



Altair

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**HyperWorks**

Altair HyperMesh 2019 Tutorials

HM-2090: Dimensioning

[altairhyperworks.com](http://altairhyperworks.com)

## HM-2090: Dimensioning

In this tutorial you will learn how to create and edit dimensions on geometry using the Dimensioning tool. This tool is used to change one or more dimensions of existing geometry, thus changing the basic shape of solids and other enclosed volumes. With the dimensioning tool, you can select dimensions of or between surfaces, and modify those dimensions as required with the use of dimension manipulators.

### Model Files

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This exercise uses the `2_holes.hm` file, which can be found in the `hm.zip` file. Copy the file(s) from this directory to your working directory.

### Exercise

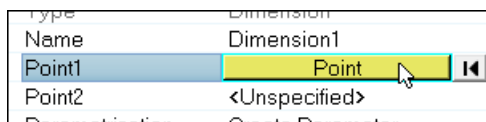
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#### Step 1: Open the model `2_holes.hm`.


1. Start HyperMesh Desktop.
2. From the menu bar, click **File > Open > Model**.
3. In the **Open Model** dialog, open the `2_holes.hm` model file.

#### Step 2: Create a dimension for the thickness of the part.

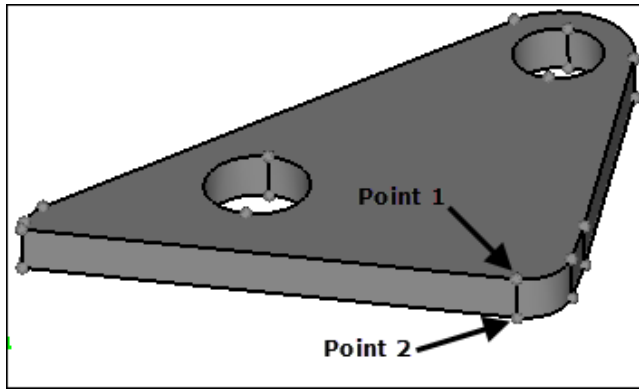
1. In the **Model** browser, right-click and select **Create > Feature** from the context menu.
2. In the **Feature** dialog:
  - For **Point1**, click **Unspecified >> Point**.



- Select point1 as indicated in the following image, then click **proceed** in the panel.

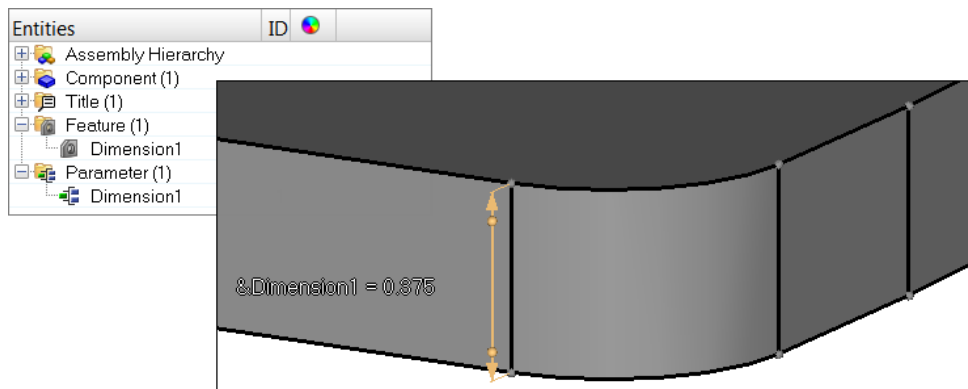
**Tip:** If there are no visible fixed points on your model, verify that  is selected on the **Display** toolbar.

- For **Point2**, click **Unspecified >> Point**.
- Select point2 as indicated in the following image, then click **proceed** in the panel.



- For **Parameterization**, leave it set to the default **Create Parameter** value.
- Click **Create**.

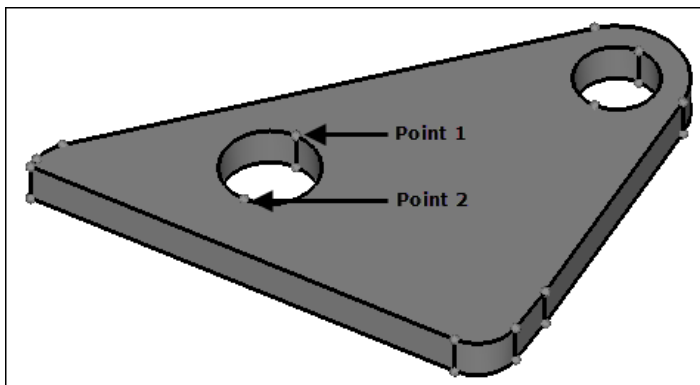
A dimension feature (Dimension1) and an associated parameter (Dimension1) are created. A dimension manipulator with a value of 0.375 is created between the two points to represent the thickness of the part.



- Click **Close**.

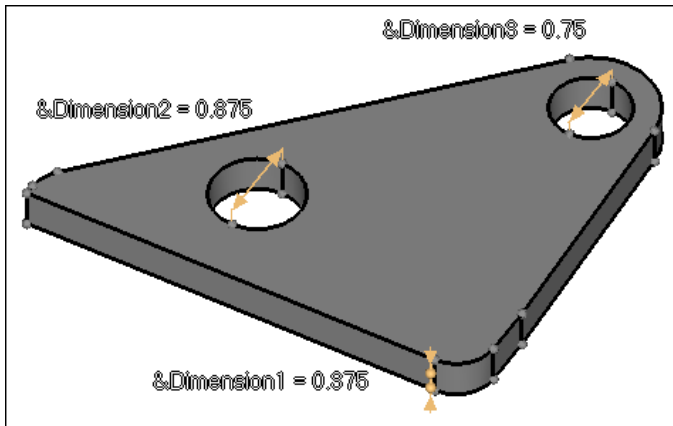
3. Repeat step 2 to create a second dimension feature for the hole. Select the points indicated in the following image.

A dimension feature (Dimension2) and an associated parameter (Dimension2) are created. A dimension manipulator with a value of 0.875 is created between the two points to represent the diameter of the hole.



- Repeat step 2 to create a third dimension feature for the other remaining hole.

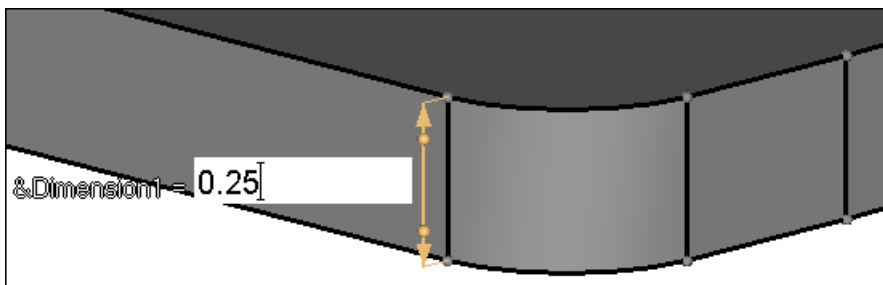
A dimension feature (Dimension3) and an associated parameter (Dimension3) are created. A dimension manipulator with a value of 0.75 is created between the two points to represent the diameter of the hole.



### Step 3: Change the dimension value.

- In the **Model** browser, **Feature** folder, click **Dimension1**.
- Click the dimension value (0.375) of the dimension manipulator, and enter 0.25 in the editable field.

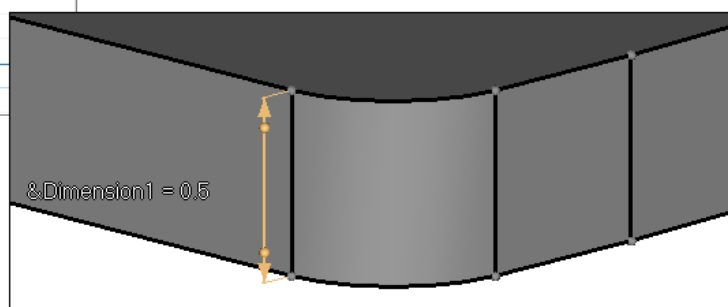
The part's thickness decreases.



- In the **Model** browser, **Parameter** folder, click **Dimension1**.
- In the **Entity Editor**, **Double value** field, change the value from 0.25 to 0.5.

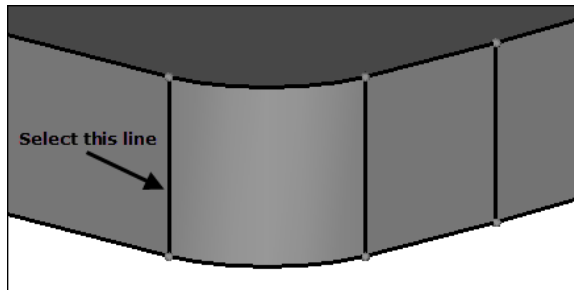
The part's thickness increases.

Name	Value
Name	Dimension1
ID	1
Parameter usage	General
Parameter type	double
Double value	0.5



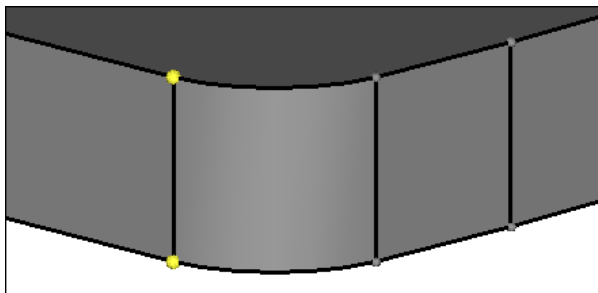
#### Step 4: Modify the dimension manipulator direction.

1. Open the **Extract on Lines** panel by clicking **Geometry > Create > Nodes > Extract on Line** from the menu bar.
2. Verify that the **lines** selector is active.
3. Select the line indicated in the following image.



4. In the **Number of nodes** field, enter 2.
5. Click **create**.

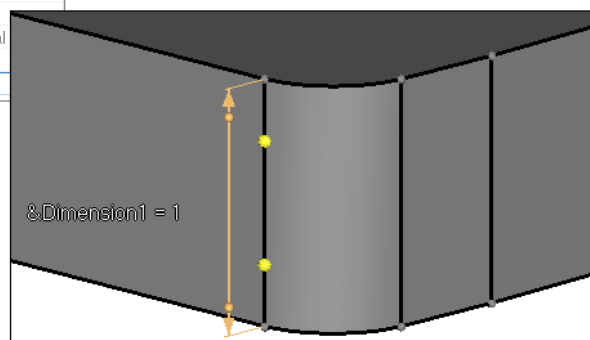
HyperMesh creates two nodes that will be used to show the starting position of the thickness during future modifications.



6. To exit the panel, click **return**.
7. In the **Model** browser, **Parameter** folder, click **Dimension1**.
8. In the **Entity Editor**, **Double value** field, change the value from 0.5 to 1.0.

The part's thickness increases equally about the midpoint between the original locations.

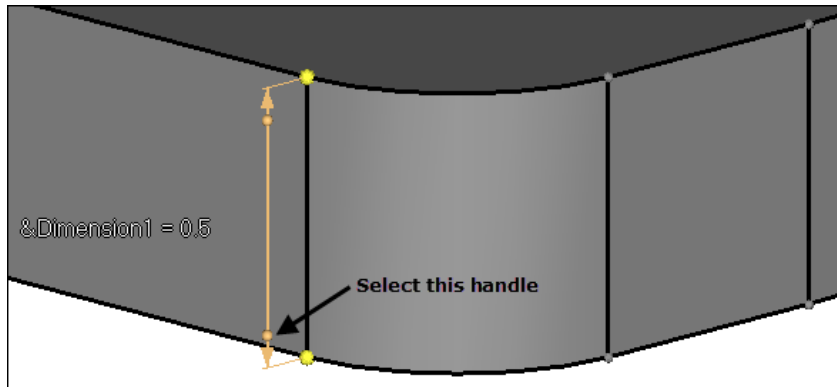
Name	Value
Name	Dimension1
ID	1
Parameter usage	General
Parameter type	double
Double value	1



9. Undo the change by clicking  from the **Undo/Redo** toolbar.

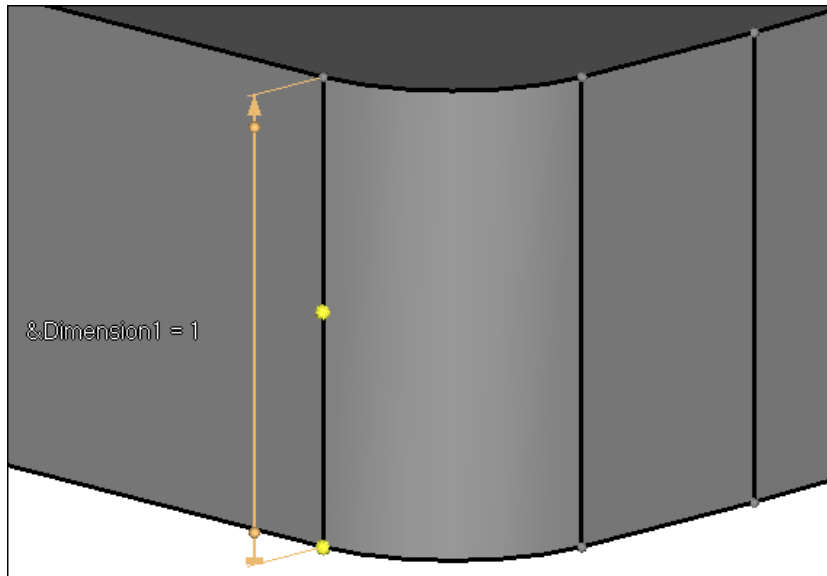
10. Select the handle at the bottom of the dimension manipulator as indicated in the following image.

The bottom arrow changes to a line, which indicates that the bottom end will remain fixed.



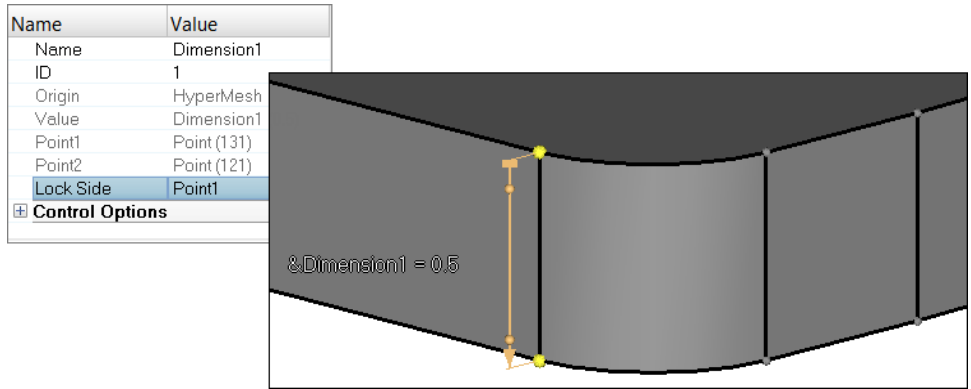
11. Change the dimension value again from 0.5 to 1.0.

The bottom end stays fixed.

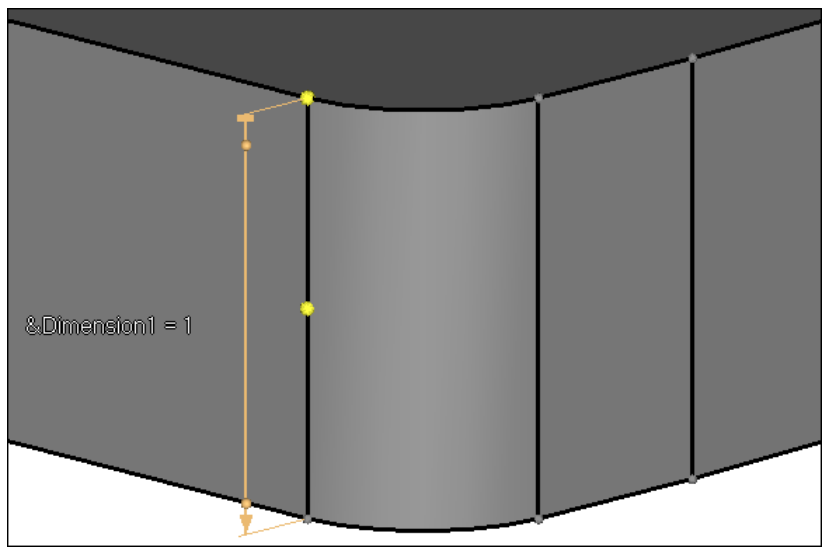


12. Undo the dimension change.
13. The dimension manipulator can also be locked from the **Entity Editor**.
- In the **Model** browser, **Feature** folder, click **Dimension1**.
  - In the **Entity Editor**, set **Lock Side** to **Point1**.

The top arrow of the dimension manipulator changes to a line, which indicates that the top end will remain fixed. The bottom end changes to an arrow, as only one end can remain fixed.



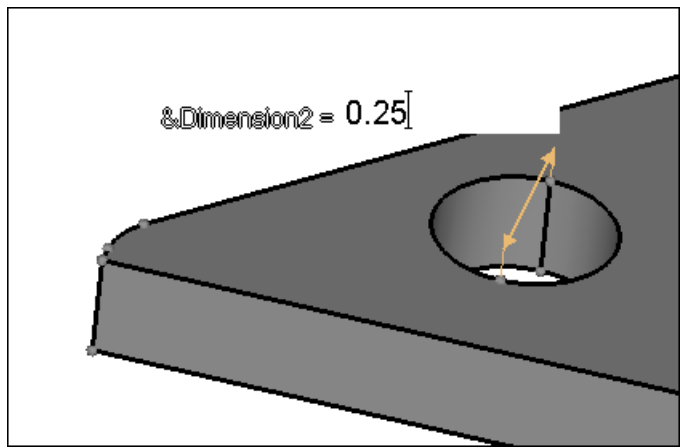
- Change the dimension value again from 0.5 to 1.0.  
The top end stays fixed.



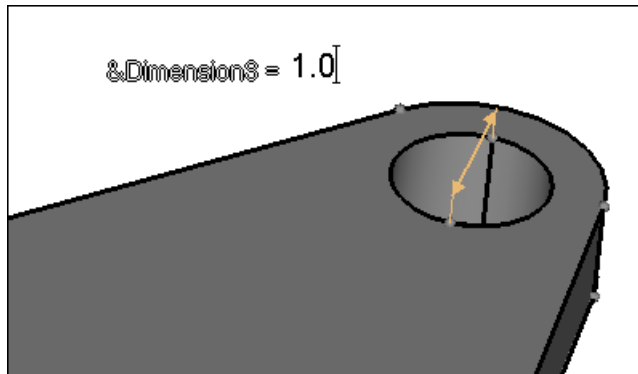
- Undo the dimension change.

**Step 5: Create and modify the diameter dimensions on the holes.**

- In the **Model** browser, **Feature** folder, click **Dimension2**.
- Click the dimension manipulator and change the dimension value from 0.875 to .25.  
The hole's diameter decreases.



3. Change the dimension value again from 0.25 to .5.  
The hole's diameter increases.
4. In the **Model** browser, **Feature** folder, click **Dimension3**.
5. Change the dimension value from 0.75 to 1.0.  
The hole's diameter increases.



6. Undo the dimension change.

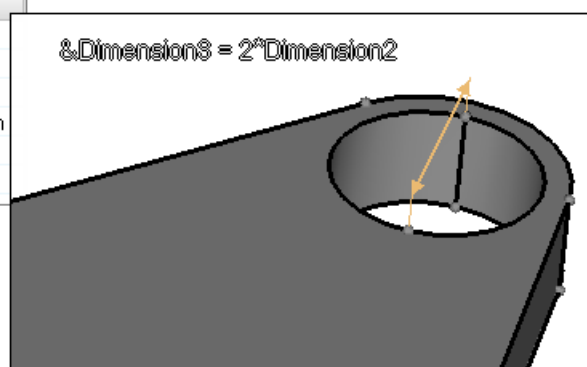
### Step 6: Delete a manipulator.

1. In the **Model** browser, **Parameter** folder, click **Dimension3**.
2. In the **Entity Editor**:
  - Set **Parameter type** to **double expression**.
  - For **Expression value**, enter  $2 * \text{Dimension2}$ .

This expression indicates that Dimension3 is two times the value of Dimension2.

The hole's diameter is updated to 1.0, which is twice the size of the first hole's diameter. The dimension manipulator displays the full expression as  $\&\text{Dimension3} = 2 * \text{Dimension2}$ .

Name	Value
Name	Dimension3
ID	3
Parameter usage	General
Parameter type	double expression
Expression value	$2 * \text{Dimension2}$
Double value	1.0



3. In the **Model** browser, **Parameter** folder, click **Dimension2**.



- In the **Entity Editor**, **Double value** field, change the dimension to 0.25.

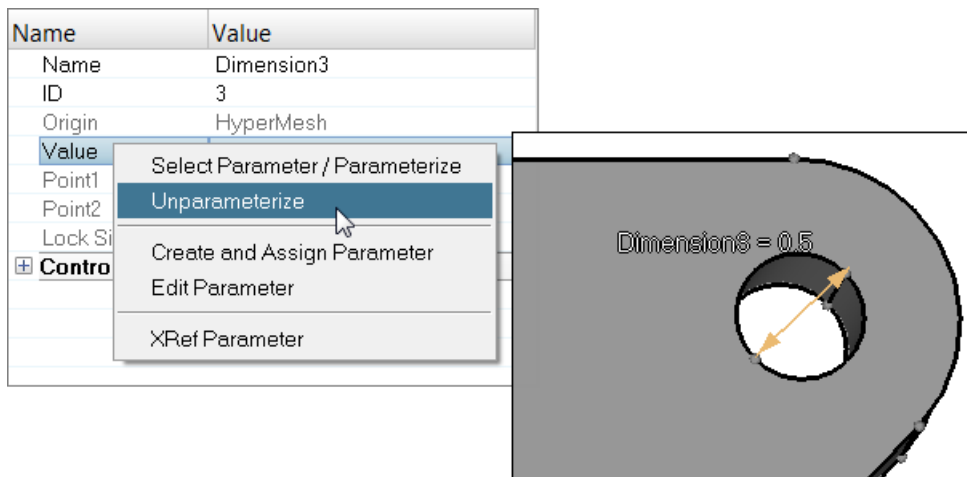
The first hole's diameter decreases from 0.5 to 0.25, and the second hole's diameter becomes  $0.25 \times 2 = 0.5$ .



### Step 7: Parametrize and Unparametrize the dimension.

- In the **Model** browser, **Feature** folder, click **Dimension3**.
- In the **Entity Editor**, right-click on the **Value** field and select **Unparameterize** from the context menu.

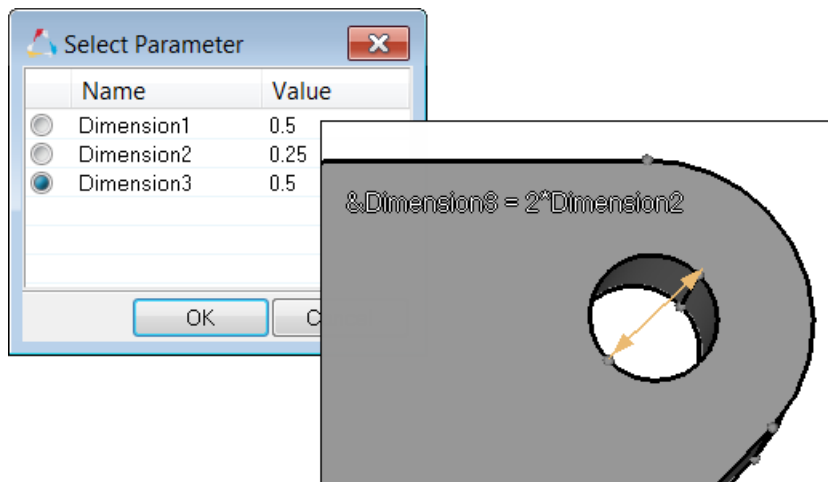
Dimension3 becomes unparametrized, and its corresponding dimension manipulator displays the current value of the dimension feature, instead of the parameter. All changes can now be made directly to Dimension3.



- In the **Entity Editor**, **Value** field, change the dimension value from 0.5 to 0.25.
- Right-click on the **Value** field and select **Select Parameter/Parameterize** from the context menu.

- In the **Select Parameter** dialog, select **Dimension3** and click **OK**.

The hole updates with the Dimension3 parameter and displays the full expression in the dimension manipulator.



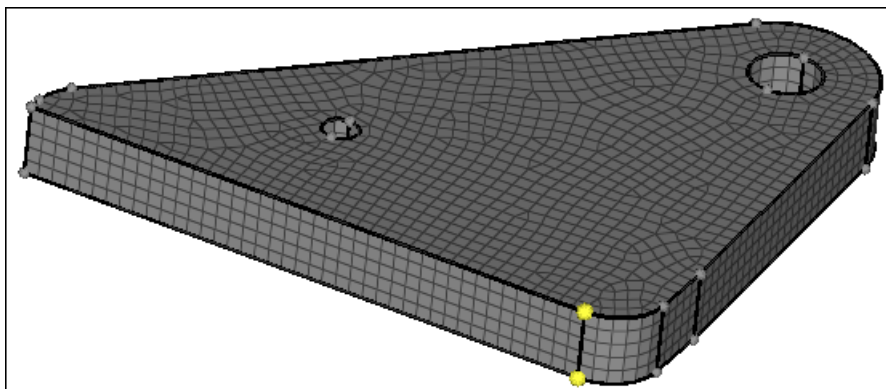
### Step 8: Delete a manipulator.

- In the **Model** browser, **Feature** folder, right-click on **Dimension3** and select **Delete** from the context menu.

The feature Dimension3 and the parameter Dimension3 are deleted from the model.

### Step 9: Mesh the part.

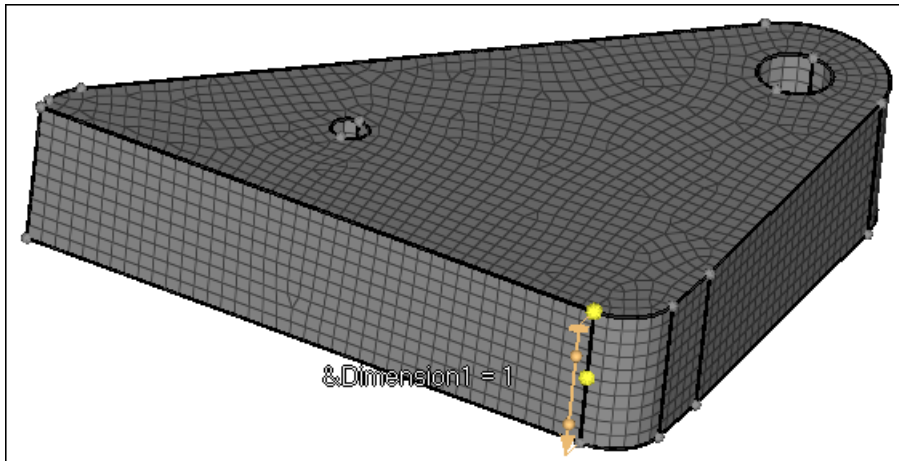
- Open the **2D AutoMesh** panel by clicking **Mesh > Create > 2D AutoMesh** from the menu bar, or by pressing **F12**.
- In the **element size** field, enter 0.1
- Click **surfs >> displayed**.
- Set the toggle from **interactive** to **automatic**.
- Click **mesh**. HyperMesh meshes the part.



- Exit the panel by clicking **return**.

**Step 8: Modify the dimensions with automatic remeshing enabled.**

1. Open the **Options** panel by pressing **O**.
2. Go to the **mesh** subpanel.
3. From the **topology revision** list, select **advanced remesh**.
4. Exit the panel.
5. In the **Model** browser, **Parameter** folder, click **Dimension1**.
6. In the **Entity Editor**, **Double value** field, change the value from 0.5 to 1.0.



7. In the **Model** browser, **Parameter** folder, click **Dimension2**.
  8. In the **Entity Editor**, **Double value** field, change the value from 0.25 to 0.5.
- The part is remeshed due to the increase in the hole's diameter.

