

Chapter Six

Saving and Using Objects in New Files

In the preceding lessons we have been working with one file at a time. We are now going to explore a powerful way to use previously made parts in new files.

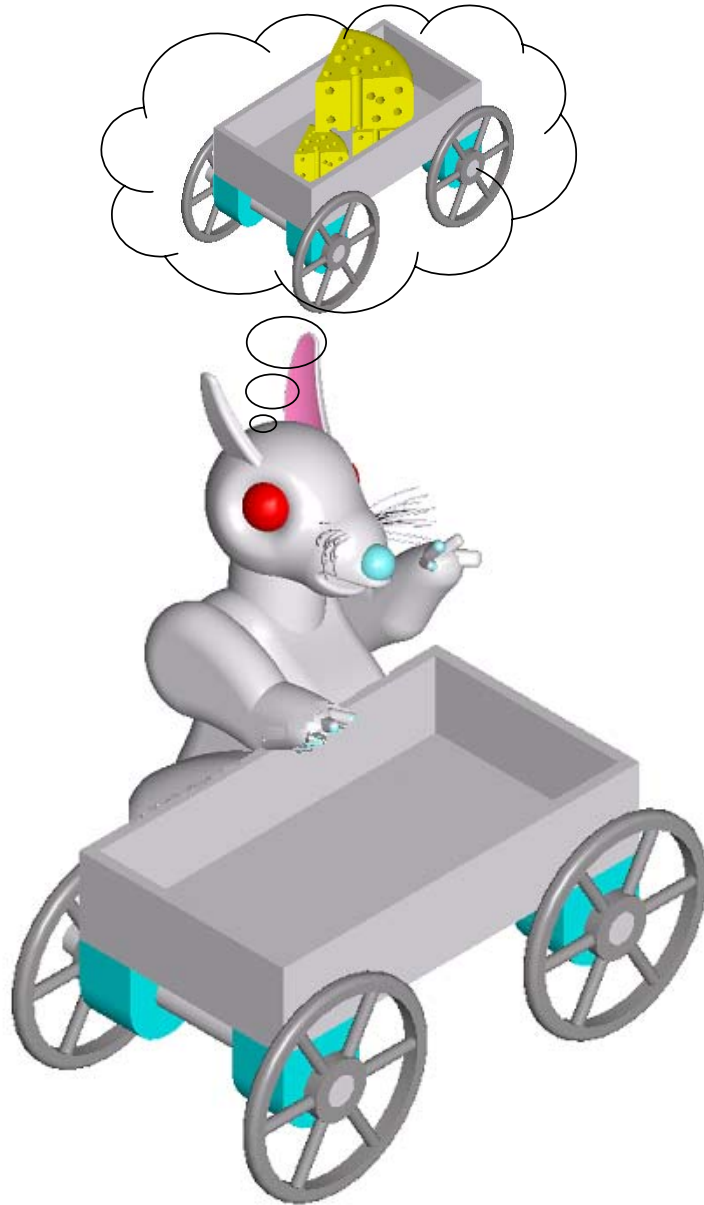
This will give you a chance to save models of common objects for reuse in more complex constructions.

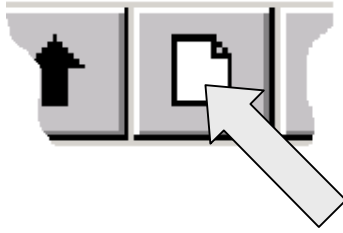
Our goal will be to first create three different types of wheels in one part file. We will then save this file.

Next, we will open a new file in which we will build a wagon. We'll build a box with a set of bearing blocks underneath and an axle. (A "Bearing Block" is a block with a hole in it for the axle.)

We will then copy one of the wheels from our first file and paste it into the file that has our wagon. We'll use the XFORM MIRROR COPY Tool to place a copy of the wheel on the far end of the axle and then copy the two bearing blocks, axle and two wheels to make a second set.

Once you master this approach to model building, your chances to build really exciting complex models will be almost unlimited!



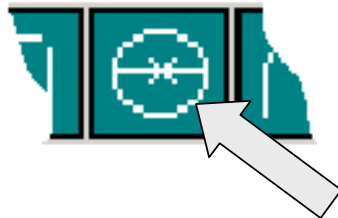
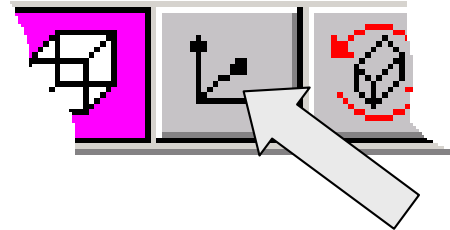


Before you start, close any other files that you have open.

Then, start with a new file by clicking on the FILE NEW Icon.

Click on the SET VIEW Icon and type 2 for the View Number.

Hit the **[ENTER]** Key.



Click on the CREATE CIRCLE DIAMETER Icon. Type 3.5 for the Diameter and hit the **[ENTER]** Key.

Using the CURSOR Option, click on the screen.

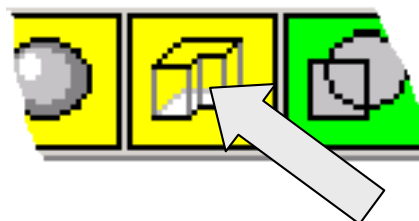
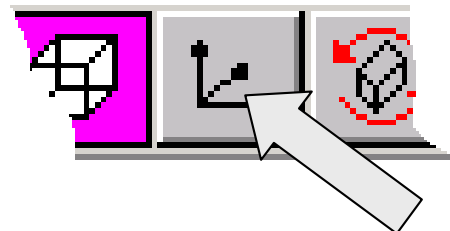
Use the **Hot Key [A]** to fit the circle on the screen.

Click on the CREATE CIRCLE DIAMETER Icon. Type 1 for the Diameter and hit the **[ENTER]** Key.

Click on the CENTER Position on the Conversation Bar and then click on the circle that you just constructed.

Now, click on the SET VIEW Icon and type 7 for the View Number.

Hit the **[ENTER]** Key.



Click on the EXTRUDE Icon.

A Dialog Box appears. Type 0.25 for the Distance and click on the OK Button.

Click on the SINGLE Option on the Conversation Bar and then click on the large circle. Hit the **[ENTER]** Button.

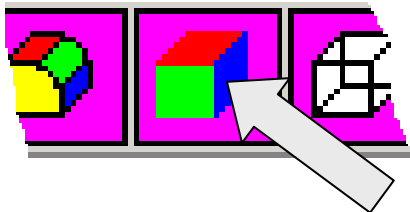
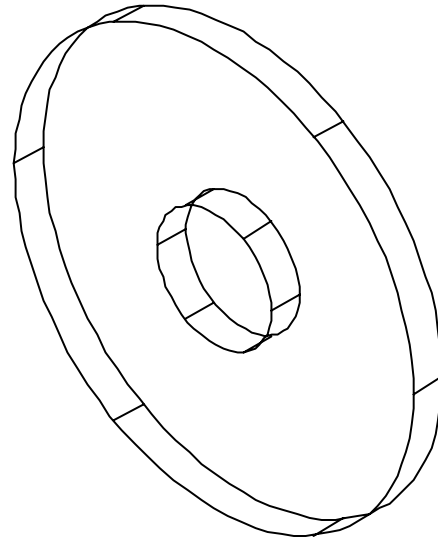
A double-headed arrow appears on the screen. Click on the arrowhead that points up to the right.

Once again, click on the SINGLE Option on the Conversation Bar and then click on the small circle.

Hit the **[ENTER]** Button.

A double-headed arrow appears on the screen. Click on the arrowhead that points up to the right.

Your screen should now look like this:

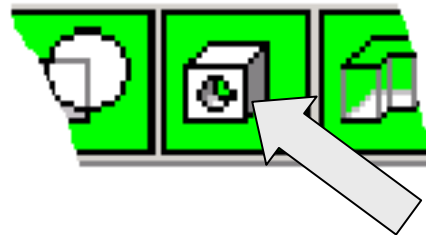


If you render the image by clicking on the RENDER WITHOUT WIRE Icon, you will only see one object since the small cylinder lies completely within the volume of the large cylinder.

Next, let's click on the DRILL Icon.

A Dialog Box appears.

Use the Through Hole Option and type 3 for the Hole Diameter. Click on the OK Button.



Now, move the cursor over the front face of the larger cylinder until it highlights and click on the highlighted face.

Then, using the CENTER Option, click on the large circle that defines the front rim of the cylinder. Note that the large cylinder turns into a ring shape.

Hit the BACKUP Button on the Conversation Bar twice. The Dialog Box reappears.

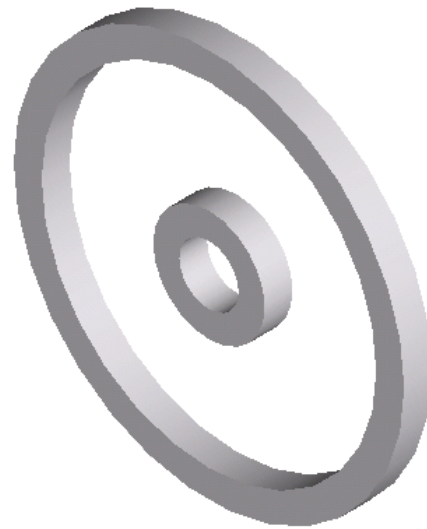
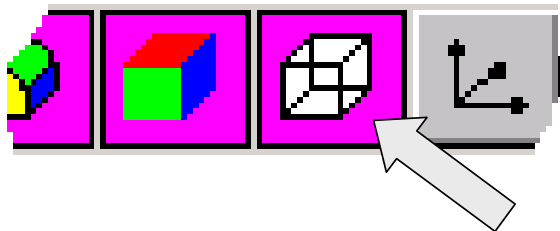
Type 0.5 for the Hole Diameter and click on the OK Button.

Now, move the cursor over the front face of the smaller cylinder. Click on the face when it highlights.

Then, using the CENTER Option, click on the small circle that defines the front edge of the small cylinder.

Note that the small cylinder also turns into a ring shape.

Your screen should now look like this:



Click on the WIRE Icon to revert back to wire display.

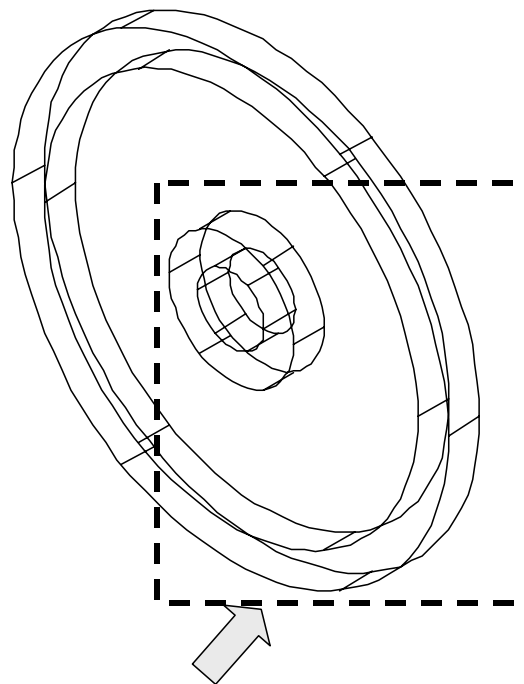
(**HINT:** For some operations like the next one that we will do, it is easier to work in wire mode because you can clearly see the lines and arcs that define the edges of the object.)

Now, let's use the **Hot Key [W]** to zoom in on our construction.

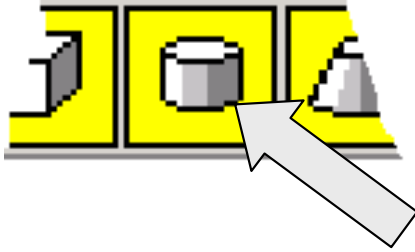
Hit **[W]** and then click with the mouse just above and to the left of the center of the smaller ring.

Drag down and to the right to create a selection box that just includes the outer rim of the larger ring.

This makes it easier to see the multiple lines and arcs that define the two cylinders.



DRAG A SELECTION BOX LIKE THIS



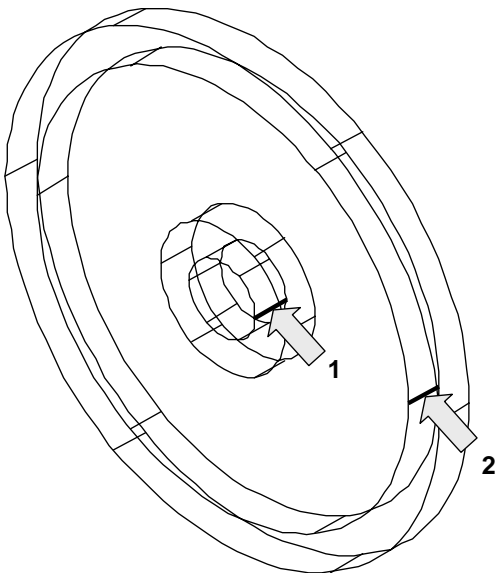
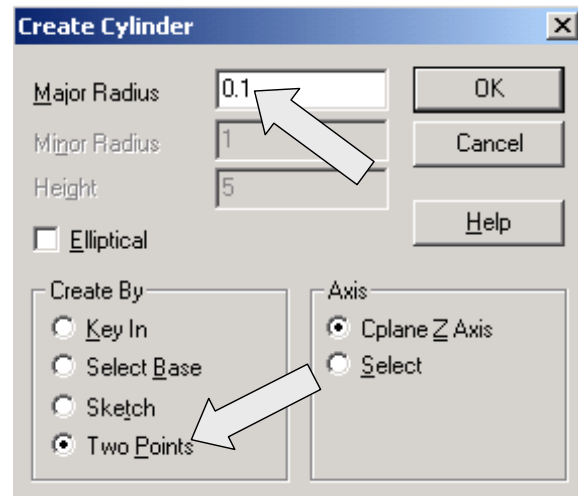
Next, click on the CREATE CYLINDER Icon.

A Dialog Box appears.

This time, instead of using the KEYIN Option, we are going to click on the Two Points Option.

Type 0.1 for the Diameter and click on the OK Button.

Now, click on the CENTER Option on the Conversation Bar.



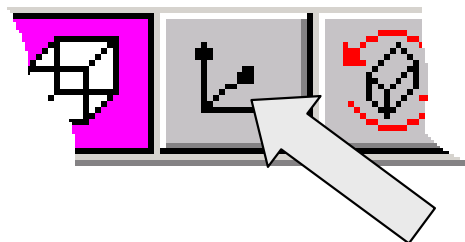
Click on the line labeled 1 in the picture to the left and then on the line labeled 2.

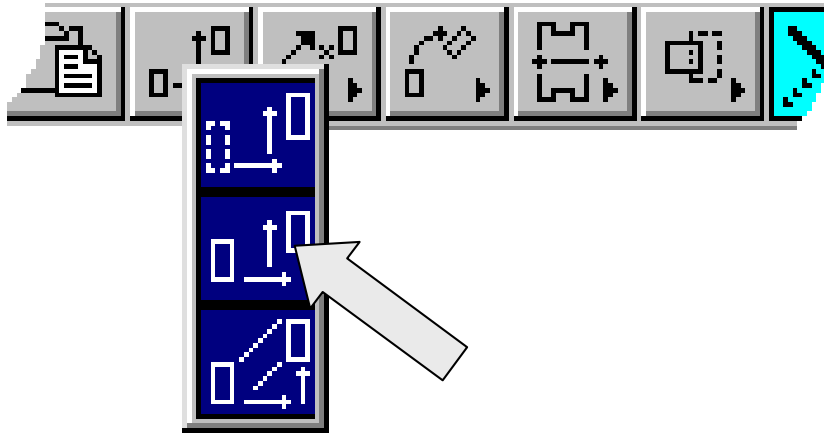
Notice that a long, thin cylinder extends from one point to the other.

Now, click on the SET VIEW Icon.

Type 2 for the View Number. Hit the [ENTER] Key.

Use the **Hot Key [A]** to fit the construction on the screen.





Now, click on the XFORM DELTA Menu Icon.

Then, click on the XFORM DELTA COPY Icon in the vertical flyout menu.

Click on the WINDOW Option on the Conversation Bar.
Drag a selection box completely around the three cylinders.

Type 2 for the Number of Copies and hit the **[ENTER]** Key.

Hit the **[ENTER]** Key to indicate a 0 for the X Value.

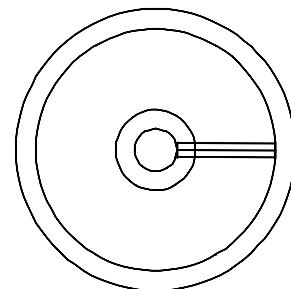
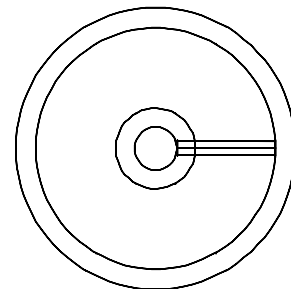
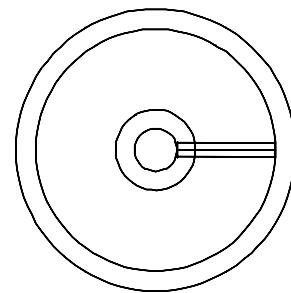
Type 4.5 for the Y value and hit the **[ENTER]** Key.

Hit the **[ENTER]** Key to indicate a 0 for the Z Value.

Hit the **[ESC]** Key to exit the function.

Use the **Hot Key [A]** to fit the construction on the screen.

Your screen should look like this:



To Complete the Top Wheel

Click on the XFORM ROTATE Menu Icon.

Then click on the XFORM ROTATE COPY Icon in the three-icon vertical flyout that appears.

Click on the SINGLE Option on the Conversation Bar.

Then, click on the long, narrow cylinder in the top wheel and hit the **[ENTER]** Key.

Type 3 for the Number of Copies and hit the **[ENTER]** Key.

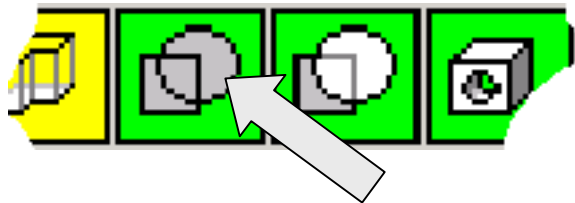
Click on the CENTER Option on the Conversation Bar and then click on the large circle that defines the rim of the top wheel.

Click at about the two o'clock position on the circle. (If you click near any of the cross lines that tie the large circles together, you may accidentally pick up the center of one of these lines and that would be the wrong rotation point for this operation.)

Next, hit the **[ENTER]** Key.

Type 90 for the Rotation Angle and hit the **[ENTER]** Key.

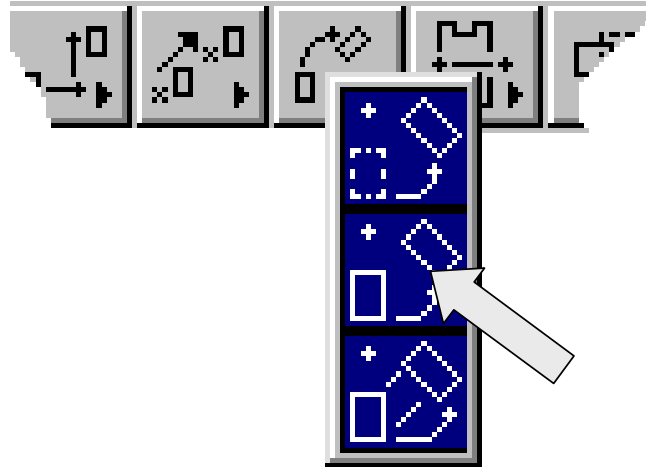
You will now have four long, narrow cylinders connecting the two rings.



Click on the BOOLEAN UNITE Icon. Move the cursor over the rim. Click on the rim when it highlights.

Now, move the cursor over each spoke and click as the spoke highlights. Then, move the cursor over the center hub and click when it highlights.

Your screen will now show a four-spoked wheel in the top position.

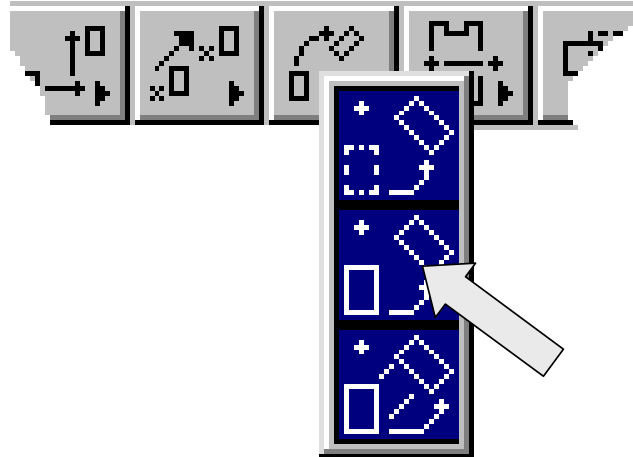


To Complete the Middle Wheel

Click on the XFORM ROTATE Menu Icon.

Then click on the XFORM ROTATE COPY Icon in the three-icon vertical flyout that appears.

Click on the SINGLE Option on the Conversation Bar.



Then, click on the long, narrow cylinder in the middle wheel and hit the **[ENTER]** Key.

Type 5 for the Number of Copies and hit the **[ENTER]** Key.

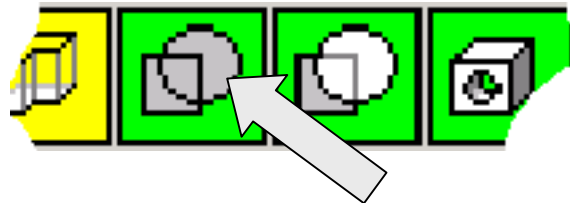
Click on the CENTER Option on the Conversation Bar and then click on the large circle that defines the rim of the middle wheel. Click at about the two o'clock position on the circle. (If you click near any of the cross lines that tie the large circles together, you may accidentally pick up the center of one of these lines and that would be the wrong point for this operation.)

Next, hit the **[ENTER]** Key.

Type 60 for the Rotation Angle and hit the **[ENTER]** Key.

You will now have six long, narrow cylinders connecting the two rings.

Click on the BOOLEAN UNITE Icon. Move the cursor over the rim. Click on the rim when it highlights.



Now, move the cursor over each spoke and click as the spoke highlights. Then, move the cursor over the center hub and click when it highlights.

Your screen will now show a six-spoked wheel in the middle position.