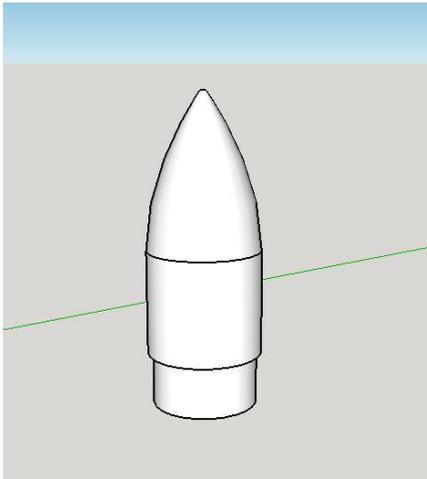


MAKE A NOSECONE

This Project is good for learning the basics again, uses knowledge of rotate tool from making the gear, learn new curviloft tool. Note that the Part where we make a tube inside, is not necessary and for learning curviloft, but would not then reiterate the rotate tool.



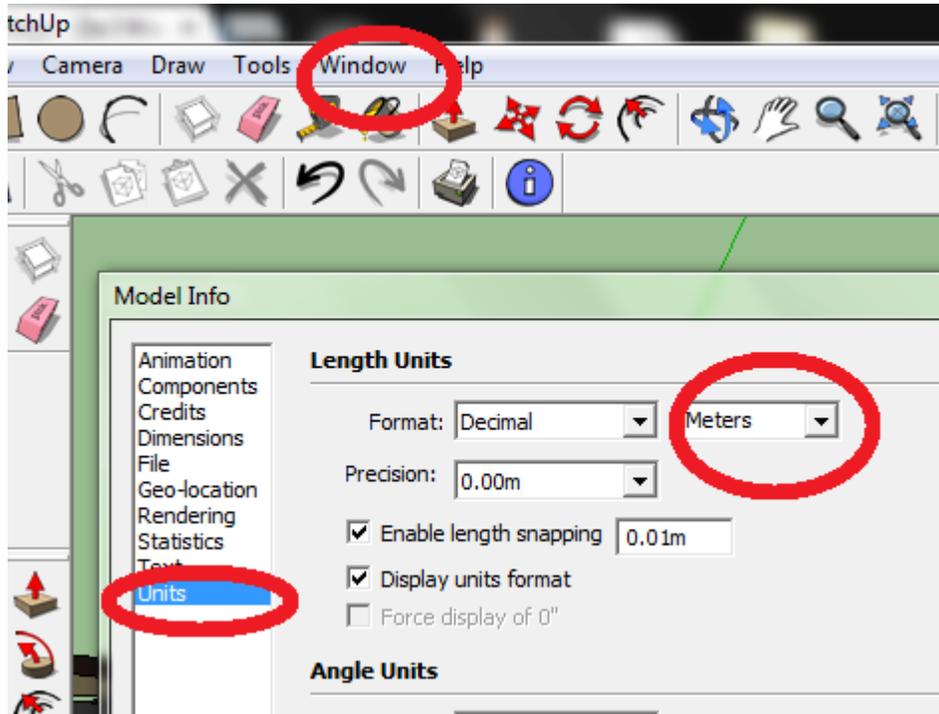
Setup

1. Download Sketchup for free on googles website (requires login).
2. Download plugins:
 - LibFredo: <https://extensions.sketchup.com/en/content/libfredo6>
 - Curviloft (requires login): <http://sketchucation.com/pluginstore?pln=Curviloft>
info if problems:
<http://sketchucation.com/forums/viewtopic.php?f=323&t=28586#p248195>
 - Sketchup_stl: <https://extensions.sketchup.com/en/content/sketchup-stl>
3. Find Plugins folder or similar to put files in, put them in and remember where they are. They have file types of .rbz
4. Top Menu (File, edit view etc.) go to 'Window' (Apple computers or other versions may have it under 'File' or something else)
5. Under Window go to 'Preferences'
6. In Preferences on left menu pick 'Extensions'
7. Click 'Install Extensions'
8. Find where you put your extensions and repeat steps 2-5 in order of 'LibFredo', 'Curviloft', then 'Sketchup-stl'

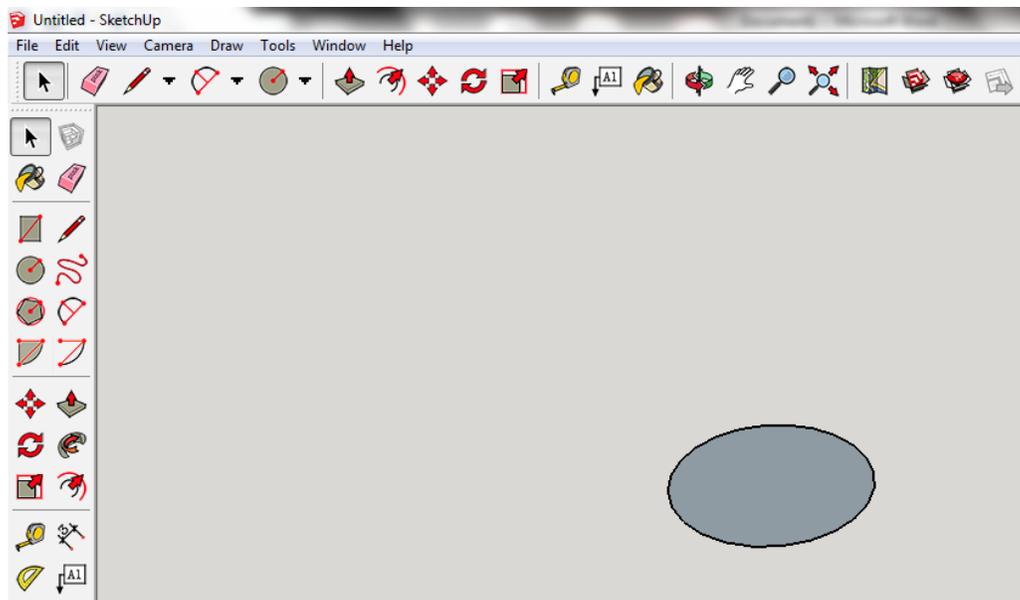
9. Restart Sketchup

Nosecone

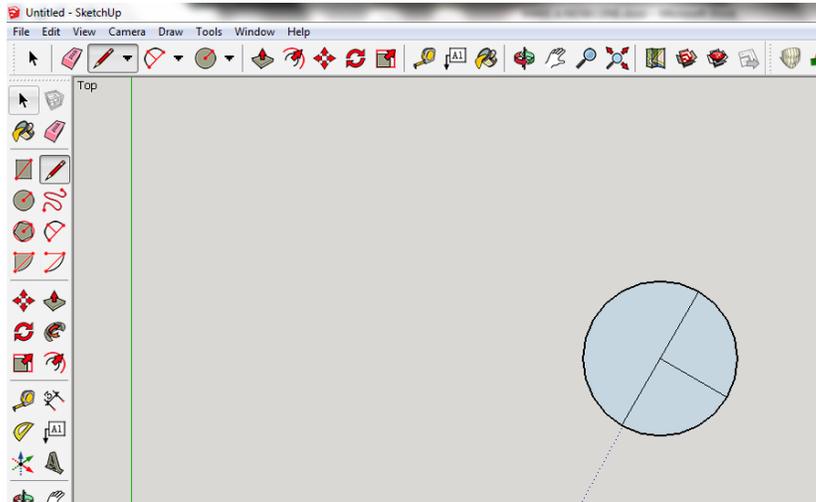
1. Change measurement units – Press Window >> Model Info then press “units” in the pop up window and change it from meters to millimeters.



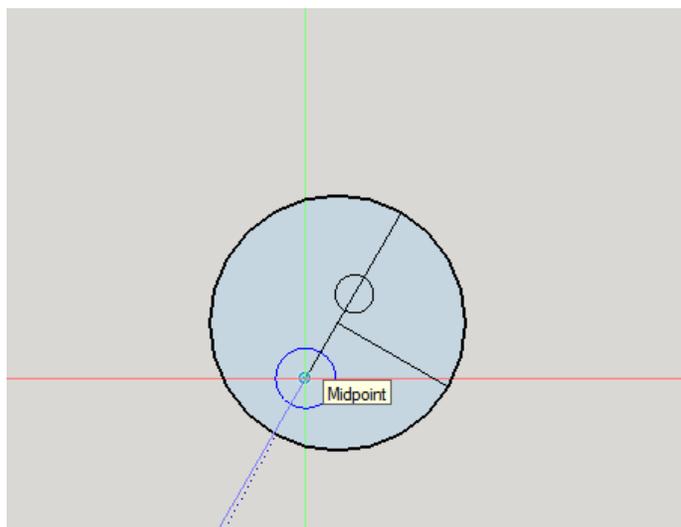
2. Draw a Circle with a 10 mm radius (20mm Diameter). This is quickest to draw any size circle, let go and then type in 10 and press enter



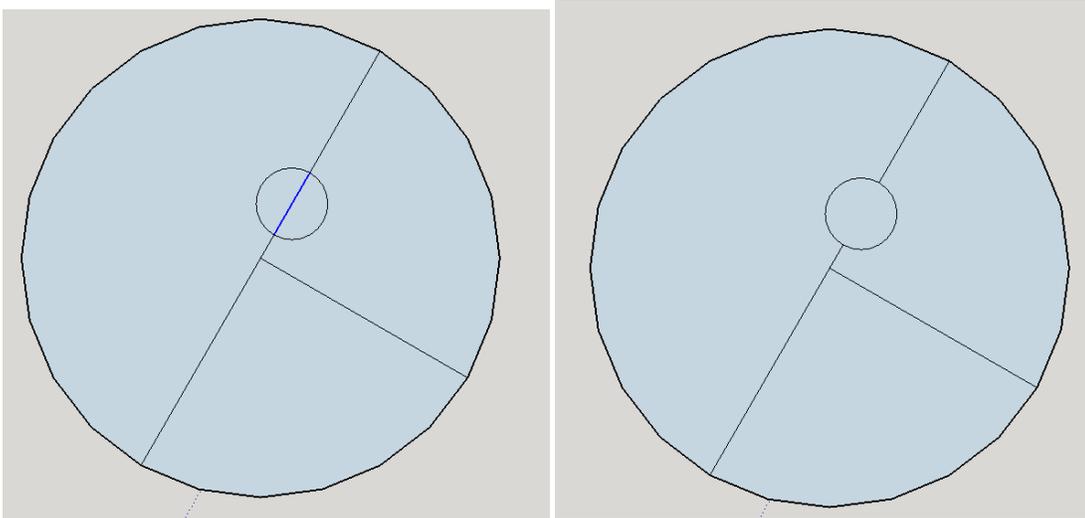
3. Draw two lines, One through the center of the circle(you can make sure it is through the centre by checking the area like in the gear instruction) and a second line from the center to the outside. These are for reference and to be able to find the center of the circle again, as sketchup has a few glitches and is not what professional engineers use, but the principles are similar.



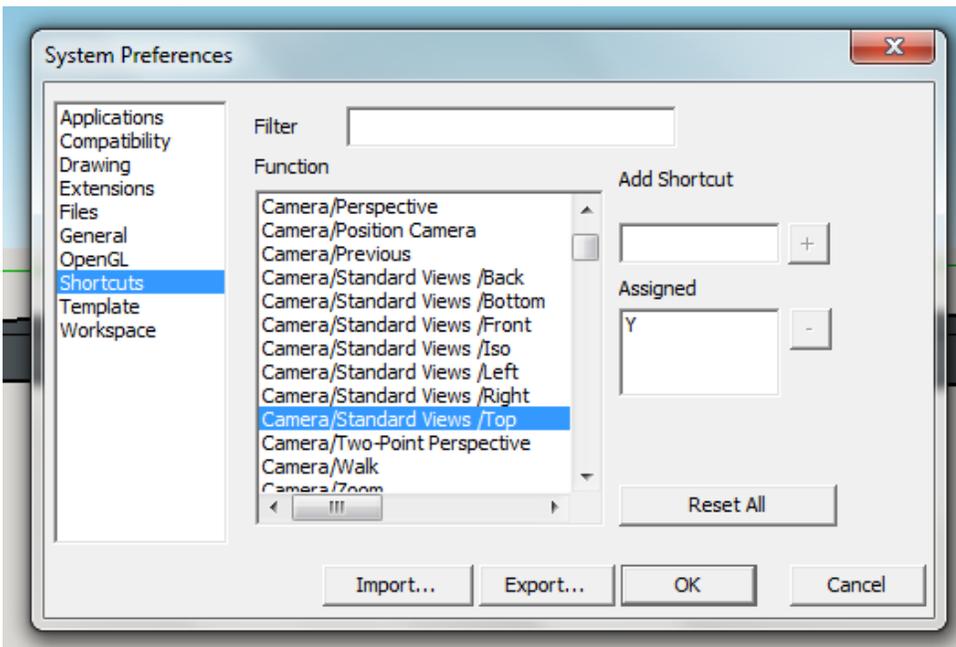
4. Now we will be making a small tube for a piece of string to be tied onto the nosecone. Draw one circle along the long line in the circle. I did mine about a quarter ways from the center of the big circle to the edge. I did this by hovering the mouse pointer along the long line until a box pops up and says "midpoint". I drew one tiny circle about halfway between the midpoint and center of the circle with a radius of 1.5mm use the same technique as the first circle. DRAW ONLY ONE TINY CIRCLE THE SECOND CIRCLE SHOWN IN THE PICTURE BELOW IS TO ILLUSTRATE THE MIDPOINT.



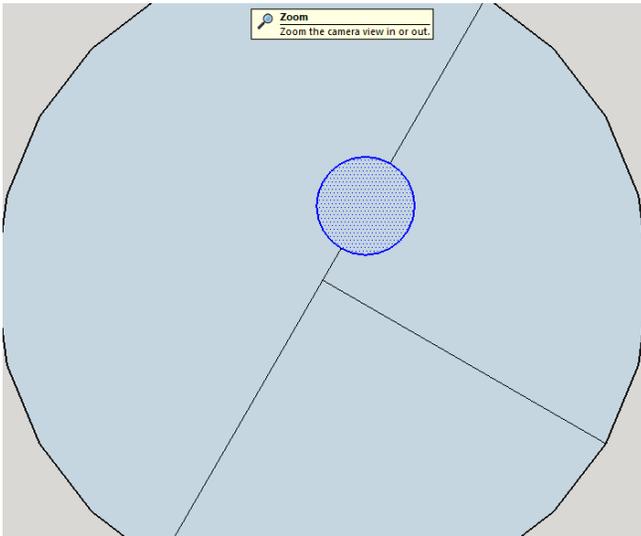
- Zoom in on the circle and select the tiny line in the tiny circle. Press Delete to delete this tiny line.



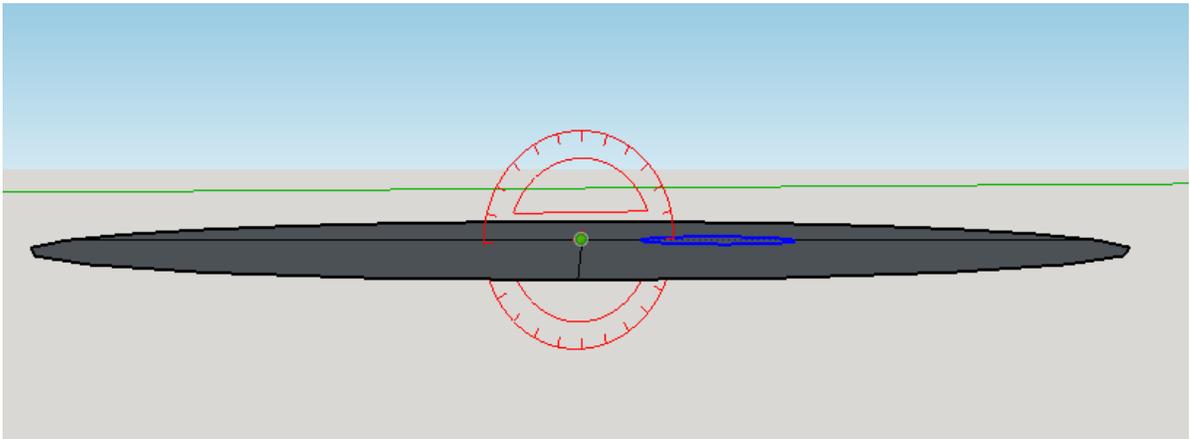
- We will now be creating a copy of this tiny circle to make the rims of a tube much like we did to copy the gear teeth when making the gear. So the next steps are VERY IMPORTANT and are the hardest part and most time consuming of this nosecone.
- We will find it useful to make a “hotkey” for this part so go to the top menu and find ‘Window’ then go to ‘Preferences’. In the preferences menu on the left press ‘shortcuts’, from there find ‘Camera/Standard Views/Top’ To the right there are two type in boxes one above and one below the word ‘Assigned’. The box above assigned is where you type which key you want to be the hotkey, I used ‘Y’ as T was taken. Press the ‘+’ key to assign it and it should show up in the box below assigned to show that there is an assigned hotkey.



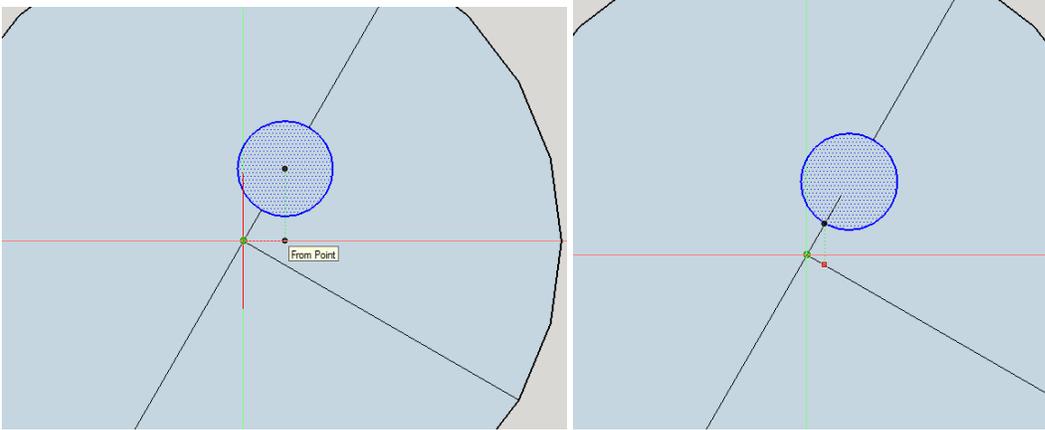
8. This is a long step due to its importance. Follow the steps EXACTLY. Select the tiny circle, this can be done by double clicking the tiny circle or by holding the control button on your keyboard and individually selecting the inner part of the small circle and the border of the small circle.



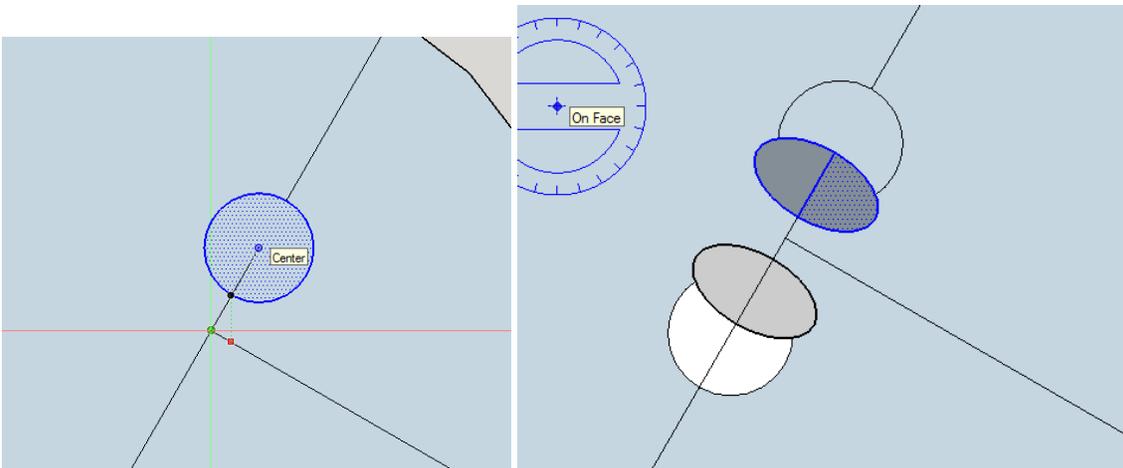
Use the orbiter tool to put the circle on an angle like the picture below then select the rotate tool and find the center of the big circle. CLICK the mouse once on the center of the circle but DO NOT LET GO OF THE CLICK! Now use your hotkey button while holding on to the click (for me it was Y).



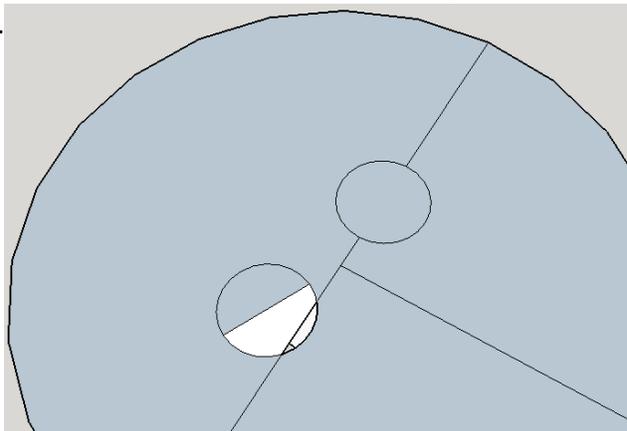
Using your hotkey will switch you to the top view of your circle, you will see a red line(Picture 1) if you move your mouse around WHILE STILL HOLDING THE CLICK you want to align that red line along the black line that goes through the mini circle, once it is aligned you may LET GO of the first click(Picture2).



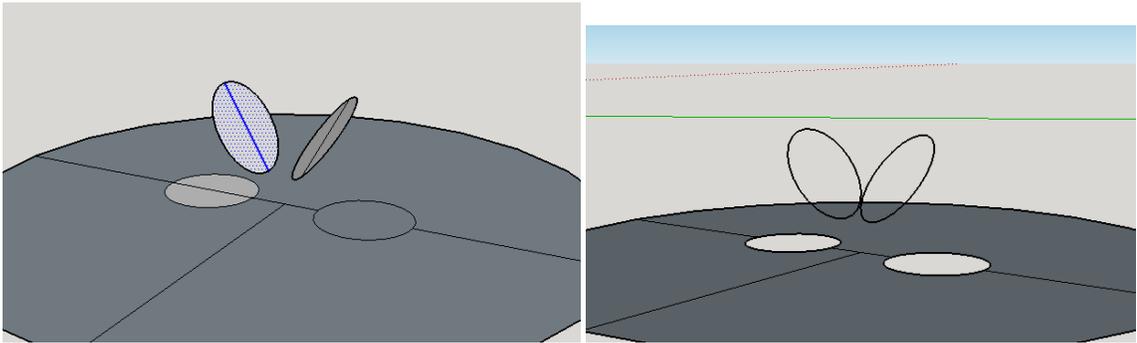
Now you must PRESS AND HOLD the CTRL and SHIFT button on the keyboard and CLICK the center of the small circle ONCE (Picture1). RIGHT AFTER THE CLICK type in '60' then press ENTER, then type in '*3' and press ENTER (star '*3') (Picture 2). The 60 means sixty degrees and it will show up in a box in the bottom right corner of the screen while you type it just like with the gears. And the *3 means multiply the shape by three, creating three copies each 60 degrees away from each other.



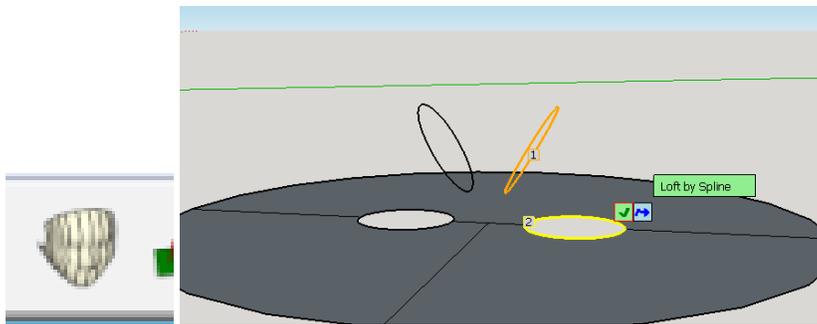
If you do it wrong it may look something like this. Often it is due to not aligning the rotate tool right after using the hotkey it can be frustrating but will get easier the next time, just be sure to do the steps exactly.



9. On each of the small circles click and delete the infill and the lines keeping only the mini circles. In picture two you can see the small circles are now 'see through' or have no filling.



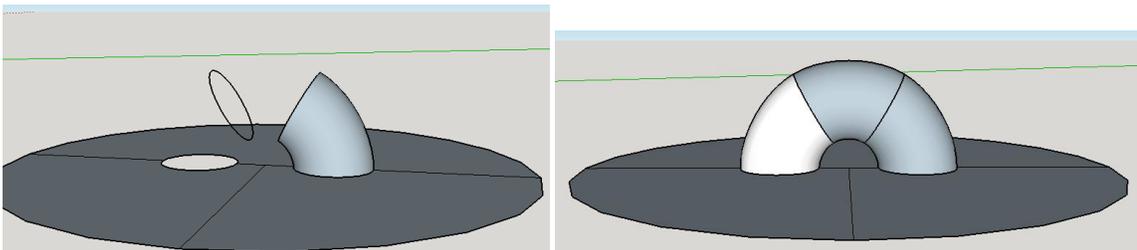
10. Now we get to use our Curviloft tool. Click the tool shown here and then click two of the circles that are beside each other and press the green checkmark.



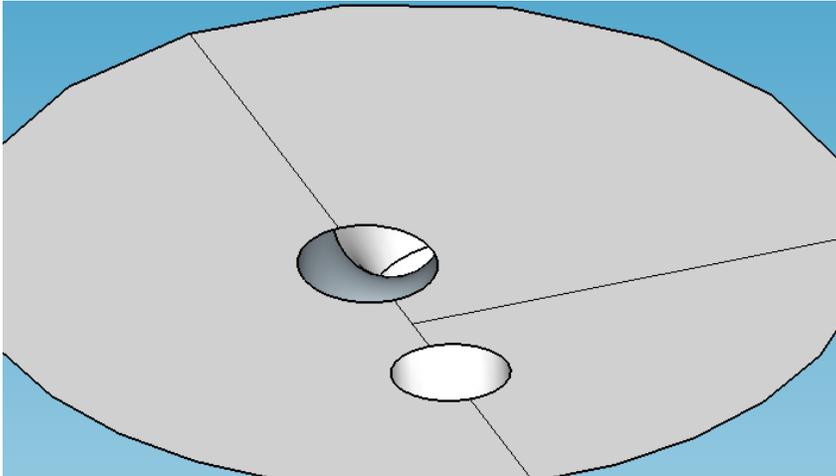
It will now look like the picture below. Find the Box labeled 'Spline Method' and click the red line and then click the green checkmark again.



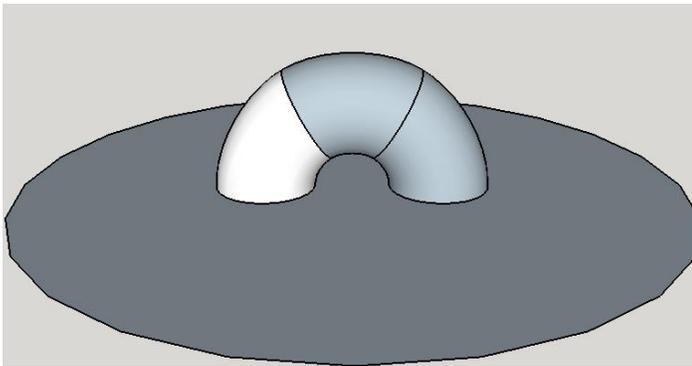
11. It should turn out like this, then repeat step 10, for the other two spaces between the circles.



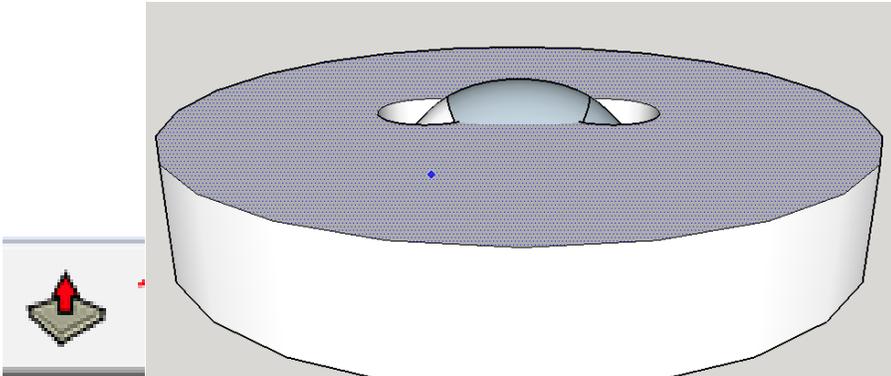
12. If you orbit around the model you should be able to see that we have created a hollow tube.



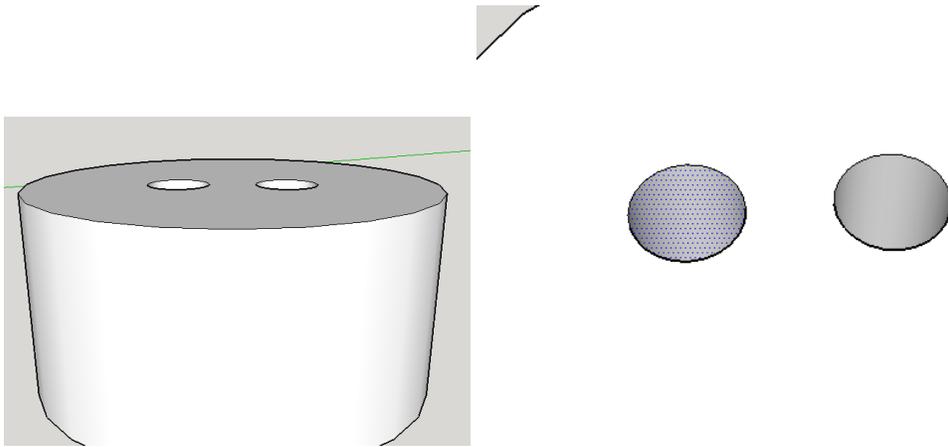
13. Now go back to the top view and delete the lines we created at the start.



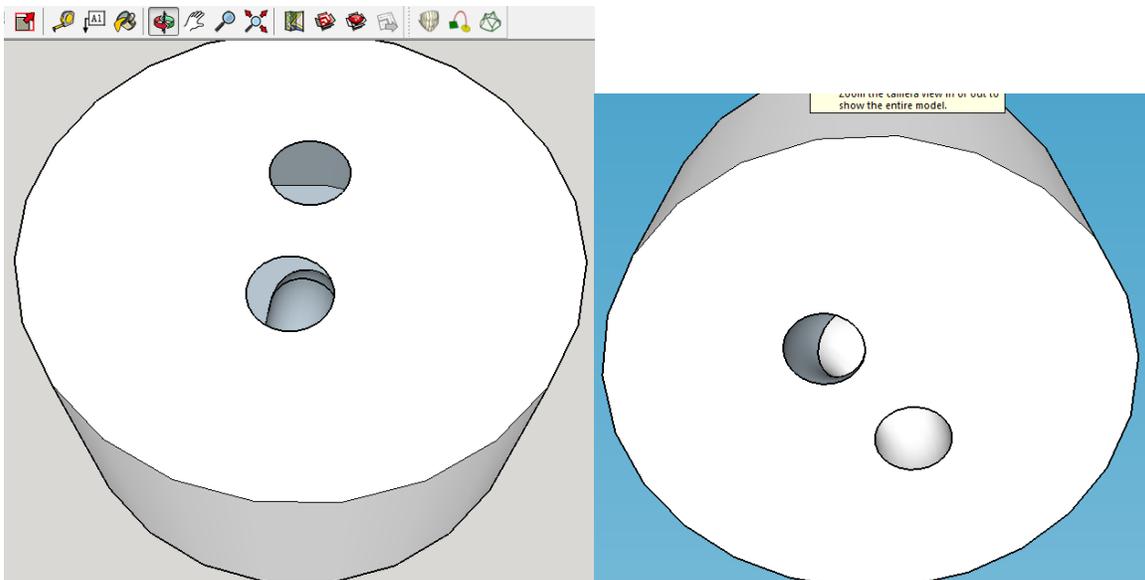
14. Select the big circle, Find the 'Push/Pull' Tool and pull up the big circle 10mm by typing it in.



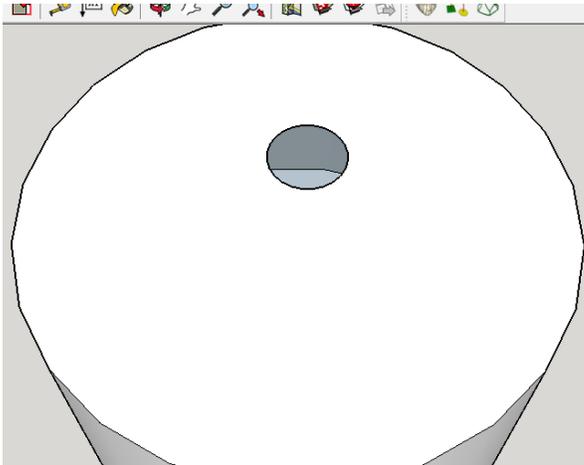
15. These top two holes are going to be a problem for the inner tube we created with the curviloft. So go to the top view, select the inner surface of the top holes and delete them.



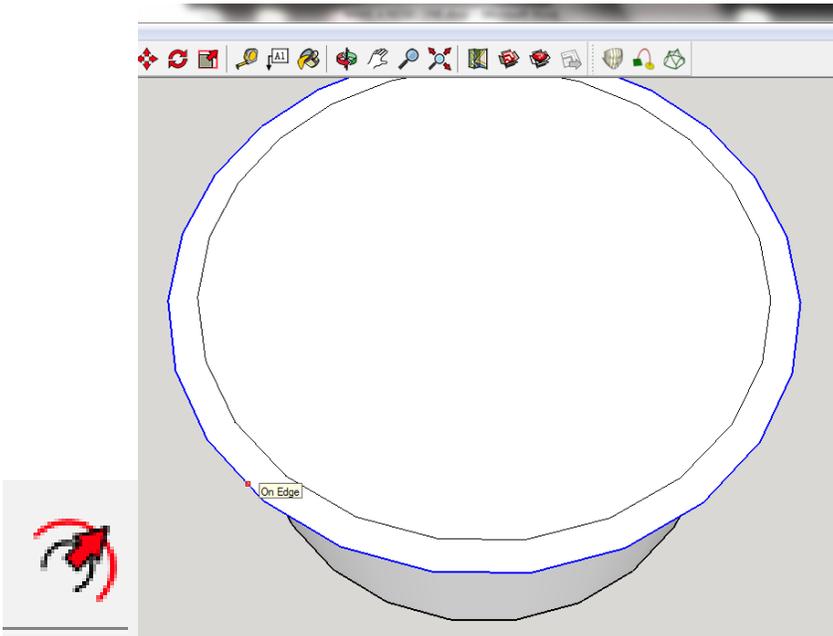
After deleting you should be able to look around inside the top two holes, and the bottom two holes you should see a clear tube like we saw before in step 12.



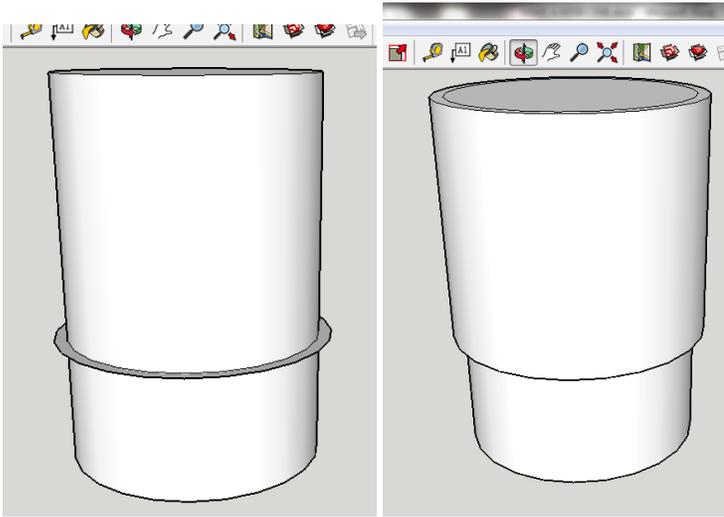
16. Now delete the top two holes.



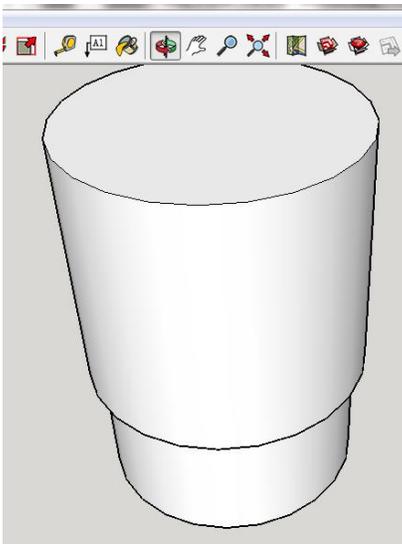
17. Now select the 'Offset' Tool, and click the edge of the circle, you should be able to see you can create a rim around the circle. Type in 1 and press enter to create a 1mm rim.



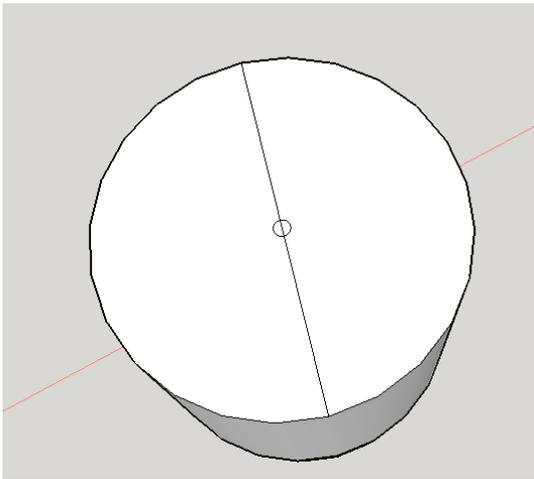
18. Select the inner circle and use the push/pull tool to create a tube up 20mm and then do the same for the outer circle rim we just made.



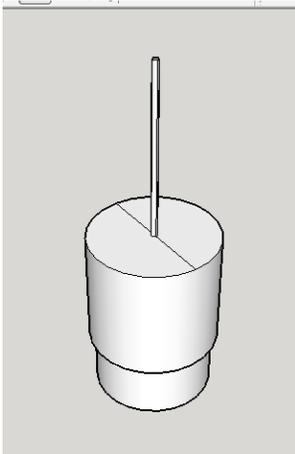
19. Delete the inner circle on top of our new model



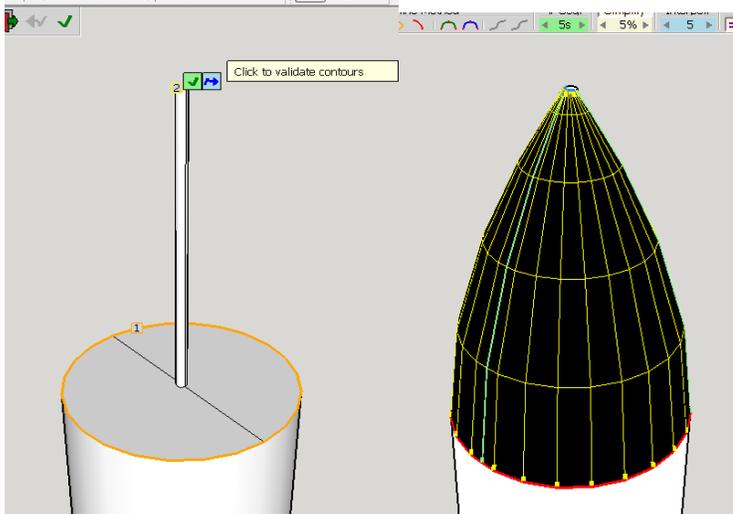
20. Draw a line through the approximate center of the circle. And draw a 0.5mm radius circle in the center of that line (the biggest glitch of sketchup is finding centers of circles, but it can always find the center of a line)



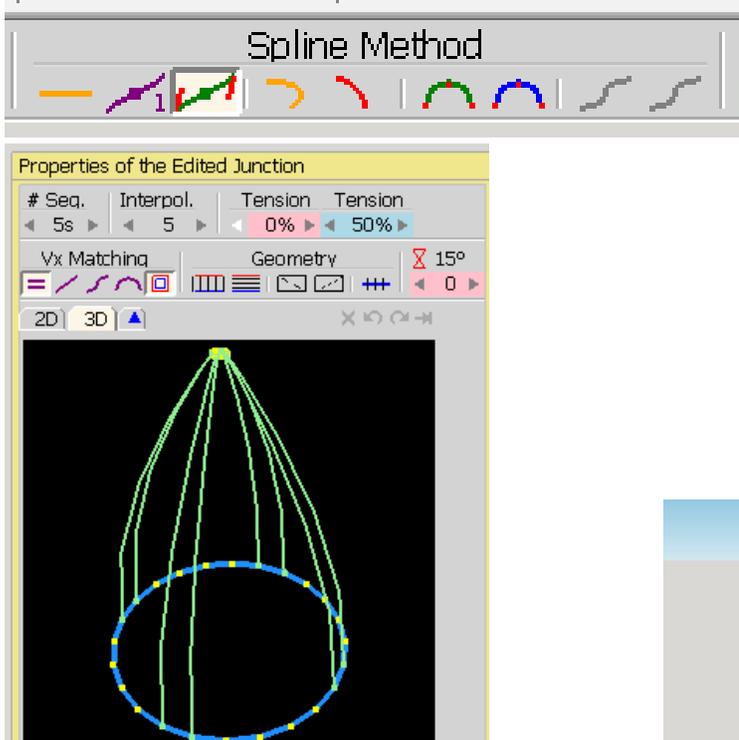
21. Delete the tiny line in the small circle and then use the push/pull tool to pull the tiny circle up 30mm



22. Now use the same curviloft button we used before and select the big circle and the tiny circle at the top. Then press the green checkmark. We want to get it in a shape like picture 2.



To get to this shape I first pressed the green and red button below. I then pressed the black part of the nosecone and the pop up menu below came up, adjusting the two tension values will change its shape, I chose 50% and 0% tension. Now press the green check mark and your done!



23. ALL DONE!

