

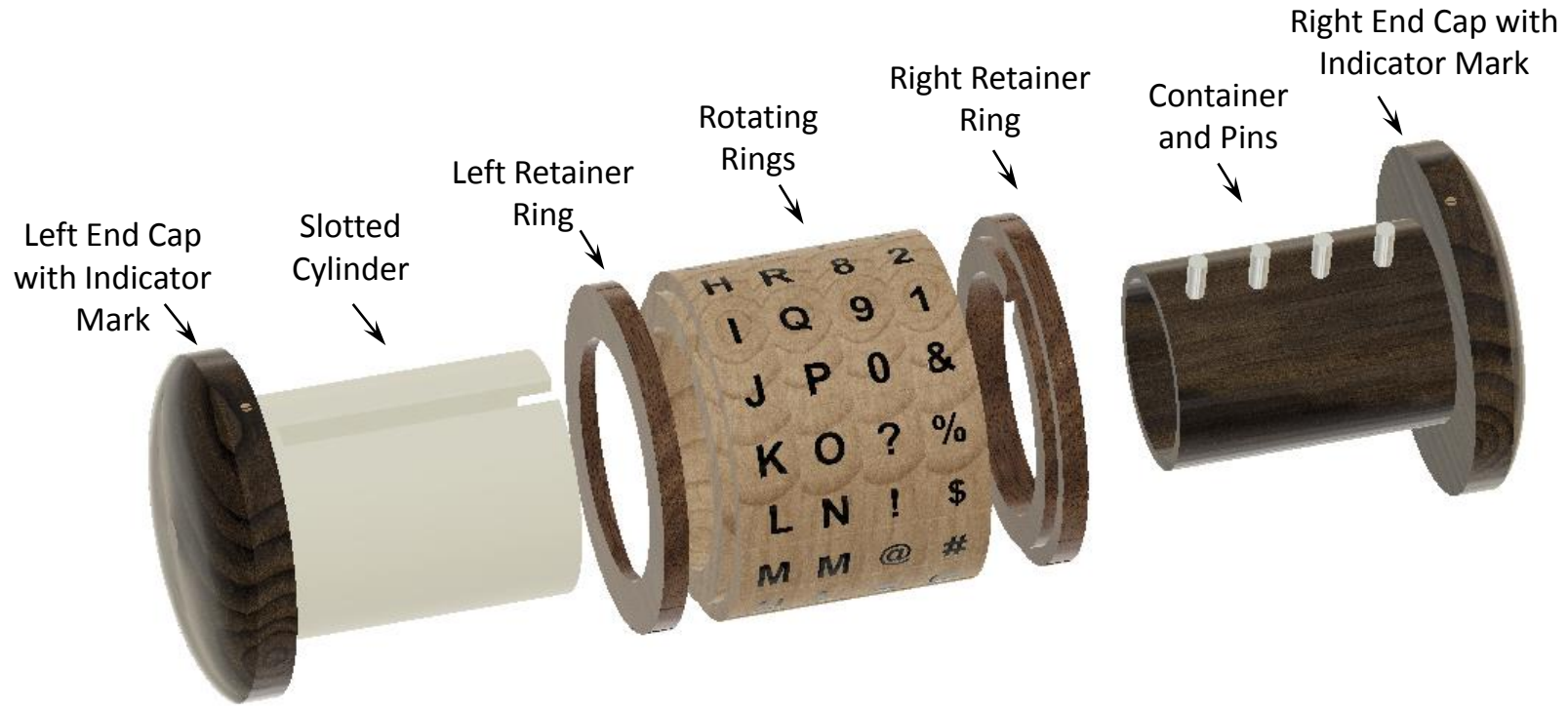
How to Make a Cryptex Box

Ron Giordano

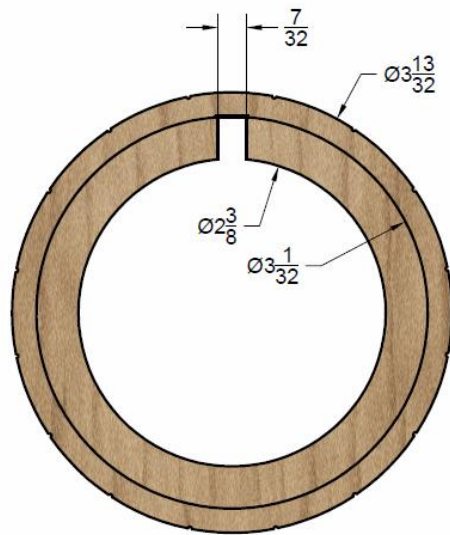
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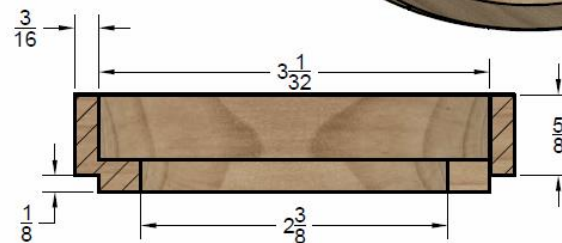
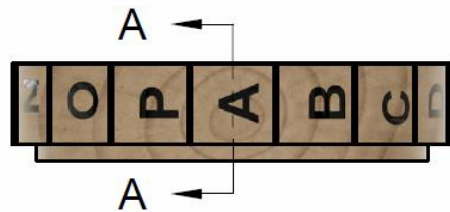
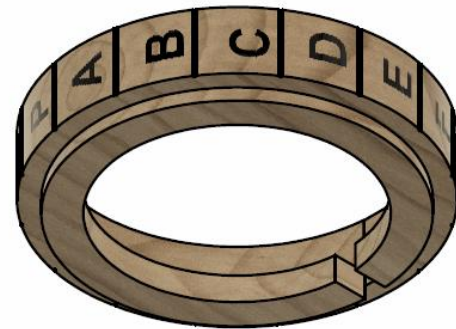
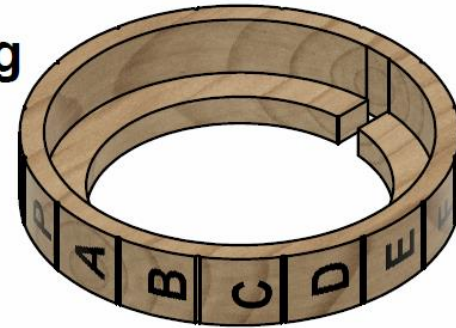
Exploded View of Cryptex



CAD Design Done in Fusion 360 Software



Rotating Ring (4 Needed)



SECTION A-A
SCALE 1:1

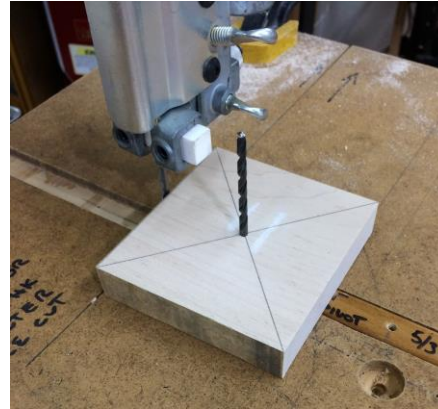
Rotating Ring Construction

STEPS:

- a) Cut square boards from $\frac{3}{4}$ " maple.
- b) Use circle-cutting jig on bandsaw to make maple disks from the square boards.
- c) Maple disks for turning.
- d) Tape maple disk to waste block.
- e) Turn to final outer dimension.
- f) Turn inner cavity as well as a tenon.
- g) Check that inner cavity is large enough to fit the PVC pipe.
- h) Remove ring, reverse mount using tenon, and turn the other side to dimension and add finish.



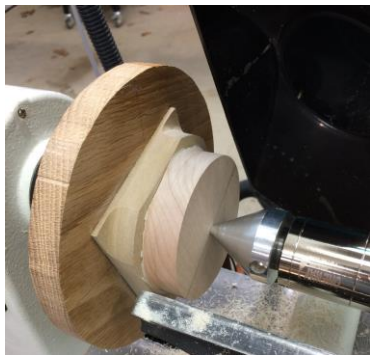
(a)



(b)



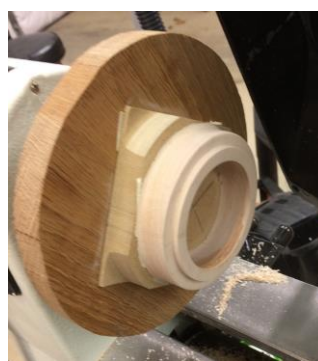
(c)



(d)



(e)



(f)



(g)



(h)

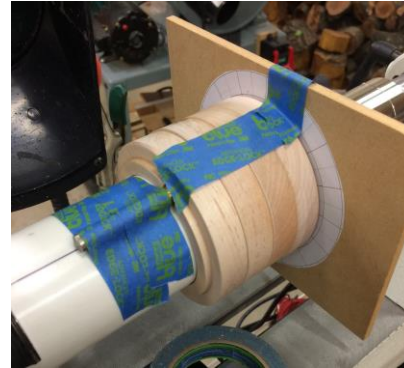
Making Grooves for the Lettering

STEPS:

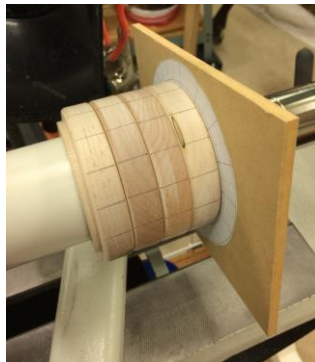
- a) Use a Forstner bit to make a slot in each ring for the pins to slide through.
- b) Print out a circle with 16 radial lines at 22.5 degrees. Mount the circle on a flat board. Slide the four rotating rings onto the PVC pipe and secure left hand side in the drive stock.
 - 1) Rotate the rings so that the slots line-up, then slide a drill bit into the slot to prevent the rings from rotating. Add tape to secure it.
 - 2) Bring up the tailstock and center the board on the rings making sure that the slot in the rings is at the midpoint between two radial lines. Tape board into position.
 - 3) Using a straight edge, mark 16 equally spaced lines on the rings. These lines will separate the letters that will be applied.
- c) Photo shows the rings with marked lines.
- d) Remove rings and use a bandsaw to cut shallow lines along the marked lines.



(a)



(b)

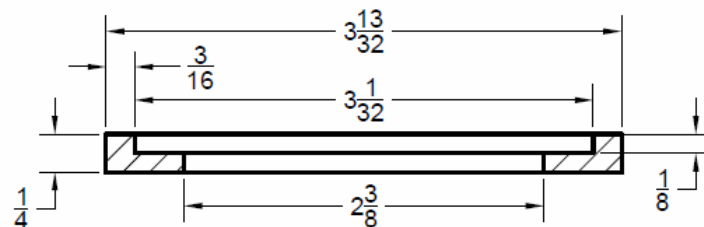
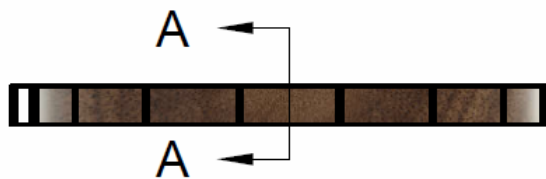
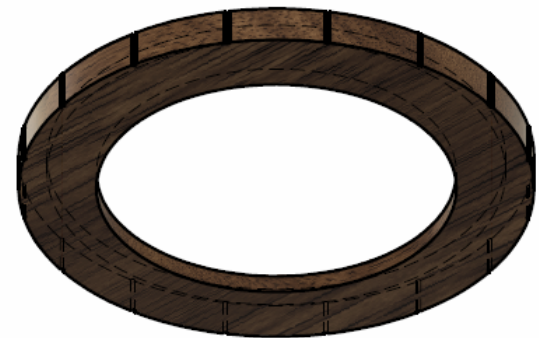
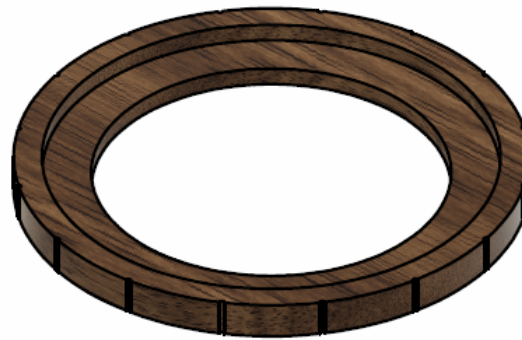
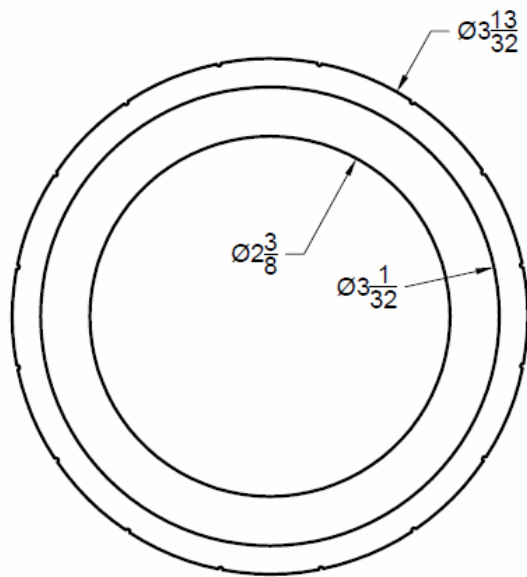


(c)



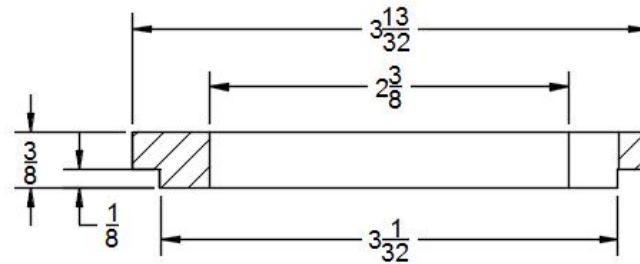
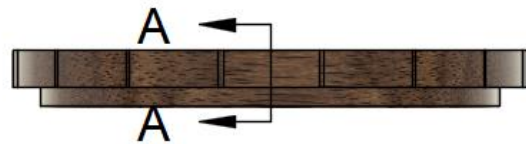
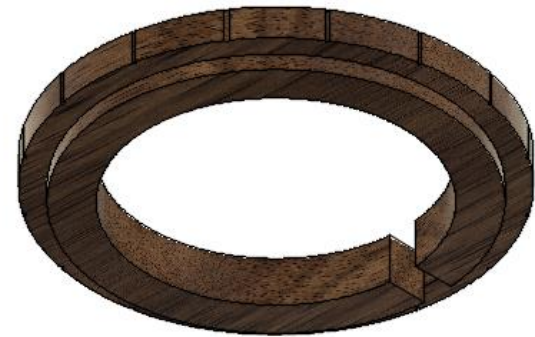
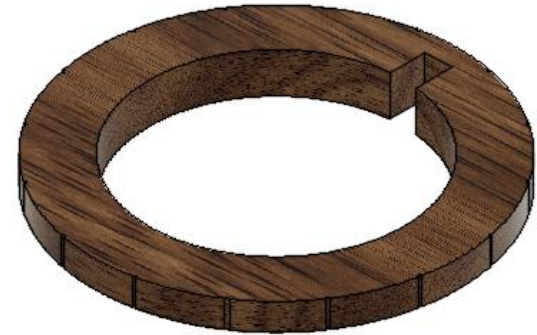
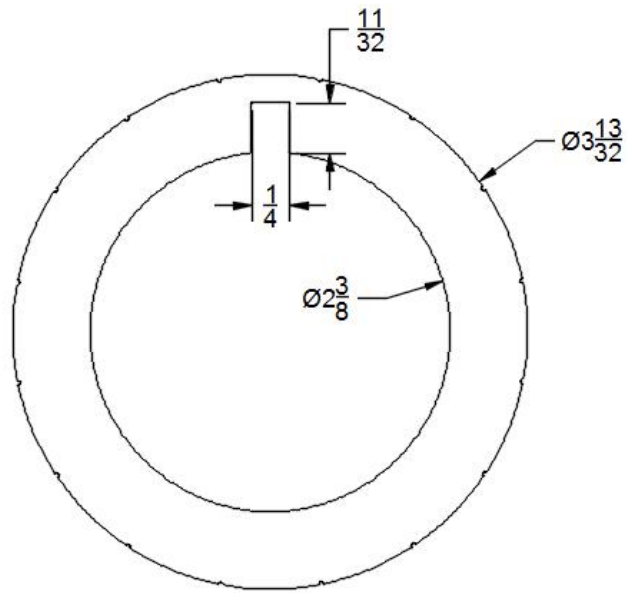
(d)

Left Retainer Ring



SECTION A-A
SCALE 1:1

Right Retainer Ring



SECTION A-A
SCALE 1:1

Retainer Ring Construction

STEPS (similar to the rotating ring construction)

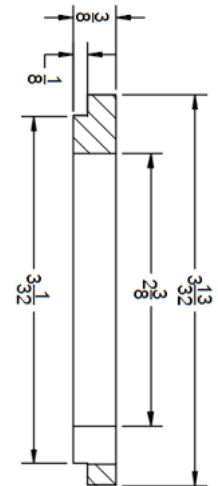
- Cut a square board from $\frac{3}{4}$ " mahogany.
- Use circle-cutting jig on bandsaw to make a mahogany disk from the square board.
- Tape mahogany disk to waste block.
- Turn to final outer dimension.
- Turn inner cavity to accept PVT pipe.
- Turn an $\frac{1}{8}$ " recess on the outer face. The diameter of the recess is $3\frac{1}{32}$ "
- Use a $\frac{1}{16}$ " parting tool and part the ring at $\frac{1}{8}$ " from the right face. This ring is the left retainer ring
- Turn an $\frac{1}{8}$ " tenon on the remaining ring
- Remove ring from the lathe. This is the right retainer ring
- Sand the ring to $\frac{3}{8}$ " thickness and add finish.



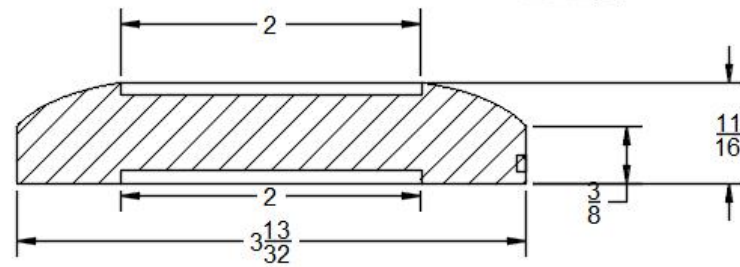
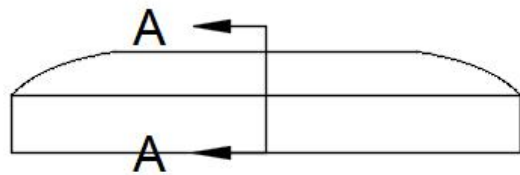
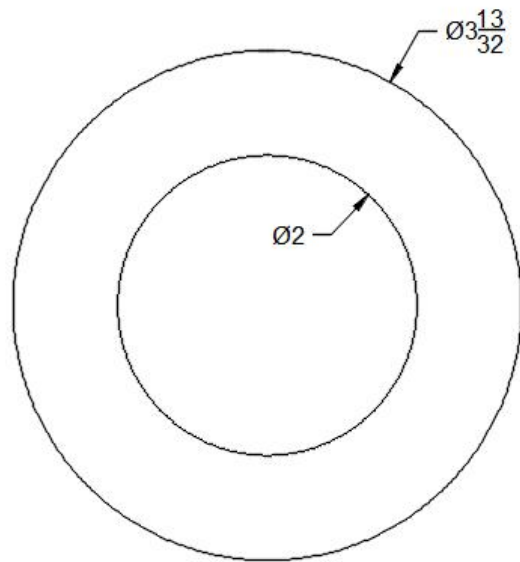
Left Retainer Ring



Right Retainer Ring

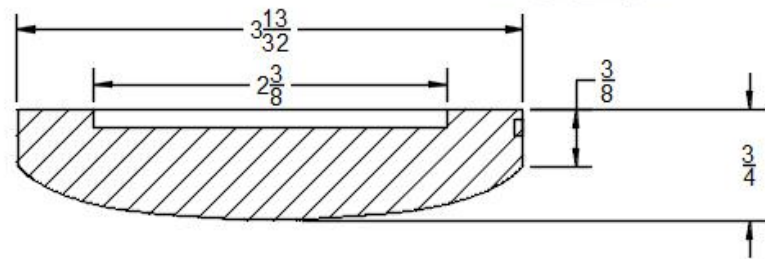
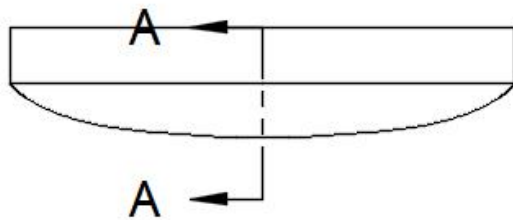
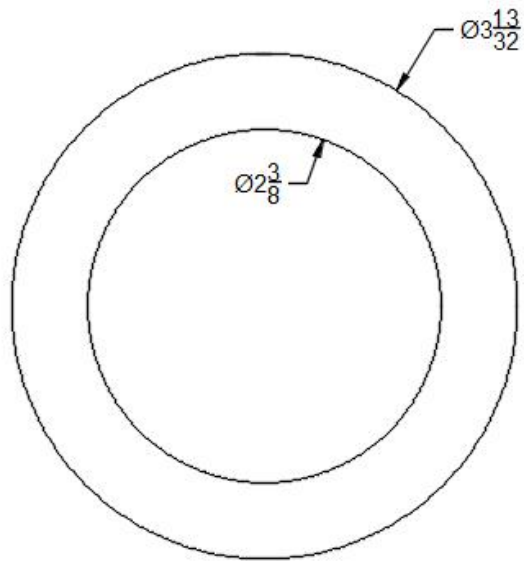


Right End Cap



SECTION A-A
SCALE 1:1

Left End Cap



SECTION A-A
SCALE 1:1

End Cap Construction

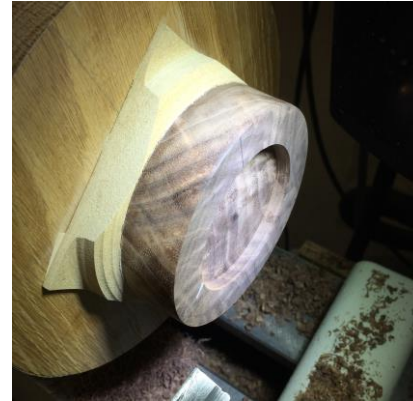
STEPS:

- Mount a $\frac{3}{4}$ " piece of walnut on a waste block.
- Turn to required outer diameter and turn a recess for the PVC pipe.
- Make sure the PVC pipe fits with a good friction fit.
- Reverse mount and make the dome-shaped top and add finish.
- This is the left end cap.
- Follow a similar procedure for the right end cap; however, the inner recess is sized to receive the wooden container rather than the PVC pipe. In addition, make a flat spot on the dome and then make a recess to receive the maple inlay.

Note: Some indicator mark should be made on the left and right end caps to indicate where the combination should align. The mark can be a small drilled hole or a small flush-cut dowel about $\frac{1}{8}$ " in diameter as circled in red below.



(a)



(b)



(c)



(d)



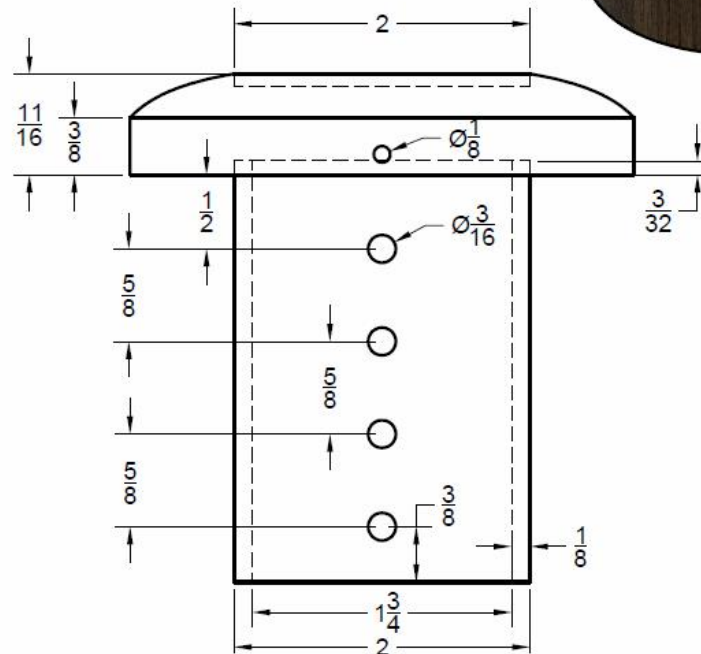
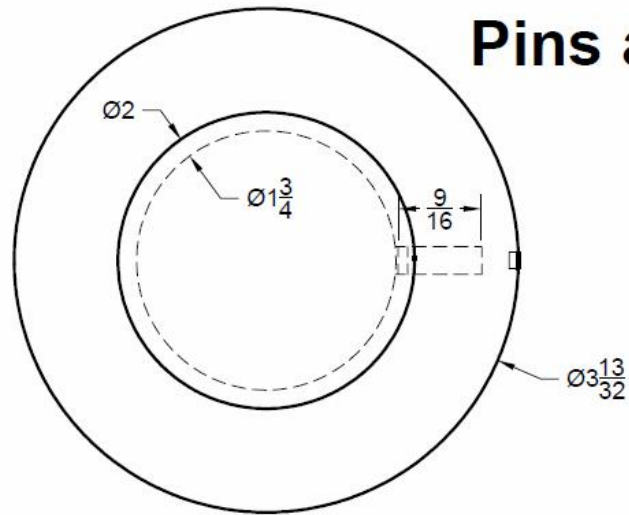
(e)



(f)



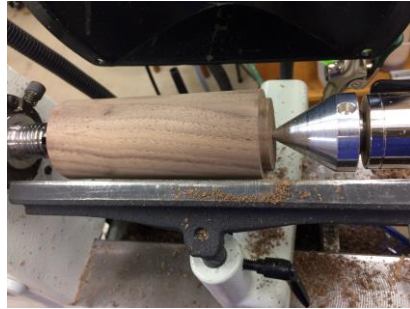
Wooden Container, Pins and End Cap



Wooden Container Construction

STEPS:

- a) Starting with 8/4 walnut that is oversized in length, mount between centers and make round. Make a tenon on the end.
- b) Reverse mount and hollow the inside to the required depth.
- c) Part off the cylinder to the desired length.
- d) Reverse mount and flatten the bottom and add finish.
- e) Print out a template of the pin locations.
- f) Drill pin holes using the template. Temporarily insert pins and test-fit to the rotating rings. Make sure rings spin freely on the PVC pipe and that the wooden container length is correct.
- g) Glue cylinder to right end cap making sure that the indicator mark aligns with the pins.



(a)



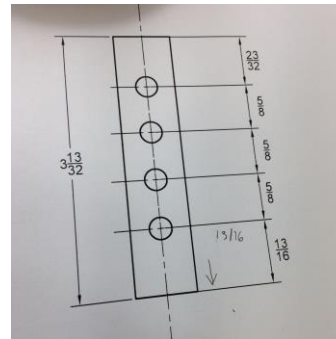
(b)



(c)



(d)



(e)

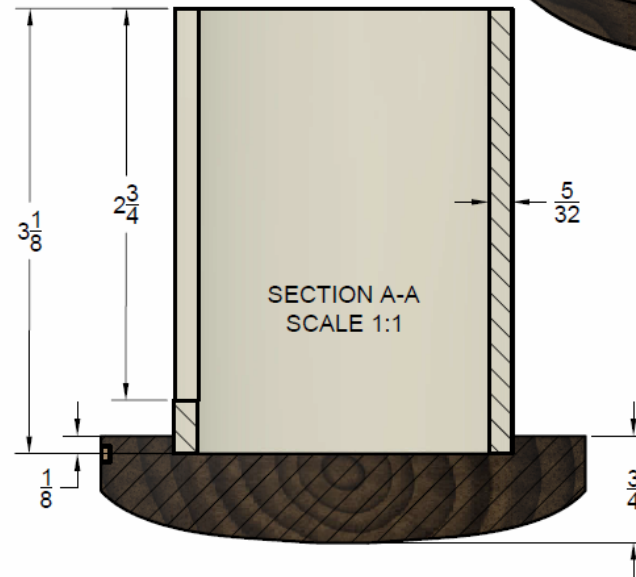
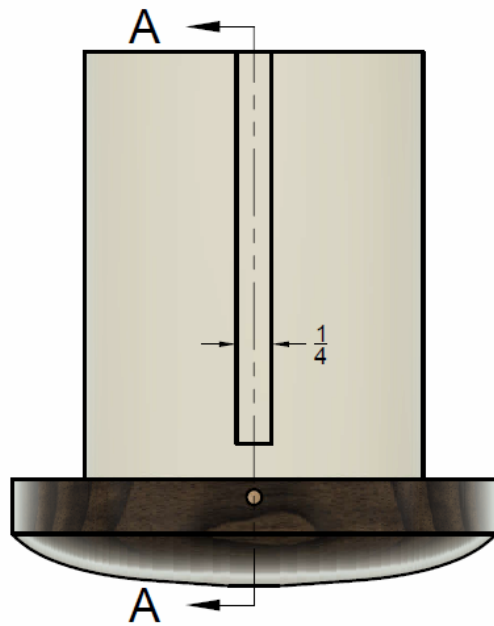
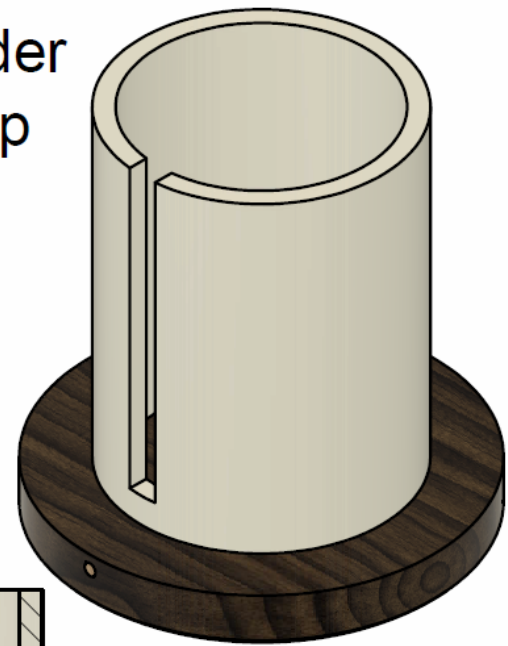
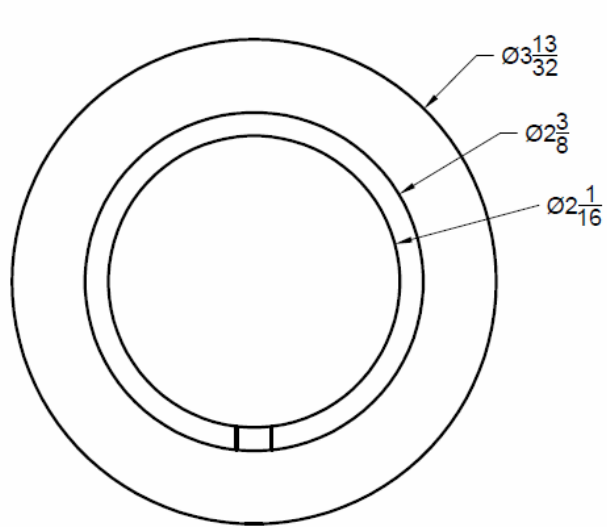


(f)



(g)

Slotted Cylinder and End Cap



Slotted Cylinder Construction

STEPS:

Cut a piece of 2" PVC pipe. The length should be longer than the final desired length. Cut a $\frac{1}{4}$ " slot part-way down the PVC pipe. This can be done with a jig on the router table.

- Slide the PVC pipe into the stacked rings including the retainer rings and the left end cap. Mark the location of the right retainer ring on the PVC pipe.
- Mount the PVC pipe and part it off at the marked line.
- The idea is for the PVC pipe to be flush to the right retainer ring when fully assembled.
- Glue the right retainer ring onto the PVC pipe. This will be at the flush cut-off location where the open end of the slot is located.



(a)



(b)



(c)

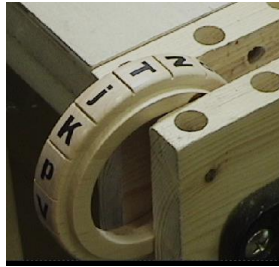


(d)

Final Steps

STEPS:

- a) Add lettering to the rings. Rub-on letters work well. It is a good idea to write and print the letters in Excel to verify that there are no repeat letters/numbers on a given ring and that no objectional words can be spelled when the rings are rotated. Make sure the desired combination letters align with the open slot.
- b) Spray a finish over the letters to protect them.
- c) Insert a wooden slat into the slot so that all of the rings are aligned to the desired combination. Insert some thin spacers about the thickness of a playing card to give some clearance for the rings to rotate.
- d) Glue on the left retainer ring making sure that the alignment mark on the ring aligns with the open slot. Make sure the rotating rings are free to rotate and are not glued to the PVC.
- e) Glue on the left end cap making sure that the indicator mark aligns with the slot..
- f) The project is now finished.



(a)



(b)



(c)



(d)



(e)