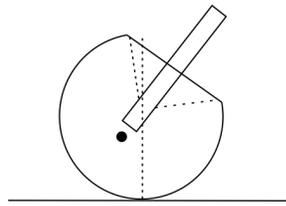


Making a Tippe Top
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In order for a tippe top to work, the center of mass should be low in the top. As shown in the picture below, the center of mass should never be directly above the point of contact of the tippe top with the table (except when it is upright). If it is, then the tippe top will just spin in that position and not proceed far enough to flip over. In the diagram below, the center of mass is marked with a dot.



1. Start with a blank that is approximately 1.5 inches square and at least 2 inches long. Turn it round at somewhere between 1 and 1.5 inches, turn a tenon to fit your chuck and mount the blank on the chuck.
2. Next turn the top of the top and hollow it. Drill a $\frac{1}{4}$ inch diameter $\frac{1}{2}$ inch deep hole for the stem. (If you do not wish to insert a ball bearing drill to approximately $\frac{1}{4}$ to $\frac{3}{8}$ inch deep.)
3. Finish the hollowed top of the top. You can texture and paint it or just apply carnauba wax.
4. Rough the outside of the top to be approximately round and part it off.

There are at least two ways to proceed. I usually continue with step 5. John Solberg usually proceeds to alternate step 5 on the back of this page.

5. Use the drilled $\frac{1}{4}$ inch hole to mount the top using a $\frac{1}{4}$ inch collet.
6. Finish turning the outside of the top making sure that the shape is approximately round, but it should be a little shorter than a perfect sphere.
7. Sand and finish the outside.
8. Insert a ball bearing into the $\frac{1}{4}$ inch diameter hole and push it to the bottom. Drop in a drop or two of CA glue to secure the ball bearing.
9. Plan on the stem extending approximately $\frac{1}{2}$ inch above the top of the top and measure the length needed for the stem.
10. Use a blank approximately $\frac{1}{2}$ inch square by at least 1.5 inches for the stem. Mount in a chuck and turn the stem. Be sure to make the top of the stem to be flat or slightly concave.
11. Finish the stem and part it.

12. Insert the stem into the top and test it. If it works well, glue it and you are done. If not go to step 13 below.

Alternate method (also known as John Solberg's method):

5. Next make the stem. Using a blank approximately $\frac{1}{2}$ inch square by at least 1.5 inches, mount in a chuck with at least a $1\frac{1}{4}$ inch outside the chuck. Turn it round and make a tenon on the end of the blank that is $\frac{1}{4}$ inch diameter and $\frac{1}{4}$ inch long.
6. Press the round part of the top on the stem tenon and finish shaping the round part of the top.
7. Mark the stem blank for length. You should have a half inch or so of the stem above the round part.
8. Remove the round part of the top and leave the stem in the chuck.
9. If you use a ball bearing, insert a $\frac{1}{4}$ inch ball bearing and add a drop or two of CA glue.
10. Shape the stem and part it at the marked length.
11. Sand the top of the stem to make it flat and square.
12. Insert the stem and check if the top flips. If it works well, you can glue it. If not, proceed to step 13.
13. If the top doesn't work, it may still be salvageable.
 - a. If the tipped top spins like a regular top, flatten the bottom more.
 - b. If the top does not rotate to the point where the stem touches the table top (as in the second position below) or if it takes a long time before the stem touches the table top (third position below), then try reshaping the top. Test if the center of mass is directly above points on the surface. Do this by placing the top flat on the table at various angles and make sure that the top rotates back to the stem pointing up. If you find a spot where the top does not "want" to rotate back up, then the center of mass is directly above the point of contact which does not allow the top to flip. Often making the top a little shorter and flatter on the bottom does the trick.
 - c. If the stem touches the table top and tries to flip, but it is too unstable to spin on its stem, then try making a different stem. You could change the diameter – a quarter inch or a little less seems to work well. Another option is to shorten or lengthen the stem, just keep it long enough that it is not too difficult to spin. Also, make sure that the top of the stem is flat or concave and not convex.

