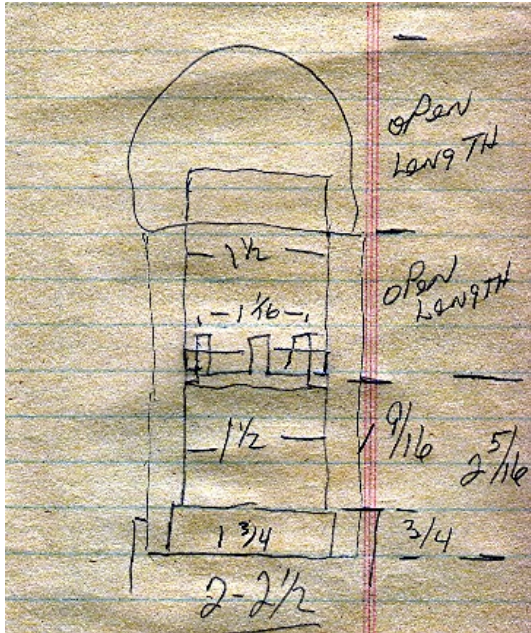


Building a shaft less Crush/Grind Pepper mill

Chuck Ellis

First off, I don't want you guys laughing at my drawing... I'm a better turner than I am a graphic artist.



This is a rough sketch – very rough – of my design for a shaft less crush grind pepper mill.

This design will create a pepper mill that will be roughly 2/3 in height of the length of your blank. I started with a 12" x 2 1/2" Spectraply blank that created a pepper mill that is 8" tall.

The mill has 2 5/16" fixed dimension that must be accounted for, the rest of the dimensions are dependent on the overall length of the blank.

Tools required:

1 3/4" Forstner bit

1 9/16" Forstner bit

1 1/16" Forstner bit

1/8" x 1 9/16" brass rod

Turning tools of choice

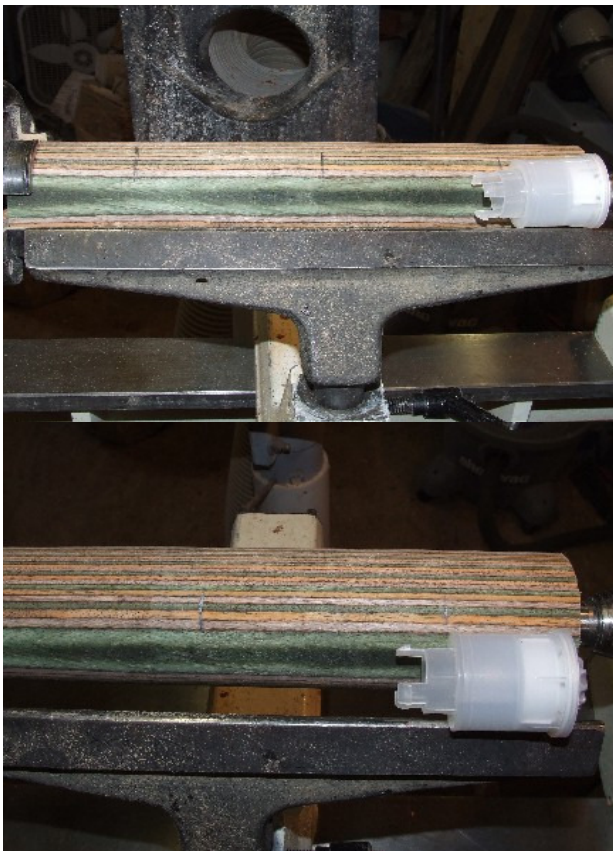
Finish of choice

For ease of handling, I chucked the blank between my scroll chuck and a live center. I brought up the tool rest to use as a support to hold the grinder mechanism for reference.

I marked the fixed length of the grinder at the shoulder and another mark at the other end where the cap end will end and rest against the main body of the pepper mill. The small part of the grinder with the 3 fingers will be inserted into the cap tenon to turn the grinder.

Measure the distance between the two marks and divide the distance in half.

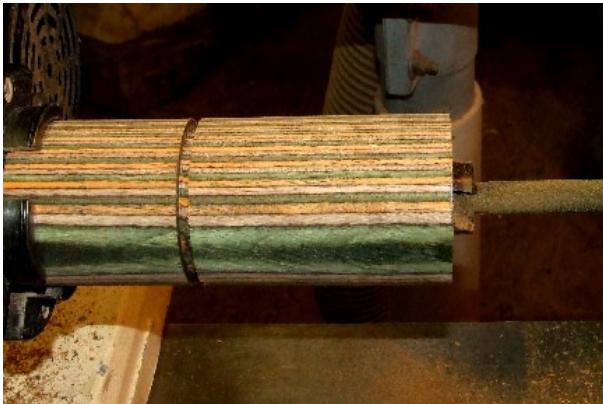
This is to determine where the blank will be parted.





Make initial cuts on the pencil marks and part the blank into two pieces at the center line. The right hand piece will be the body. The left piece will be the top and tenon.

Leave the cap end chucked.



Using the 1 1/16 Forstner bit, drill the cap end of the mill through the blank past the cut line for about 1/2 the distance of the cap. This will be the pepper chamber. The deeper you are able to drill, the greater volume of pepper corns the mill will hold.



Determine the depth of the pepper corn chamber.



Now turn a tenon on the cap end of the mill to a smooth and uniform size of approximately 1 17/32" diameter. This tenon will need to fit inside the main body of the peppermill and turn smoothly, but not be loose.

The body will be drilled to a size of 1 9/16". I normally turn to this size and then sand down until it fits smoothly into the main body.

After you are satisfied with the tenon, unchuck and lay aside for now.



Now chuck the main body of the pepper mill.

Drill the bottom of the pepper mill with the 1 3/4" Forstner. Drill the hole to a depth of approximately 3/4 inches. This cut is to allow the grinder mechanism to clear the bottom of the mill and also allow the user to adjust the grind.



Now chuck up the 1 9/16" Forstner and drill the body of the pepper mill all the way through. I use an extension bit and go through the top end of the mill, but you can drill from the bottom half way or just over, then reverse the body and drill from the other direction to meet in the middle. Take care that you meet smoothly in the middle as the tenon on the top will need to slip all the way through the body to meet with the grinder top. If you have an off set meeting, the tenon will not slip smoothly and it will be necessary to sand the inside to make it smooth.



Checking the fit of the top tenon into the body of the mill.



I have mounted the body of the mill on specially made jam chucks. The bottom of the mill is towards the tail stock, but orientation here is the turner's choice. This is my preference... dictated by the fact that this is the way I cut the original jam chucks.

The body is now ready to turn to shape.



Body of the pepper mill turned to shape.



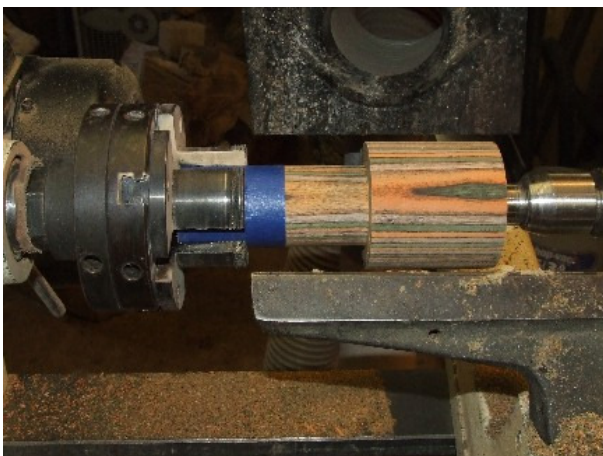
Wiped down with Naptha to clean and bring up the color.

You could also use Acetone or your choice of wipe here.. I use Naptha because it will bring up the color and I can see what the finished product may look like.



Check to determine your size reference for the top ball and the mill body.

This would also be an opportune time to make sure your tenon isn't too long. Suggest you dry fit the parts of your mill. Slip the grinder mechanism into the bottom of the mill body, then slide the tenon down the top of the mill body and engage the fingers of the grinder. If there is a gap between the top and body, you will have to cut the tenon off slightly to create a nice flush fit of the top to the body.



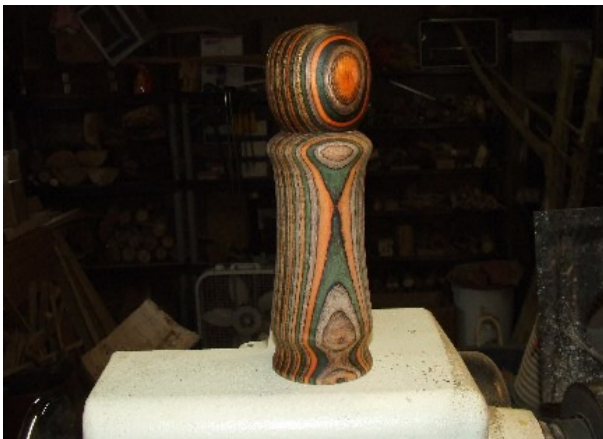
The top chucked into a long nose alligator chuck. I've wrapped the tenon in blue masking tape to keep from marring the surface.



Turn the top.



Wiped with Naptha to clean and bring up color.



My finished pepper mill body.

Before assembly the tenon needs to be prepared to fit over the grinder mechanism. Since everything is compression fit, often the grinder turning mechanism can slip inside the tenon. Below is a solution to that problem.

Fitting the tenon to fit over grinder:



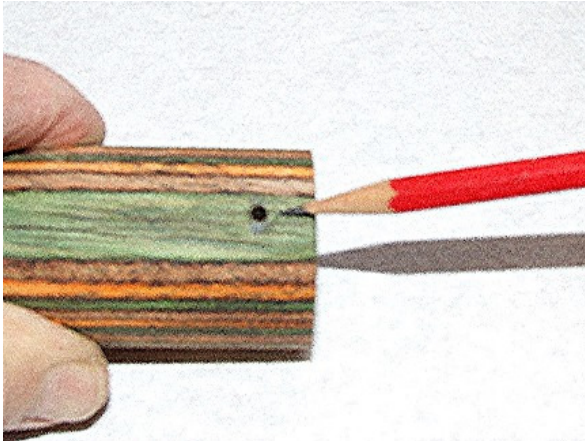
If you have not already, it would be wise to again dry fit the mill parts to make sure the top fits flush and snugly against the mill body.

If all is correct, set the end of the tenon on the shoulder of the grinder and determine where the little fingers will be inside the tenon.

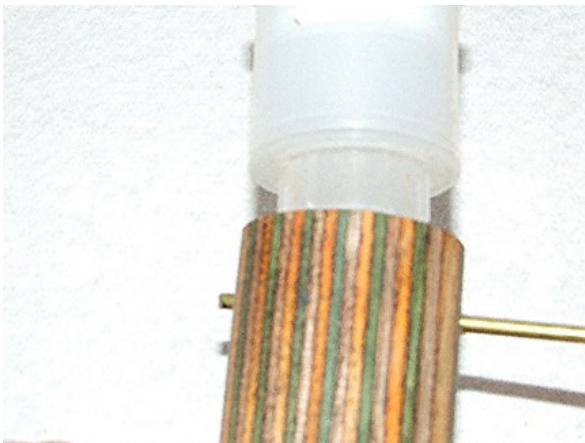


Mark the tenon just above the grinder turning mechanism about 1/8 inch.

This is where we will drill a 1/8 inch hole at an angle through the tenon for the brass rod. The angle needs to be such that the rod will catch one of the fingers of the turning mechanism.



The hole is drilled.



Dry fit the 1/8" brass rod to make sure you have the hole in the correct place and mark it to length for cutting. I generally pull the rod until one end is near flush, then mark the other end as close to the body as possible. The ends of the rod will be sanded smooth on a belt sander. Or you could use a spindle sander.



The rod is inserted and has been sanded smooth on both ends. It must be sanded smooth and flush with the wall of the tenon. I use my 1 inch belt sander. The brass will sand quickly and smoothly. You could also use aluminum if you want.



The pepper mill is complete and ready for finishing, using your finish of choice. Final assembly should wait until the finish has cured.

After the finish is cured, I will use epoxy to glue the grinder mechanism into the mill body.

A drop of CA on the brass rod will hold it in place in the tenon... I usually glue on the inside of the tenon so as not to have a glob on the outside where it could bind the tenon and cause it to stick and not turn freely.