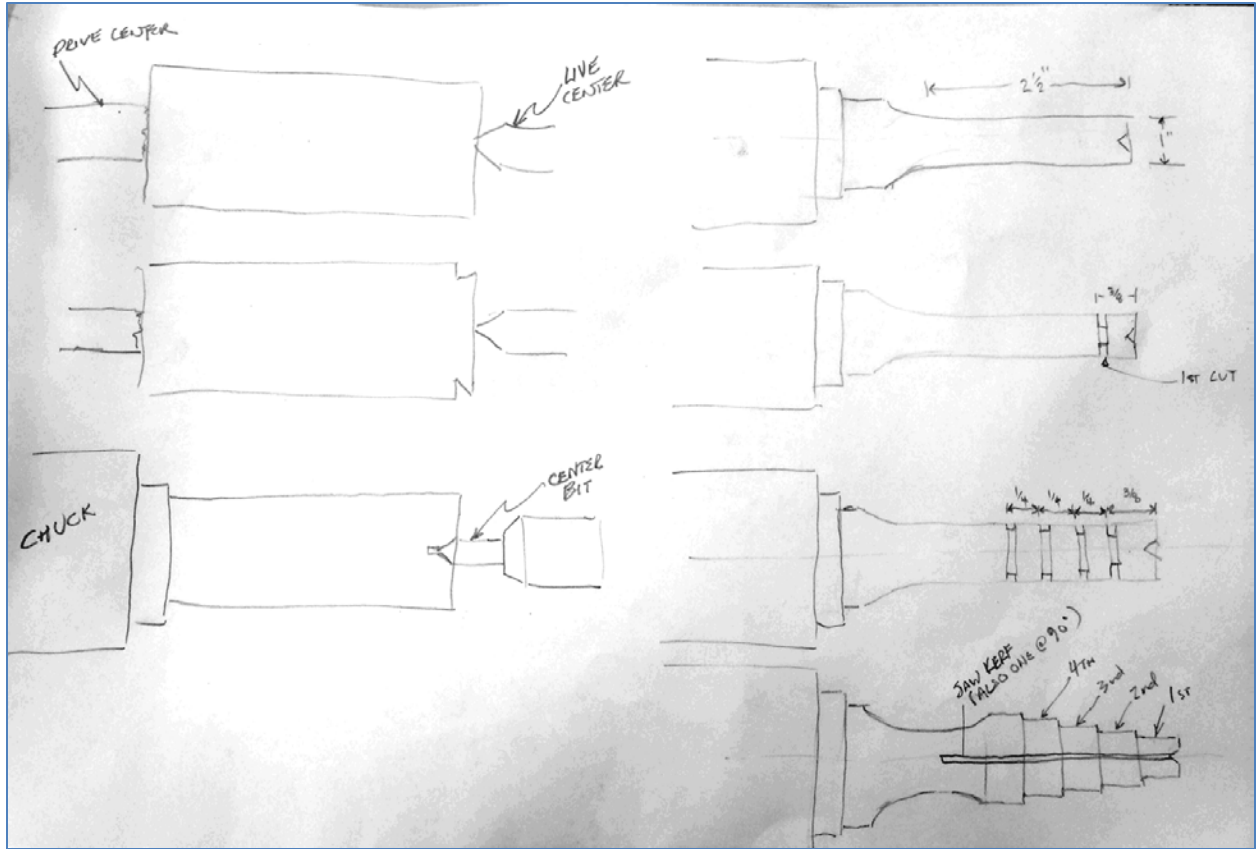


Figure 5. Steps in Turning a Mandrel

Table 1

International Ring Size Chart						
USA & Canada Ring Size	Diameter (Inches)	Great Britain	France (mm)	Germany	Japan	Switzerland
5	0.619	J-½	49	15 ¾	9	9
5 ¼	0.627	K	49 5/8	16	---	9 5/8
5 ½	0.635	K-½	50 ¼	16 ¼	10	10 ¼
5 ¾	0.643	L	50 7/8	---	11	10 7/8
6	0.652	L-½	51 ½	16 ½	12	11 ½
6 ¼	0.660	M	52 1/8	16 ¾	---	12 1/8
6 ½	0.668	M-½	52 ¾	17	13	12 ¾
6 ¾	0.676	N	53 ¾	---	---	13 ¾
7	0.685	O	54	17 ¼	14	14
7 ¼	0.693	O-½	54 5/8	17 ½	---	14 5/8
7 ½	0.701	P	55 ¼	17 ¾	15	15 ¼
7 ¾	0.709	P-½	55 7/8	---	---	15 7/8
8	0.717	Q	56 ½	18	16	16 ½
8 ¼	0.726	Q-½	57 1/8	18 ¼	---	17 1/8
8 ½	0.734	R	57 ¾	18 ½	17	17 ¾
8 ¾	0.742	R-½	58 ¾	18 ¾	---	18 ¾
9	0.750	S	59	19	18	19
9 ¼	0.759	S-½	59 5/8	19 ¼	---	19 5/8
9 ½	0.767	---	60 ¼	19 ½	19	20 ¼
9 ¾	0.775	T	60 7/8	19 ¾	---	20 7/8
10	0.783	T-½	61 ½	20	20	21 ½
10 ¼	0.792	U	62 1/8	20 ¼	21	22 1/8
10 ½	0.800	U-½	62 ¾	20 ½	22	22 ¾
10 ¾	0.808	V	63 ¾	---	---	23 ¾
11	0.816	V-½	64	20 ¾	23	24
11 ¼	0.825	W	64 5/8	---	---	24 5/8
11 ½	0.833	W-½	65 ¼	21	24	25 ¼
11 ¾	0.841	X	65 7/8	---	---	25 7/8
12	0.849	Y	66 ½	21 ¼	25	26 ½
12 ¼	0.858	Y-½	67 1/8	21 ½	---	27 1/8
12 ½	0.866	Z	67 ¾	21 ¾	26	27 ¾

12 3/4	0.874	Z-1/2	68 3/8	---	---	28 3/8
13	0.882	---	69	22	27	29