



Ornamental Bowl



Materials:

- (1) 6 3/4" x 1 1/2" x 1 1/2" - Stem
- (4) 6" x 6" x 1 3/4" - Bowl
- (2) 4 1/4" x 4 1/4" x 1 3/4" - Base

Router Bits:

- 1 1/2" Barley Twist
- 1 1/2" Surface Planing
- 2" Core Box
- 1" Rope Molding
- 3" Point-cutting Roundover
- 1/2" Upcut Spiral

Techniques:

- Single Start Spiral
- X,Y,Z Milling with Rotary Table

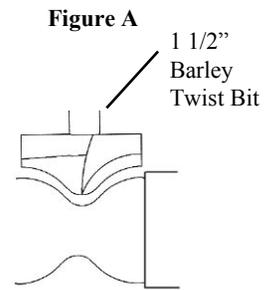
Preparation: Stock should be cut to the sizes indicated above. You will need double-sided carpet tape for milling the bowl and the base on the rotary table. Mount the stock for the stem on an index hub.

Machine Setup: You will need a rotary table and a flat milling table mounted to the rails of the machine (see *Appendix: X,Y,Z Milling*). Use the 1 1/2" gear pitch and a 1 1/2" barley twist bit. Set the stop on the right side at 2 1/4". This will leave you enough room on the headstock end so that you don't run into the mounting screws and will give you a 1/2" tenon to attach the stem onto the base. Set the left stop at 5 1/4". Set the stop on the y-axis at 0.

NOTE: The above photo shows a single start barley twist using a 1 1/2" bit, and an 1 1/2" pitch. *Not all Legacy Ornamental Mills come standard with a 1 1/2" pitch.* If you do not have 1 1/2" gear pitch (models 1000 or 600L), we recommend you mill a 2 start barley twist using a 1 1/2" bit and a 3" gear pitch (see *Project 1: Barley Twist Candlestick Holder*).

STEP ONE: With the split-nut open, plunge to the side of the stock, start your router and bring it to center using the y-axis handwheel while pushing the carrier tray against the right stop. Mill the cove (Fig A) around the circumference of the stock.

STEP TWO: With the router plunged to the side, lock the x-axis split-nut onto the linear drive screw. Set the carrier tray to the beginning stop and bring the router over the center of the stock (the bit should be rotating freely in the previously milled cove). As you rotate the stock the router will mill the bead of the barley twist. When you get to the end of the milled section (the left stop set at 5 1/4") release the split-nut and mill the cove at the left end. (Note: To avoid divits or burn marks it is best to move the router to the side of the workpiece when releasing the split-nut.)





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STEP THREE: Use the surface planing bit to mill the left end of the workpiece round. (Fig B) Set the plunge depth of the surface planing bit level with the edge of the milled cove.

STEP FOUR The final cuts will be to mill tenons on both ends. The final measurement for the tenon should be 1/2" diameter and 1/2" long. This is where a set of calipers is very useful. Set the right stop at 1" to avoid running into the screws that are holding the stock to the mounting hub. Use the 3/8" upcut spiral bit. (Fig C)

STEP FIVE - Milling the base: The base in Project 1 (Candlestick Holder) was created with the stock held center to center. This base will be created using the rotary table and the x, y, z-axis milling.

Center the stock onto the rotary table with double-sided tape. With the 2" core box bit in place, set the plunge depth so that you are milling 1" into the 1 3/4" stock. With previous planning in the setup of the rotary table, you should be able to identify the center position of the workpiece along the x and y-axis. With the router centered on the workpiece, lock the router into place using the x-axis split-nut. (Note: To insure that the router will stay positioned along the x-axis, see that the handle on the drive shaft is in the down position.) Set the stop on the y-axis so that the center of the router bit is aligned with the edge of the workpiece. You will want to make several passes, plunging the router bit a little deeper each time until you have reached the predetermined depth. As you mill each pass, bring the router in from the side of the workpiece with the y-axis handwheel.

STEP SIX: After milling the cove, adjust the y-axis stop so that from the side of the workpiece you will mill into the base approximately 1/16". You will mill the scallops 18 times in 5 degree increments. Place the Rotary Indexing Scale (*Appendix C*) onto the flat milling table (under the rotary table). Your rotary table should be divided into 8 equal sections. These lines will be used to index the workpiece into 18 sections. As you rotate the stock every 5 degrees, use the y-axis handle to gently bump the router against the stop and back out again. Repeat this action around the outside of the base.

STEP SEVEN: Use the 1" rope bit to mill the roundover edge at the base of the scallops (Fig D).

STEP EIGHT: Use the 1 1/2" surface planing bit to mill the flat and recessed areas as shown (Fig D). Mill a 1/2" mortise into the center of the piece for the tenon of the stem.

STEP NINE- Milling the bowl: Milling the inside of the bowl (Fig E) uses the same procedures as outlined for milling the base (Step 6). The plunge of the bit was set so that the top of the router bit runs level with the top surface of the wood. When milling the bowl take several small passes (1/8" deep).

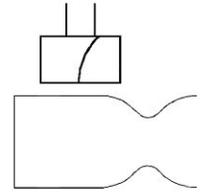


Figure B - Milling the round

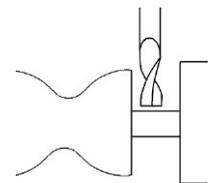


Figure C - Milling the tenon

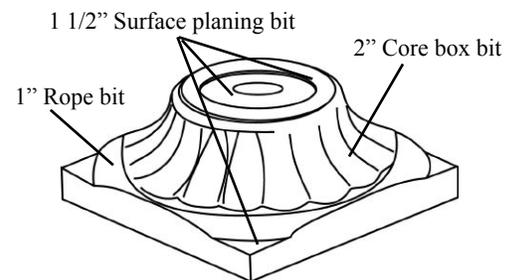


Figure D - Router bits used on the base

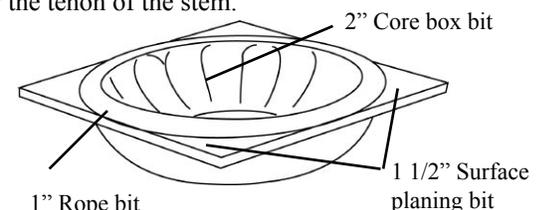


Figure E - Router bits used on the bowl

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STEP TEN: Use the 1 1/2" surface planing bit to mill a flat bottom into the center of the bowl. Recess the flat so that the bottom is approximately 1/8" lower than the scallops.

STEP ELEVEN: Use the 1" rope moulding bit to mill the round-over lip on the top surface of the bowl (Fig E).

STEP TWELVE: The 1 1/2" surface planing bit is used to mill the corner edges flat (Fig E).

STEP THIRTEEN: Once you have completed milling the top of the bowl you will flip the bowl over to mill the underside. The curved profile is achieved using a 3" diameter point-cutting roundover with radius. To mill the underside you will want to mount four 1/4" spacers to the top corners of the bowl with double-sided tape. These spacers will need to have double-sided tape on both surfaces. The spacers will give you more surface with which to mount the top of the bowl to the rotary table. When you mount the top of the workpiece onto the rotary table, take care to center the workpiece as accurately as possible.

STEP FOURTEEN: With the workpiece remounted onto the rotary table, use the 3" point-cutting roundover with radius to mill the contoured profile of the exterior (Fig F). Set the plunge depth so that you will be milling 1/8" below the surface of the workpiece and set your y-axis stop so that you are 1 1/4" from the center. Your using a large cutter with a lot of surface being removed so you will want to enter from the side and mill the piece in several passes. By milling from the side (as opposed to the top) you will be able to control the amount of material being removed.

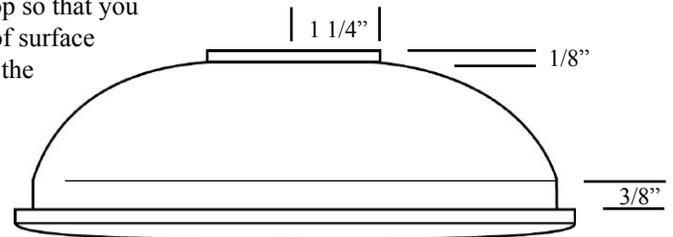


Figure F - Milling the bottom of the bowl

STEP FIFTEEN: Use the 1 1/2" surface planing bit to mill the flat surface on the underside of the bowl.

STEP SIXTEEN: With the same bit mill a recessed space for the stem to set into about 1/8". In the center of the recess you will use a 1/2" upcut spiral bit to mill a mortise for the tenon on the stem. When milling the mortise you will want to watch that you don't cut too deep. Cutting too deep will create an unwanted hole in the bottom of the bowl. (In step four we milled a 1/2" tenon on the stem, the mortise depth should not exceed 3/8", and you will want to cut the tenon off accordingly)