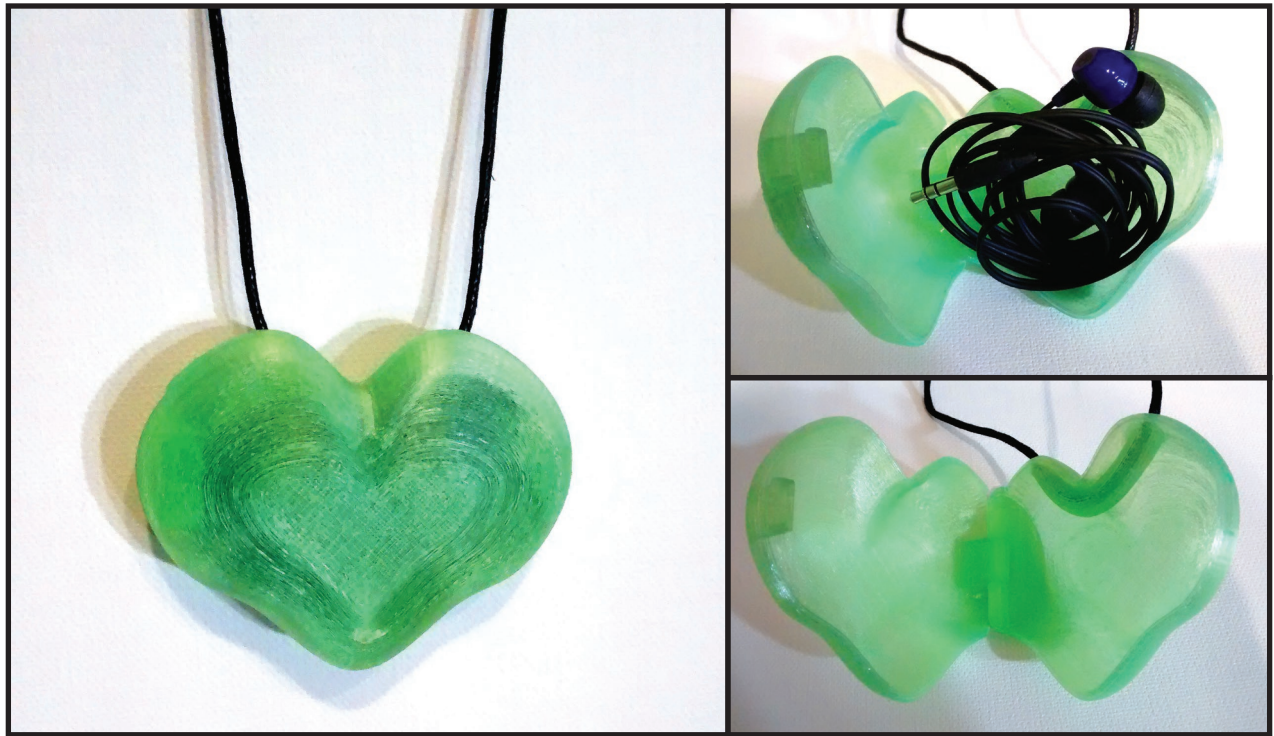


# SCULPTED HEART LOCKET IN FUSION 360

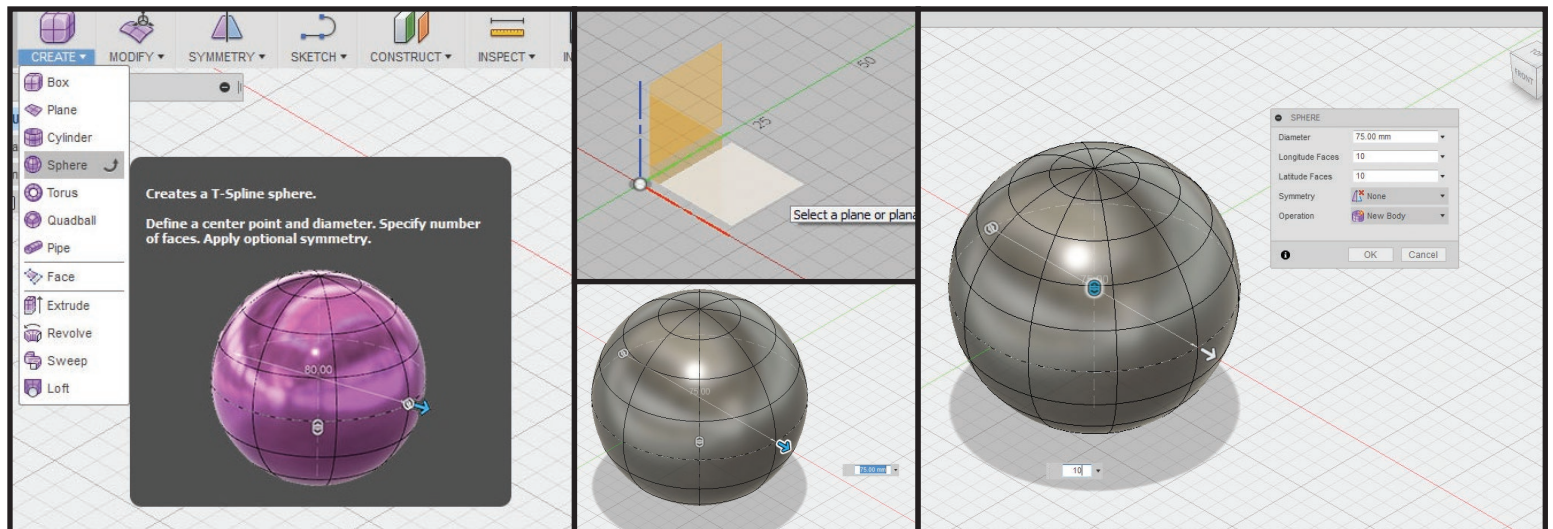
(Fusion 360 Tutorial - Intermediate Level - Written by Maz a.k.a. Rose M.)

(Required Finishings: 70cm Jewelry Cord)



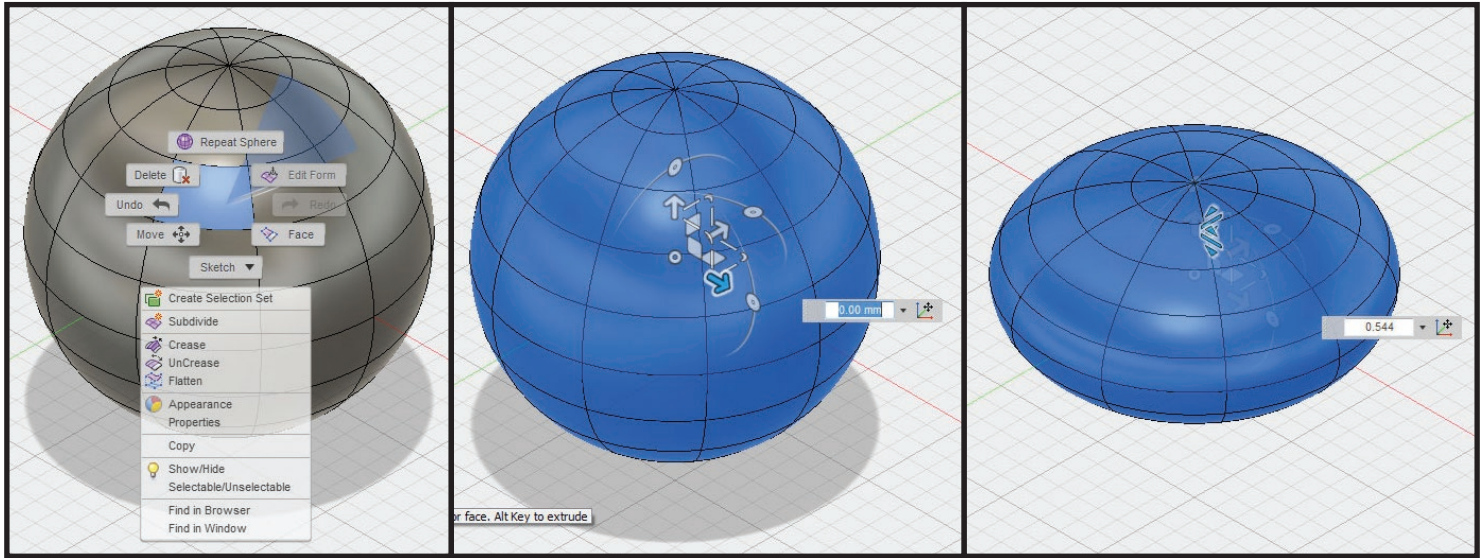
## STEP 1: START SCULPTING HEART SHAPE

- In the toolbar at the top, go near create and click the purple icon called "Create Form". After acknowledging the pop-up notification, click "Okay".
- Once switched over to the sculpt environment, in the toolbar at the top, go to "Create > Sphere", select the floor plane, and click the center point of origin to place the sphere. Click the arrow icon on the sphere and drag to "75.00mm". In the dialog box on the right change the values for longitude and latitude faces to "10". Click "Okay" in the dialog box to finish placing sphere body.

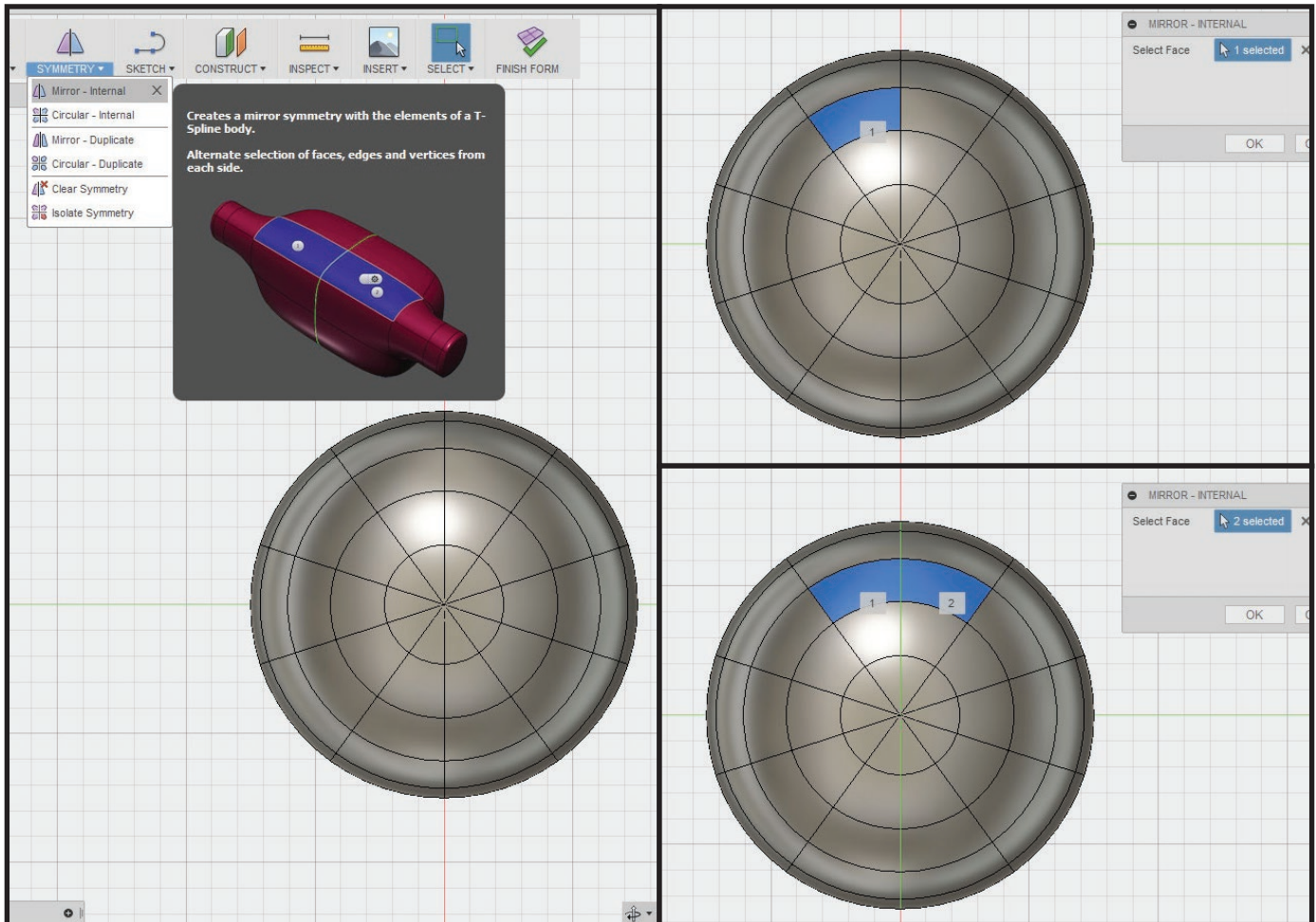




• Click anywhere on the sphere, then right click or option click to open the option menu and select "Edit Form". Double click anywhere on the sphere to quickly select all points/edges/faces of sphere, and using the scale lines of the gizmo shrink the sphere on the "Z axis" to about half scale (0.5-ish).

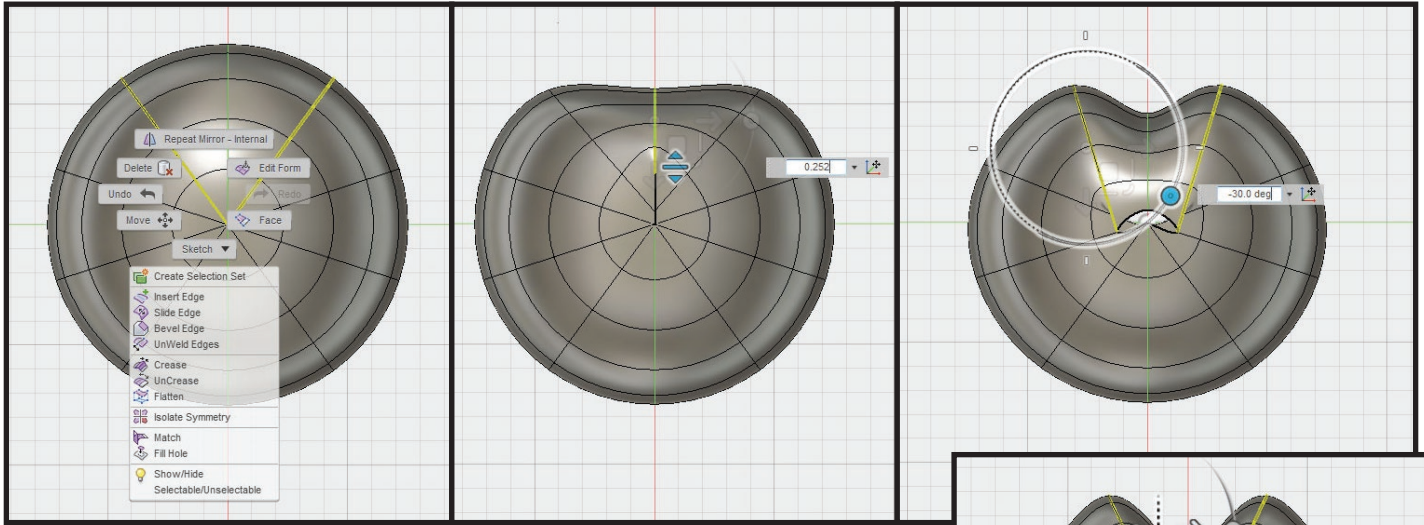


• Change to the top view port. To create a heart shape, start by adding symmetry to the sphere. To do this, in the toolbar at the top go to "Symmetry > Mirror - Internal", select a face on the left side of the sphere centerline and then a face on the right side of the sphere centerline, and click "Okay" in the dialog box on the right.

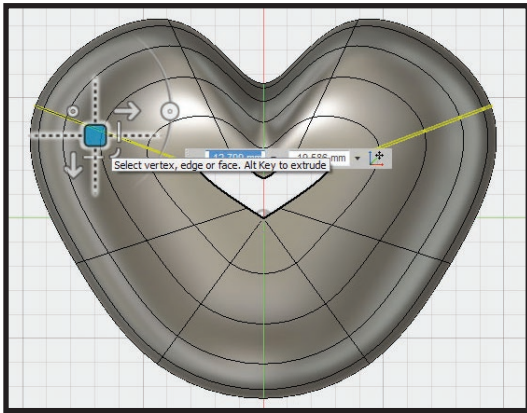
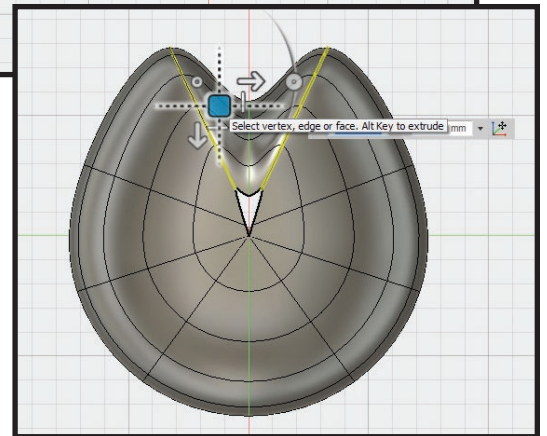




- Double click the edge on the top middle of the sphere to select, open the option wheel menu, and select "Edit Form". Using the scale line on the gizmo, relative to the top view port position, drag the scale line up to pinch the top middle edges. Using the arrow pointing down, position the top middle edges down to create a slight "V" shape on the sphere.

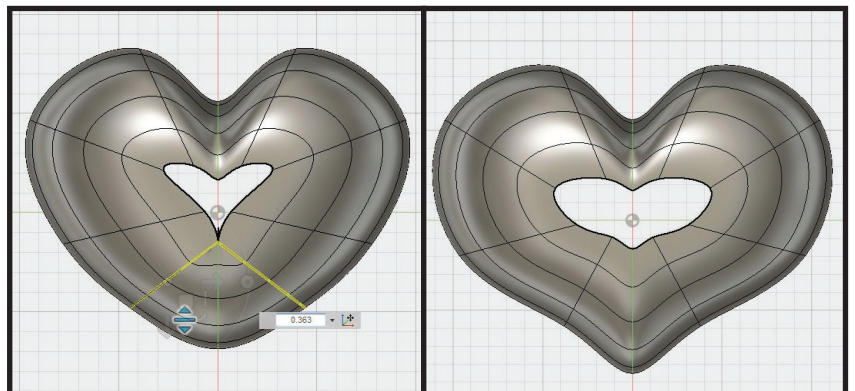


- Next double click the edge to the left of the middle top edges, and use the arc on the gizmo to rotate the edges inward toward the top middle. Click + drag the white square on the gizmo to position the edges to push together making the top of the heart.



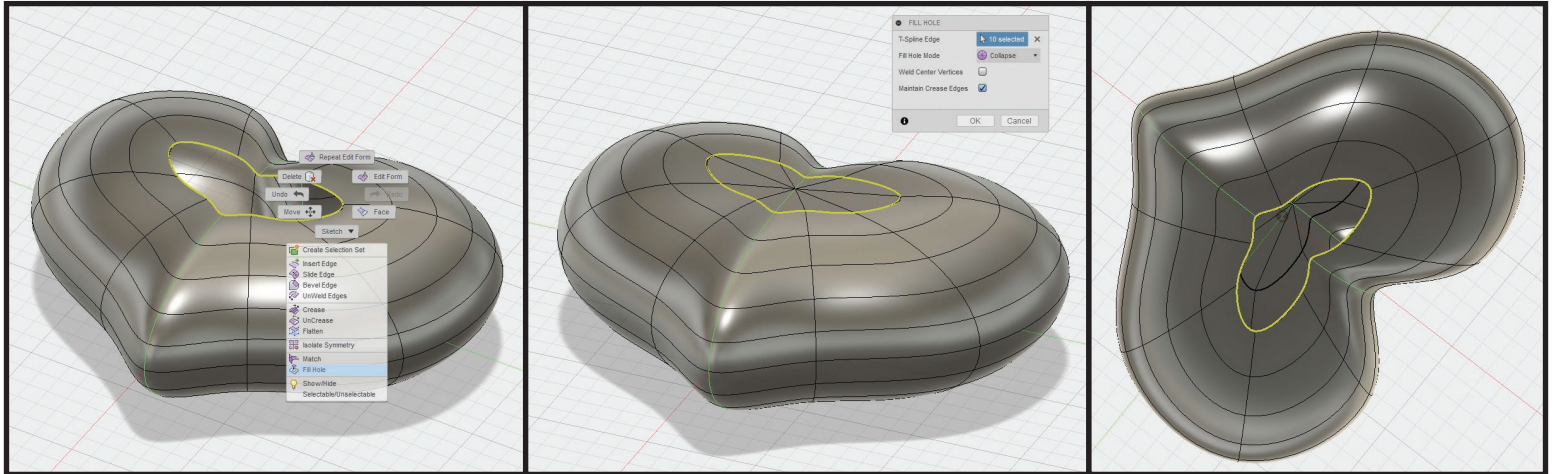
- Double click the edge left of the current selected edges set, would be the second edges set from the top middle, and click + drag the white square to position the edges slightly away from the middle. Use the rotation arc if desired to help shape the top sides of the heart.

- Continue editing the last two sets of edges by moving and scaling to further sculpt the heart shape. To make the bottom of the heart more pointy, double click the bottom middle edge to select, scale up slightly and drag down to position. Once finished editing the edges to sculpt the heart shape click "Okay" in the dialog box on the right.



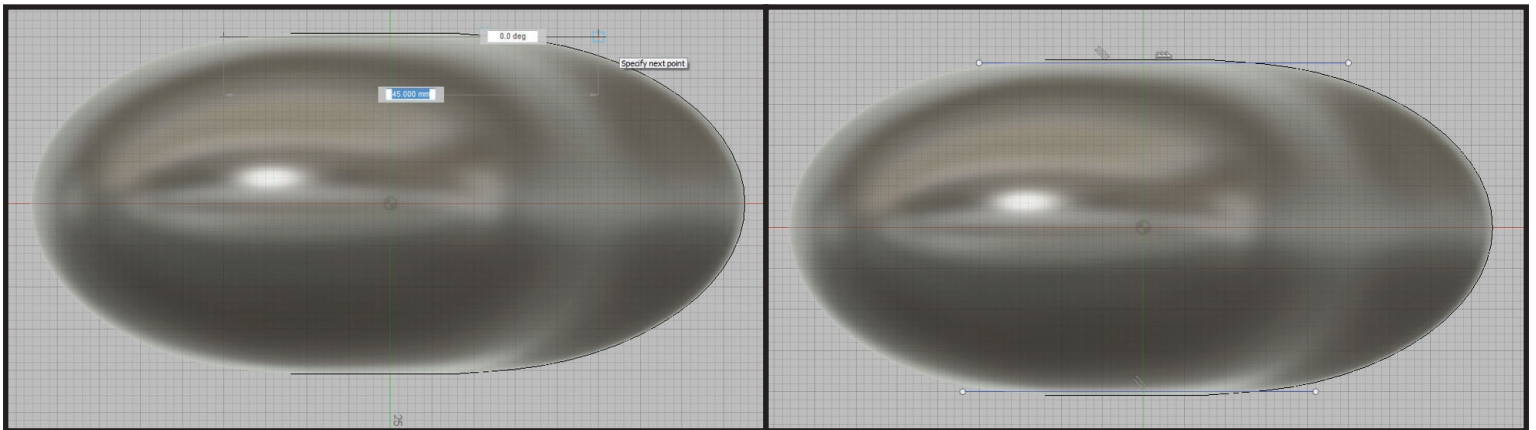
## STEP 2: MAKE THE HEART SOLID

• Change to the top view port. Double click the inside ring of edges to select, open the option wheel menu, and select "Fill Hole". In the dialog box on the right, change the "Fill Hole Mode" to "Collapse", and click "Okay" to accept. Rotate view to bottom view and double click the bottom middle ring of edges to select. Repeat the previous fill hole steps to close the bottom of the heart shape. Heart shape is now finished and sculpt environment can be left. In the toolbar at the top near the right click "Finish Form" to return to modeling workspace.



## STEP 3: TRIM TOP & BOTTOM FOR 3D PRINTING SURFACE

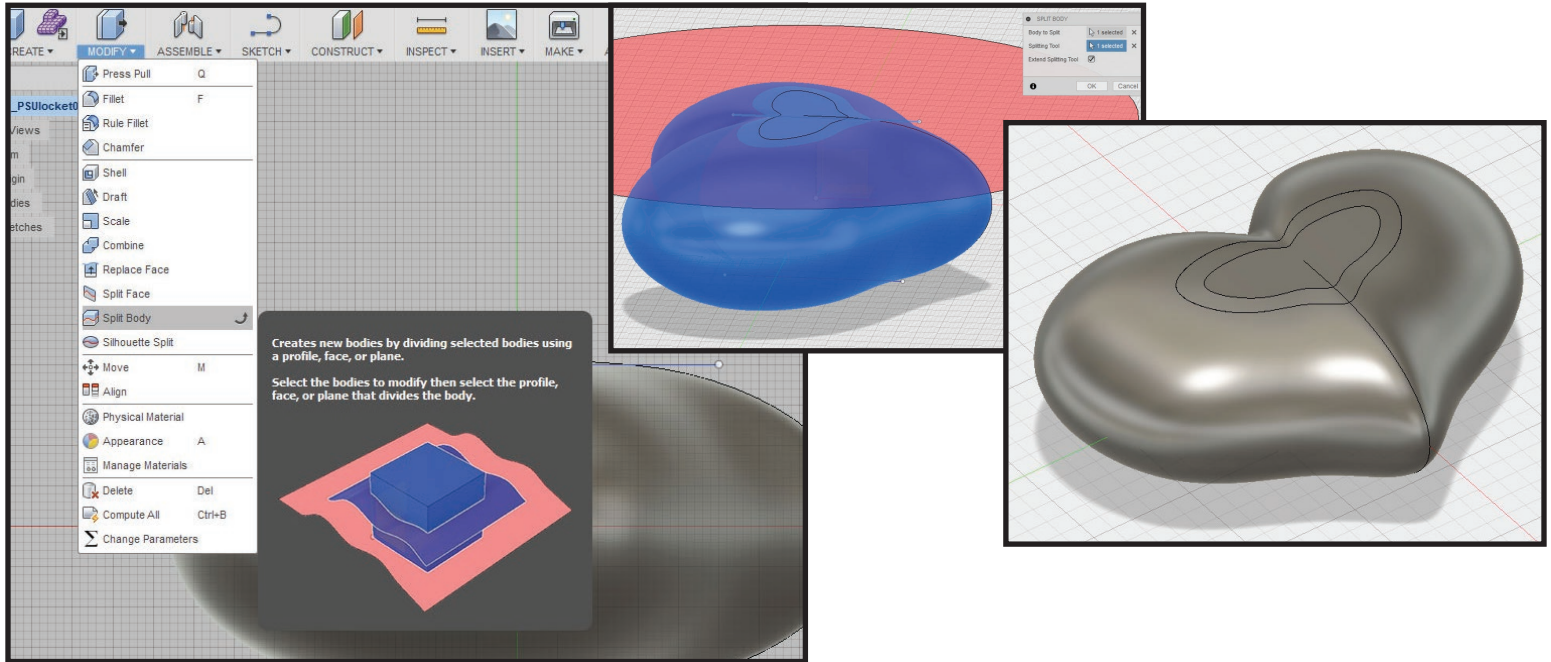
• Due to the position the heart locket is printed in, it is necessary to trim the top and bottom of the heart shape to have enough contact on the build plate. Use the split body tool to create flat surface on top and bottom of heart. To do this, first create a sketch to use as reference for splitting.



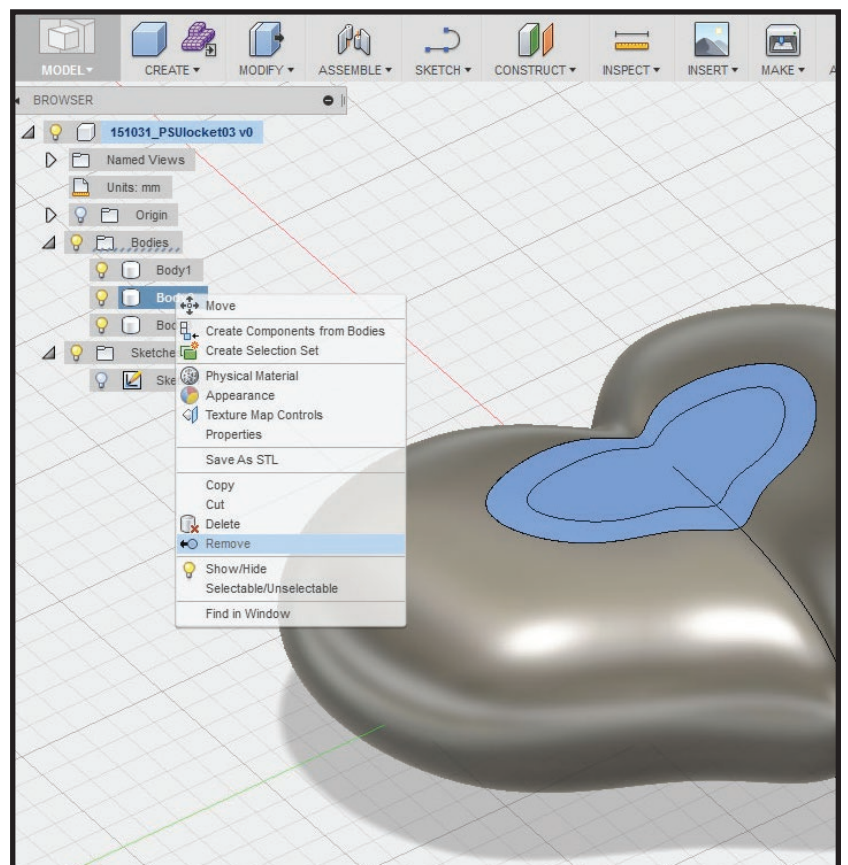
• Change to the "Front" view port. Press "L" on the keyboard to activate "Line" tool, click the front plane to sketch on(not the heart body), set the first sketch point near the top on one side of the heart and the next point straight across at 0°. Sketch the line to intersect just enough on the top of the heart to make it flat near the edge, about one grid space is good. Do the same for the bottom of the heart.



- In the toolbar at the top, go to “Modify > Split Body”, click on the heart to select, in the dialog box on the right click the gray text block near splitting tool, click on one of the sketch lines, and click “Okay” in the dialog box on the right to accept. In the browser tree on the left side, expand the “Sketches” section and click the light bulb to show the line sketch for splitting. Repeat the splitting tool for the bottom of the heart. In the browser tree on the left, in the Sketches section click the light bulb near the splitting line sketch to hide.



- Remove the left over bodies from splitting the heart top and bottom. In the browser tree on the left, expand the “Bodies” section, hover over the bodies to see which body is the top/bottom little trim piece, right click or option click the body name in the browser tree, and select “Remove”. Do the same for the other trim piece still in the workspace.

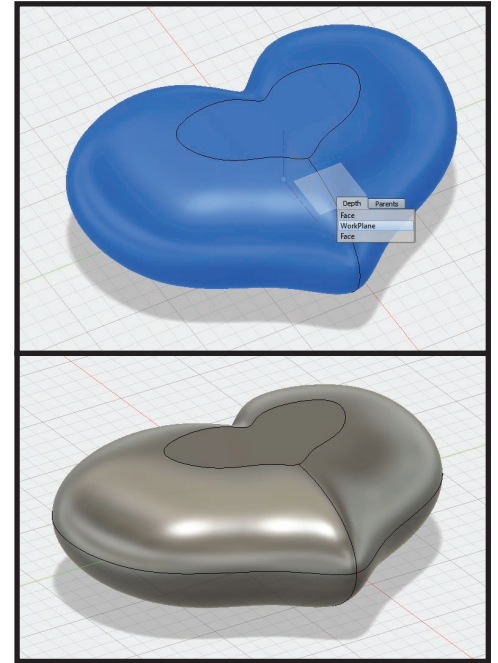




#### STEP 4: SPLIT HEART INTO TOP AND BOTTOM HALF OF LOCKET

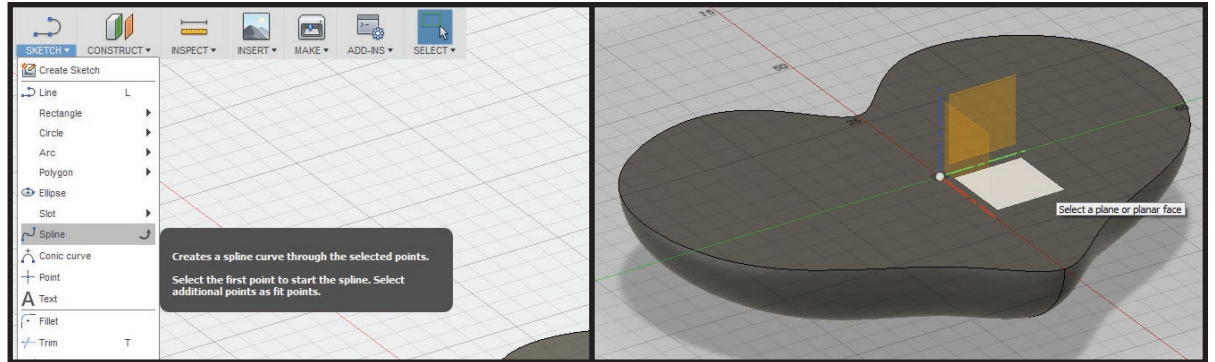
- Use split body tool to separate the heart into two halves. In the toolbar at the top, go to "Modify > Split Body", select the Heart, in the dialog box on the right click the gray text near "Splitting Tool", and select the floor plane as splitting tool.

To make selecting the floor plane as the splitting tool easier, click + hold on heart near floor plane till drop-down pops up and select "Workplane" in the menu. If by chance the wrong plane appears to be selected, in the dialog box on the right click the "X" near gray text of Splitting Tool. Press "Enter/Return" or click "Okay" to accept.

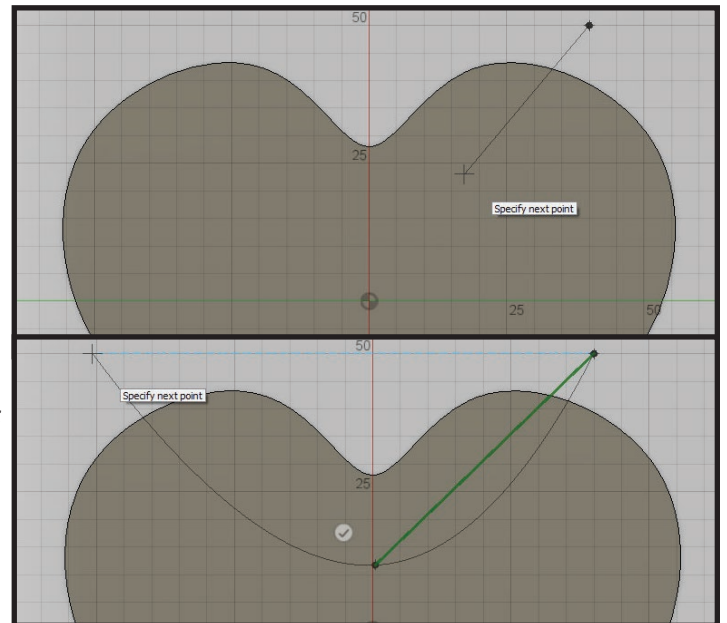


#### STEP 5: CREATE PLACE FOR CORD TO ATTACH TO HEART LOCKET

- In the browser tree on the left, in the bodies section, hide the top half of heart and the whole heart, so the only thing showing in the workspace is the bottom half of heart.

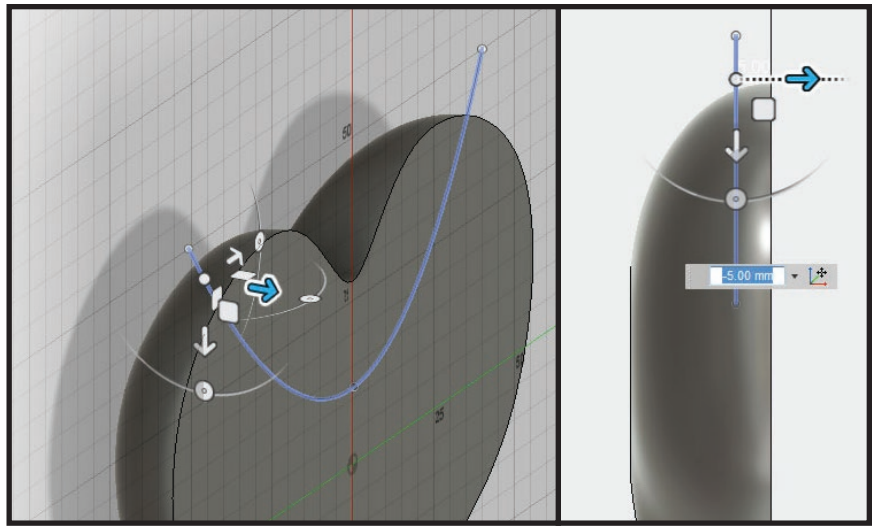


- Create path for pipe on heart bottom. Change to the top view port. In the toolbar at the top, go to "Sketch > Spline", and select floor workplane to sketch(not heart body). Using the view port tools at top right corner, click the arced arrows to rotate top view to the orientation where the heart appears right side up. Using the spline tool, draw a sketch line that intersects the top edge of heart bumps and down inside through the top middle of the heart to create a "U" shape.

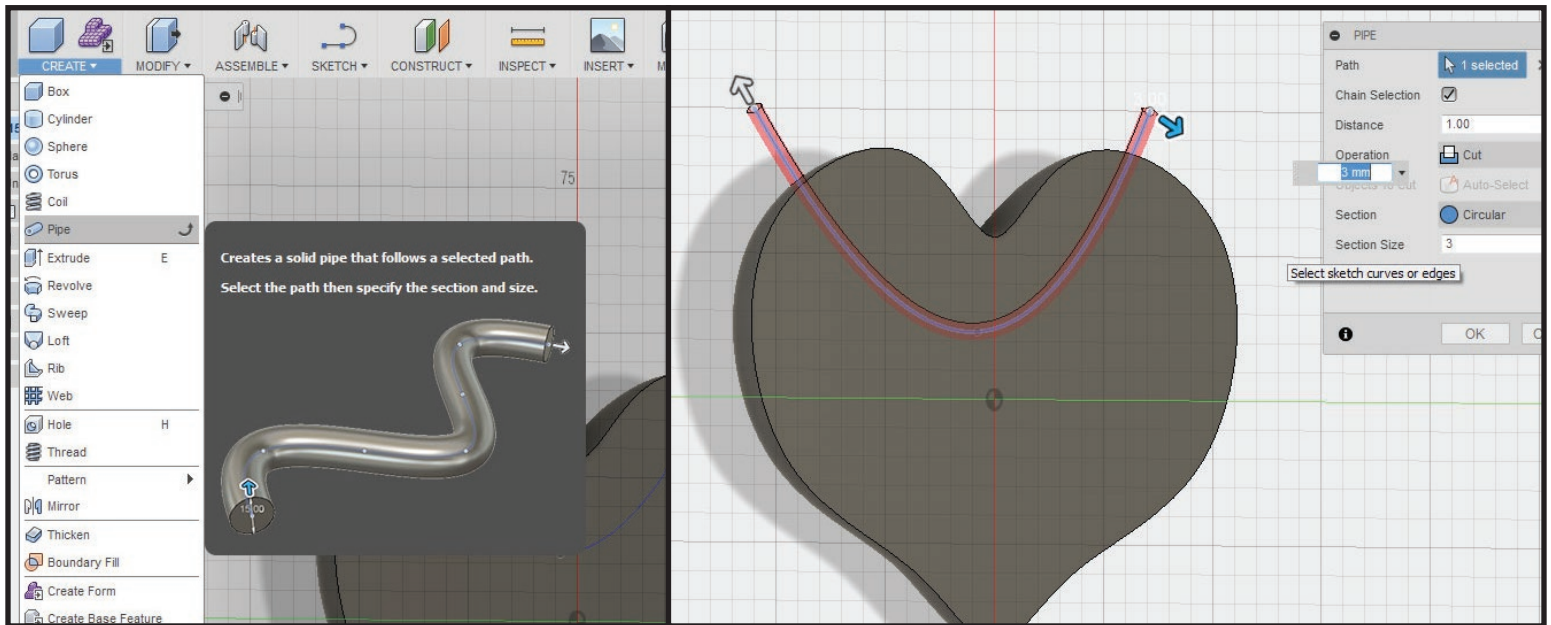




- Move the sketch spline down just below the flat face of the bottom heart half. To do this, change to the "Front" view port, press "M" on the keyboard to activate the move tool, select the spline sketch, click + drag up arrow on "Z" axis and move down (about -5.00mm is good). Press "Enter/Return" or click "Okay" to accept.

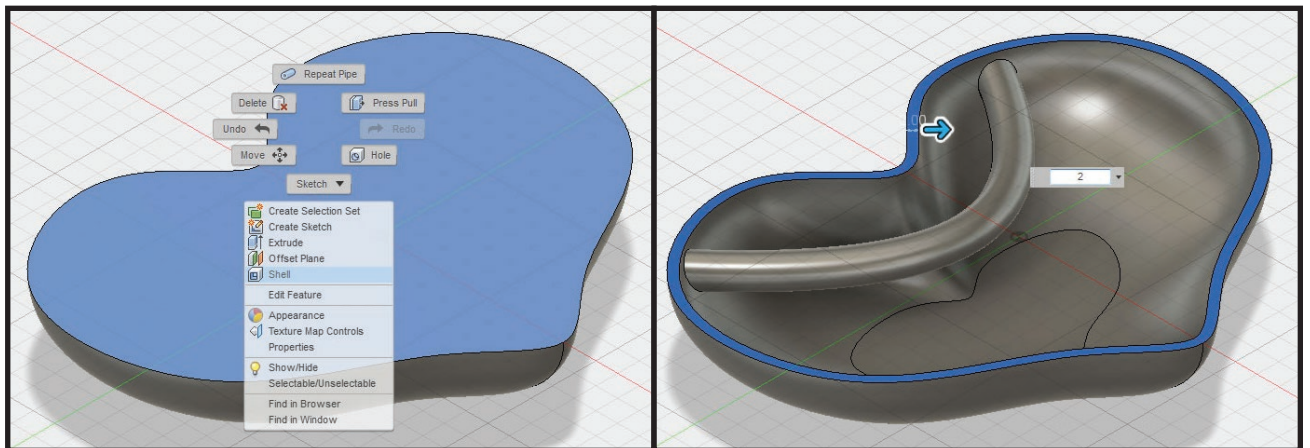


- Create the hole for the cord to pass through. To do this, in the toolbar at the top, go to "Create > Pipe", click the spline sketch in the workspace, in the dialog box on the right change the "Section Size" to "3.00mm", set operation to "Cut", and press "Enter/Return" to accept.



## STEP 6: SHELL OUT THE INSIDE OF THE HEART LOCKET

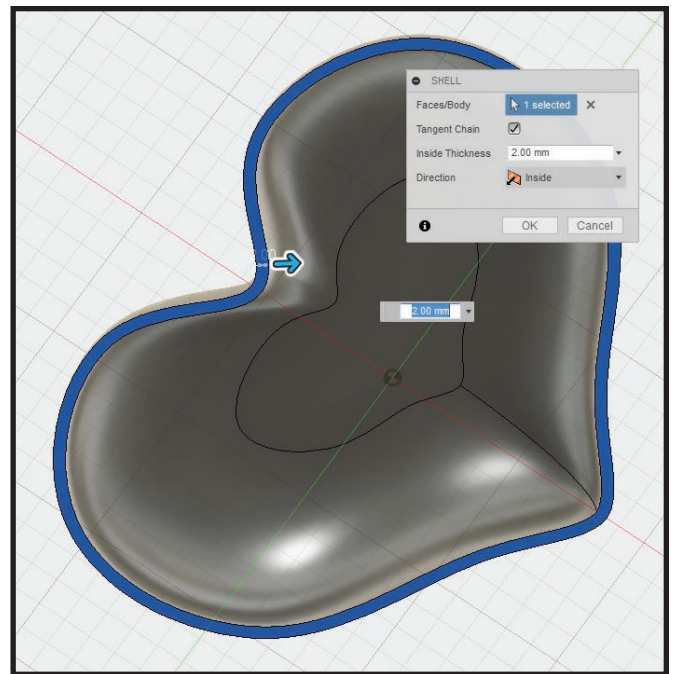
- Select the flat face on the bottom heart half, open the option wheel menu, select "Shell", set the "Inside Thickness" value to "2.00mm", and press "Enter/Return" to accept.





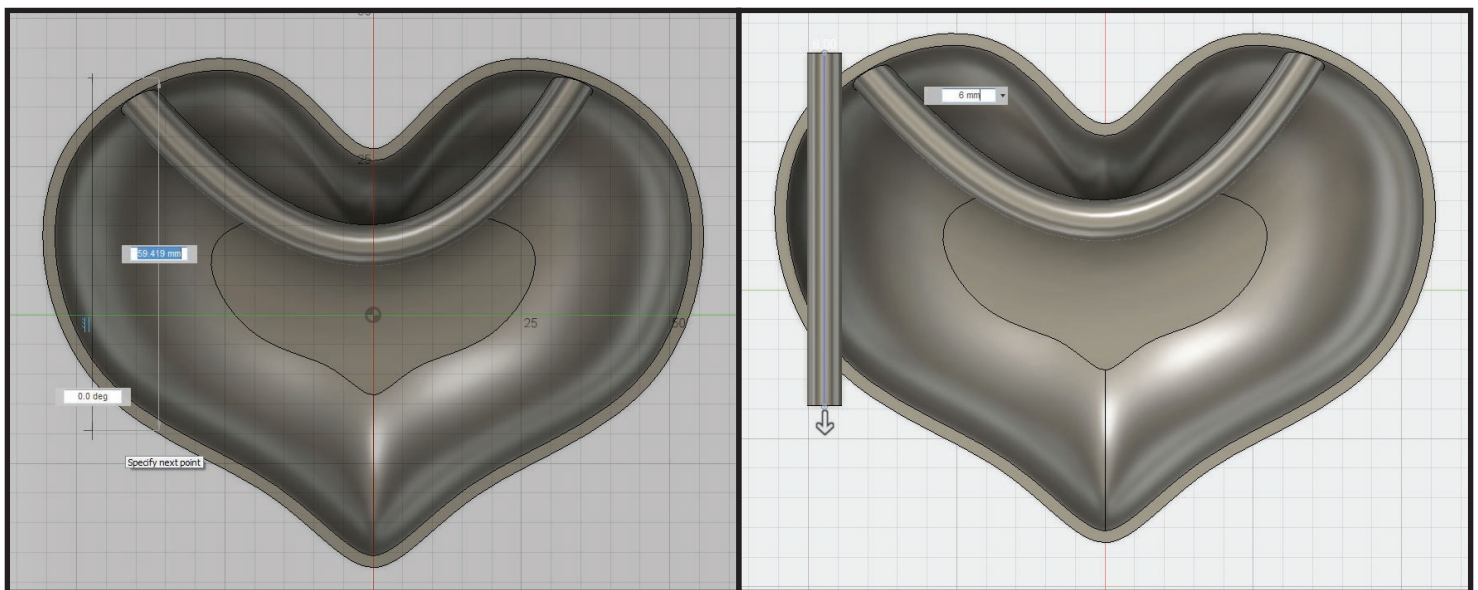
- In the browser tree on the left, in the bodies section, on the bottom heart half body click the light bulb to hide and click the light bulb on the top heart half body to show. Rotate view to the bottom view port.

- Select the flat face on the top heart half, open the option wheel menu, select "Shell", set the "Inside Thickness" value to "2.00mm", and press "Enter/Return" to accept. In the browser tree on the left, rename the top heart half body to "Heart Top" and hide Heart Top. Unhide the heart bottom half.



## STEP 7: CREATE PIPE FOR HINGE

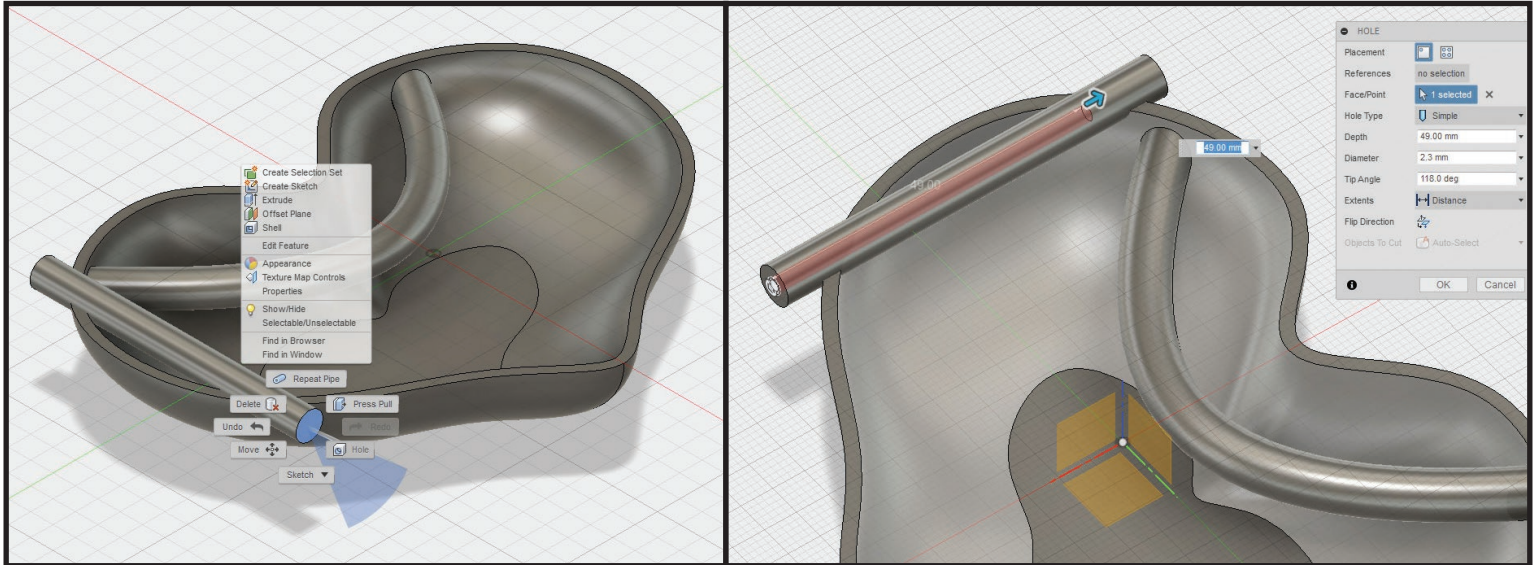
- To create the pipe to use for hinge, first create the path for the pipe. Press "L" to activate the "Line" tool, and select the top/bottom plane. Rotate view port so the heart is right side up in the top view port. Sketch a line that passes through the left side of the heart. Start with placing the first point outside the heart body toward the top left and place second point straight down from first point. Make sure the sketch line doesn't pass through the cord pipe.



- Use the pipe tool on the sketch line. To do this, in the toolbar at the top, go to "Create > Pipe", click the sketch line to be the path, in the dialog box on the right change the "Operation" to "New Body", set the "Section Size" value to "6.00mm", and press "Enter/Return" to accept.

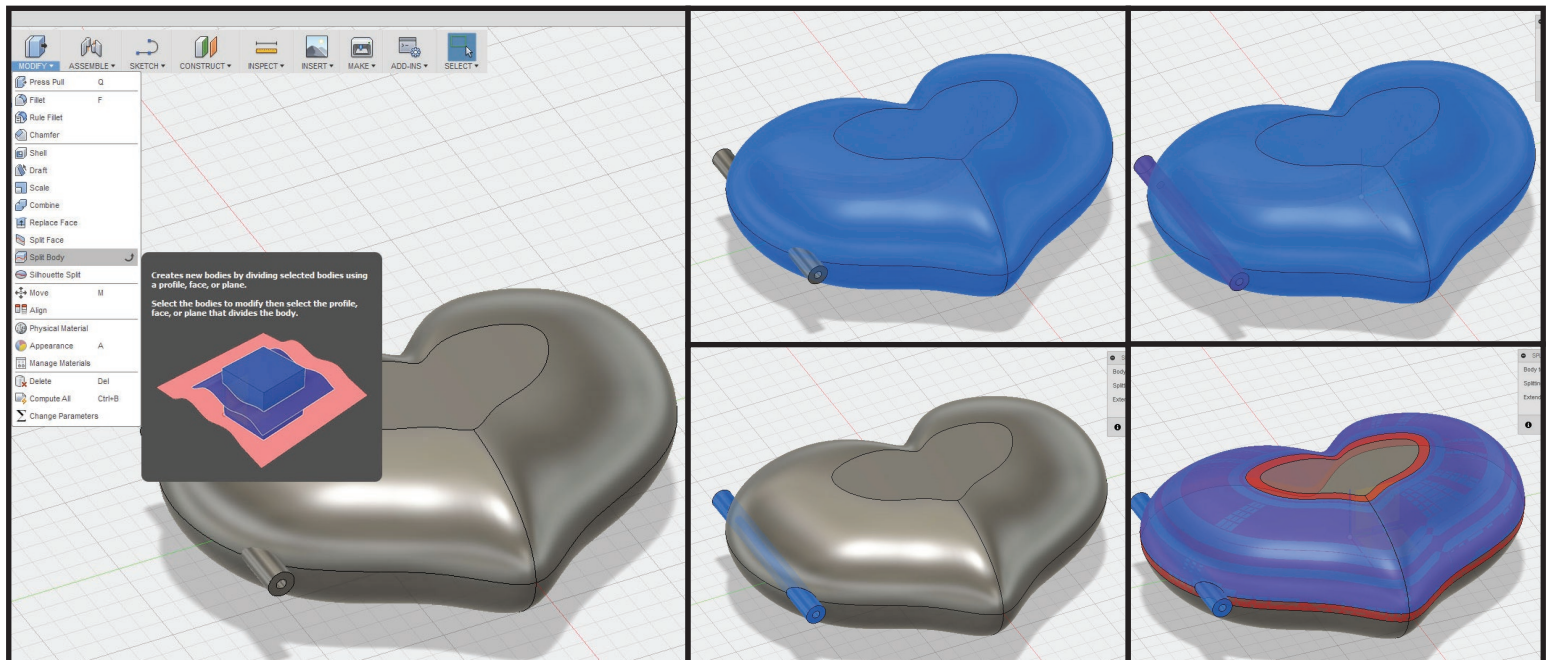


- Create a hole inside the pipe. To do this, select the flat face on the pipe, open the option menu, select "Hole", and change the view port to the respective orthographic view(i.e. Right view)of hole being made. Click + drag blue circle to snap position of hole into center of pipe. Set hole diameter to "2.3mm". Change the viewing angle to see the length of the pipe and the red shading of the hole. Click + drag the arrow till the end of the hole point is just before the inside wall of the heart bottom. In the browser tree hide the heart bottom. Press "Enter/Return" to accept.



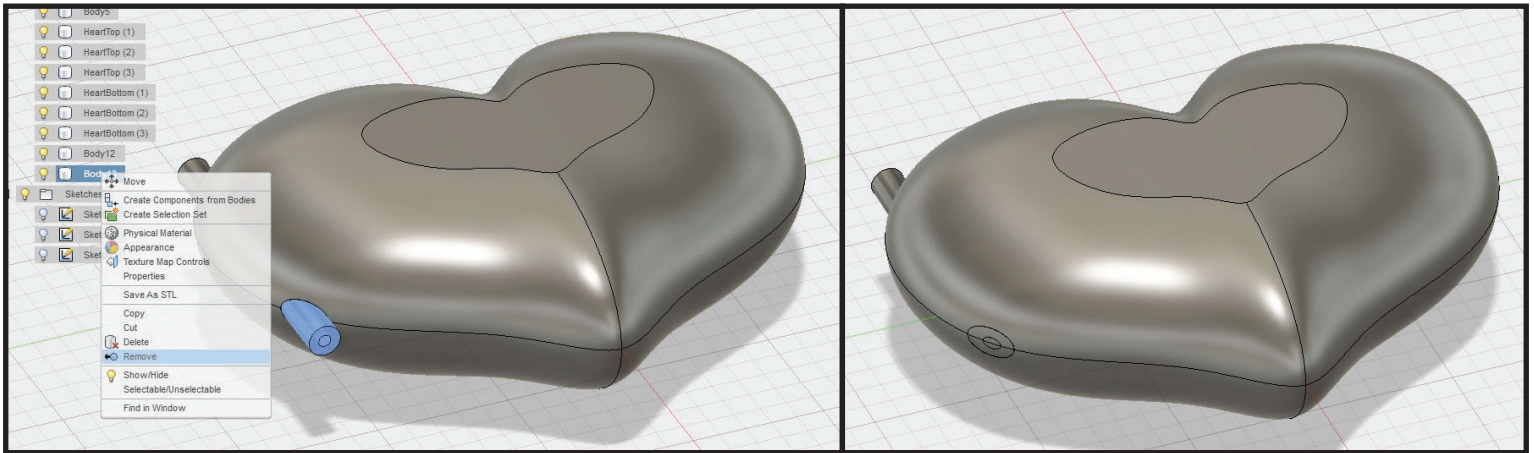
### STEP 3: MAKE HINGE PIPE SAME CONTOUR AS HEART

- Use the split body tool to trim the hinge pipe to the heart. To do this, in the toolbar at the top, go to "Modify > Split Body", select the heart top and heart bottom, in the dialog box on the right click the gray text near "Splitting Tool", click the hinge pipe to set as splitting tool, and press "Enter/Return" to accept.



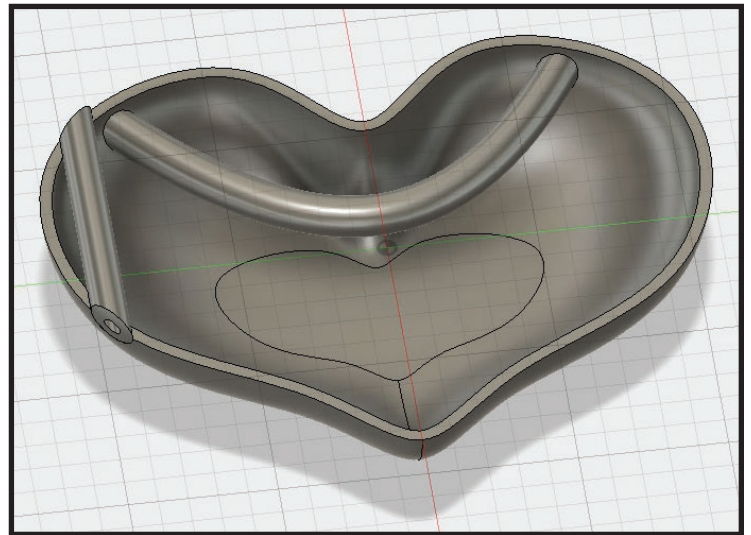


• Repeat the split body tool again with opposite inputs. To do this, open the option wheel menu, select the last used action "Repeat Split Body", select the pipe body first, then in the dialog box on the right click the gray text near splitting body, click the heart bottom and top, press "Enter/Return" to accept.



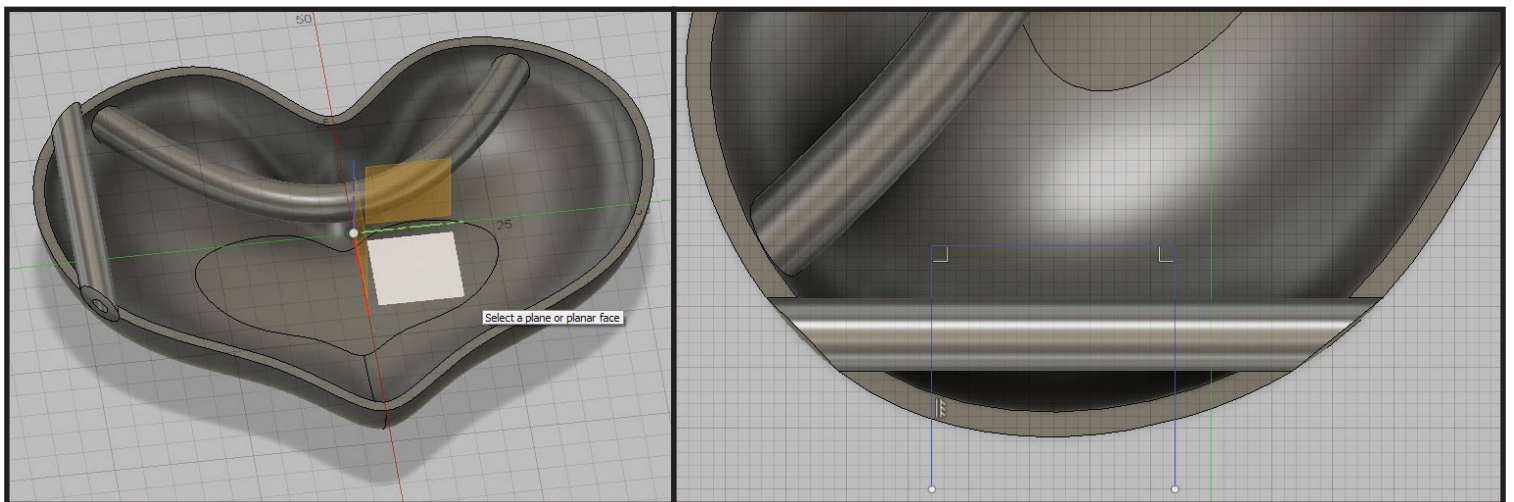
• Perform cleanup of unnecessary remnants from splitting. To do this, in the browser tree on the left, find the small remnant bodies from splitting by hovering over the body title to highlight, when finding a remnant body, right click or option click body title, and select "Remove". (Also remove the two pieces on the bottom of the hinge pipe that is covering the hole in the pipe.)

Hide the heart top body.



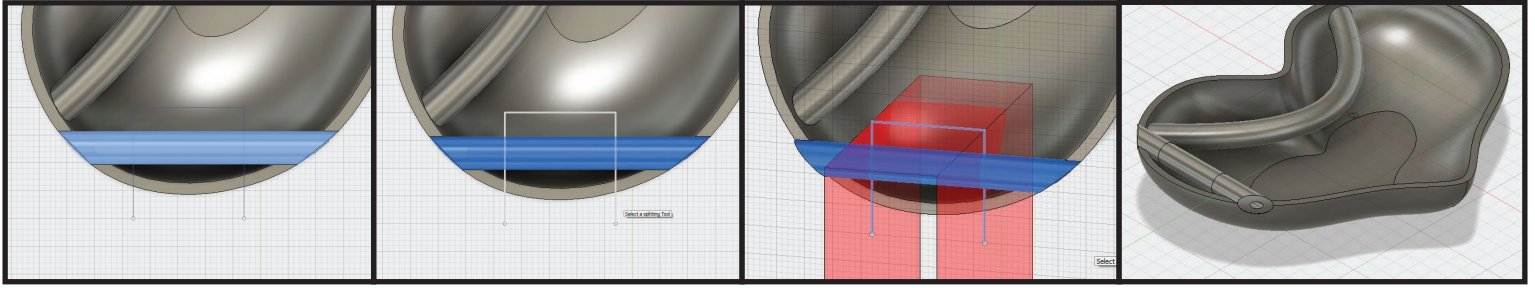
### STEP 9: CREATE CUTS ON HINGE PIPE FOR SEPARATING

• Change to Top view. Create sketch for splitting the hinge pipe. Press "L" to activate the "Line" tool, select the top/bottom plane, and rotate top view so heart is right side up. Draw backward "C" shaped sketch line that intersects the hinge pipe into thirds.



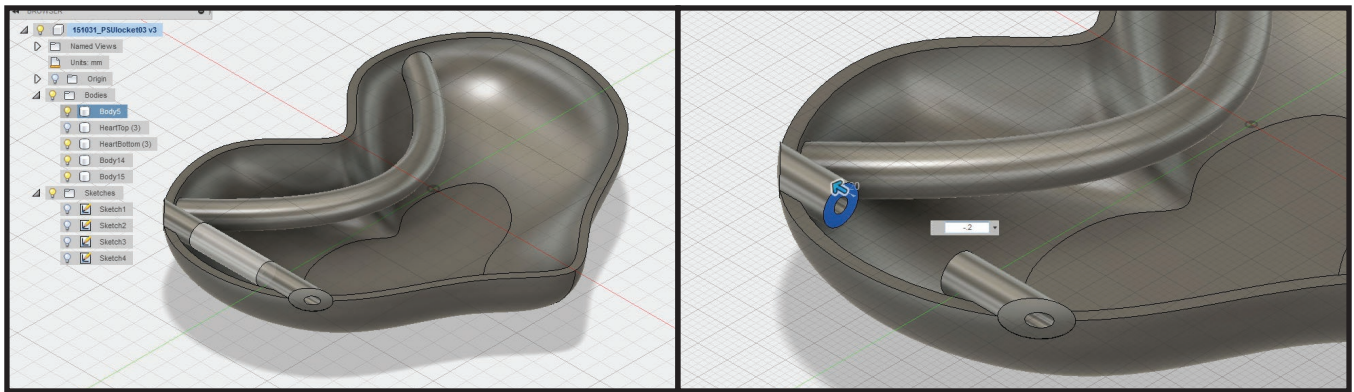


- Split hinge pipe with line sketch. To do this, go to “Modify > Split Body”, select the hinge pipe, set “Splitting Tool” to the line sketch, and press “Enter/Return” to accept.

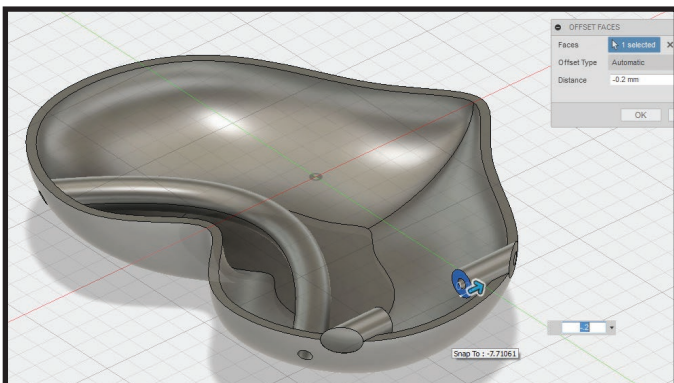


## STEP 10: ADD FITTING TOLERANCE FOR HINGE PIPE SECTIONS

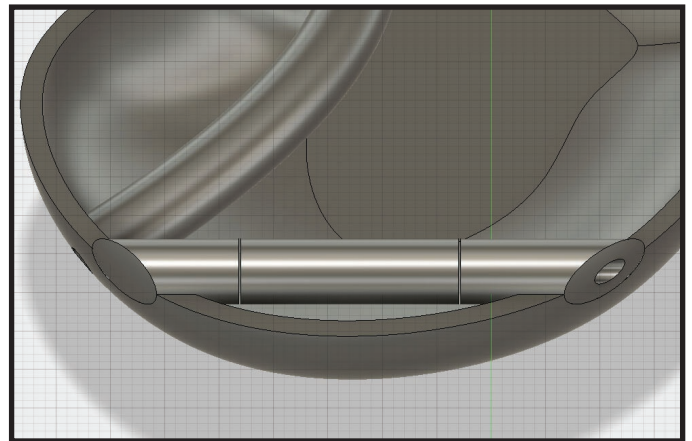
- Press/Pull the flat faces on the hinge pipe sections for proper fitting after printing. To do this, hide the center section of the hinge pipe, select the flat face on the inside of the top section, press “Q” to activate “Press/Pull” tool, offset flat face “-0.2mm”, and press “Enter/Return” to accept.



Do the same for opposite inside flat face of the bottom hinge pipe section.

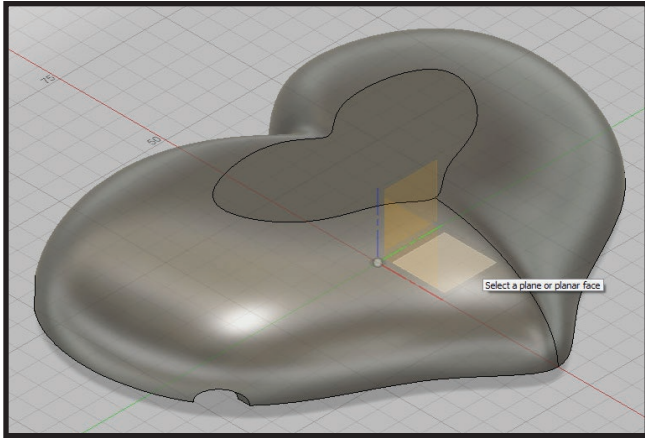
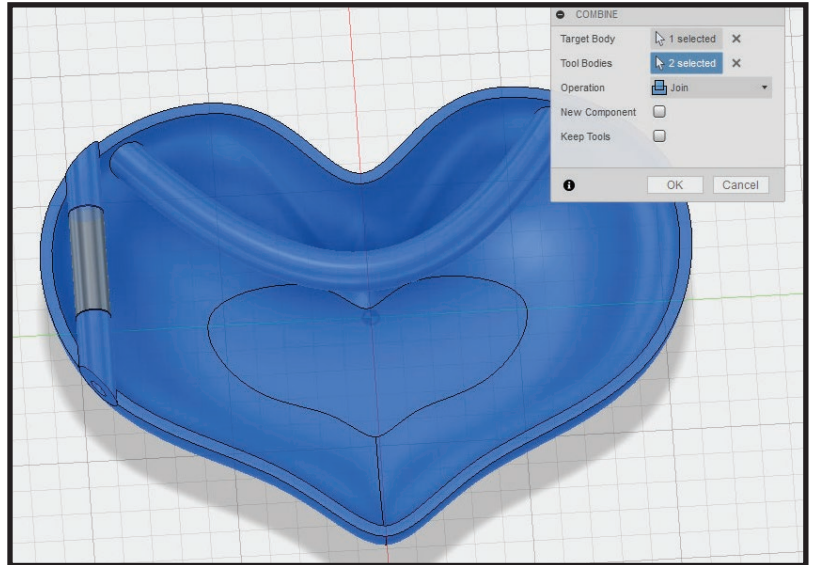


Unhide center hinge pipe section.

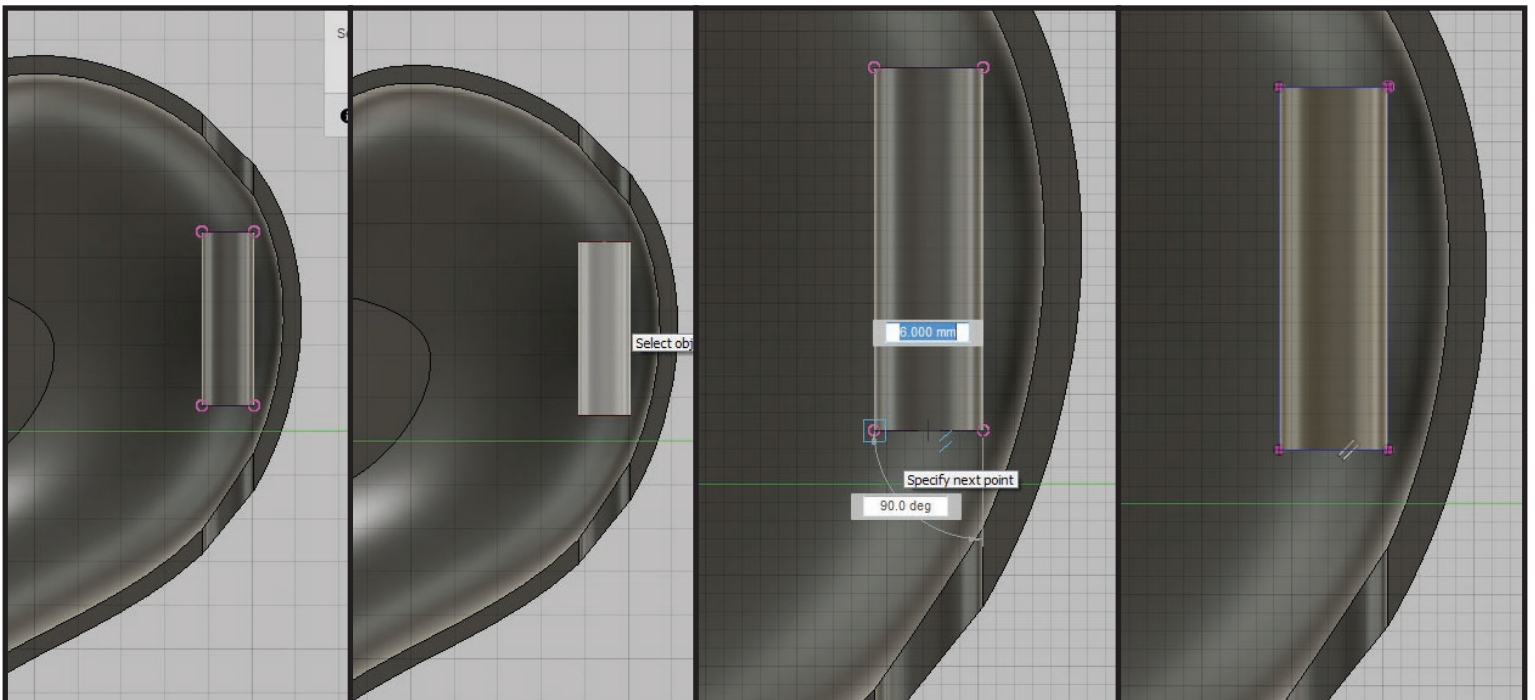


## STEP 11: COMBINE HINGE PIPE SECTIONS TO HEART HALVES

- Combine bottom heart half to outside sections of hinge pipe. To do this, go to "Modify > Combine", select the heart bottom + top hinge pipe + bottom hinge pipe, make sure operation is set to "Join", and press "Enter/Return" to accept. Hide heart bottom and unhide heart top.

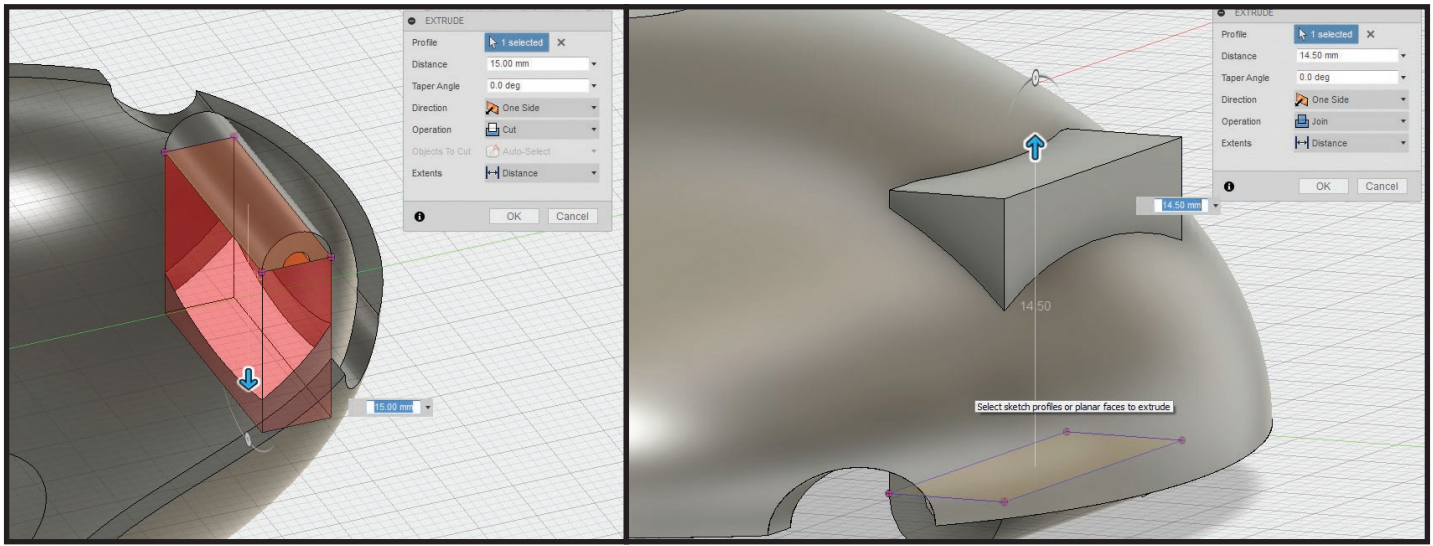


- Create geometry for middle floating hinge pipe section to connect to heart top. To do this, press "P" to activate the project sketch tool, select floor plane, in the bottom view click the flat edges of the middle hinge pipe section to project a partial square, press "L" to activate line tool, and sketch lines to close the square projection of the middle hinge pipe section. Press "Enter/Return" to exit line tool.

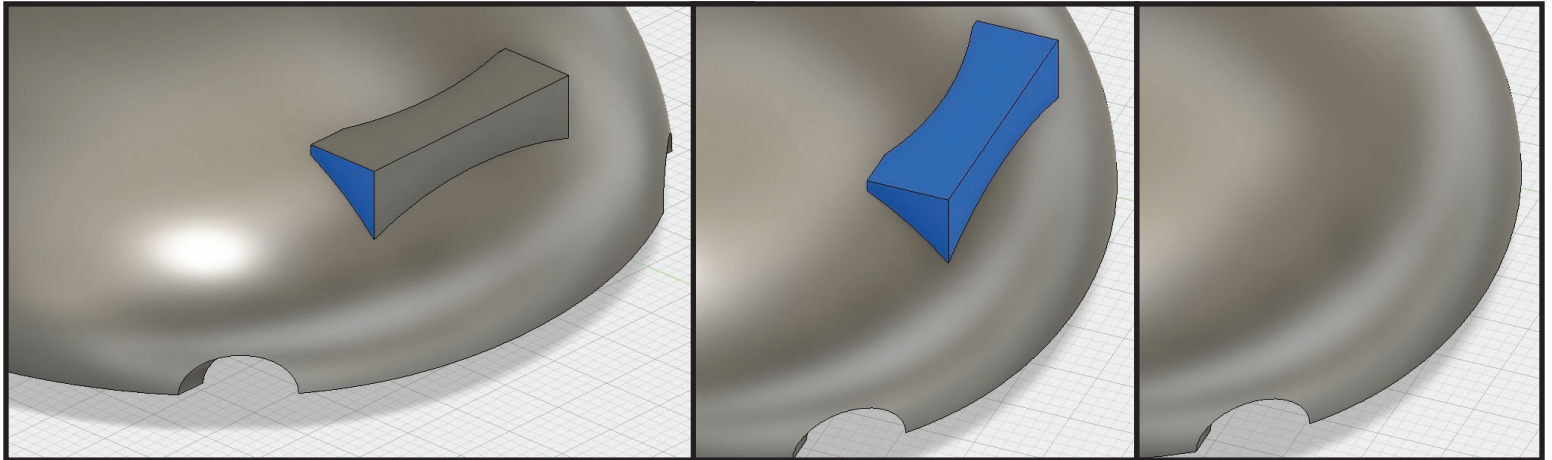




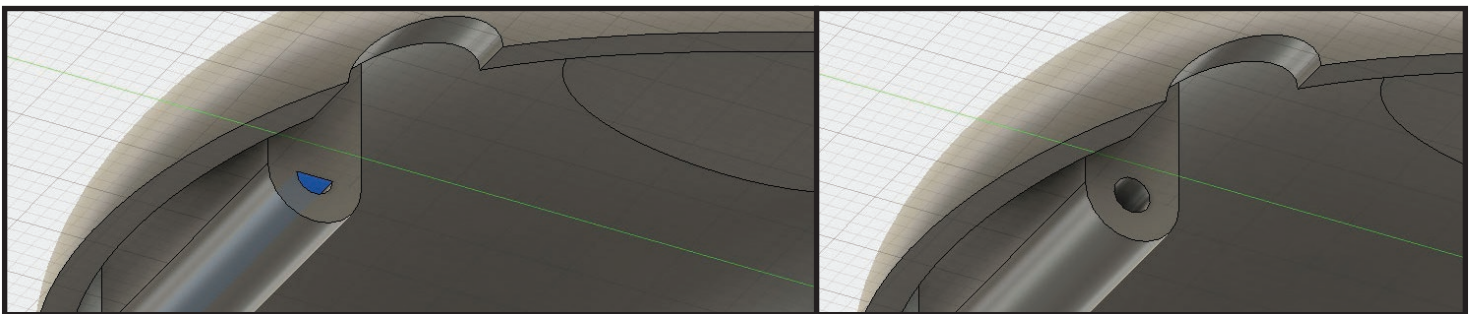
Press "E" to activate extrude tool, select the sketch of middle hinge pipe section, rotate viewing angle to see 3D contour of heart top and hinge pipe section, click + drag extrusion arrow to drag square just past outside wall of heart top, change the "Operation" to "Join", press "Enter/Return" to accept.



- Viewing the top of heart top with newly extruded faces sticking through, select all puncturing faces and remove. To do this, click one face that is not the contour of the heart top, press + shift + select additional faces coming through heart top, and press "Delete/Backspace" to delete the faces.



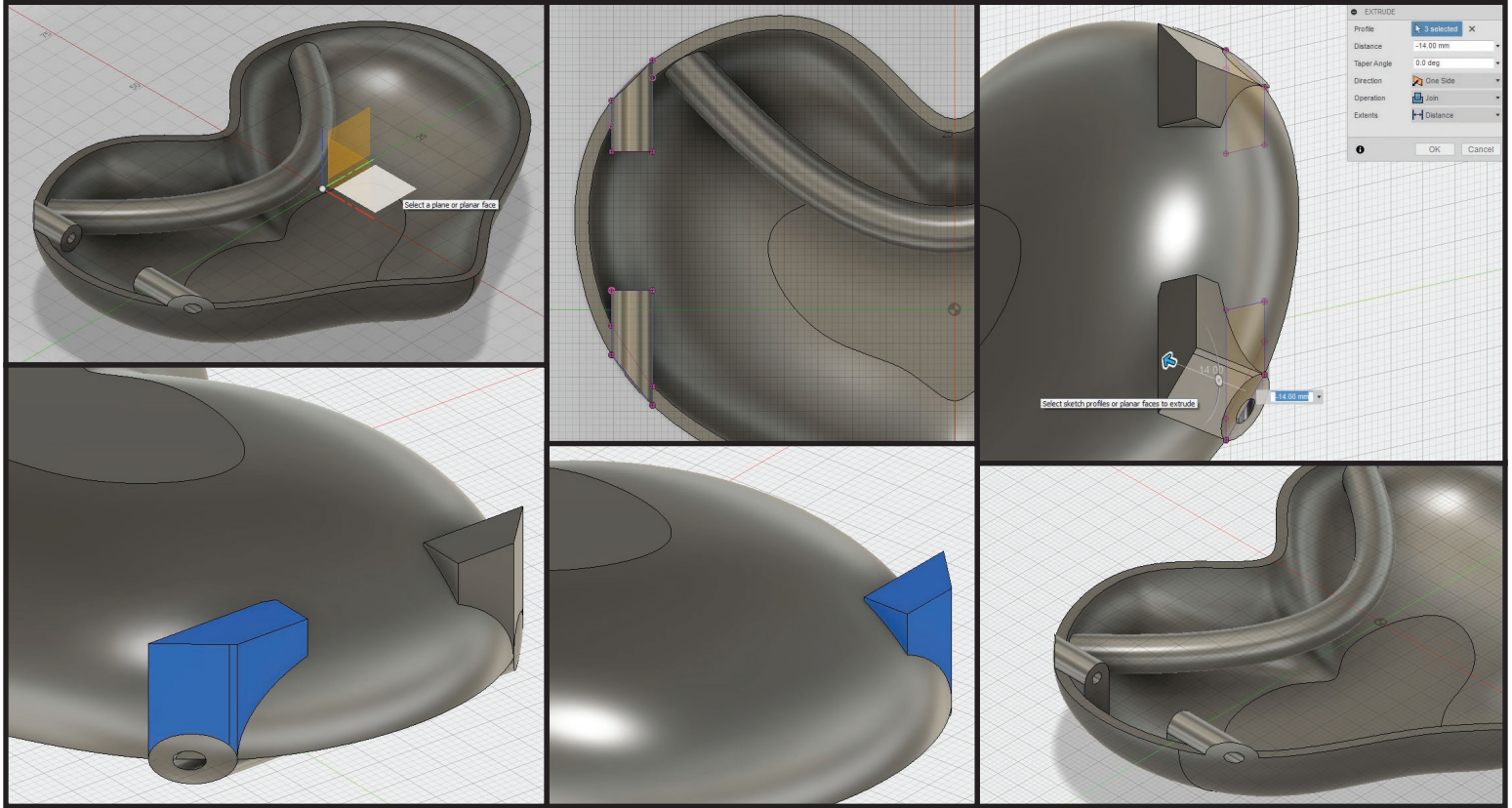
To do this easily, rotating of the viewing angle is necessary. To rotate the viewing angle efficiently, press + hold "Shift" while pressing down the middle mouse wheel button and moving mouse.



- Rotate viewing angle to see inside of middle hinge pipe section. Select the flat face inside the pipe and press "Delete/Backspace" to delete.

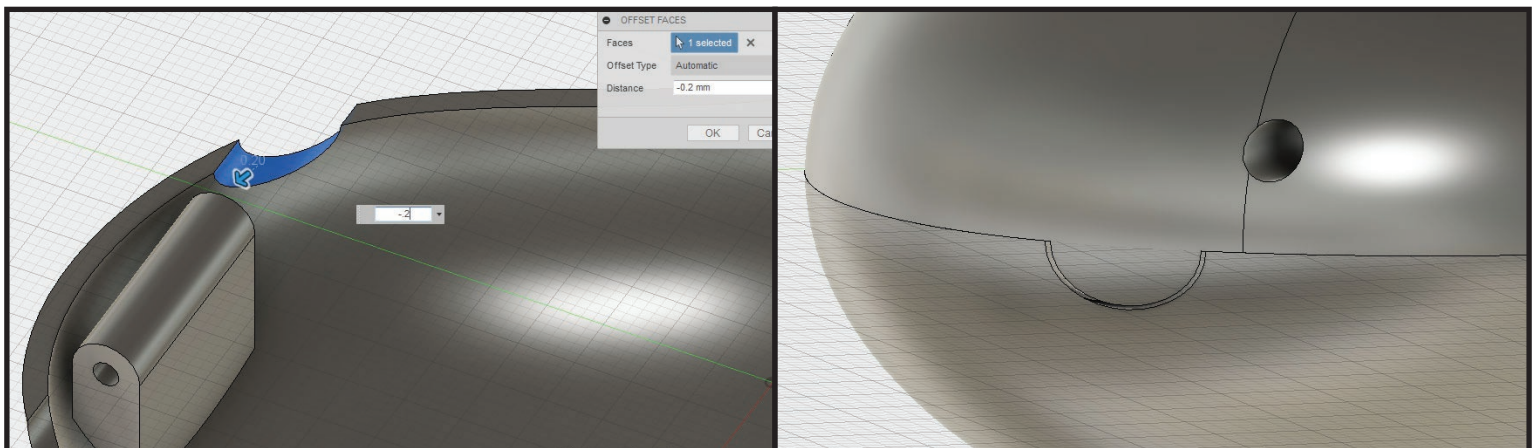


Repeat the project sketch, extrude, and delete faces for the heart bottom to connect hinge pipe to heart bottom.



## STEP 12: ADD TOLERANCE FITTING FOR HEART TOP

- Hide heart bottom and show heart top. Press/Pull inside curved faces along heart wall. To do this, rotate viewing angle to see bottom of the heart top, select the inside curved face along the heart wall, press "Q" to activate "Press/Pull" tool, set offset distance to "-0.2mm", and press "Enter/Return" to accept.

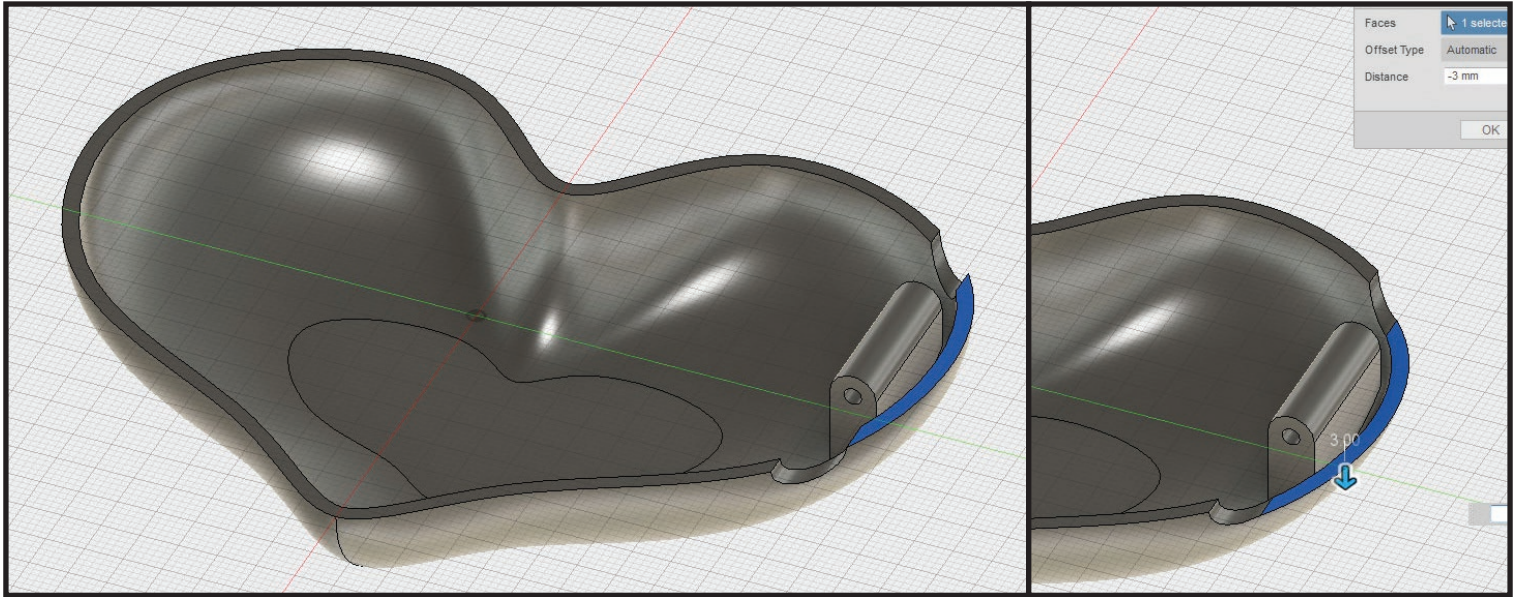


Repeat this same step for opposite curved face on heart wall.

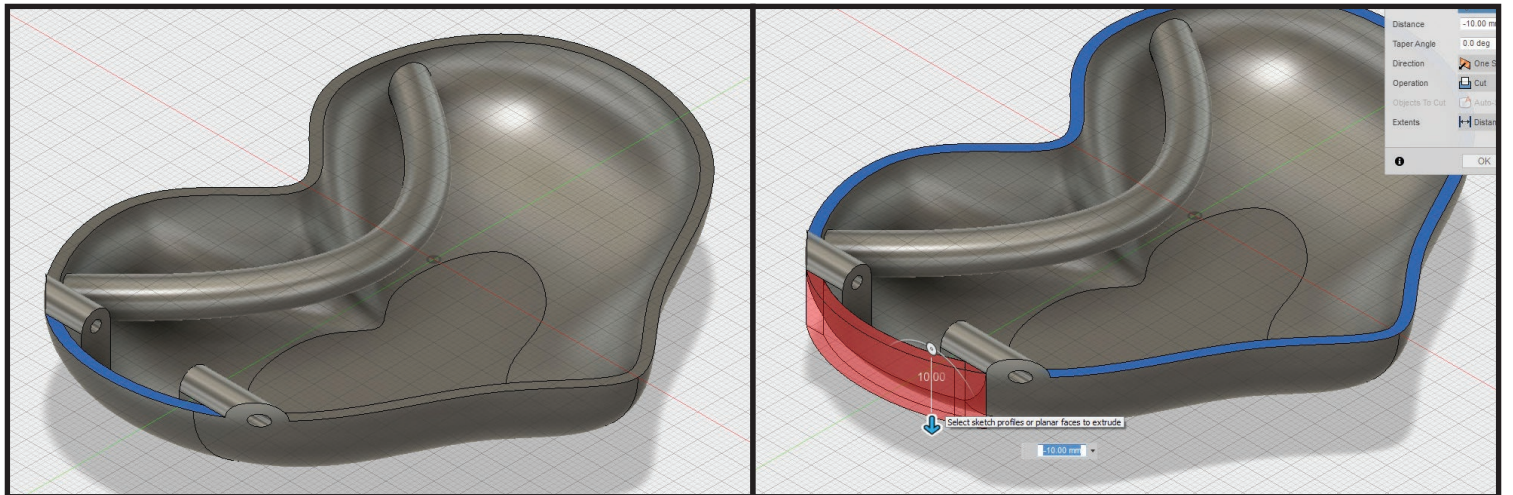


### STEP 13: ADD CLEARANCE FOR HINGE SWING

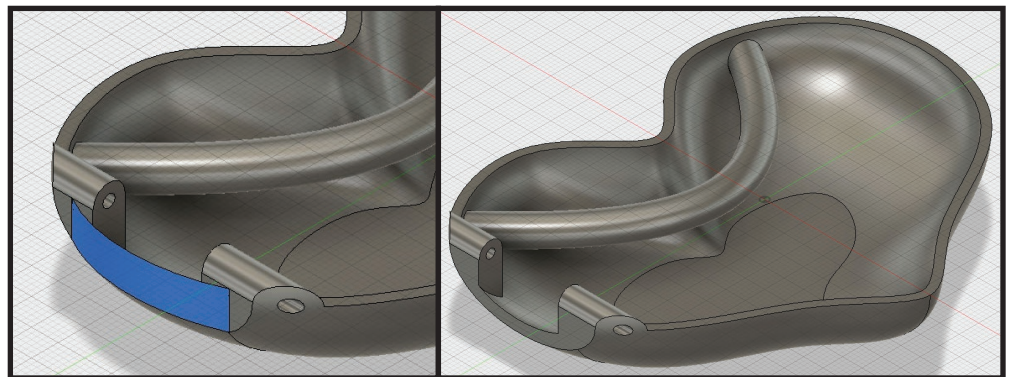
- Press/Pull flat face on edge of heart top. To do this, select the flat face on side near hinge, press "Q" to activate "Press/Pull" tool, set distance to "-3.00mm", and press "Enter/Return" to accept.



- Extrude the top flat face on heart bottom near the edge of the hinge pipe. To do this, select the flat face on the heart wall slightly between the hinge pipe sections, press "E" to activate "Extrude" tool, pull extrusion through entire part of heart bottom, have operation set as "Cut", and press "Enter/Return" to accept.



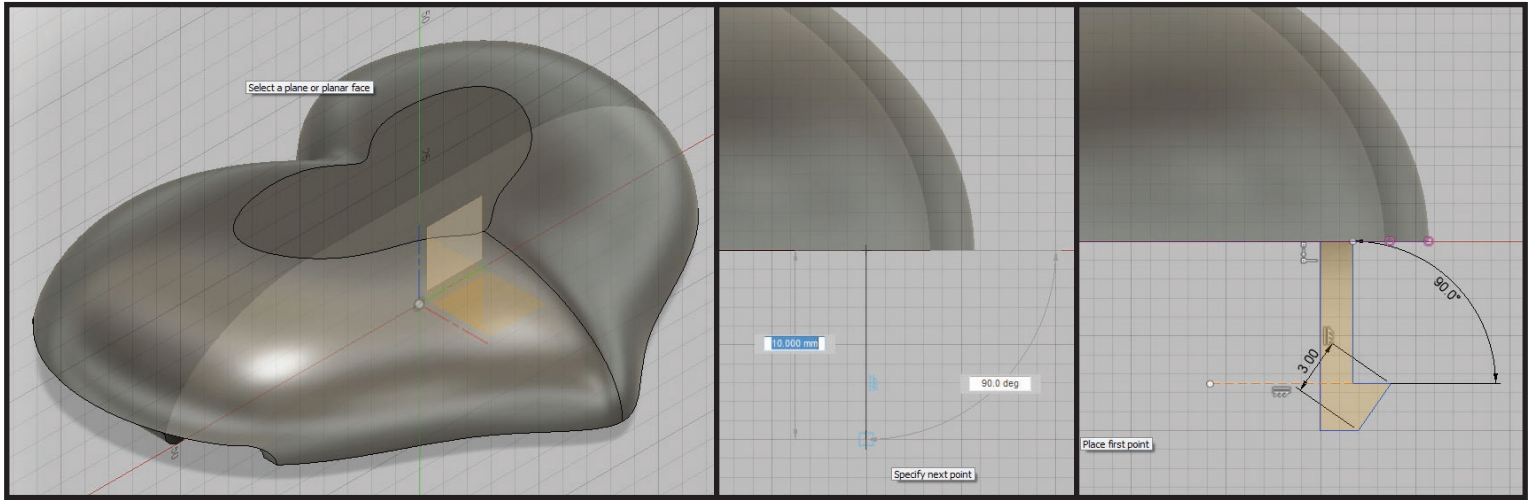
- Delete curved face created from extrusion. To do this, select the curved face on the outside heart wall and press "Delete/Backspace" to delete.



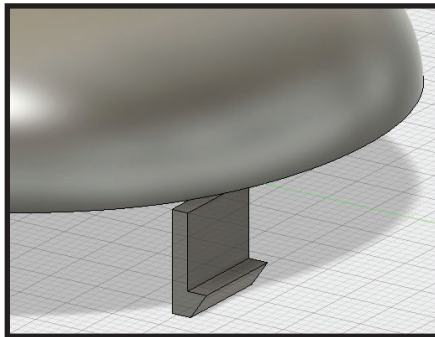


## STEP 14: ADD LATCH FOR HEART LOCKET CLOSURE

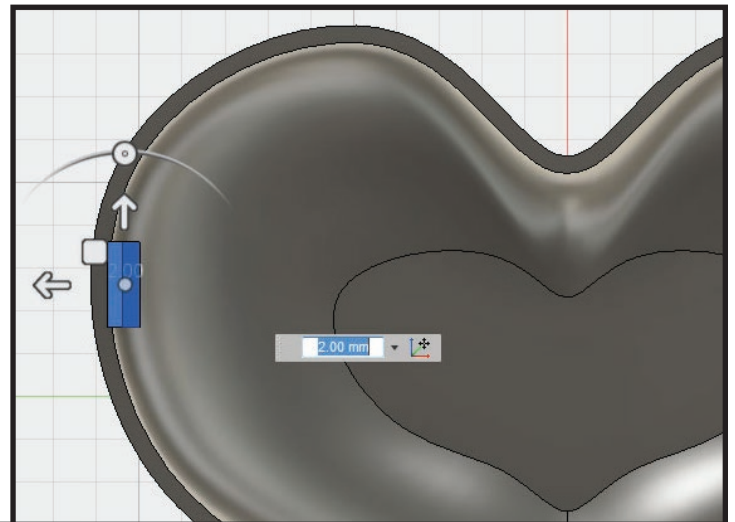
- Hide the heart bottom and show the heart top. Create a sketch for the latch. To do this, press "L" to activate the "Line" tool, select the "Right/Left" plane to start sketch, set first point on bottom edge of heart top near the opposite side of the hinge, and create line sketch as shown below.



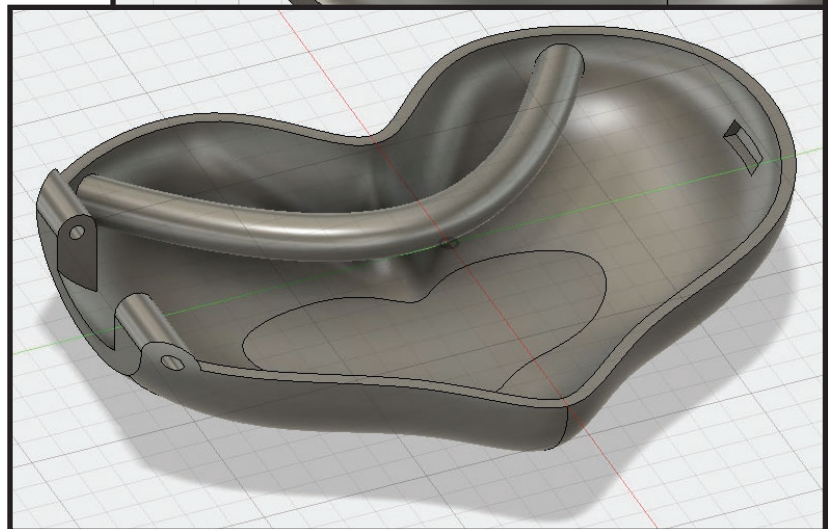
- Extrude latch sketch "10.00mm" into "New Body".



- Using the move tool position latch on heart top as shown.

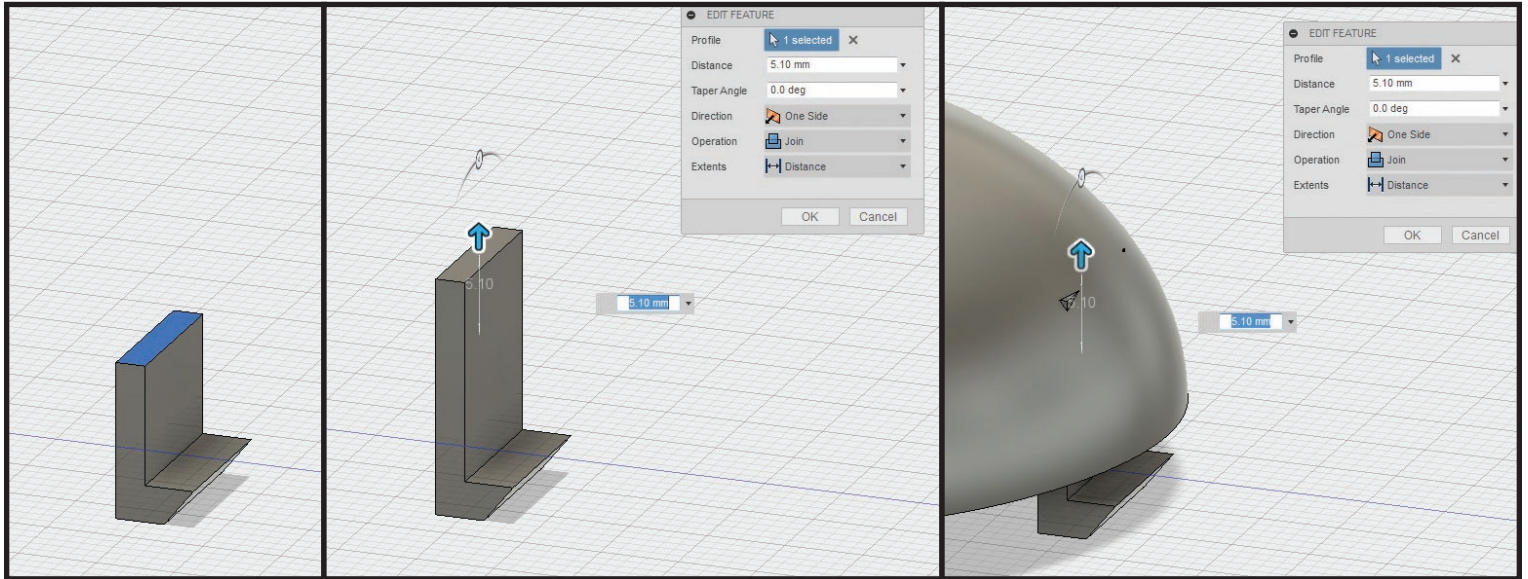


- Perform split body on heart bottom using latch as splitting tool to create cavity for latch. Cleanup the remnants by removing.

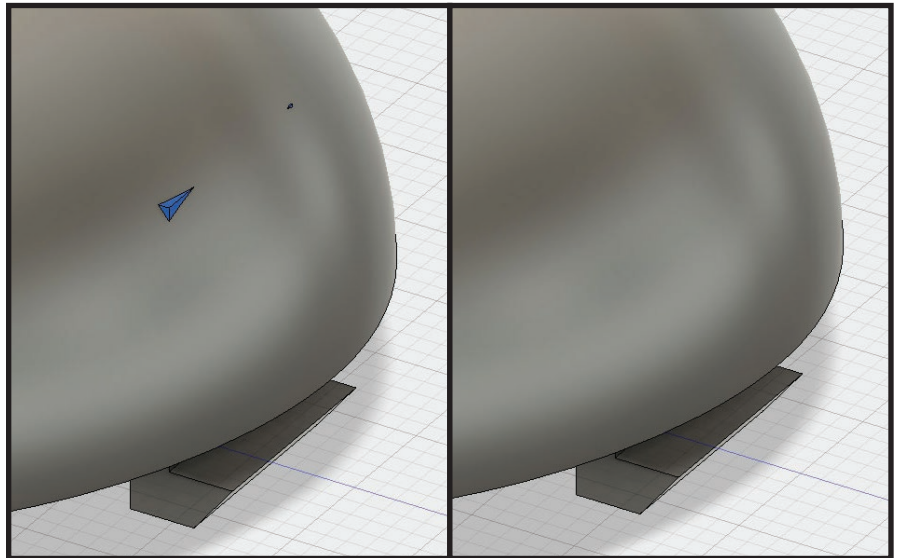




- Extrude top face of latch into wall on heart top and set operation to "Join".



Delete faces puncturing through outside curved face of heart top.



**STEP 15: CONTINUE POLISHING HEART LOCKET DESIGN AS DESIRED**

