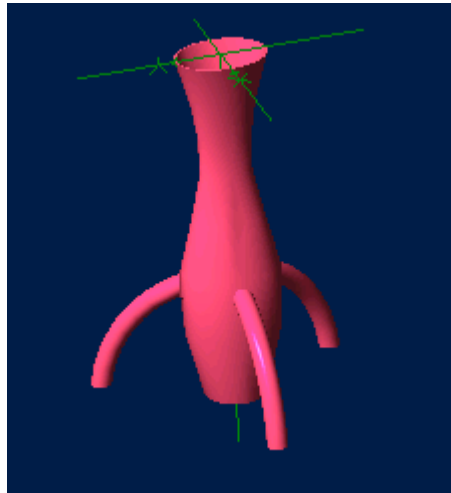


## Alibre Design Tutorial: Loft, Sweep, Pattern, & Shell Loft-Vase-1



### Part Tutorial

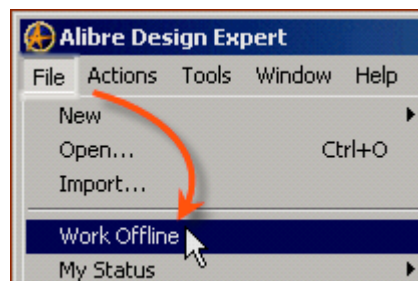
#### Exercise 6: Loft-Vase-1 [Complete]

In this Exercise, We will set System Parameters first, then part options. Then, in sketch mode, we will set the first four sketches of the vase for the loft, and loft them. Then the Sweep Feature to create the Legs, and Feature Pattern to create the three of them. Then Shell to hollow out the vase and the legs. Setting the Color Properties will follow this. Finally, we will insert and view a 3D Section, and Save the Loft-Vase-1 file.

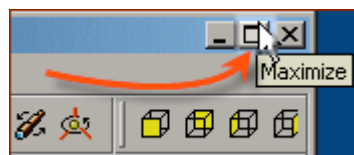
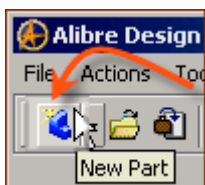
#### Launch Alibre Design.

From the Home window - select **File, Work Offline**. (You may switch to work online later.)

(Also - Even though these pictures show 'Alibre Design Expert' - these are basic instructions that can be done without Professional or Expert Versions.)

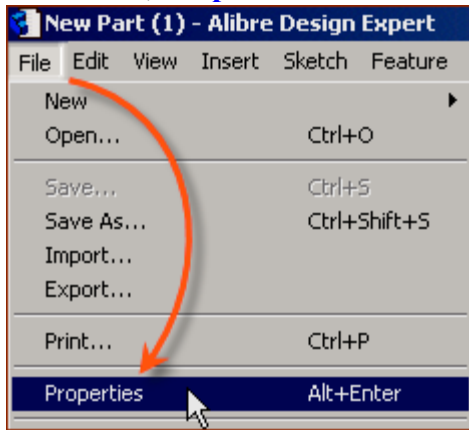


Open a **New Part** workspace. From the Home window - click on the **New Part** icon.  
Maximise the Part Workspace Window.



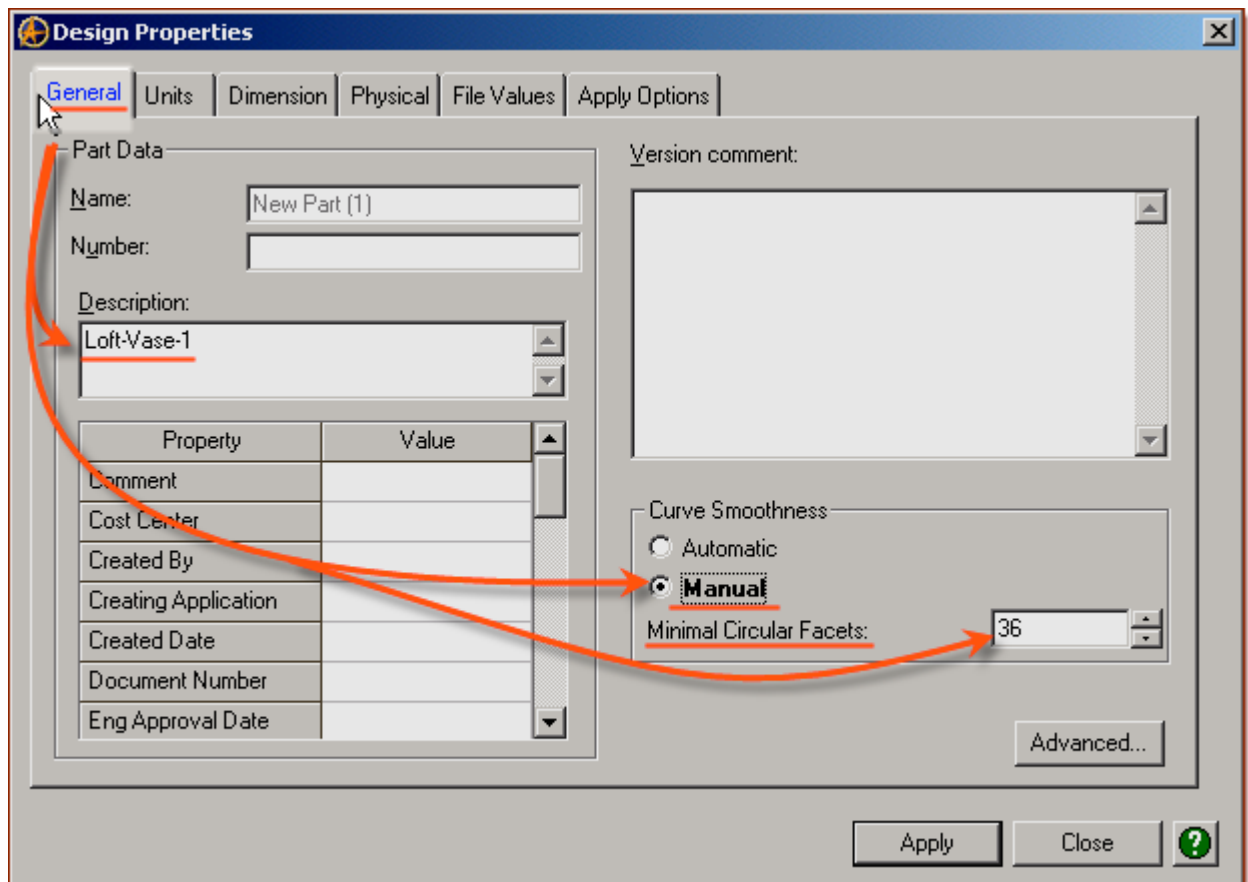
## Set Design Properties.

Select **File, Properties**.



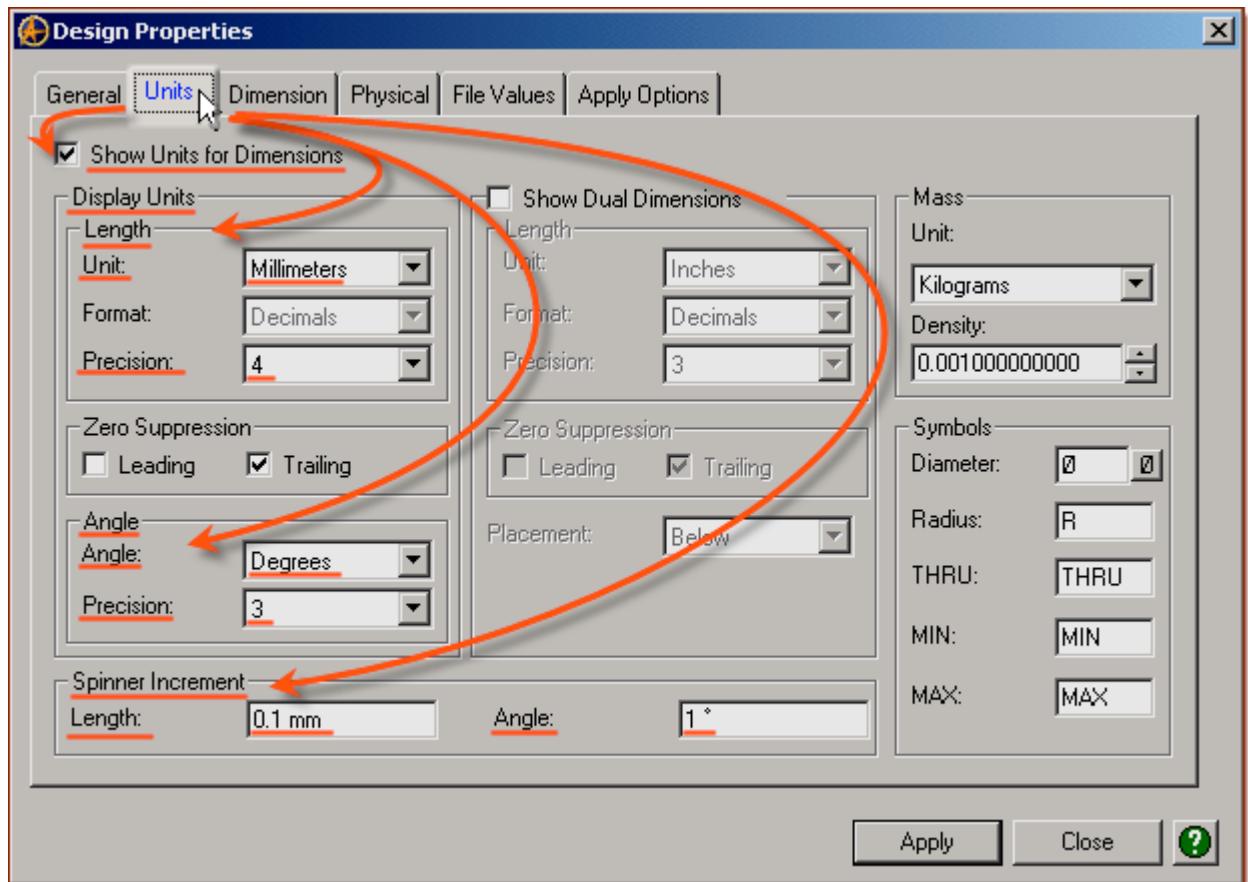
### A) Select the Tab Marked "General"

- In **Description**: insert the information: 'Loft-Vase-1'.
- In **Curve Smoothness**, Select the Radio Button marked 'Manual'.
- Set **Minimal Circular Facets**: to 36.



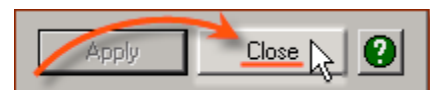
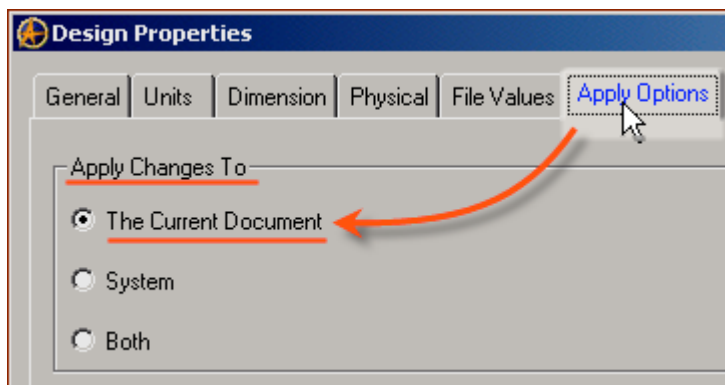
**B) Select the Tab Marked "Units"**

- Check (*check mark in box is showing*) the Box **Show Units for Dimensions**.
- On **Display Units** - confirm **Unit:** Millimeters, and **Precision:** 4.
- On **Angle** - Confirm **Angle:** Degrees and **Precision:** 3. Adjust if not.
- On **Spinner Increment** - for **Length:** enter 0.1mm and for **Angle:** enter 1 degrees. Adjust to these parameters if not. Press 'Tab' to move after editing them.



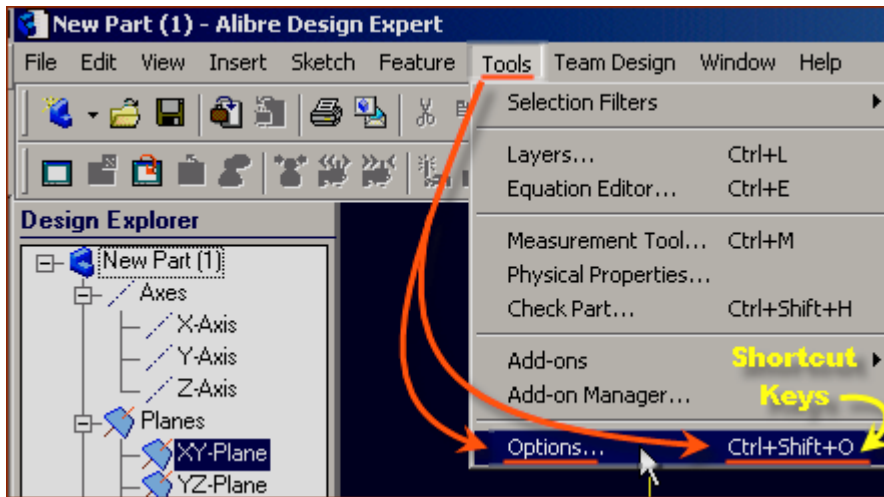
**C) Select the Tab Marked "Apply Options"**

- On **Apply Changes to** - Click the Radio Button beside **The Current Document**.
- Click **Apply**, then Click **Close**.



## Set Part Options.

From Top Text Menu - Select - **Tools > Options > (Ctrl-Shift-O)**



**General** Tab > Selected or checked off (*check off = check mark in box*) are:

**Global** - Show popup on errors,

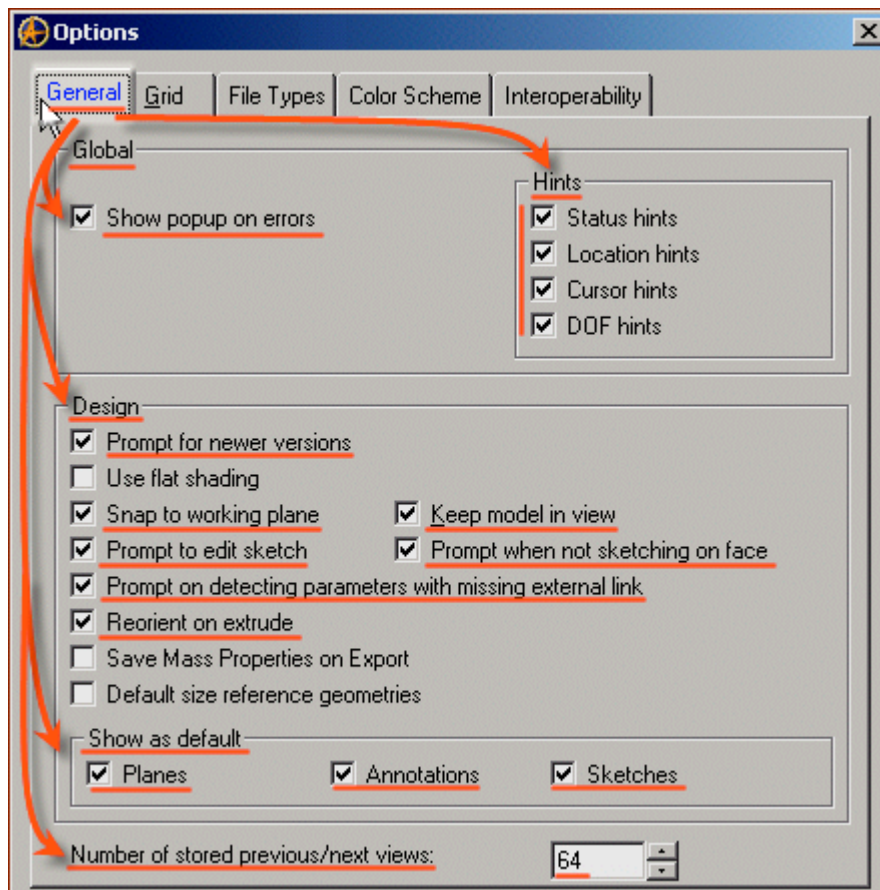
**Hints** - All

**Design**

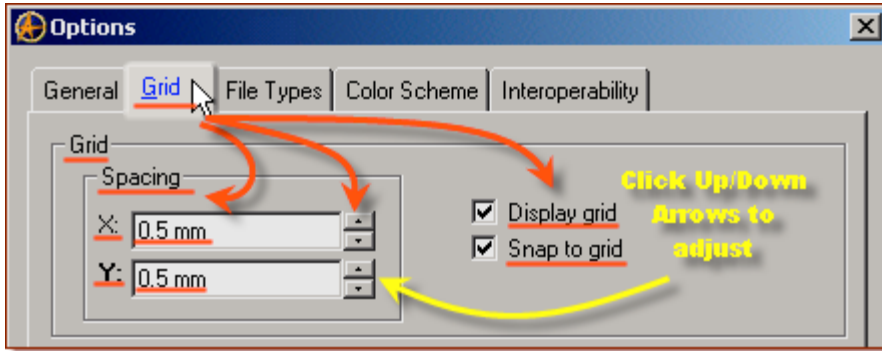
- Prompt for newer versions, - Snap to working plane, - Prompt to edit sketch,
- Prompt on detecting parameters with missing external link, - Reorient on extrude,
- Keep model in View, - Prompt when not sketching on face.

**Show as Default** - Planes, Annotations, and Sketches.

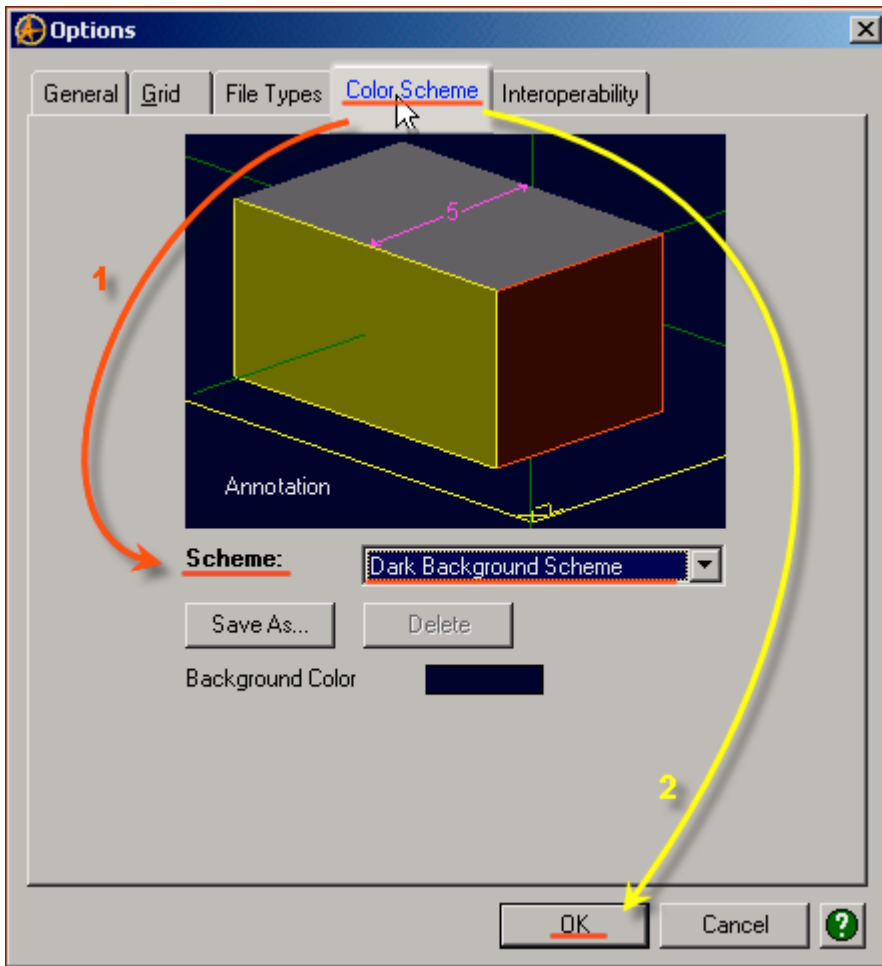
Number of stored previous/next views: 64



**Grid** Tab> Spacing: Make X: 0.5 mm and Y: 0.5 mm, check off Display grid, and Snap to grid.



**Color Scheme** Tab> For Scheme: - confirm - Dark Background Scheme. Click 'OK'.  
(You may come back to this at any time later - and edit - or change - any element.)

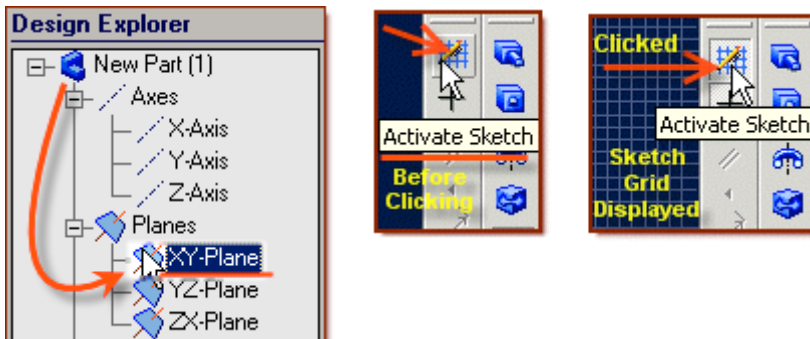


**Continue, Starting to create the sketches.**

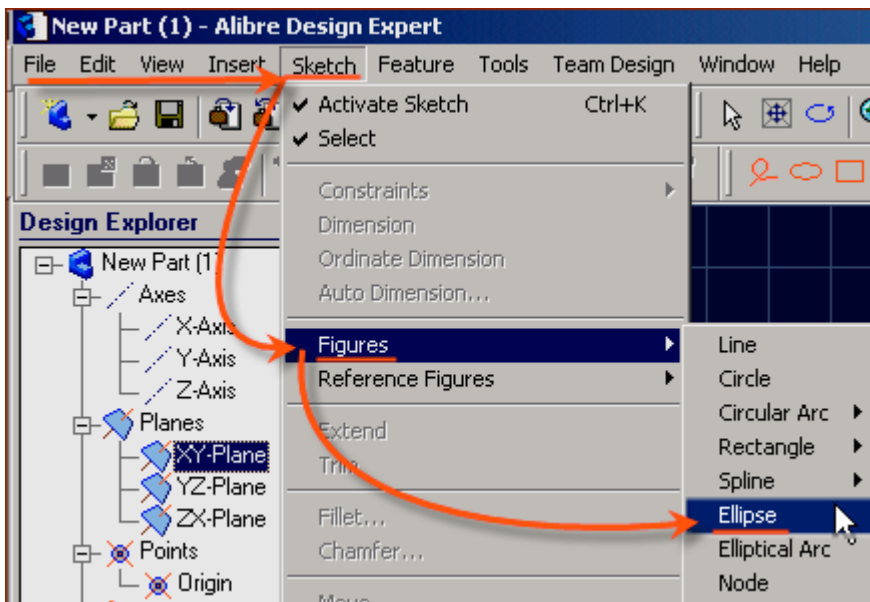
## Create the First Loft Sketch.

From the Sketch Icons > Click **Activate Sketch**.

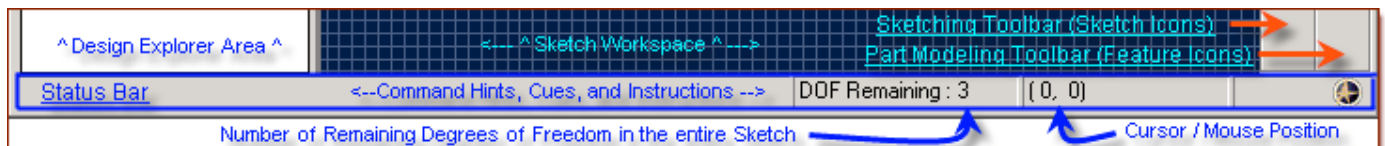
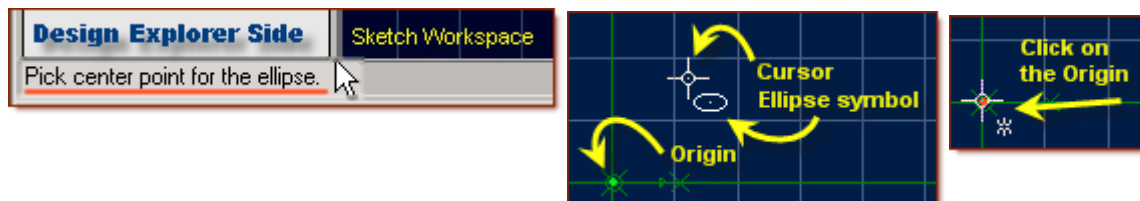
(Note in the Design Explorer, XY-Plane should be selected.)



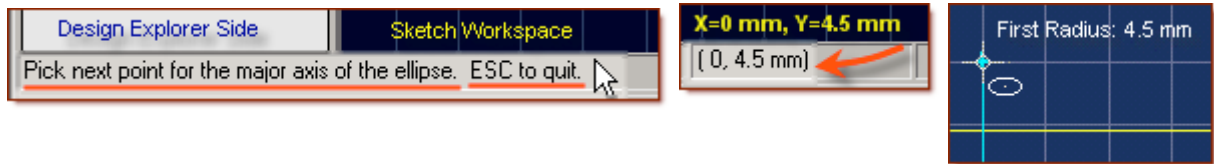
From the Main Menu, Select **Sketch > Figures > Ellipse**.



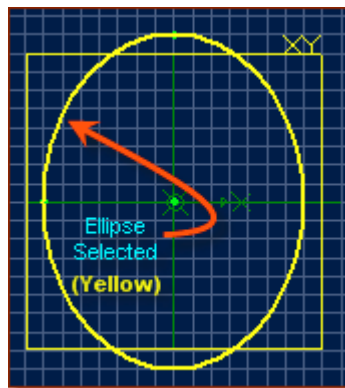
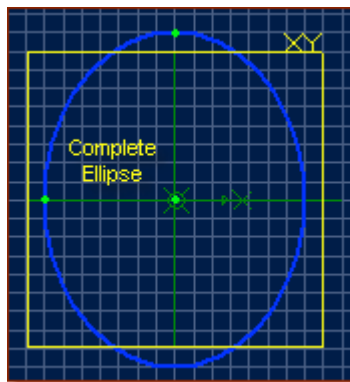
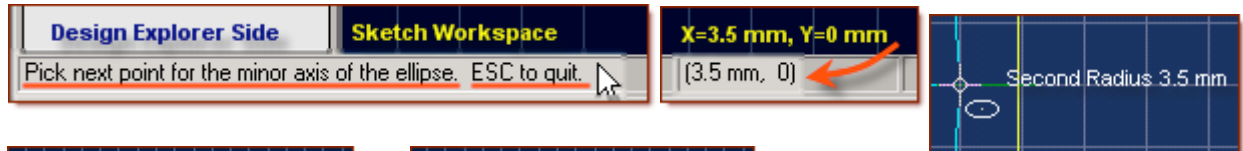
- As per the hint line at the bottom of the workspace "*Pick a Center point for the ellipse*" - Click on the **Origin**.



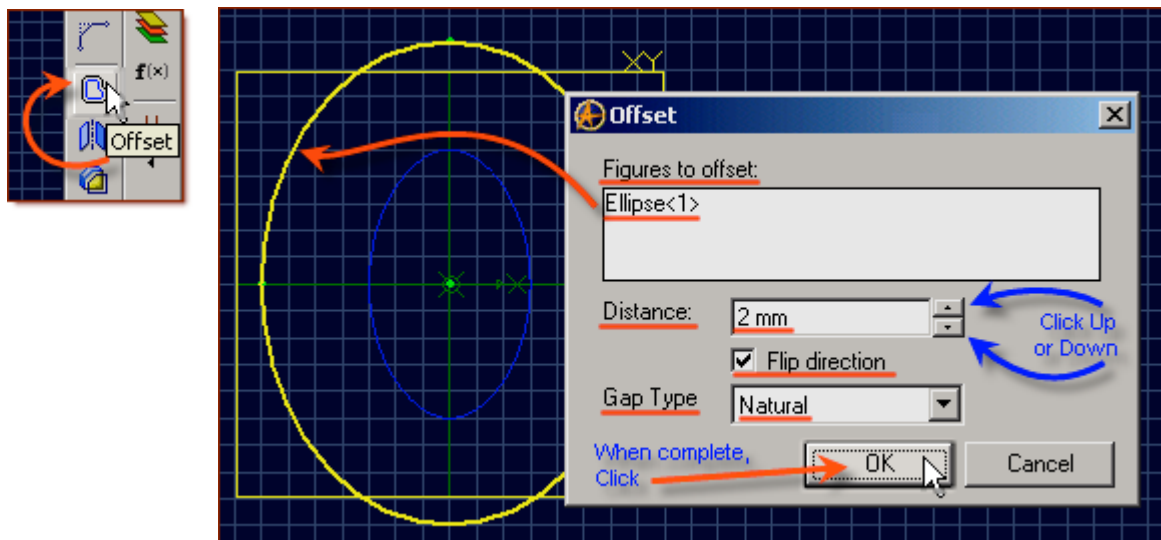
- As per the hint line "Pick next point for the major axis of the ellipse. ESC to quit" - drag up the Y-Axis to a distance of 4.5 mm, Click,



- As per the hint line "Pick next point for the minor axis of the ellipse" - drag right along the X-Axis to a distance of 3.5 mm, Click. Press Control+A (Ctrl-A) to select the Ellipse created.



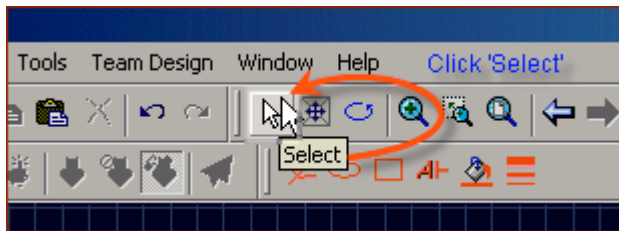
- From the Sketch Icons, Click Offset.
- In the Offset Popup, Figures to offset: should be defaulted at Ellipse<1>
- Set Distance: to 2 mm, and if new line is not inside selected ellipse, select Flip direction.
- Leave Gap Type as Natural, and Click OK.



- Click the new **ellipse**, to select it, and press Ctrl-X to **delete** it and place it on the clipboard.



**From the top Icons, click on **Select** (Beside Undo and Redo Icons) to exit sketch mode.**  
*(Sketch<1> appears below Features in the Design Explorer)*

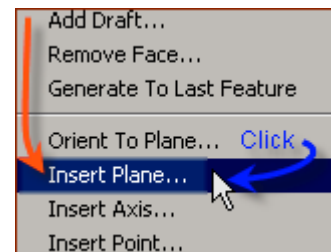
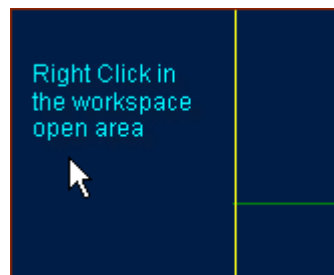
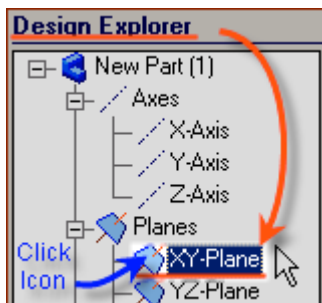


**This Completes Sketch<1>**

## Create the Second Loft Sketch.

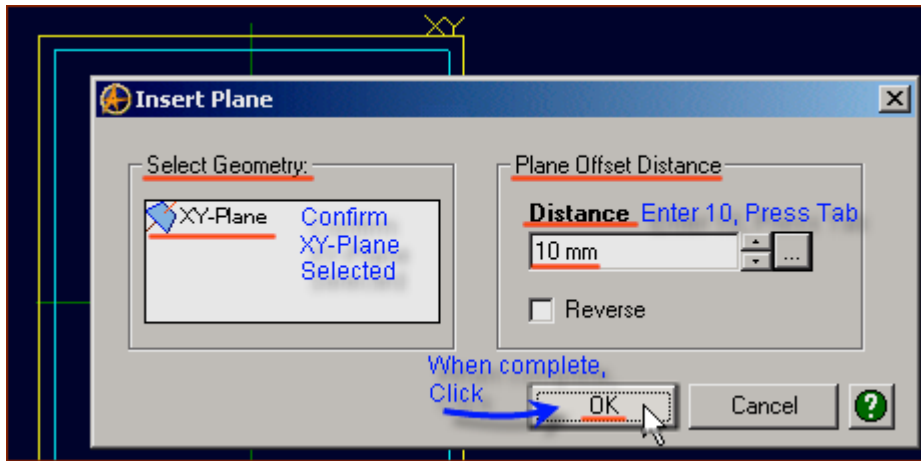
**First - Insert a new plane to place the next sketch on.**

- Left Click the **XY-Plane** in the **workspace** or in the **Design Explorer**.
- Then, Right-Click in the workspace open area (away from any selectable planes, axis, etc.)
- Select **Insert Plane** from the drop-down menu.

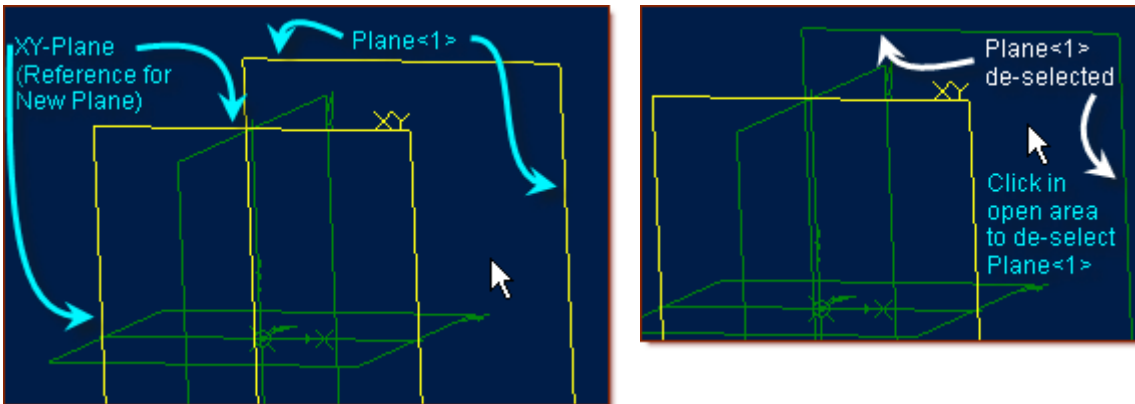




- In the **Insert Plane** popup, confirm the **XY-Plane** is displayed in the **Select Geometry** window, or else re-click on it now.
- For the **Plane Offset Distance**, Set **Distance** to **10 mm** (*Highlight '0', enter 10, Press Tab*)
- Click **OK**. **Plane<1>** is created.

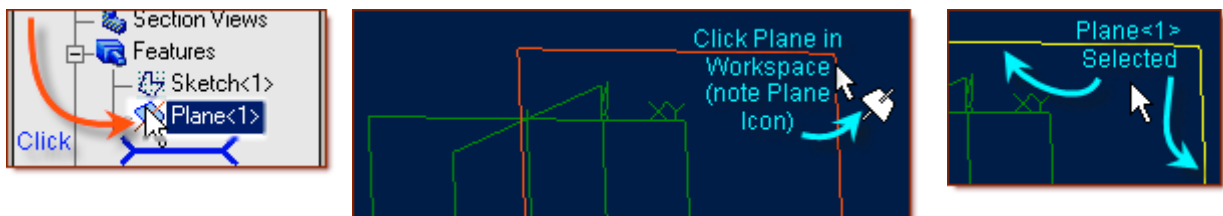


- Rotate viewing area to see both planes (left & right Mouse buttons held down, and drag mouse). Click off in the open workspace again, to de-select it.

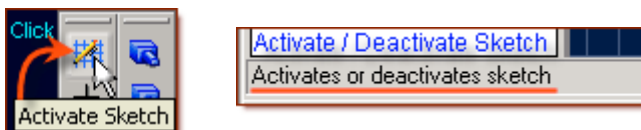


**Next - Create the Sketch for the second part of the Lofted Vase. (*Select Plane<1>*)**

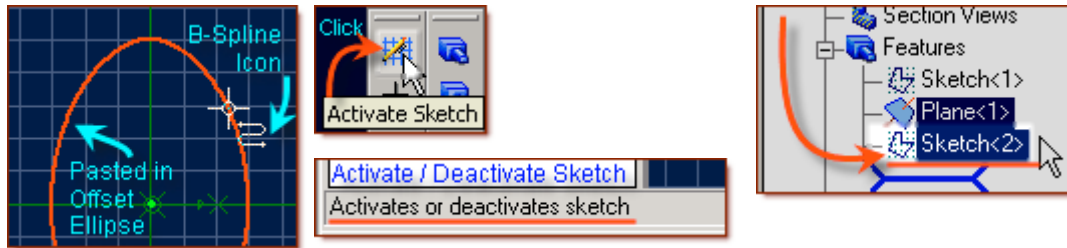
- Click the new Plane (**Plane<1>**) in the design Explorer, or in the workspace.



- From the **Sketch Icons**, Click **Activate Sketch**. (*Note - This either enters or exits sketch mode*)



- When the **Sketch Workspace** opens, press Ctrl-V to paste the previously deleted offset ellipse. *(When the cursor is over the pasted sketch, it will show the icon for B-Spline now, instead of Ellipse. This happens when creating an offset from the ellipse.)*
- This will create the content for the next sketch (**Sketch<2>**).
- From the **Sketch Icons**, Click **Activate Sketch**. *(Note - This either enters or exits sketch mode)*  
*(Note - Sketch<2> is attached to Plane<1> and both are highlighted.)*

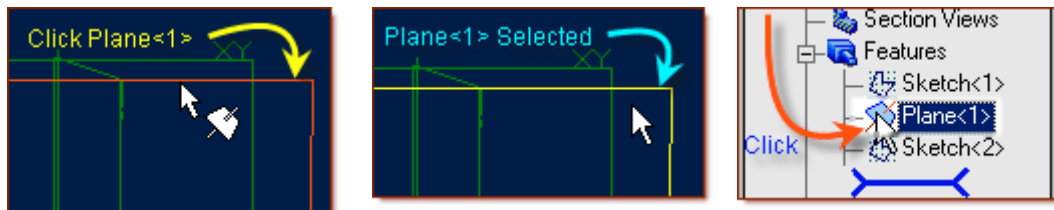


**This Completes Sketch<2>**

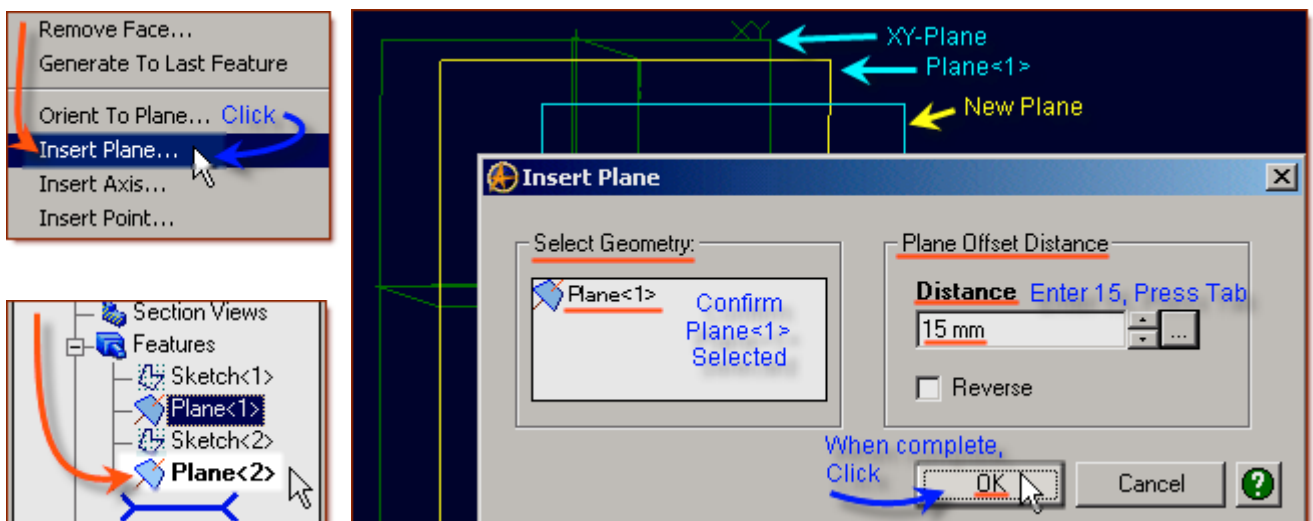
### Create the Third Loft Sketch.

**First - Insert a new plane to place the next sketch on.**

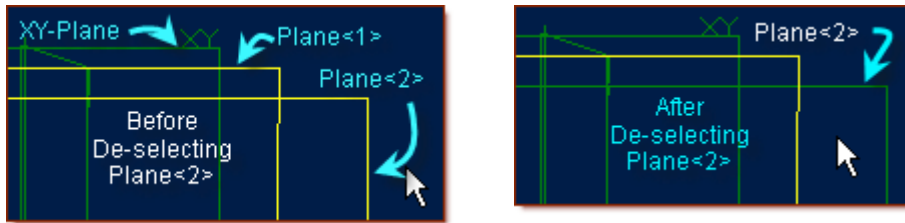
- Click the new Plane (**Plane<1>**) in the **workspace** or in the **Design Explorer**.



- Then, Right-Click in the workspace open area (away from any selectable planes, axis, etc.)
- Select **Insert Plane** from the menu.
- In the **Insert Plane** popup, confirm the **Plane<1>** is displayed in the **Select Geometry** window; or else re-click on it now.
- For the **Plane Offset Distance**, Set **Distance** to **15 mm** *(Enter 15, Press Tab. New Plane Shows)*
- Click **OK**. **Plane<2>** is created.

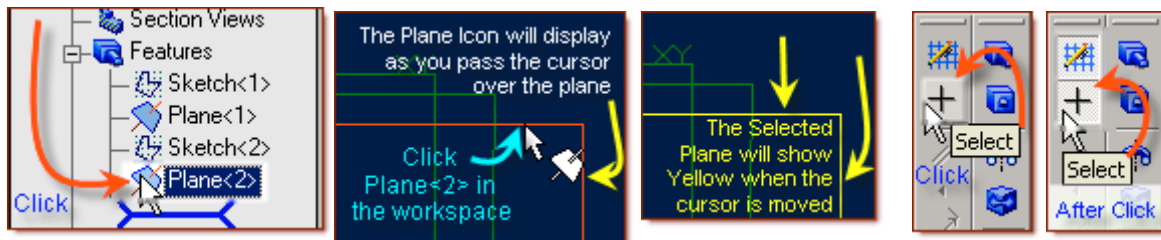


- Rotate viewing area to see both planes (left & right Mouse buttons held down, and drag mouse). Click off in the open workspace again, to de-select it.

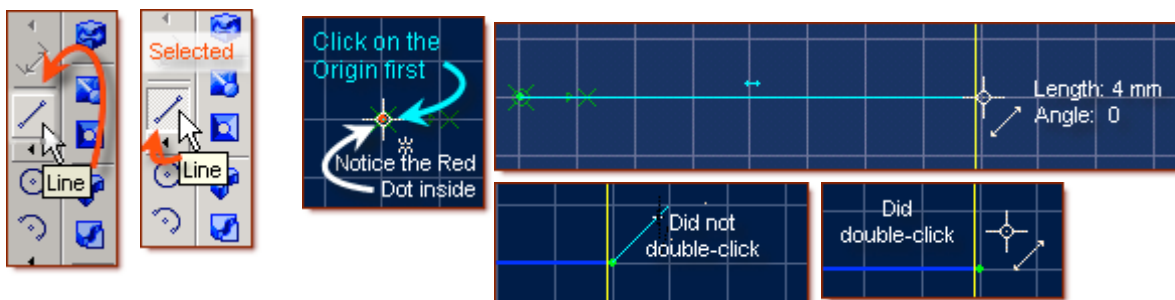


**Next - Create the Sketch for the third part of the Lofted Vase. (*Select Plane<2>*)**

- Click the new Plane (**Plane<2>**) and from the **Sketch Icons**, Click **Select**.



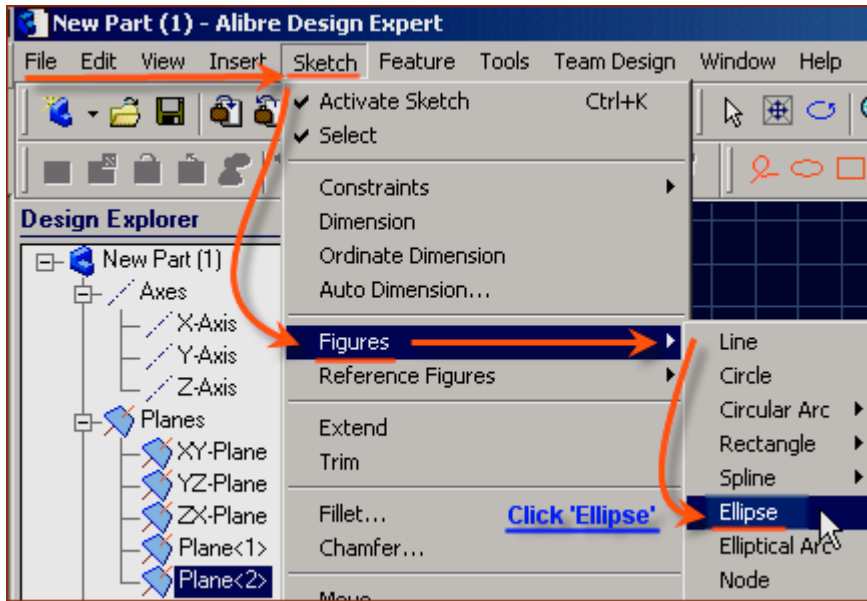
- From the **Sketch Icons**, select **Line**.
- Click on the **Origin**, and move right along the **X-Axis** to **4.0**, Double-Click to end the line. (*If you failed to correctly double click - when you move away - the line will show a light blue line between the last point - and the cursor, simple press the Esc key. To exit this line.*)



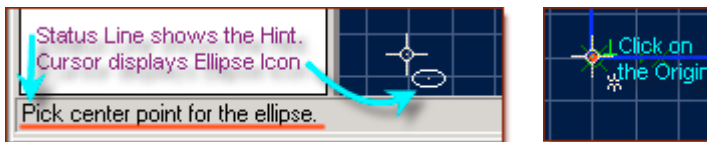
- Click again on the **Origin**, and move up along the **Y-Axis** to **5.0**, Double Click to end the line. (*These two lines will be used to make it easy to know you are placing the ellipse major and minor axis at the correct distance.*)



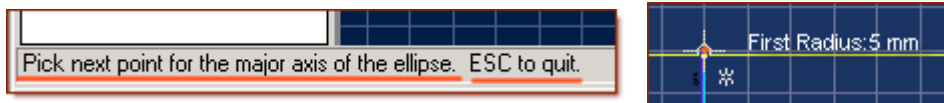
- From the Main Menu, Select **Sketch**> **Figures**> **Ellipse**.



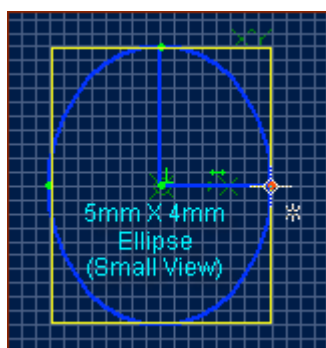
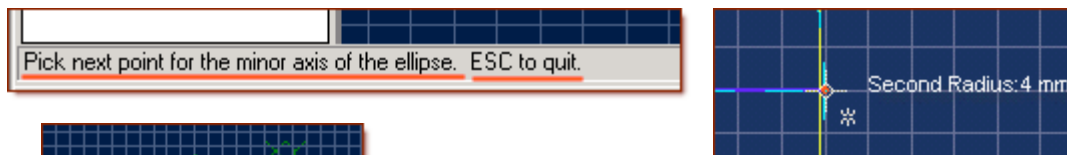
- As per the hint line "*Pick a Center point for the ellipse*" - Click on the **Origin**.



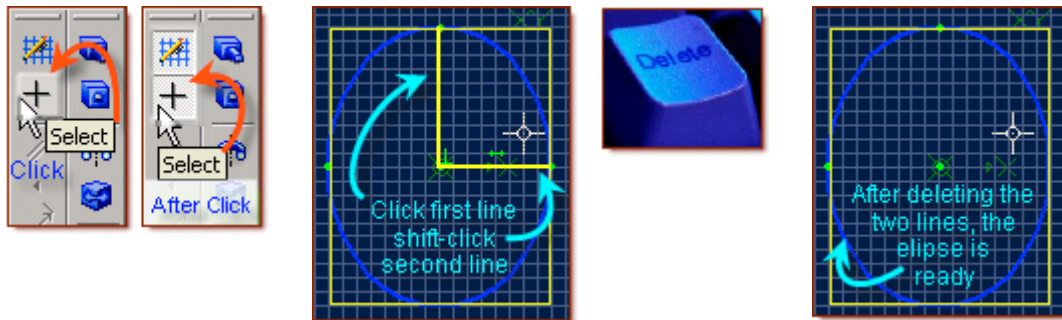
- As per the hint line "*Pick next point for the major axis of the ellipse*" - drag up the **Y-Axis** to the end of the vertical line, and when the cursor symbol changes to indicate it is over the end of the line, Click. (*The cursor changes from an ellipse symbol - to a figure like an Asterisk [\*]*)



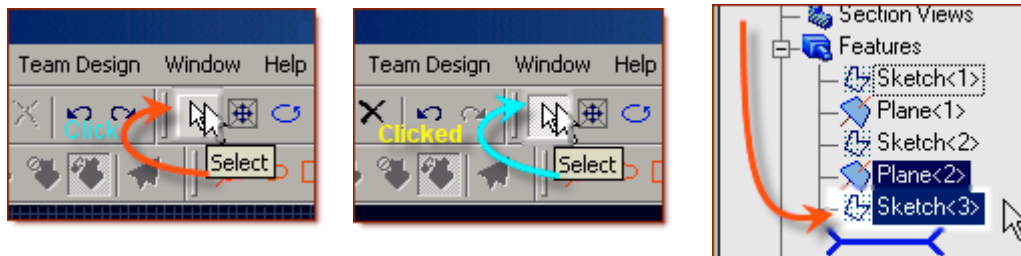
- As per the hint line "*Pick next point for the minor axis of the ellipse*" - drag right along the **X-Axis** to the end of the Horizontal line, and when the cursor symbol changes to indicate it is over the end of the line, Click. (*This creates the 5 x 4 ellipse*)



- From the **Sketch Icons**, Click **Select**.
- Now - click on the vertical line, and shift-click on the horizontal line. (They are both yellow)
- Press the **Delete** Key on the keyboard to delete them both.



- This will complete the content for the next sketch (**Sketch<3>**)
- From the top row toolbar Icons, Click on **Select** to exit Sketch mode.
- **Sketch<3>** shows up in the **Design Explorer**.

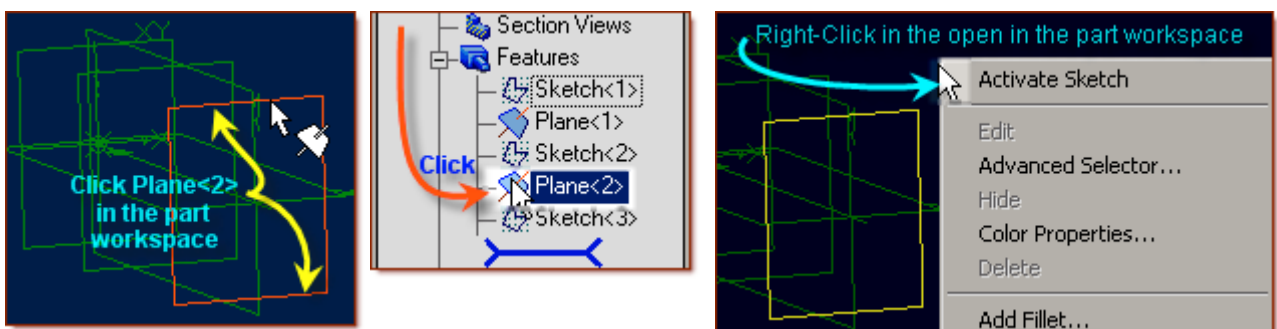


**This Completes Sketch<3>**

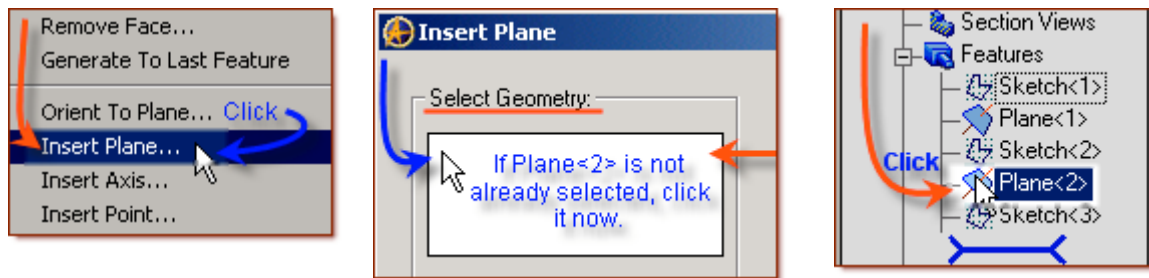
## Create the Fourth Loft Sketch.

**First - Insert a new plane to place the next sketch on.**

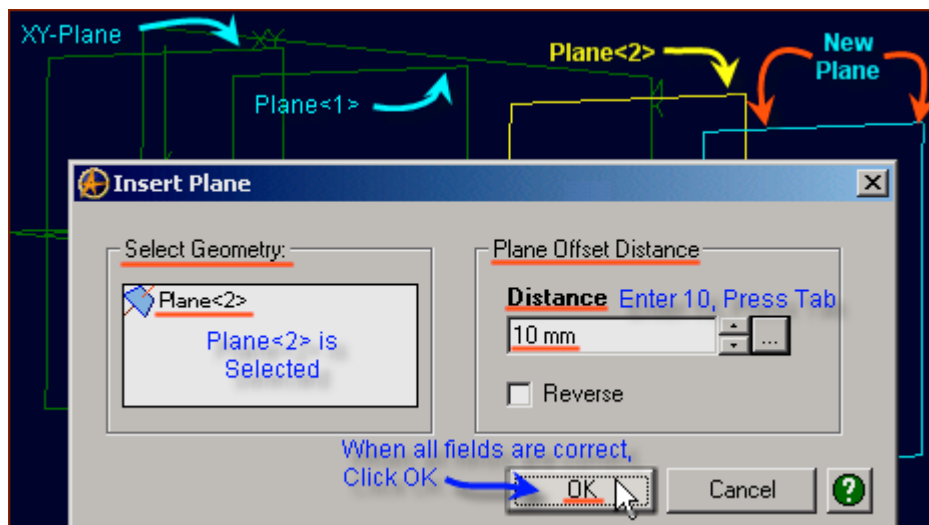
- Rotate the view in the **part workspace** by left & right clicking on the mouse and dragging.
- Click **Plane<2>** in the **part workspace** or in the **Design Explorer**.
- Then, Right-Click in the **part workspace** open area (away from any selectable planes, axis, etc.)



- Select **Insert Plane** from the menu.
- In the **Insert Plane** popup, confirm the **Plane<2>** is displayed in the **Select Geometry** window; or else re-click on it now.



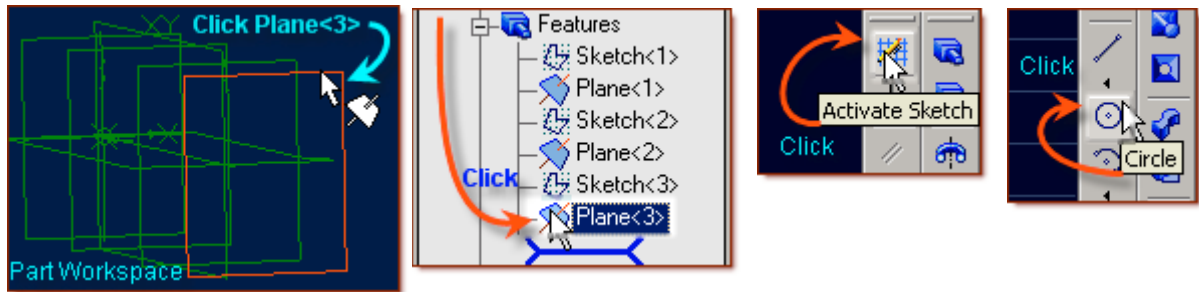
- For the **Plane Offset Distance**, Set **Distance** to **10 mm** (*Enter 10, Press Tab*)
- A **New Plane** is displayed in **Light blue**. Its location may be changed by clicking Reverse, and by editing the distance. (*Leave it set how it is for now*)
- Click **OK**. **Plane<3>** is created. Then Click off in the workspace again, to de-select it.



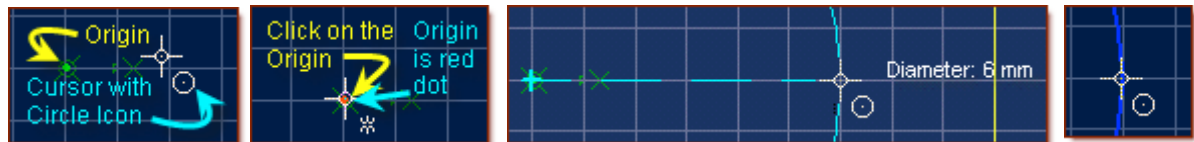
- Continue to create the last Sketch required for the Vase.

Next - Create the Sketch for the fourth part of the Lofted Vase. (*Select Plane<3>*)

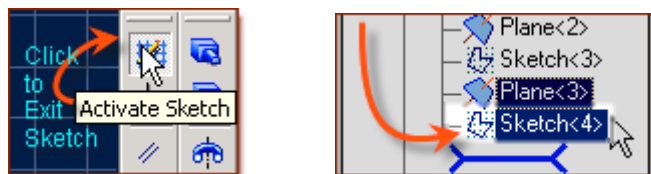
- Click the new Plane (**Plane<3>**) in the **workspace** or in the **Design Explorer**.
- From the **Sketch Icons**, Click **Activate Sketch**.
- From the **Sketch Icons**, select **Circle**



- Click on the **Origin**, and move right along the **X-Axis** until the Diameter is 6mm, Click.



- From the **Sketch Icons**, Click **Activate Sketch**, to exit Sketch Mode.
- This results in **Sketch<4>** now showing in the **Design Explorer**.

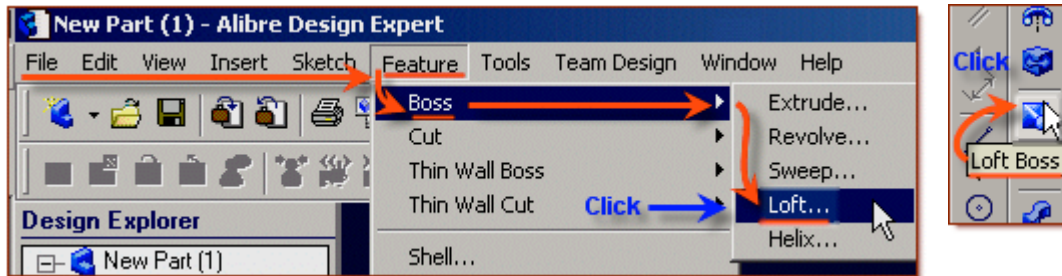


**This Completes Sketch<4>**

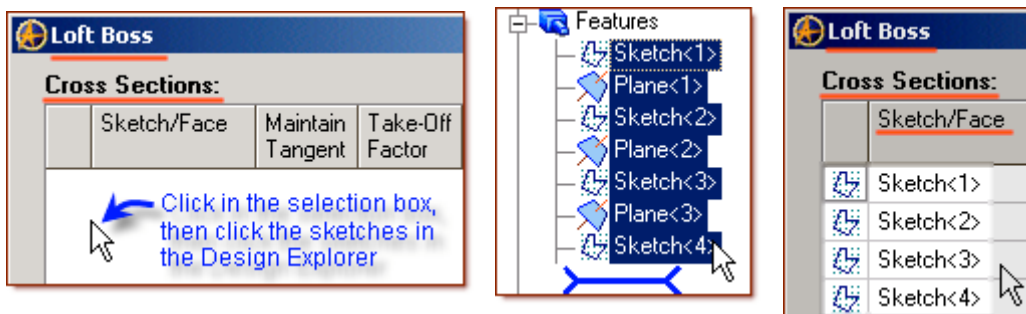
**Continue, to create the Loft using these Four Sketches.**

## Create the Loft

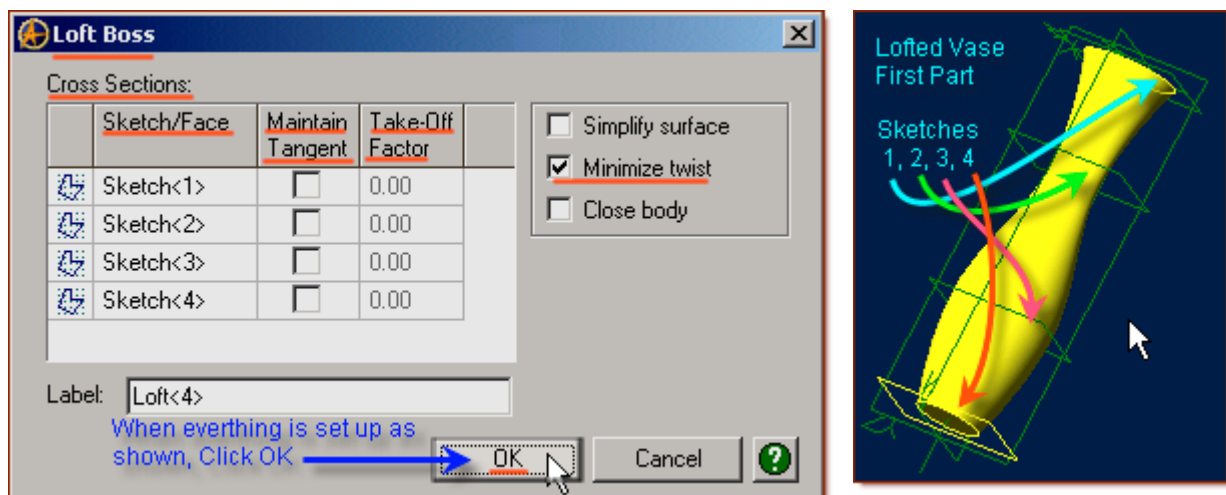
From the main menu, select **Feature**> **Boss**> **Loft**.  
(Or Select **Loft Boss** from the **Feature Icons**)



- From the **Loft Boss** popup, click in the White selection box area under **Cross Sections** to prepare it for picking the sketches.
- In **Design Explorer**, click **Sketch<1>**, then Shift-Click **Sketch<2>**, **Sketch<3>**, and **Sketch<4>**
- You will see the four sketches you have selected appear under **Sketch/Face**, in **Cross Sections**.



- A selection box for each will appear under **Maintain Tangent**. Leave it unchecked.
- Under **Take-Off Factor** it will now show 0.00. It is not editable without checking **Tangent**.
- On the right, **Minimize twist** is currently selected. Leave it that way.
- In the selection area beside **Label**: it is defaulting to **Loft<4>**. This is fine for now.
- Click **OK**. Your new lofted vase will be displayed (highlighted in yellow, initially)



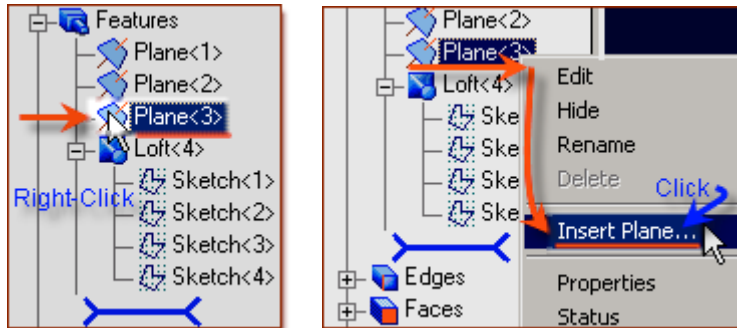


## Create the First Leg

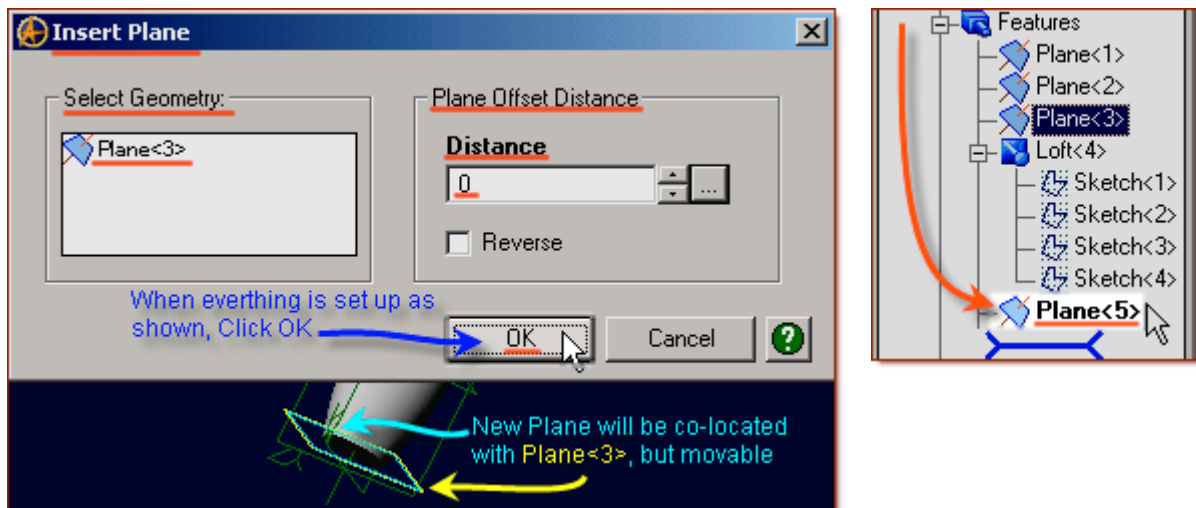
For this we will first create a new plane, and then create the two sketches for a sweep.

First - create a new plane.

- Right-Click Plane (Plane<3>) in the Design Explorer.
- Select **Insert Plane** from the menu.

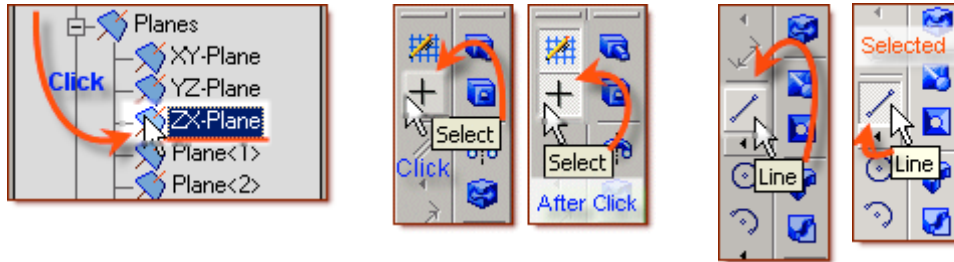


- In the **Insert Plane** popup, confirm the **Plane<3>** is displayed in the **Select Geometry** window; or else re-click on it now.
- For the **Plane Offset Distance**, Set **Distance** to **0 mm** (*Leave the default '0' as is, Press Tab*) (*This plane is co-located with Plane<3>, but may be moved to edit the features attached to it.*)
- Click **OK**. **Plane<5>** is created. Then Click off in the workspace again, to de-select it.

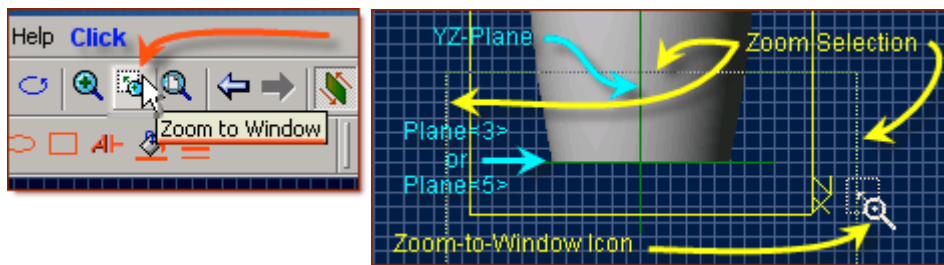


**Second - create the Sweep Path in a crossing plane, between Plane<7> and the lofted Vase.**

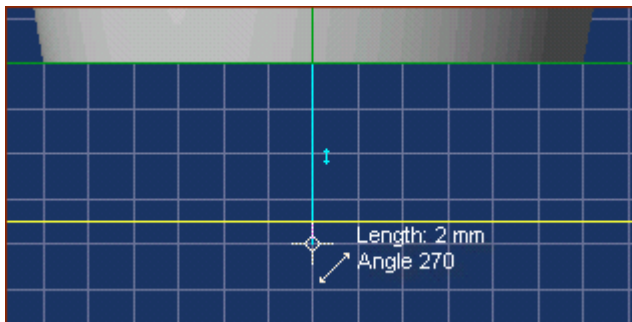
- Click on the ZX-Plane in the Design Explorer.
- From the Sketch Icons, click Select.
- From the Sketch Icons, select Line.



- Click Zoom to Window from the Top Toolbar Icons.
- Click-Drag a Selection that covers the Bottom of the Vase (Plane<3>/Sketch<4>) to Zoom in.



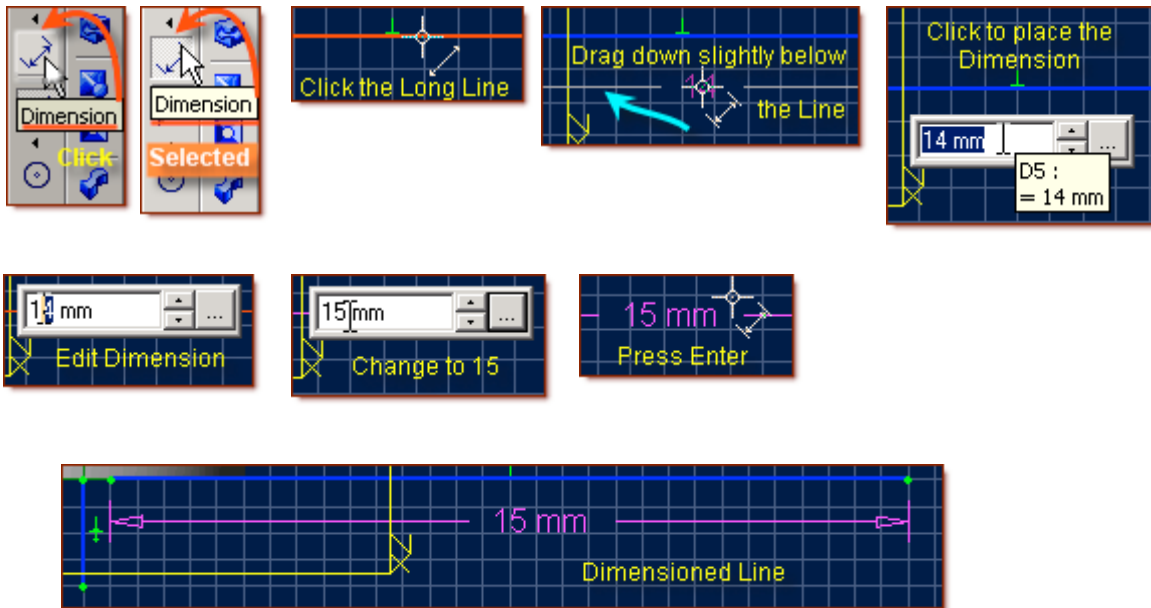
- Create a line 2 mm long, from Plane<5> (Bottom) down along the YZ-Plane (Center-Line).



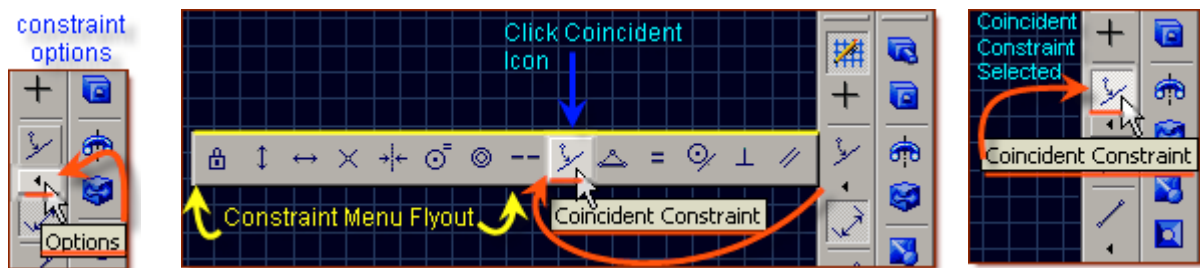
- From near, but not touching the start of the first line, create another line approximately 12-14 mm long, out to the right, on axis. (So Horizontal Sketch Constraints are automatically added)
- Double-Click.



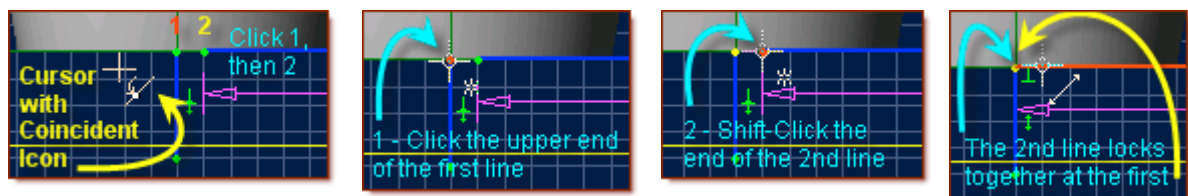
- From the **Sketch Icons**, select **Dimension**.
- Click the long line, and drag down slightly below the line, click to place the dimension, then edit the dimension to 15.0, Press Enter.



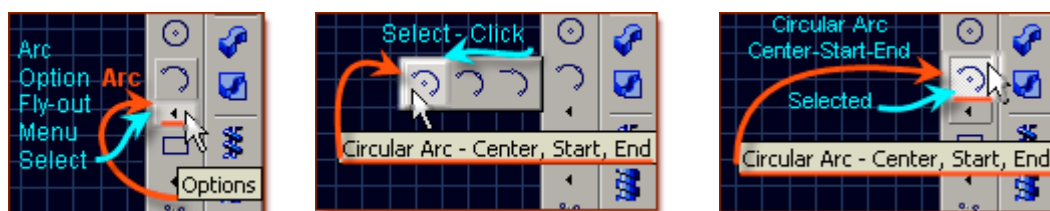
- From the **Sketch Icons**, select (**Constraint**) **Options - Coincident Constraint**.



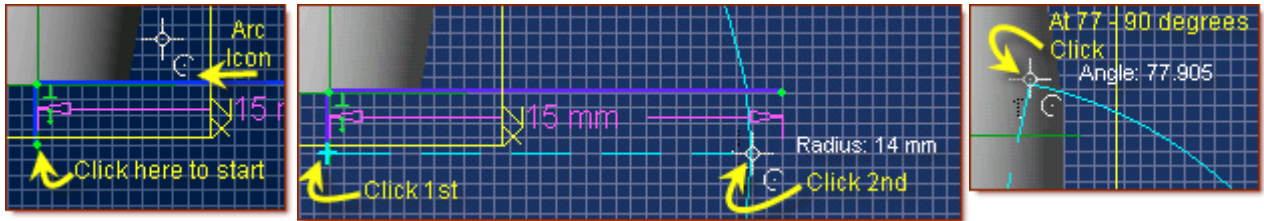
- Click the upper end of the first line right at its end point, then shift-click the nearest end of the long line. ( They will automatically lock together)



- From the **Sketch Icons**, select **Circular Arc - Center - Start - End**. (If this is not in the arc selection currently - click on the options below arc, and select it from the fly-out menu.)



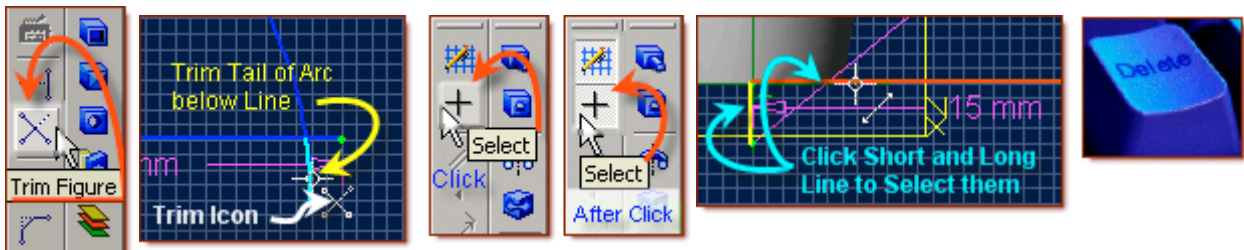
- Start the Arc at the bottom of the 2 mm line, drag the mouse to the right - along a Horizontal direction, and click when **Radius 14 mm** is displayed, then drag up and left until the Angle displays 77 - 80 degrees and you are over, or in front of, the Vase Body. Click.



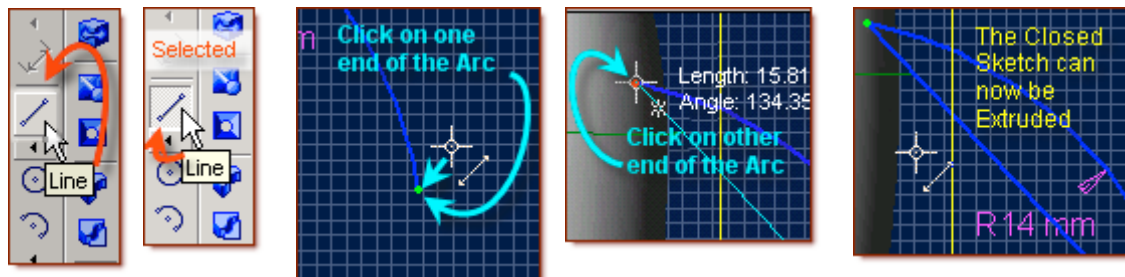
- From the **Sketch Icons**, select **Dimension**.
- Click on the Arc, and drag inward to the Center, Click, Confirm / Enter 14.0, Press Enter.



- From the **Sketch Icons**, select **Trim Figure**.
- Trim the tail of the arc below the 15 mm long line.
- From the **Sketch Icons**, click **Select**. Click the long line and shift-click the short line. Press the **Delete** Key to delete them.

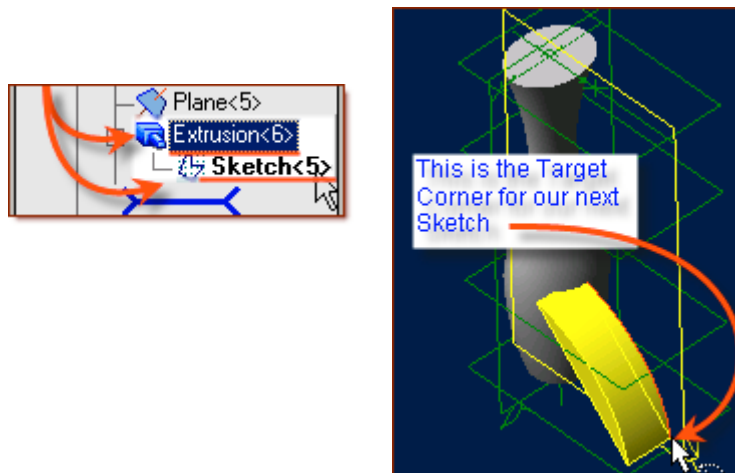
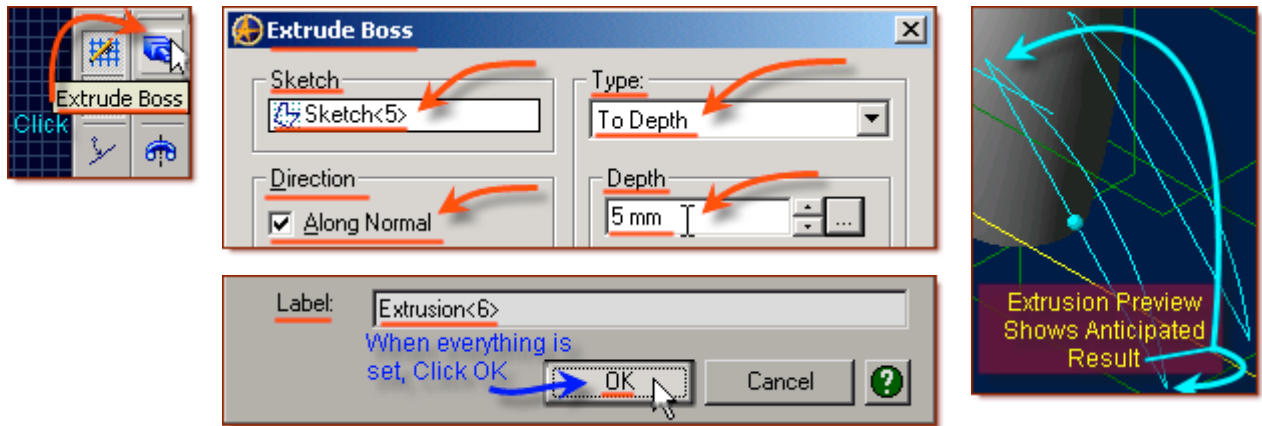


- To make it easier to find the edge of the bottom of the Arc we just made; we will close the feature temporarily, and extrude it!*
- From the **Sketch Icons**, select **Line**.
- Click on one end of the Arc, and then **double-click** on the other end. (*Or click, then press Esc.*)



Now, we can extrude this to easily find the edge corner for our next sketch to be aligned to.

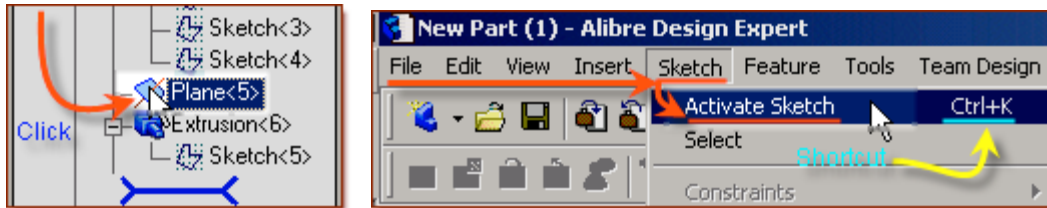
- From the **Feature Icons**, select **Extrude Boss**.
- In the **Extrude Boss** Popup, **Sketch** should be **Sketch<5>**, **Type = To Depth**, **Direction = Along Normal** and **Depth = / Make 5 mm**. **Label: Extrusion<6>**. Click **OK**.



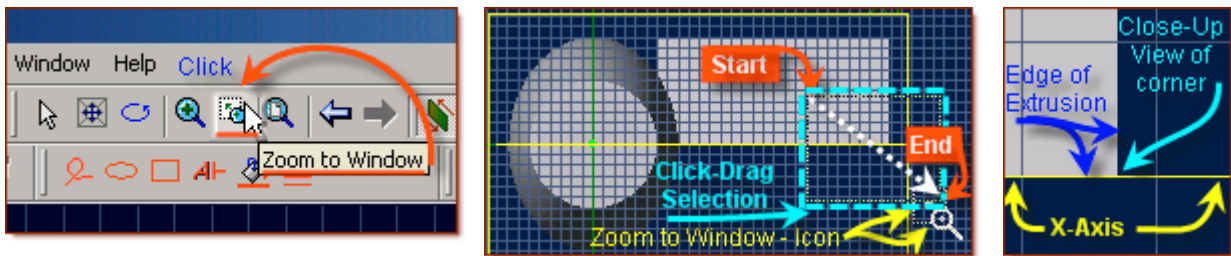
**This Completes Sketch<5> initially, and creates Extrusion<6>. We will return later to Delete the Extrusion, and edit Sketch<5>.**

Next - On the New Plane, put the sketch to be swept - Sketch 6.

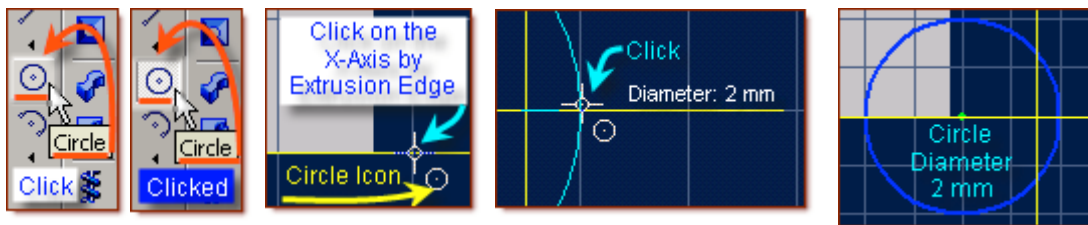
- Click the new Plane (Plane<5>) in the Design Explorer.
- From the Main Menu, Click Sketch, > Activate Sketch. (Shortcut = Ctrl+K)



- From the Top Row of icons, Select - Zoom To Window, Click. Drag a selection box around the outer edge of the extrusion just created, at the edge that is center to the vase. This gives us a close-up of this corner. This should be - in line with the X-Axis, at the outer edge of the Extrusion. (Click the X-Axis in the Design Explorer to identify it easier)

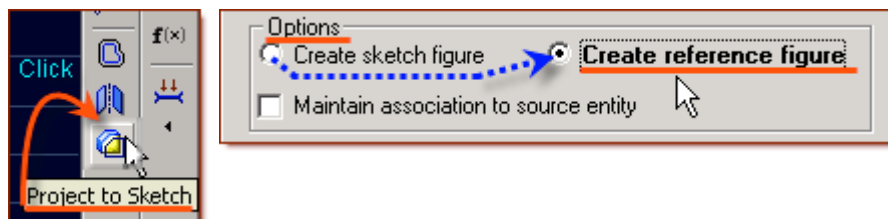


- From the Sketch Icons, select Circle.
- Click along the line of the X-Axis at The lower edge of the Extrusion, and Drag to the right to make the circle Diameter 2, Click.

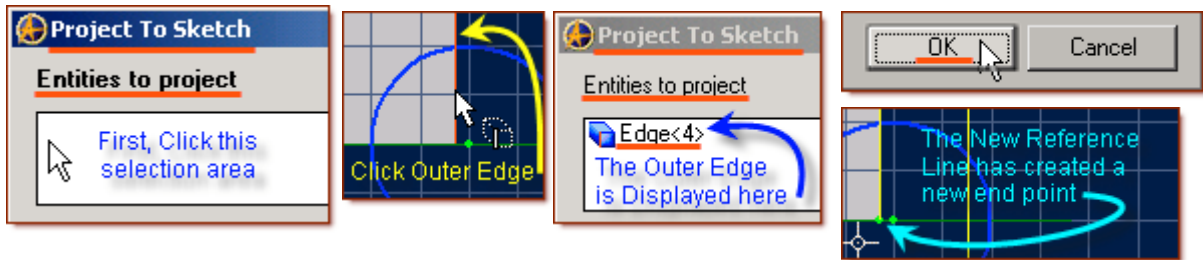


Next - Create a reference line to lock the center of the circle to, and constrain it there.

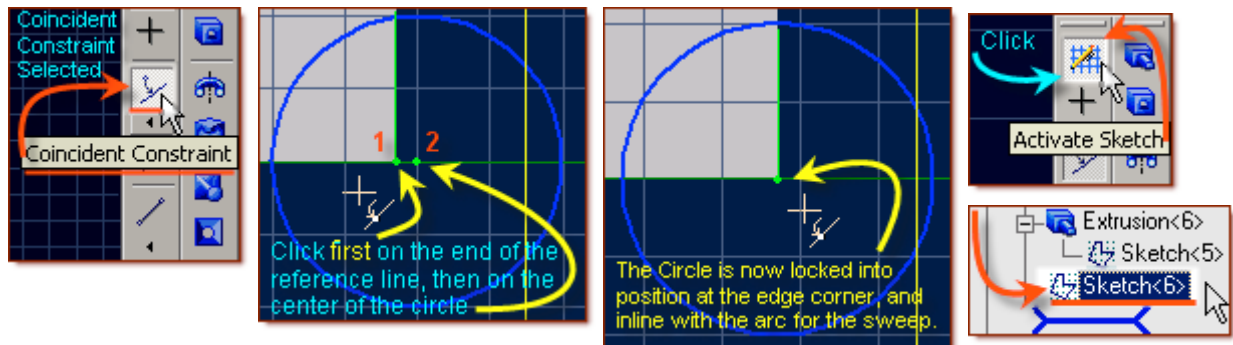
- From the Sketch Icons, select Project to Sketch.
- In the Project to Sketch popup, first change the Options to Create Reference Figure by clicking in the other Radio Button.



- Then Click inside the selection area below **Entities to project**, the click on the outer edge of the extrusion (To the right). (*Edge<4> is now displayed in Entities to project.*)
- Click **OK**.



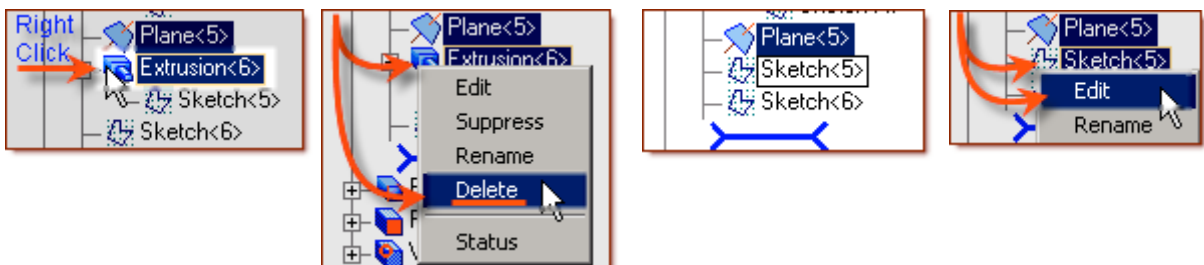
- From the **Sketch Icons**, select **Coincident Constraint**.
- Click on the end of the line at the **X-Axis**, and shift-click on the center point of the circle. *The Circle now jumps to the end of the line, and is perfectly aligned.*
- From the **Sketch Icons**, click **Activate Sketch**, to exit Sketch Mode. **Sketch<6>** shows in Design Explorer.



**This completes Sketch<6>**

**Now - we will go back, Delete Extrusion<6> and edit Sketch<5>**

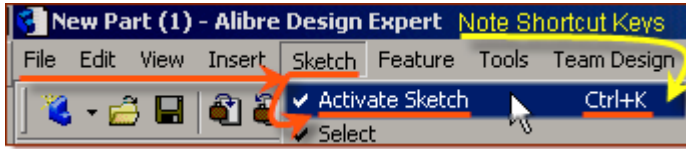
- In the **Design Explorer**, Right Click on **Extrusion<6>** (above **Sketch<5>**), and select **Delete** from the drop-down menu.
- In the **Design Explorer**, Right Click on **Sketch<5>**, and select **Edit** from the drop-down menu.



- In the Sketch Workspace, (Select is default Selected when editing), Click the line between the Arc end points, press the **Delete** key.



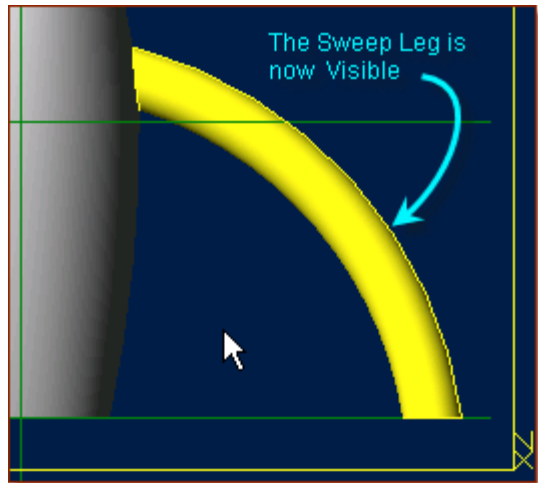
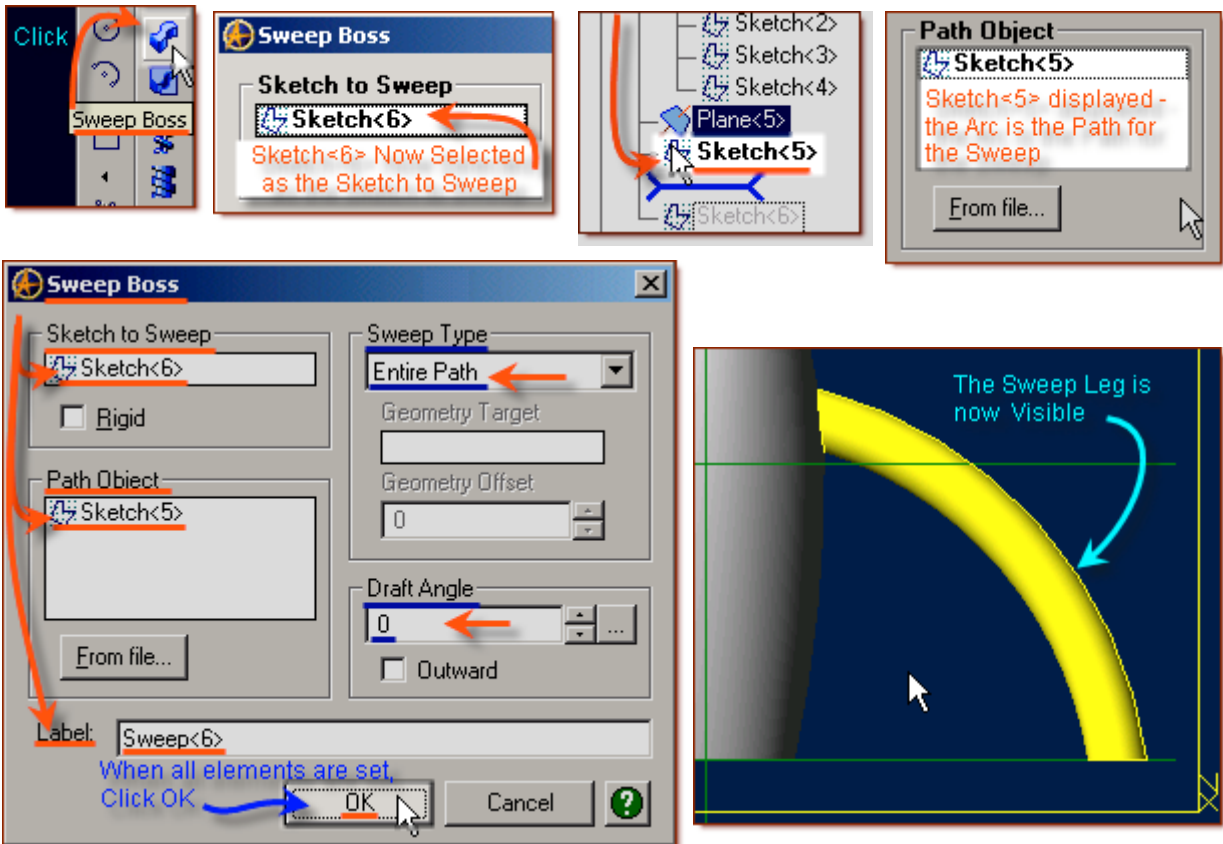
- Press Ctrl+K, or select main menu **Sketch > Activate Sketch** to Exit Sketch Mode.



**This completes the edit of Sketch<5>**

**From the Feature Icons on the right, Click on Sweep Boss**

- In the Sweep Boss popup, Click under **Sketch to Sweep**, and then click on Sketch<6> in the Design Explorer,
- In the Sweep Boss popup, Click under **Path Object**, and click on Sketch<5> in the Design Explorer,
- Leave Sweep Type as **Entire Path**, and Draft Angle as 0
- **Label:** is set for Sweep<6>, which is fine. Click OK.  
(The New Sweep Leg is now Visible.)

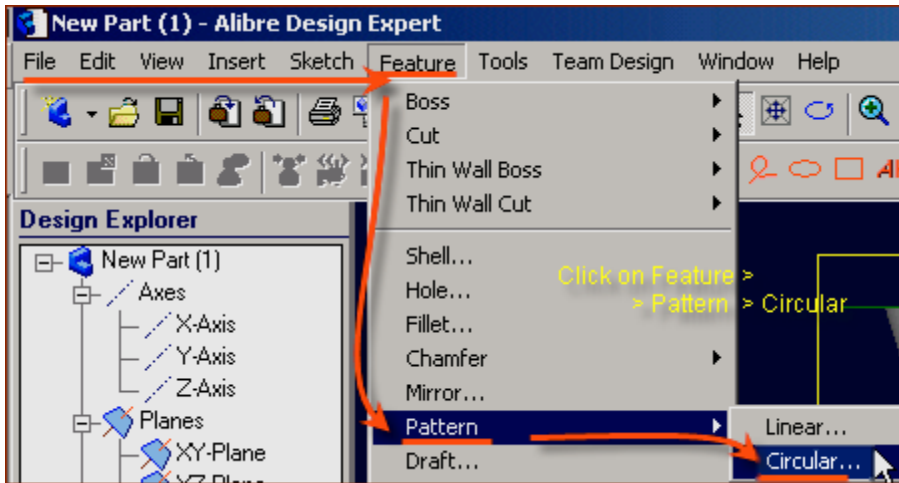


**This completes the creation of Sweep<6> (Leg 1 of 3)**

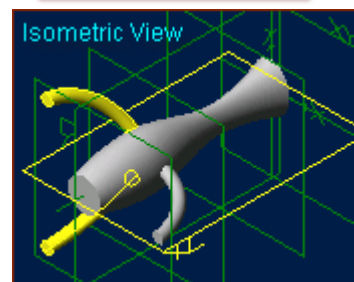
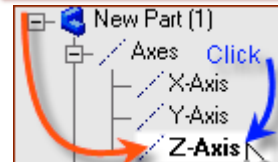
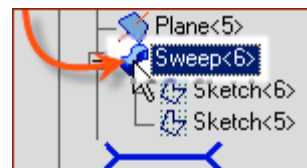
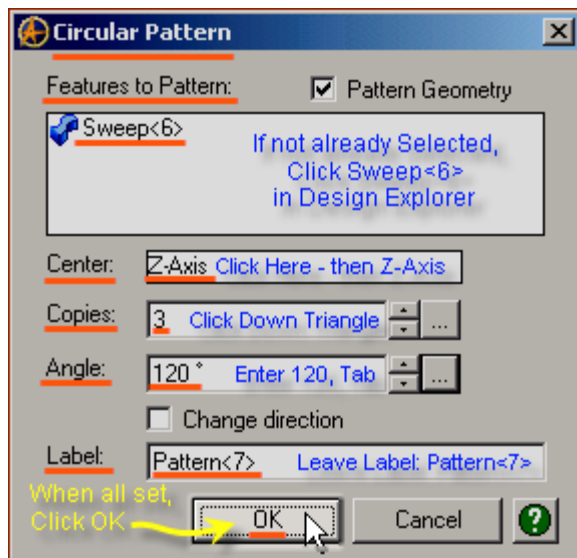


## Create the Other Legs

From the Main Menu, Select **Feature**> **Pattern**> **Circular**.



- **Features to Pattern:** Confirm **Pattern Geometry** is checked.
- Click in the Selection Area under **Features to Pattern**, then (*If it is not already selected*), click **Sweep<6>** in the **Design Explorer**,
- Click in the **Center:** Selection area, then click on the **Z-Axis** in the Design Explorer,
- Make **Copies: 3** (*Click up/down triangles to change*),
- Set **Angle** at **120 Degrees** (*Highlight the value, enter 120, press Tab*)
- **Label:** is currently **Pattern<7>**, which is fine. Click **OK**.  
(*The new Legs are Highlighted Yellow.*)



**This completes the creation of Pattern<7> (Legs 3 of 3)**

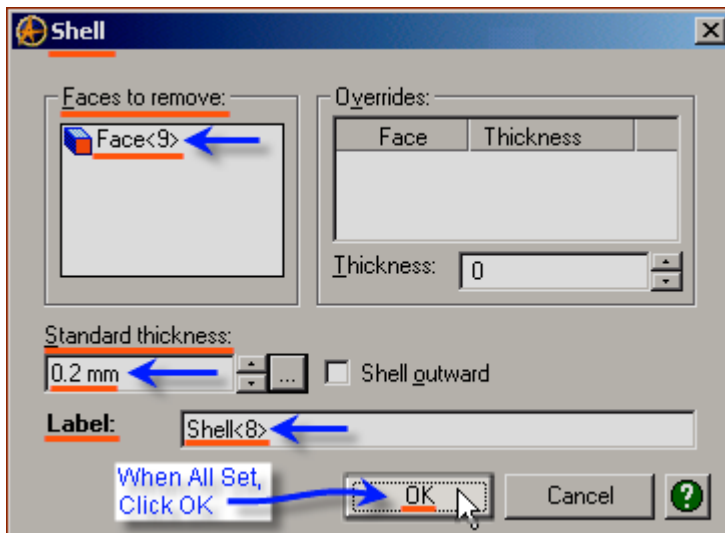
## Create the Shelled Walls

**This will set the overall Vase and Leg Shells**

- From the View Orientation Icons - click **Orient to back**.
- The **Ellipse** Surface End is now Selectable, Click on it.
- From the **Feature Icons**, Select **Shell**.



- In the **Shell** popup, **Faces to remove:** should show **Face<9>**, if not, click the Ellipse to select it.
- **Standard thickness:** change to **0.2 mm** either using the up/down arrows to select, or highlight the value, enter 0.2, and press Tab.
- Leave **Shell outward** unchecked. **Label:** is showing **Shell<8>**, this is fine.
- Leave **Overrides** alone, Click **OK**.

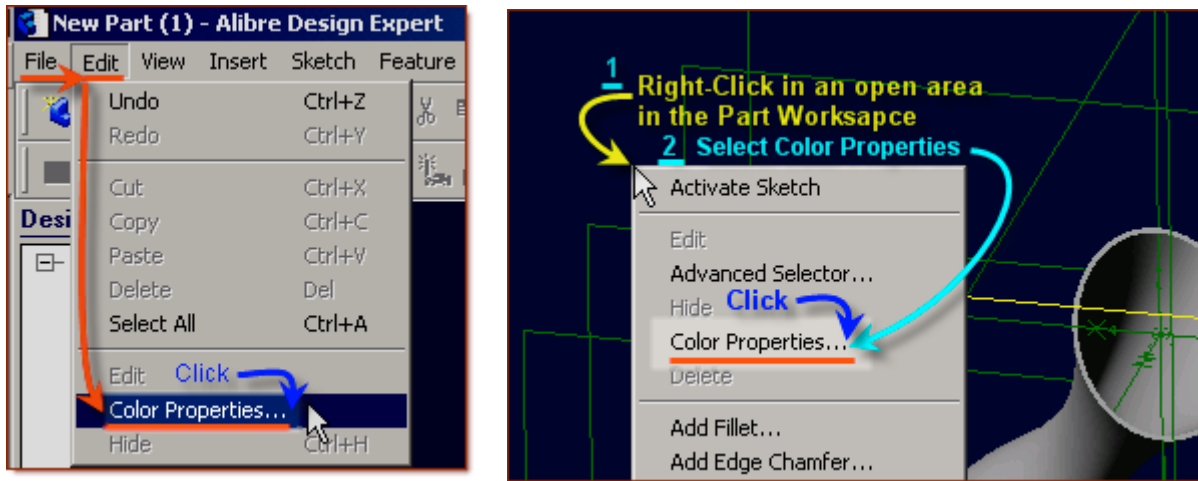


**You can see the successful shell highlighted yellow inside the vase!**

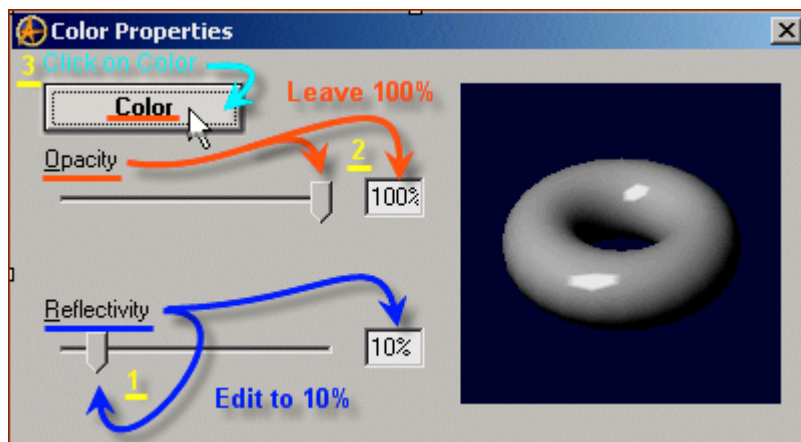
**Continue on for editing the Feature Colors.**

## Create the Feature Colors

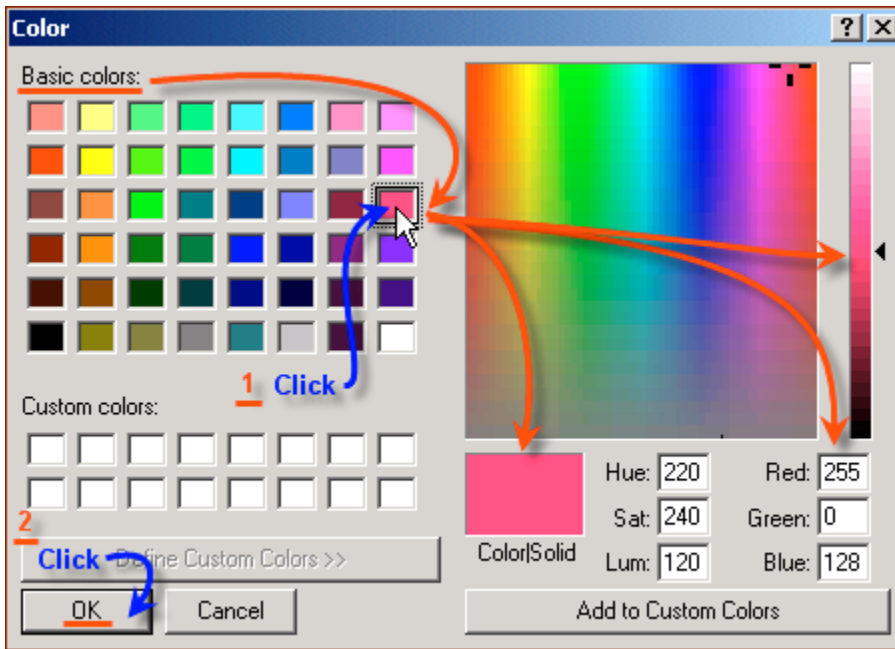
- From the main menu, click **Edit, Color Properties**, (Or - Right Click in an open area in the Part Workspace, select Color properties from the drop-down menu.)



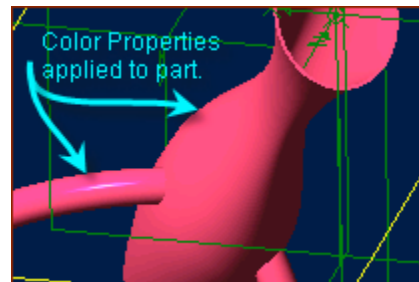
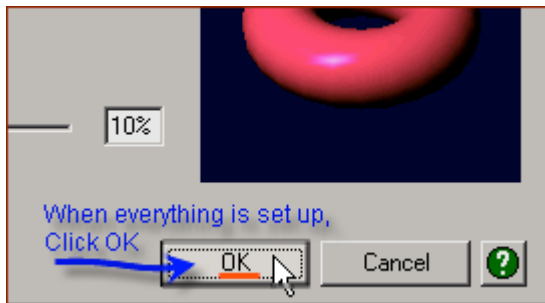
- From the **Color Properties** Popup Window - Set the **Reflectivity** Slider to 10%,
- Leave **Opacity** at 100%,



- Click on **Color** to select a new Color.
- Select: Fuschia. [i.e. Choose the 3<sup>rd</sup> box down on the Last column over: Red 255, Green 0, Blue 128]



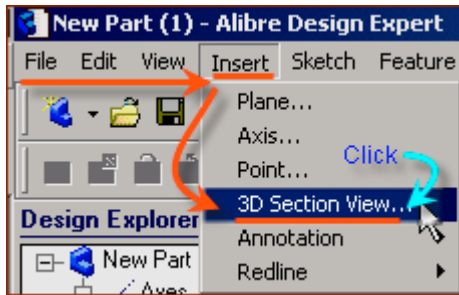
- Click **OK** to close the Color selection box and accept the new Color,
- Click **OK** to apply the Color to the model.



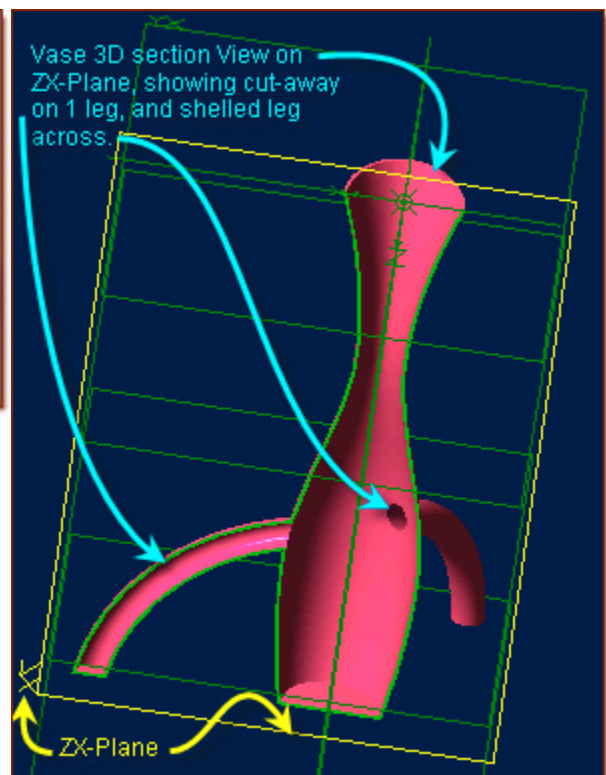
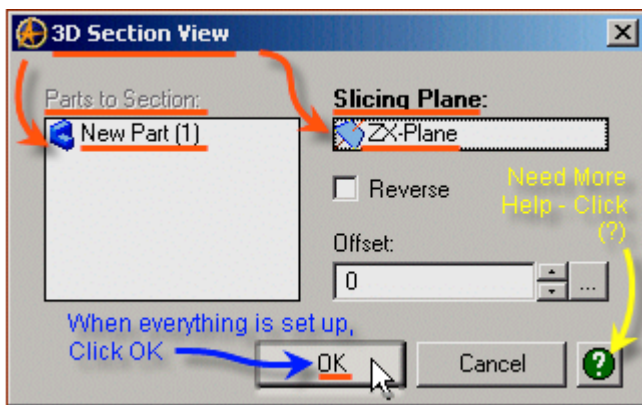
**Continue to create the 3D Section.**

## Create the 3D Section

- From the Main Menu, Select **Insert > 3D Section View**



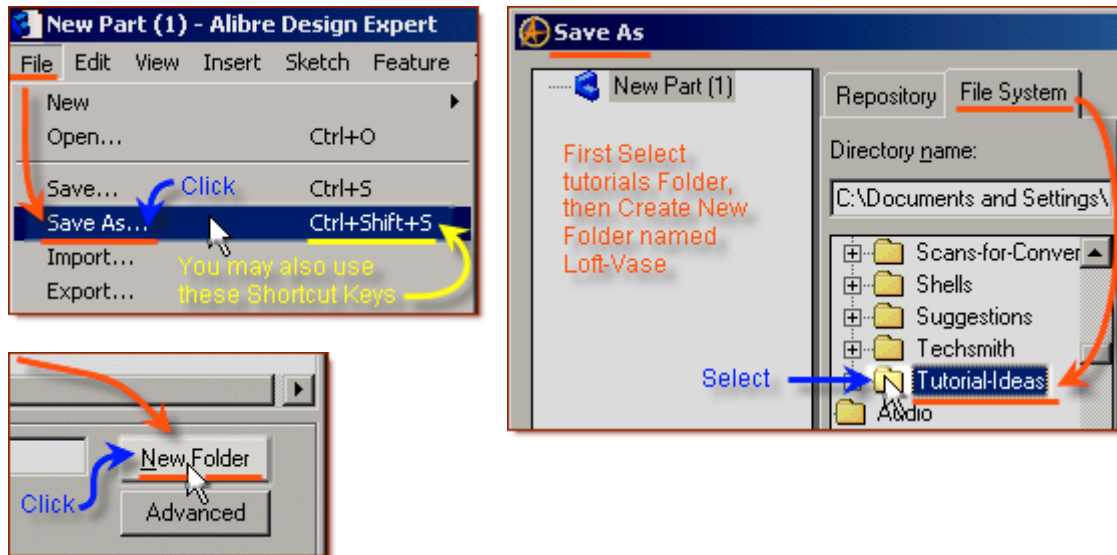
- From the **3D Section View** popup, **Parts to Section** should be showing **New Part (1)** listed.
- Click in **Slicing Plane:** Selection area, then click on **ZX-Plane** in the **Design Explorer**.
- Click **OK**. This will split the vase across one leg and show the whole body.
- Now you can see inside the Vase and Leg!



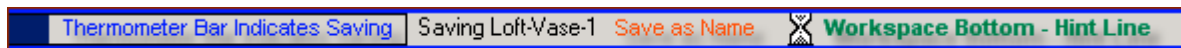
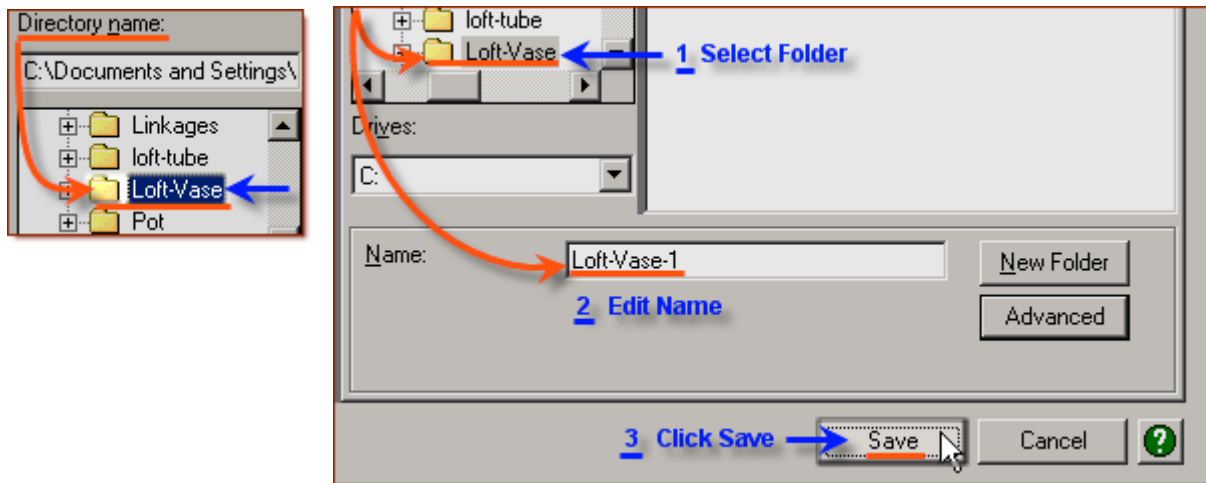


Now, to save this file in it's own folder:

- From the main text menu, select **File, Save As...** (*Shortcut keys Ctrl+Shift+S*)
- From the **Save As** popup, **File System, Explorer View**, Select **Tutorials** folder.(*Tutorial-Ideas*)
- Click on **New Folder** - create one with the name **Loft-Vase** under Tutorials.



- Select this new folder Named: **Loft-Vase**.
- Edit the name of the part - to **Loft-Vase-1**, and click - **Save**.



**Congratulations!**  
**You have completed the Loft-Vase-1 Tutorial!**  
(Complete Version)

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