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## **Introduction**

### **DMU Viewer**

The DMU Viewer is a product that was designed for users who need to be able to view and analyze CATIA products but do not need to design them. The purpose of this course is to cover the tools that are available and provide a set of exercises to utilize these tools.

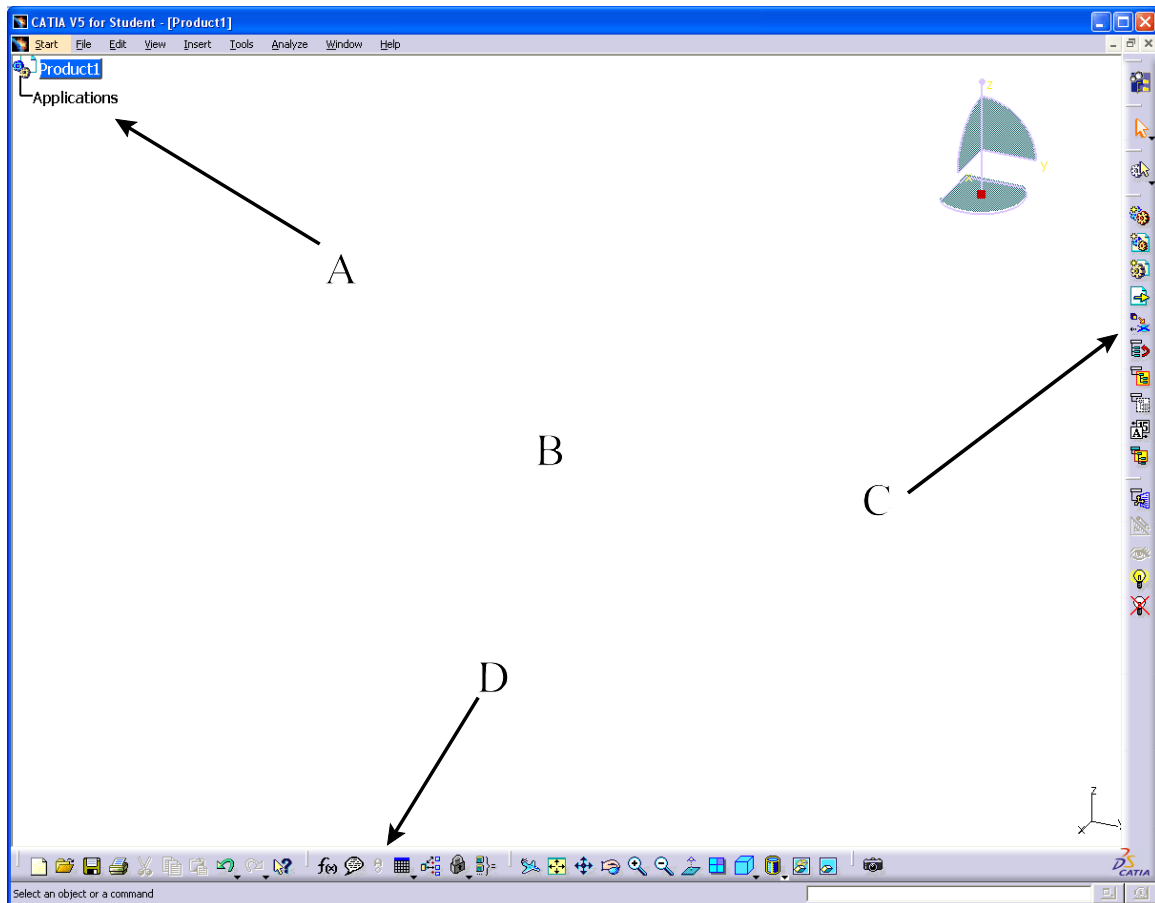
There are a number of workbenches that will be covered in this course. They include Product Structure, DMU Navigator, DMU Space Analysis, DMU 2D Viewer and DMU Tolerancing Review.

Upon completion of this course the student should have a full understanding of the following topics:

- Opening and manipulating products
- Using the specification tree
- Creating measurements
- Performing clash analysis
- Performing section analysis
- Creating markups on products
- Capturing pictures
- Playing simulations
- Viewing drawings
- Viewing functional tolerancing and dimensioning information

## Product Structure Introduction

This section is going to look into the different icons, menu items and window options that are involved with the Product Structure workbench. This workbench is primarily used to bring models into an assembly which is referred to as a product. Once the assembly is created, you can perform various analyses on the components as well as create markups and annotations.



### A Specification tree

This shows all of the parts loaded into the DMU Viewer. It will be in this area that you can identify the part number of parts selected from the workspace. It basically is a verbal representation of the Graphical Area.

### B Graphical Area

This will be the area where all of the geometry and models will be displayed.

### C Workbench

This column of tools will change as you go from one workbench to another.


### D Bottom Toolbar

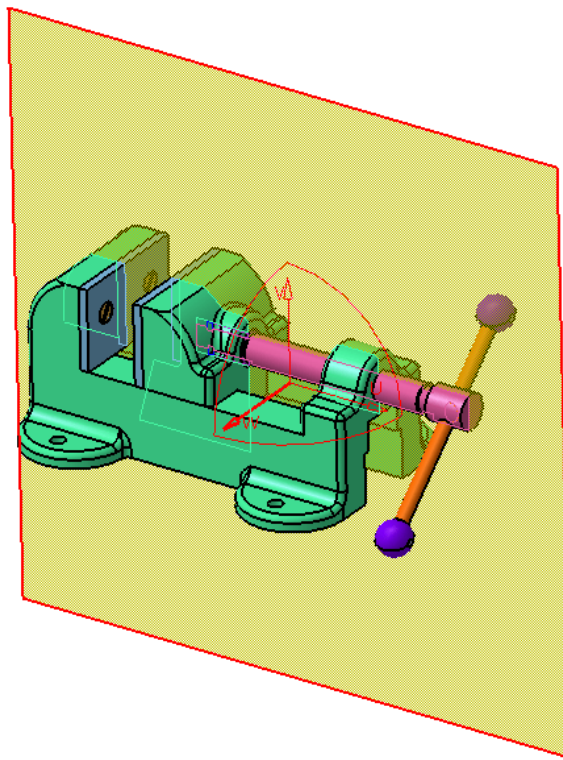
This toolbar holds all of the common tools that can be used from any workbench. However, some additional options may appear depending on which workbench you are in.

## Sectioning

Sectioning allows you to take a section cut and analyze the cut geometry. This can be very useful when you are looking for clearances and interferences between different geometry loaded into DMU Navigator.

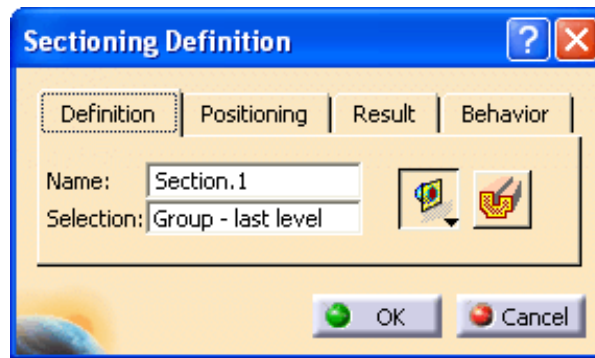
**Open the Machine Vise document located in the *Machine Vise* directory.** You do not have to create a new product and insert the models, because it has already been assembled in V5.

**Select the Sectioning icon.**  The *Sectioning Definition* window appears. This will create a section plane that will be shaded. You will also have a window that contains the section cut geometry.



The section plane will have a red axis system. This axis can be used to manipulate the section plane.

Look closely where the section plane intersects the geometry. Notice the contour outline, this is the same contour that is available in the other window.



### Definition

*Name* Gives your section analysis a name

*Selection* Objects that you want to perform a section analysis on



Uses a plane for the section analysis



Uses a slice for the section analysis

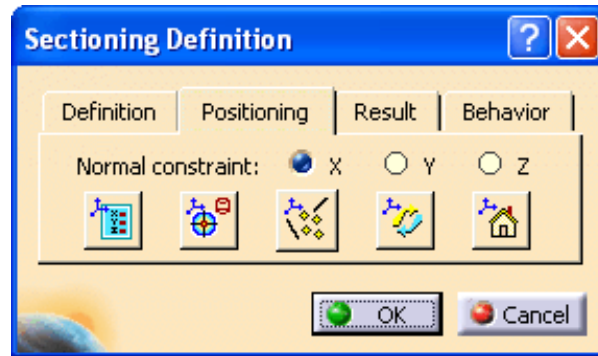


Uses a box for the section analysis



Cuts the volume with the section



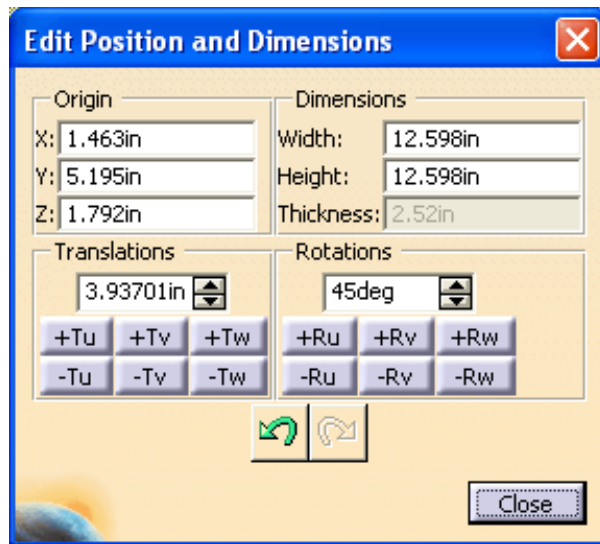


### Positioning

*Normal constraint* Specifies which axis the sectioning element will be normal to



Edits the position and size of the sectioning element



Defines position using a geometrical target



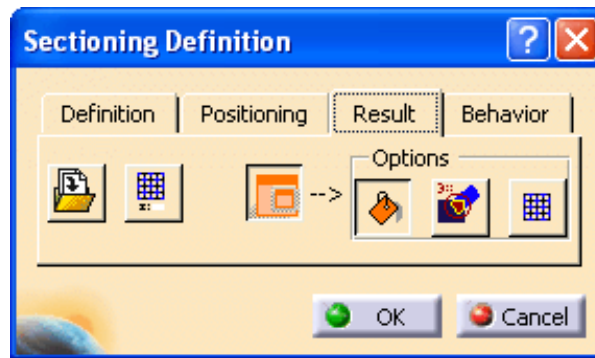
Defines position using 2 or 3 elements



Inverts the normal direction



Resets the position



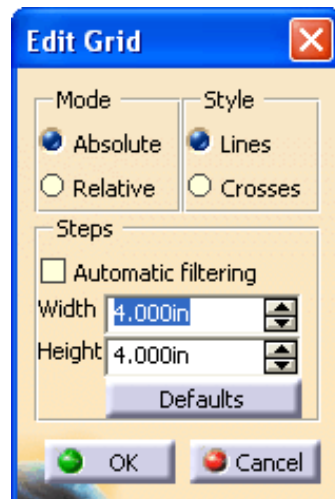
### Result



Exports the results



Edits the grid



Turns on and off the results window

### Options



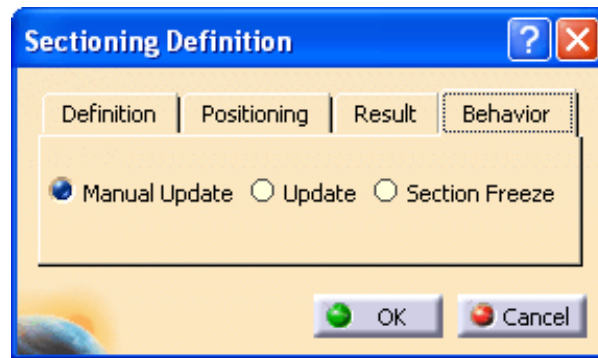
Turns on the section fill



Turns on clash detection




Turns on the grid



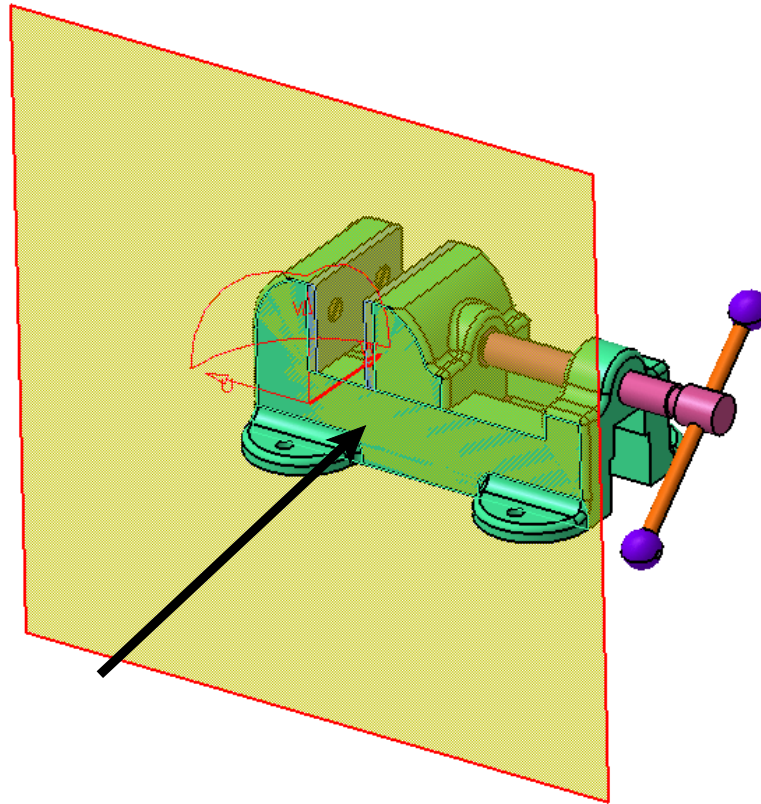
- Manual Update* Will not update the section results when parts are moved within the product such as with fitting simulation or kinematics, you will have to manually update the section results
- Update* Updates the section results when parts are moved automatically, this can slow down the response of the system
- Section Freeze* Keeps the section from changing when moving the sectioning element

To position the section plane, there are several options. The first option is to move the plane by a geometric target.


**Select the *Positioning* tab and select the Geometrical Target icon.**  This icon allows the section plane to be positioned by selecting geometry for the section plane to lie on.

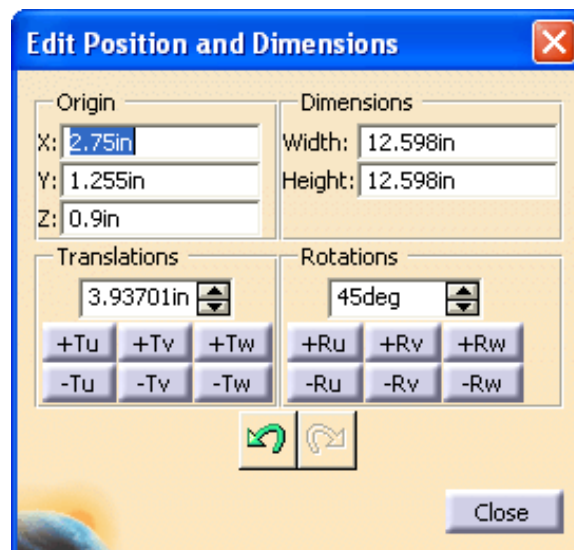
**Move the cursor over the part.** Notice that as you move the cursor over the part, a plane with an arrow appears. This indicates where the section plane will be moved to. At any time, if you press the left mouse button, the section plane will be moved to that location.

**Point to the face as shown and select the left mouse button.** This will indicate where you want the section plane located.



Moving the section plane by defining a geometric target is a good way to move the plane to a specific location. Sometimes though, you need a section plane located where you cannot select a geometric target. This is where the edit position and dimensions icon can be used.

Select the **Edit Position and Dimensions** icon.  This will bring up the *Edit Position and Dimensions* window. Using this window you can control the position of the plane using numerical values.



*Origin* Controls where the axis of the section plane is located

*Dimensions* Controls the size of the section plane. If you need a section cut from just a small area, for example, a small part within a large assembly, you can set the height and width of the section plane to control what gets cut and what is left alone.

*Translations* Allows incremental movements of the section plane to be made. By setting a translation step and then selecting one of the plus (+) or minus (-) translations along the X, Y, or Z direction, you can move the section plane a specific distance.

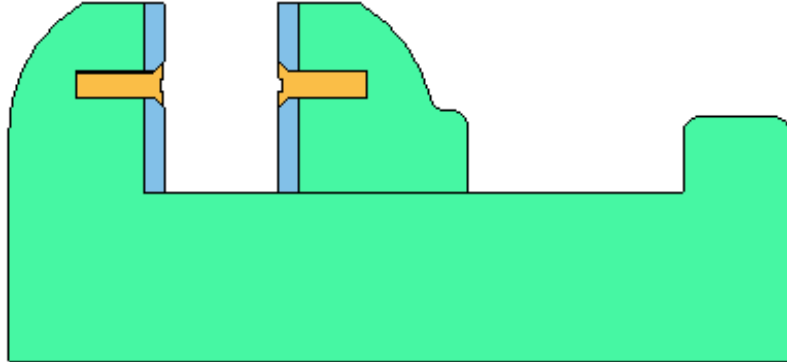
*Rotations* This is similar to the *Translations* area with the exception that the section plane is being rotated about a given axis instead of translated along the axis

At the bottom of the window there is also an undo and redo icon. This allows the section plane to be moved back to the previous location if a wrong move is made.

**Set a translation step size of 0.125 and rotation step size of 1.0.** This will allow the section plane to move in 1/8th inch increments and rotate in one degree increments about the axis. Take special note to the axis directions on the section plane. These axis directions will control the movement of the section plane as you translate and rotate it.


**Move the section plane farther into the model by selecting  $+Tw$ .** If by chance your positive Z axis is not toward the inside of the vise you will need to press  $-Tw$ . Notice the section plane moves and the section cut geometry changes. You can watch the resulting geometry that is being generated in the other window.

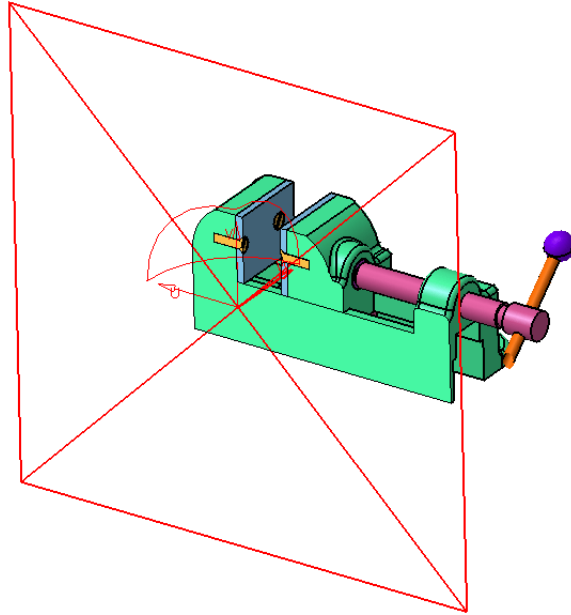
**Press  $+Tw$  four more times.** This should move the section plane so that it cuts across a set of screws. The results window should look something like the following.




**Select *Close* when done.** This will close the *Edit Position and Dimensions* window.

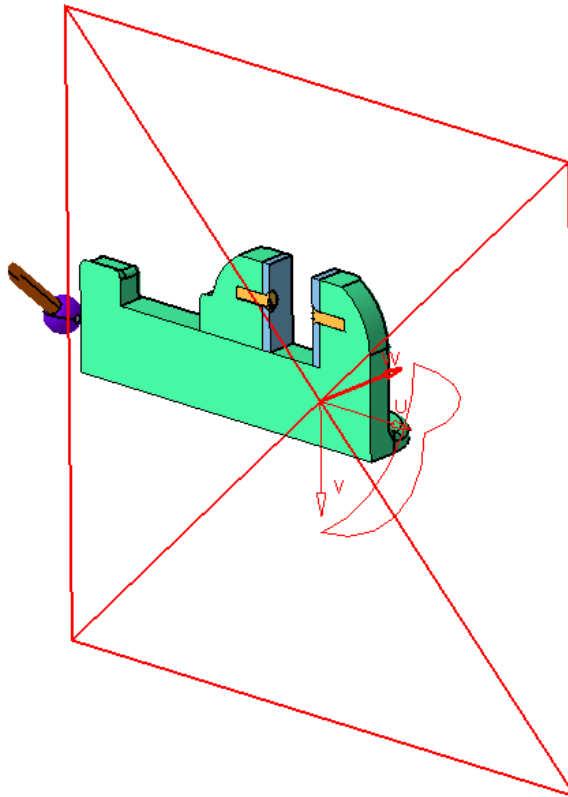
Sometimes it can be difficult to view the geometry, especially when it is within an assembly. There is an option to hide all of the extra geometry.

Select the *Definition* tab and select the Volume Cut icon.  This will cut or hide all the extra geometry behind the section plane.




Inverting the normal direction of the section cut plane can flip the side of the geometry that will be shown.

Select the **Positioning** tab and select the **Invert Normal** icon.  This will change the normal direction of the section plane. The geometry hidden will also be swapped accordingly. The image shown below is rotated around to look at the cut.



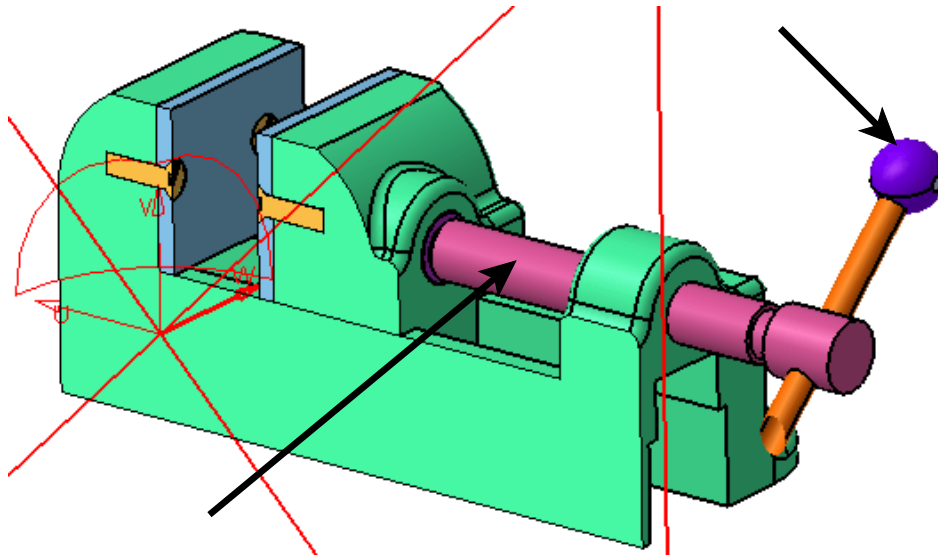
If the plane gets skewed out of proportions or becomes unusable in its current location, you can reset it back to the original position.

Select the **Reset Position** icon.  This will reset the plane to the original position that the plane started at.

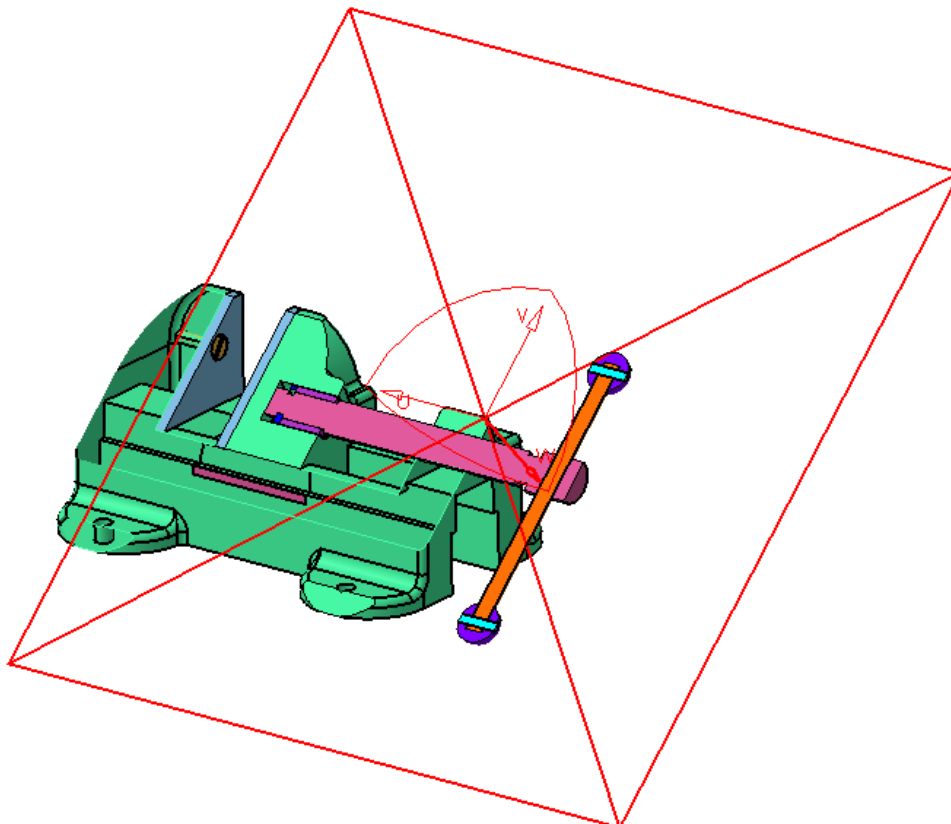
Select the **Positioning by 2/3 Selections** icon.  Now you need to select where you would like the plane to intersect.



Select the cylinder and the sphere as shown below in order to get a centerline and a center point as well. The plane will pass through the centerline and the point.




The plane should appear as shown.



**Change the Normal constraint to Y.** The normal of the plane changes to be in the Y direction.

**Select the Edit Position and Dimensions icon.**  The *Edit Position and Dimensions* window appears.

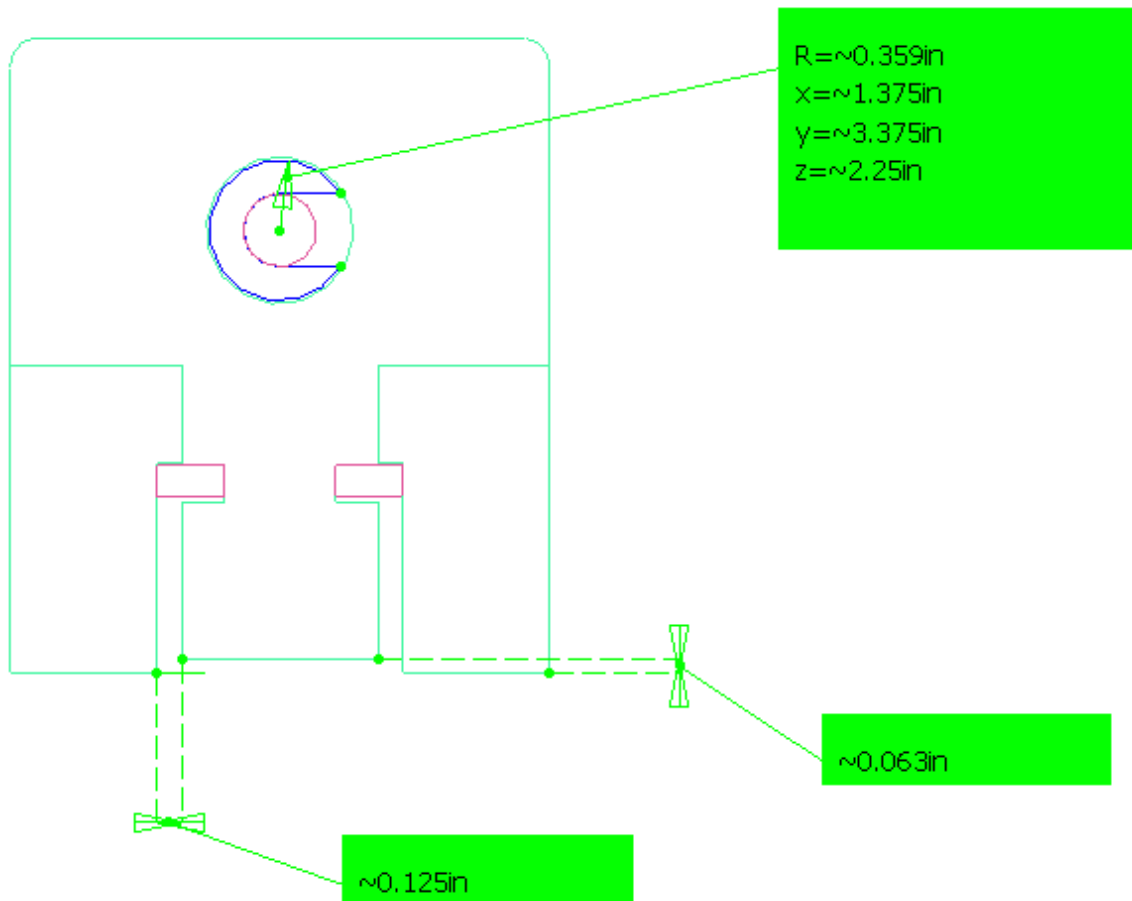
**Key in 0.0, 3.375, 0.0 for X, Y and Z respectively under the Origin section of the window and select Close.** The plane moves to that location.


**Select the Definition tab and turn off the Volume Cut.** 

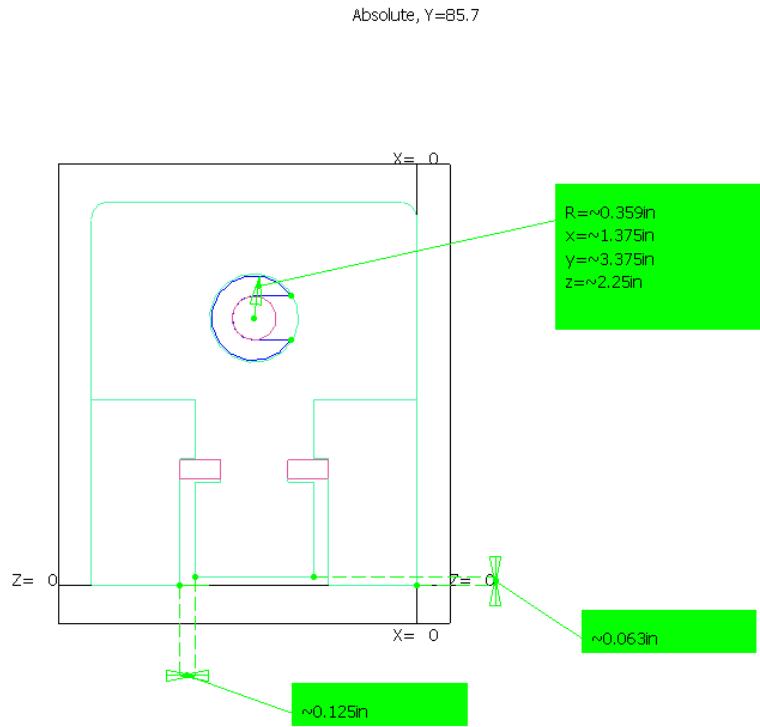
**Select the Result tab and turn off the Section Fill option.**  This removes the area fill in the results window.

You can create measurements within the section analysis.

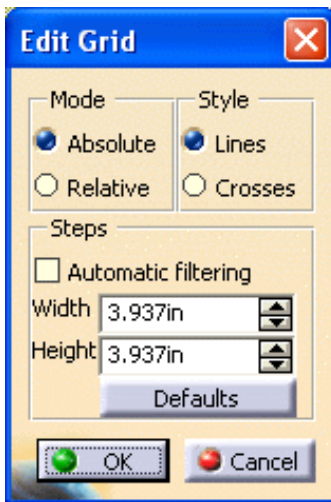
**Using the measurement icons, create the measurements within the results window as shown below.** Make sure you have *Keep measure* turned on. These measurements are stored within the section analysis and will not appear except in the results window. All of these measurements will be approximate since they are based off the section cut geometry.



Select the Grid icon.  This puts a grid on your section and you can edit the grid using the edit grid icon.

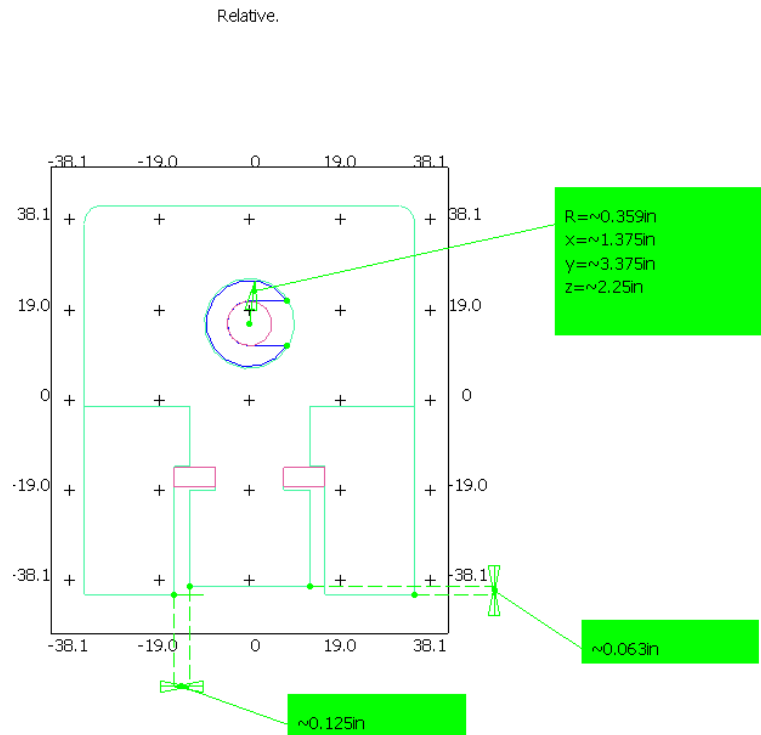


Select the Edit Grid icon.  The *Edit Grid* window appears.

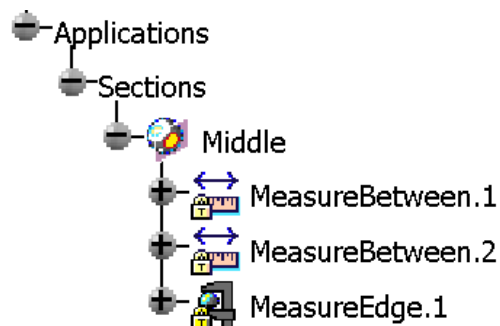


Change the *Mode* to *Relative* and the *Style* to *Crosses*.

Under *Steps*, change the *Width* to **0.75** and the *Height* to **0.75** and select **OK**. Each cross is 0.75 inches apart. You may notice that the values on the scale are shown in millimeters.



Under the *Definition* tab, change the *Name* to **Middle** and select **OK**. Go ahead and close the results window as well. The section analysis is stored in the *Sections* branch under the *Applications* branch. You can go back to the section analysis and see the results along with the measurements by double selecting the *Middle* section.



Using the first mouse button double select the *Middle* section from the specification tree. The results window appears with the grid and measurements.

Select **OK**. Close the results window and maximize the product window. If you look closely, you will see the section geometry in the graphical area. This can be hidden by hiding the section analysis.

**Hide the *Sections* branch.** You can select the branch and then select the hide/show icon.

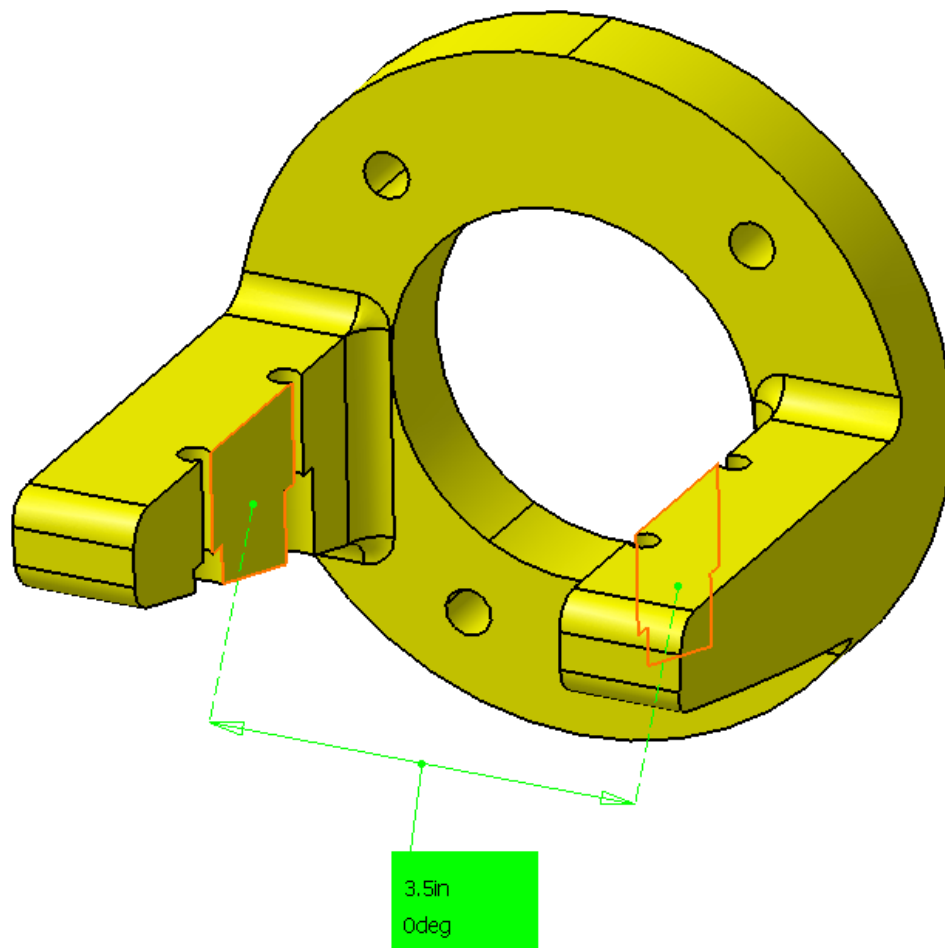
## Review

The following section will act as a review for the DMU Space Analysis workbench. Therefore, not all of the steps will be given. If you need to, you can refer back to the previous exercises for help.

**Start a new product and insert the Review model.** Again, it is not possible to just open the model. It is mandatory that the model is imported into the assembly even if it is only one model.

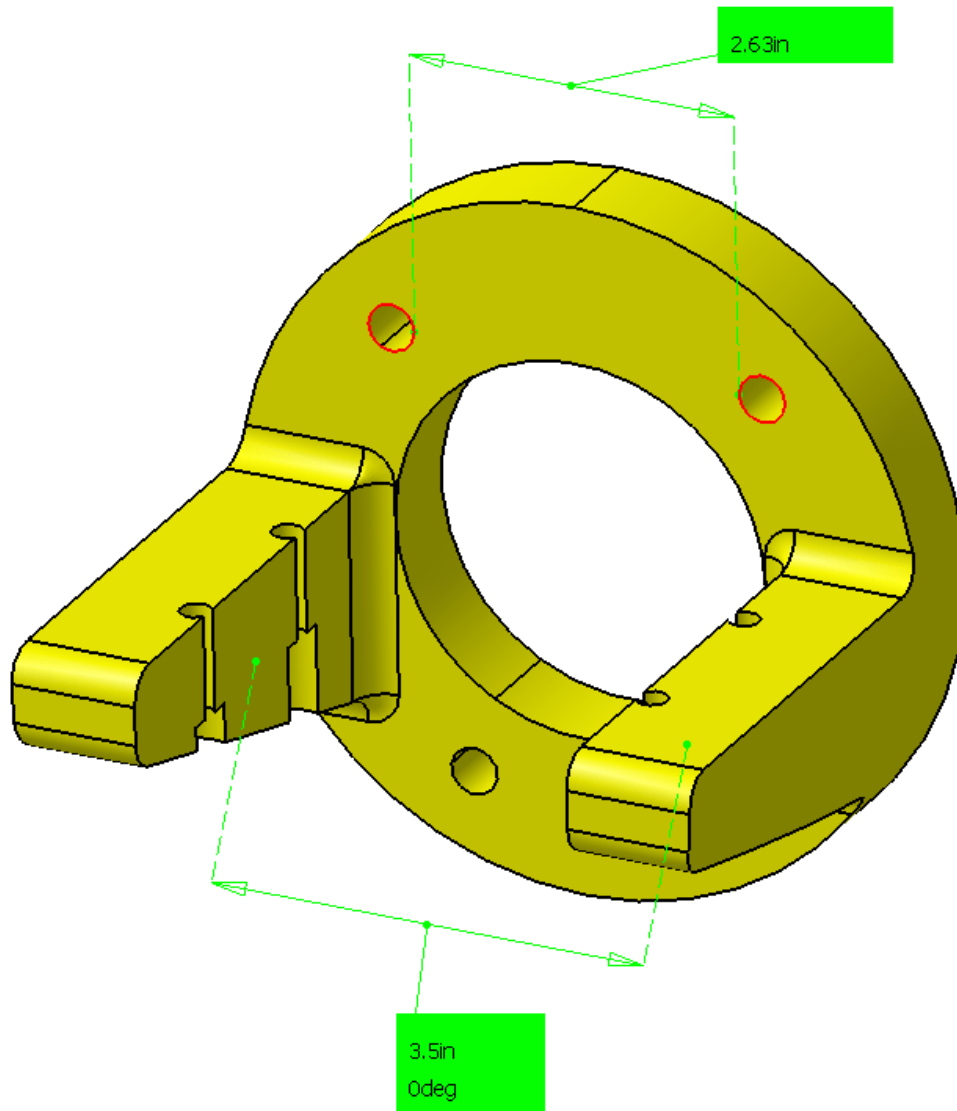
**Make sure you are in the DMU Space Analysis workbench.**

**Create a measurement between the two faces as shown below.**

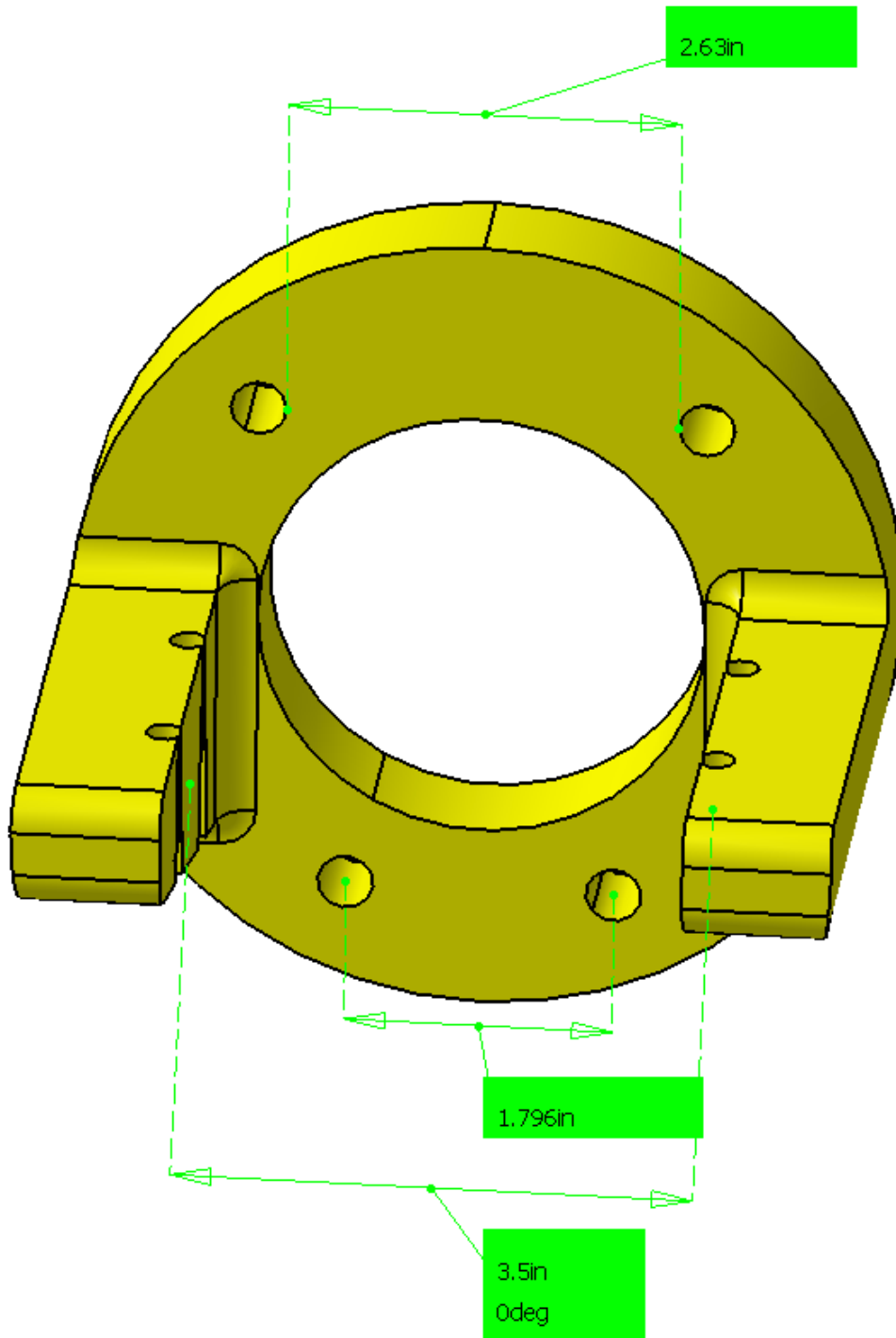


Move the dimension as necessary to keep a clear, concise picture. Also be sure to turn the *Keep Measure* option on otherwise you will not be able to view all the dimensions at once.

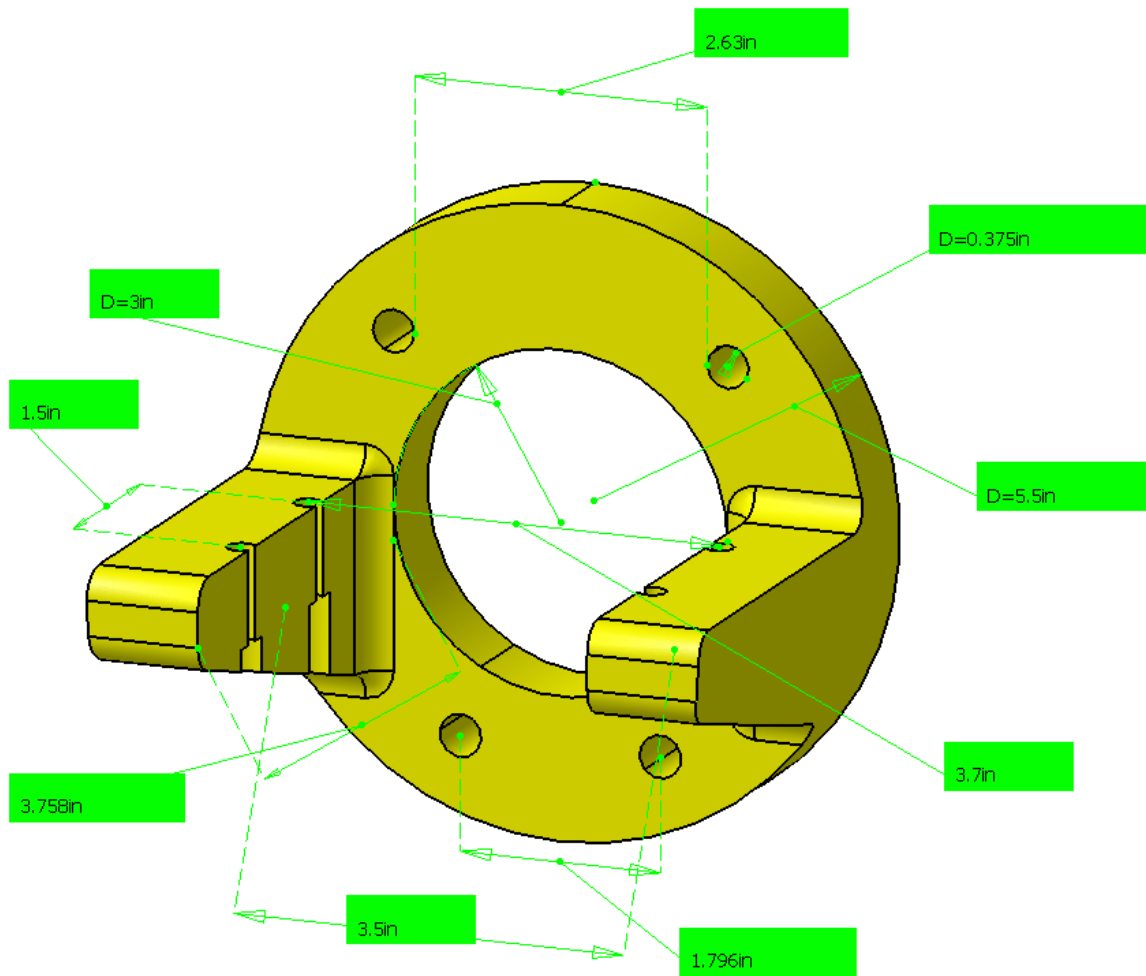
Create a measurement between the edges of the two circles as shown below. Take note where the measurement was made. The measurement goes from the hole edge to the other hole edge.



Create a measurement between the center points of the two circles as shown below.  
This time you are measuring from center to center.

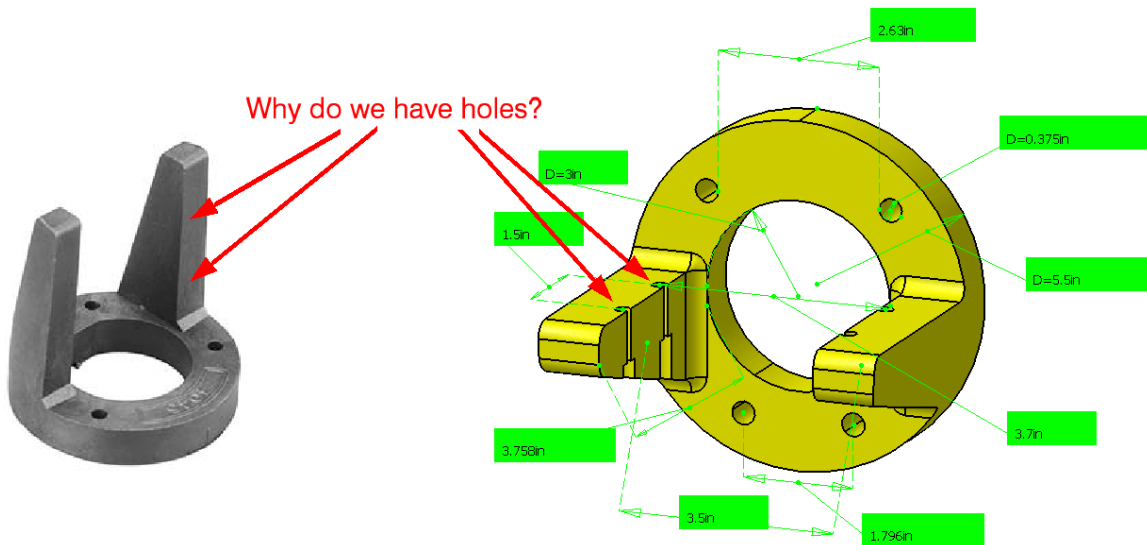


Create the following measurements and position them similar to the diagram shown below.





Create a 2D annotated view with the following markups. The picture is located in the *Images* directory.



Identifying a problem is only part of the task necessary. You also need to be able to relate that information to someone else. Unfortunately, not everyone has the capabilities of viewing the 2D annotated view in DMU. That is why it is sometimes necessary to create images or pictures of what you see in DMU and then send them to someone else.

**Change the name of the product to be Review.**

**Save and close the document.** Save it in your area with the same name.