Plastic Part Modeling 2

This is a continuation of the task - Plastic Part Modeling 1. In this task, we'll learn how to work on thinkdesign **Model Derived from Current**. We will also cover some new modeling techniques.

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1. Step 1 : Model Derived from Current

Now that we have modeled the base plastic part, we should be able to have a top and bottom part to work on.

Make sure that you have the model open that you saved from the Plastic Part Modeling 1 web task. We called it mymodel.e3.

NOTE:

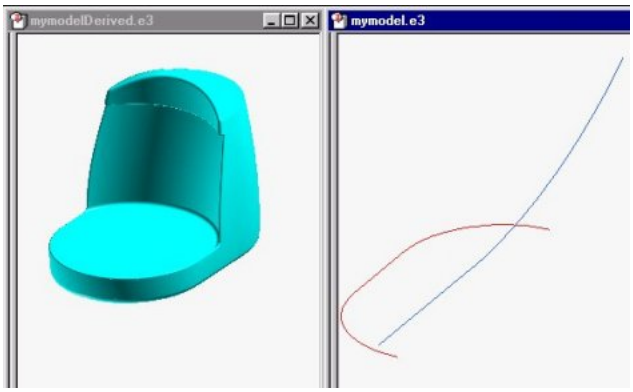
With a double click on the exe file you can run the webtraining session. ThinkDesign will be open with the right model to start.

If request to open a file, you can find it in the C:\MyTraining path.

- **Set Work Plane to World** .
- Activate **File**➪**New...**➪**Model Derived from Current**.
- Set the Mode to As current.
- Click OK

We now have a new model called mymodelDerived.e3. By creating this Derived model, we are making a linked copy of the original model. If the original model ever changes, this Derived model will update also.

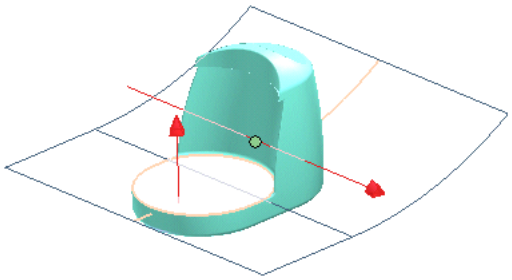
- Activate **Tile Vertically**.
- Hide solid of mymodel.e3 using the **Hide Entities** command.
- Turn on Layers0 and 1.



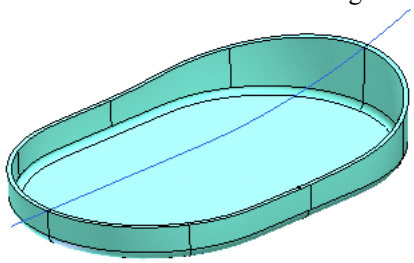
- **Copy** the 2 Profiles, Red and Blue by selecting them and going to **Edit**➪**Copy**
- Go to the mymodelDerived.e3 window, and do **Edit**➪**Paste**.
- **Close** the file mymodel.e3 without saving.

Activate Layer 1.

- Activate the **Linear Slot**
- Select the blue profile
- Set the cut direction to Symmetric and ExtensionThru all
- Click OK



The results should look like the image below.

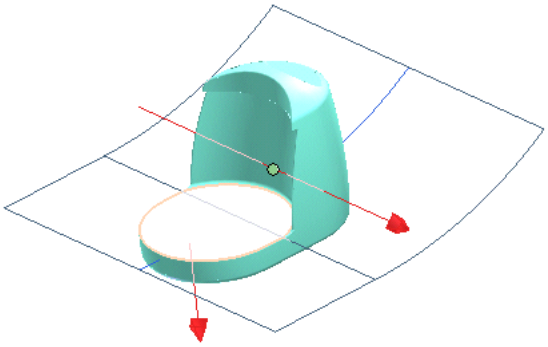


Use **File**➪**Save As**and use the name lowercase.e3.

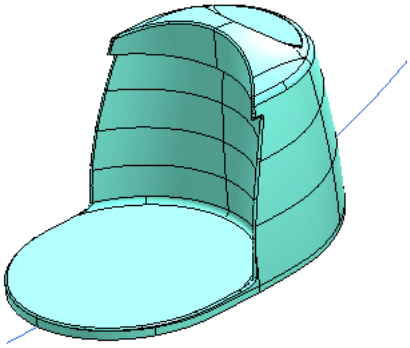
- Right click on the Through Slot in the history tree and click on **Roll Back**.

Now let's make the top half.

- Activate the **Linear Slot** command. An alert message of Roll Back appears; read it and press on Yes button.
- Use the same blue profile that we used in the previous step
- Set the cut direction to Symmetric and ExtensionThru all
- Make sure that the cut side arrow is pointing down. You can flip the arrow direction by double clicking on it.
- Click OK



The uppercase of the plastic model is ready.



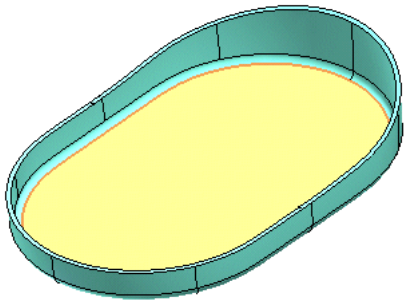
Use **File**➪**Save As**and use the name uppercase.e3.

Close all model files.

2. Step 2 : Using Smart objects.

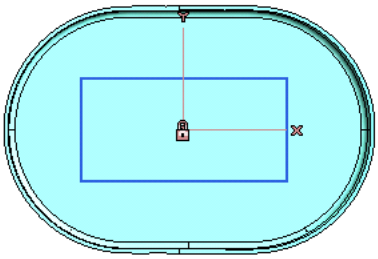
Open the lowercase.e3 file.

Right click on the inner surface and click Work Plane Here.



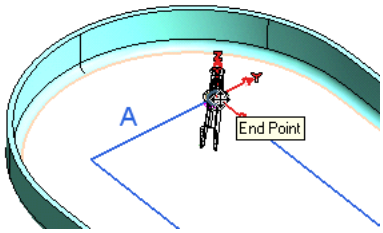
Insert a **Rectangle**.

- Change the Mode to Cen+Sizes.
- Set the values to X size100 and Y size50.
- For Point, select **Work Plane Origin**.
- Hit Esc or Cancel

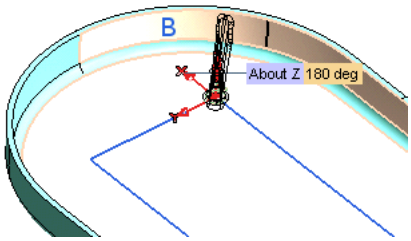


Now, we are going to insert some ribs with an useful self made smart object (rib.sf).

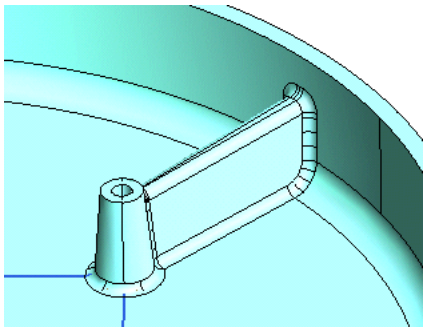
- Click **Insert Smart Object** from your Smart Object toolbar. If it isn't showing, then go to **Tools** **Customize** to the toolbars tab and turn it on.
- Browse for the file rib.sf - it should be located in the same directory as the web task.
- Select the inner bottom face (A) for the placement.
- Select one of the corners of the rectangle for the Point.



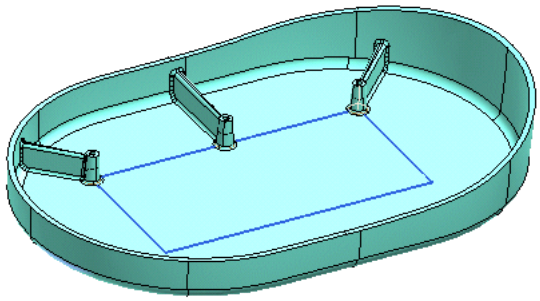
- Drag the X or Y axis to rotate the rib so that the preview shows the rib going towards lowercase inside face and not towards the middle of the lowercase. Assign the value About Z180 deg.
- Select Face in the last row in the selection list and indicate the perpendicular face (B).
- Click OK.



Your first Smart Object rib feature should look like the image below.



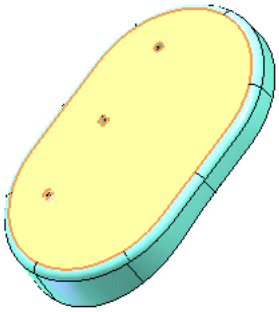
Similarly, place the smart object on other 2 places as shown below using the midpoint and endpoint of the line as your location points. When you are done, the model should look like the image below.



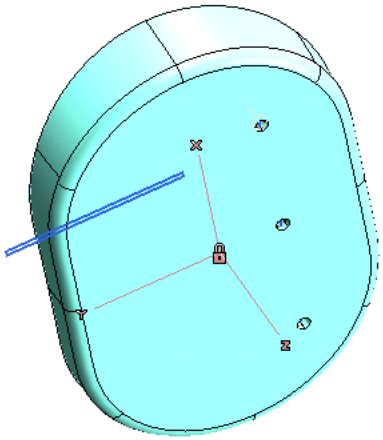
3. Step 3 : Vent part.

We are now going to add a vent to the bottom of our coffee maker model.

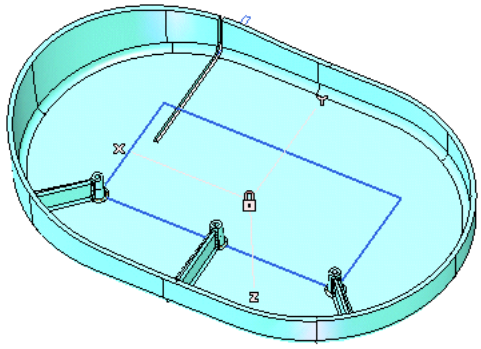
Set work plane on bottom face of solid as shown by right clicking on the face and clicking Work Plane Here.



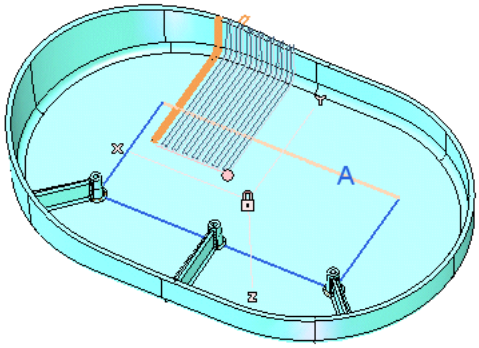
Insert a **Rectangle**70 x 2 in the approximate location as shown below.



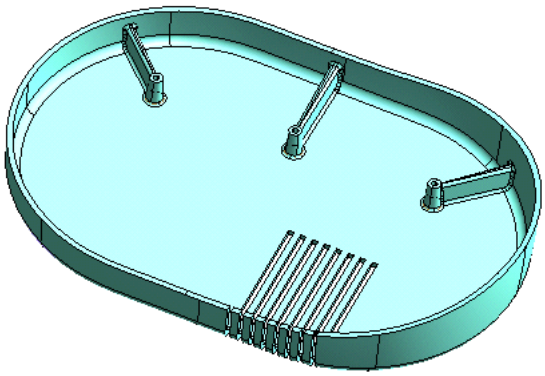
- Change color to Red.
- Activate the **Linear Slot** and set the Depth25.
- Set the draft angle to 1 under More Options - making the solid smaller at the top of the protrusion.
- Set Extension to Single Depth.
- Click OK.



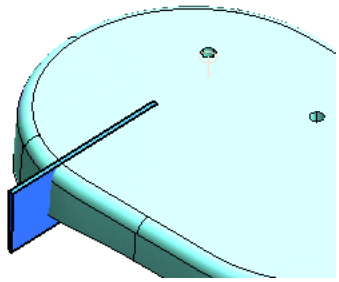
Use the **Pattern Solid** to pattern the new slot with the values of 1st Extension30 and 1st No. Copies8 as shown in the image below.



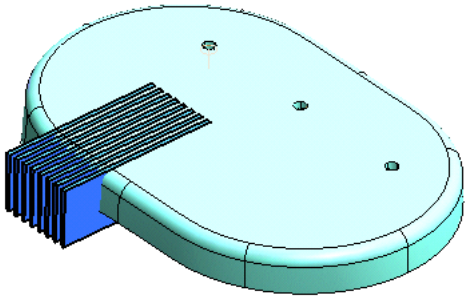
Here is the result. Analysing the object, the slots weaken the rigidity of plastic model. We need to strengthen their shape.



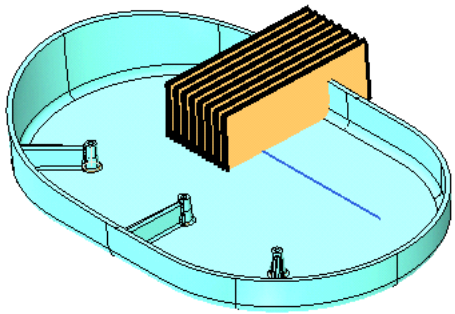
- Right click on the Slot feature in the history tree and click **Roll Back**.
- Instead a linear slot, make a new solid using **Linear Solid** but using the same data.



Same for the **Pattern Solid** to pattern the new blue solid with the values of 1st Extension30 and 1st No. Copies8.



Let's use **Solid Union** to make one solid from lot.

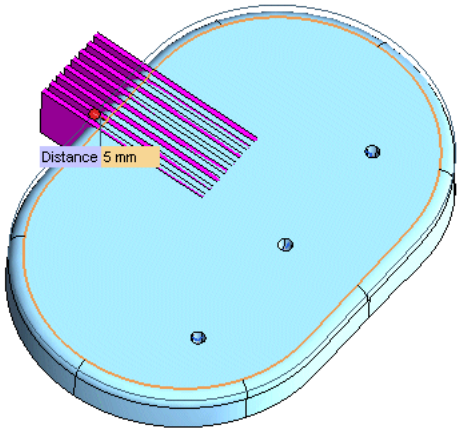


Note :

Now the model is multishell - having more than 1 body and also non manifold - cannot hold water or has gaps. After we add some more features, including another Boolean operation, our model becomes a Manifold solid again.

This vent cut through the sides of the model and this isn't what we want. Let's cut off the external part of the lower part solid and then we'll redo the Boolean operation. Could be necessary to hide the cyan solid to work better and unhide subsequently.

- Activate the **Offset on Plane** command.
- Select the bottom edges of the fillet as shown in the image below.

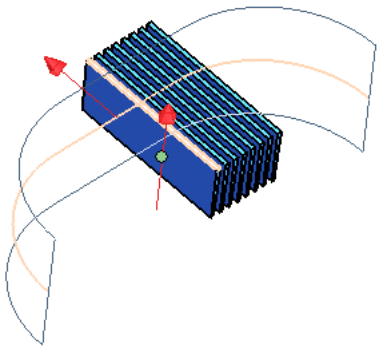


Tip: Wrong side

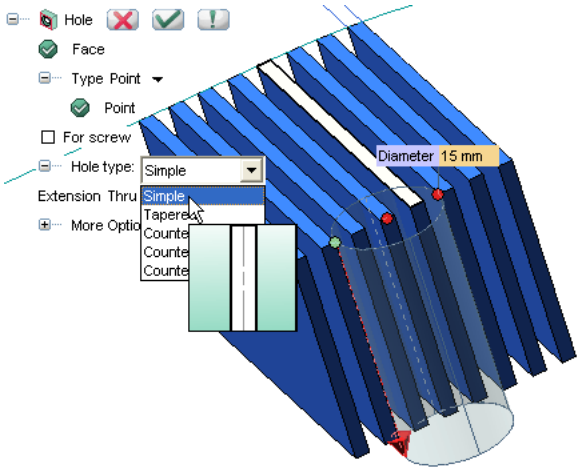
If you find the profile in the opposite side of the solid, edit 2D profile and use the mirror command to move it in the right.

- Type in the distance in the parameter area as - 5. (We want this new curve to be inside the model so if your arrow is pointing inwards, make the value 5 rather than -5.)
- Right click on the Graphic area and say End of Selection.
- Hit Esc.

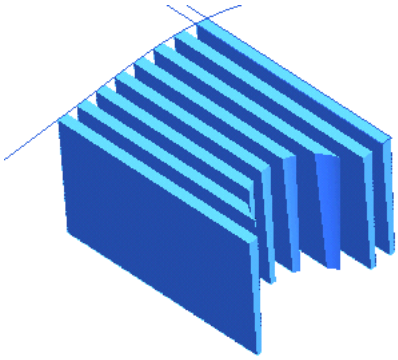
- Activate the **Linear Slot** command. An alert message of Roll Back appears; read it and press Yes button.
- Select as Face the multishell faces.
- Use Extension Thru all.
- Make sure your arrow is pointing as shown in the image below, out of the model.
- Click OK



Insert a **Hole** with a Diameter15 on multishell solid as shown below.

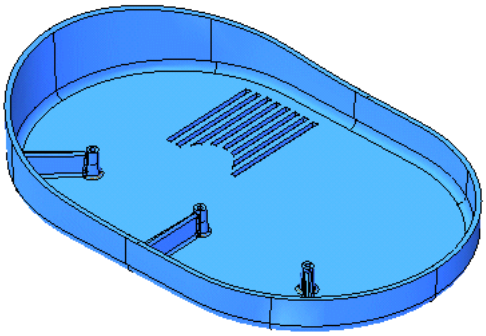


Click OK.



Sometimes when you try to **Rebuild Model**, thinkdesign throws up a message on solid multishell. Always press Continue and proceed.

- Activate the **Solid Difference** command
- Select lowercase part as Solid A.
- Select patterned, booleaned solid as Solid B.
- Click OK.



Select **Tools**➪**Modeling**➪**Check Manifold**. Now the model is manifold solid.

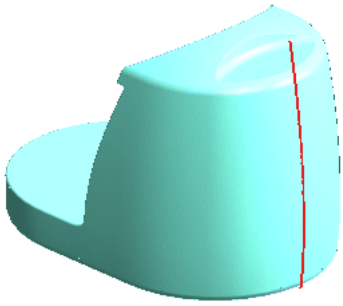
Save and **Close** the model.

4. Step 4 : Parent - Child

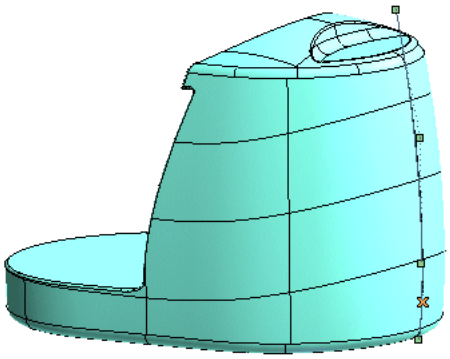
Now **Open** the mymodel.e3 file.

Turn on Layer 2 from the **Output Layers** command.

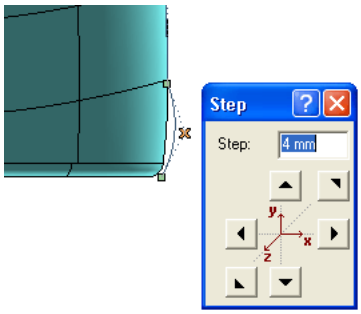
- **Set Work Plane to World** .
- Right click on the Red curve and click Modify Curve through control points..



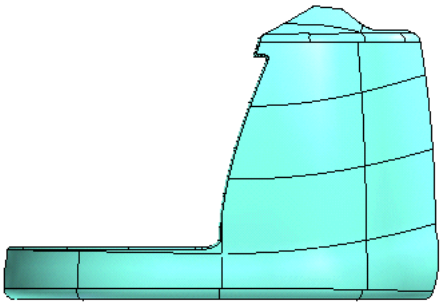
- Click open Constraints and Set Mode to Move control points.



- Select the second bottom control point as shown and press F8.
- Expand the option Tools.
- Expand Step, we get a dialog box.
- Set the value of the Step to 4 mm.
- Hit the button once.
- Hit ☑ Update Dependencies to apply same change in all linked features. Without it the result curve will be duplicated.
- Click OK.



- Now **Rebuild Model**.
- **Save** and **Close** the model

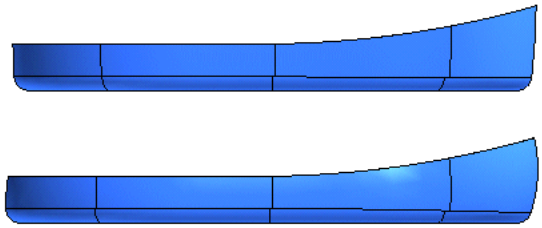


- **Open** the model file lowercase.e3.

We get External references warning message. Click Continue to open the model.

- Now **Rebuild Model** lowercase.e3.

We get multishell warning message. Click Continue and the model gets rebuilt

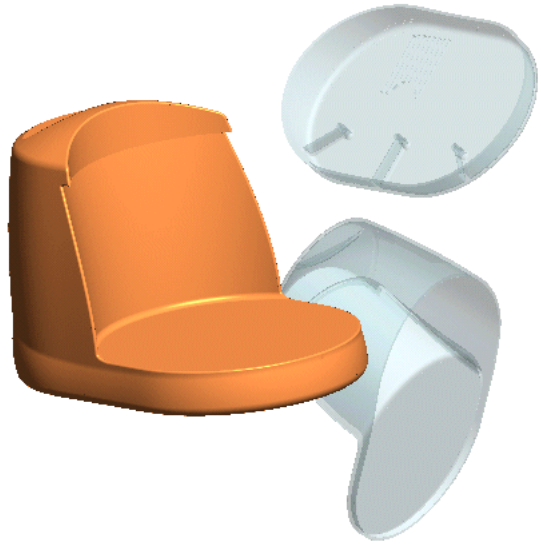


- **Save** and **Close** the model

That's the power of using Derived models. If the original model ever changes, each side of the derived models will also be updated. Repeat the same step with uppercase.e3.

Tip:

The Derived model refers to the original model through its pathname. In **Tools**→**Options/Properties**- under System Options tab - Assembly/Shared Group the checkbox 'Keep absolute file path' defines if the file path will be relative or absolute. It is risky to ignore this setting when working with Derived models on machines over a network.



Great job!