

Chapter 7 – Adding Animation

7.1 Icons

We will use Sample Model 3 in Figure 7.1 to discuss how to add animation to simulation models in this course.

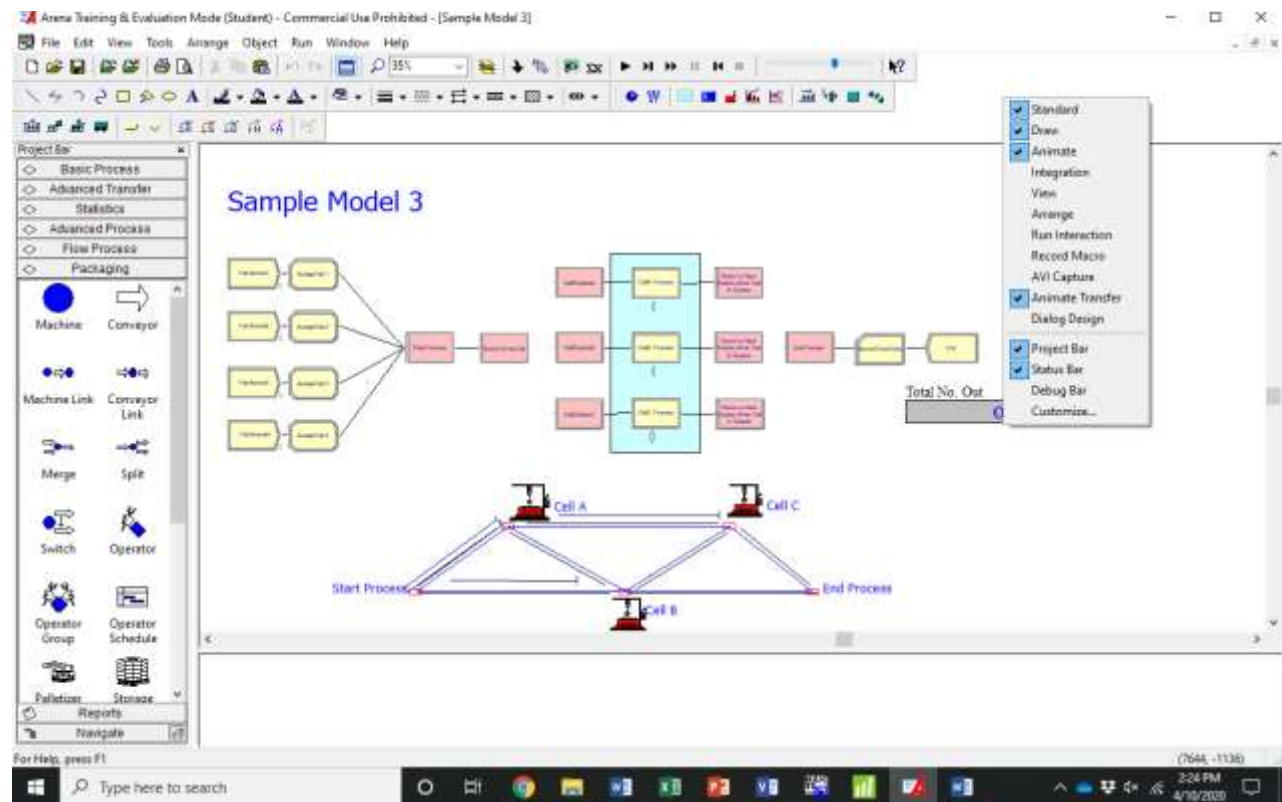


Figure 7.1. Sample Model 3.

In Figure 7.1 above, right-click anywhere in the white space in the Toolbar area to see which options have been selected as indicated by the check marks. Be sure all options are selected that appear in the window pane in the upper right-hand corner of Figure 7.1. This adds all of the toolbars you will need in this course.

7.1.1. The Segment Icon

The yellow Segment icon appears in the bottom row of the Toolbar. It is mostly rectangular in shape. By clicking on the Segment icon, a dialog box will appear in the Flowchart view, as shown in Figure 7.2.

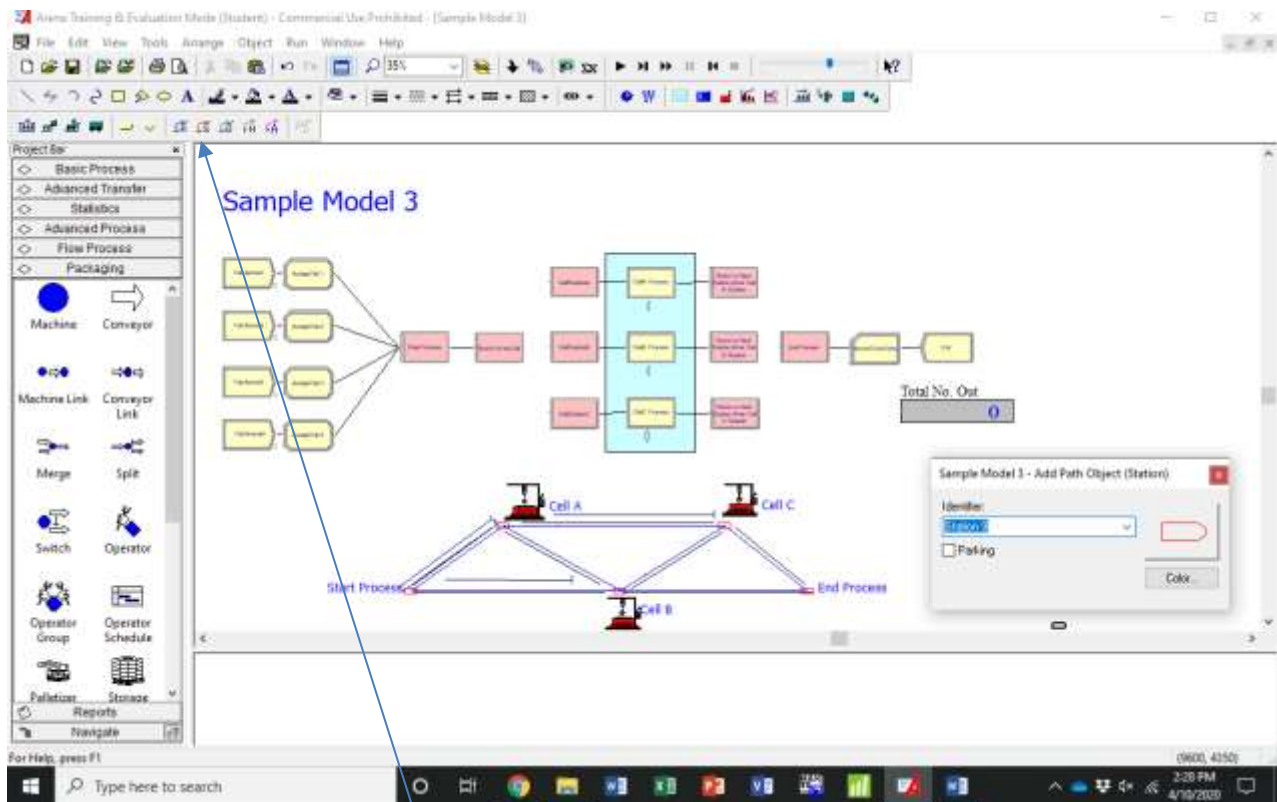


Figure 7.2. Dialog box for the Segment icon.

In the Identifier field, select the appropriate Station in the drop-down menu. All Stations in the drop-down menu have been previously defined in various Station modules above the animation in the Flowchart view. Place as many Segment icons in the Animation portion of the Flowchart view as you have in Station modules in the logic portion of your model in the Flowchart view.

7.1.2. The Route Icon

Connect the Segment icons by clicking on the Route icon in the Toolbar. The Route icon is the R icon with Segments indicated to the left and above the R. There are two ways to connect routes: 1) by clicking on the Route icon to open its dialog box as shown in Figure 7.3.

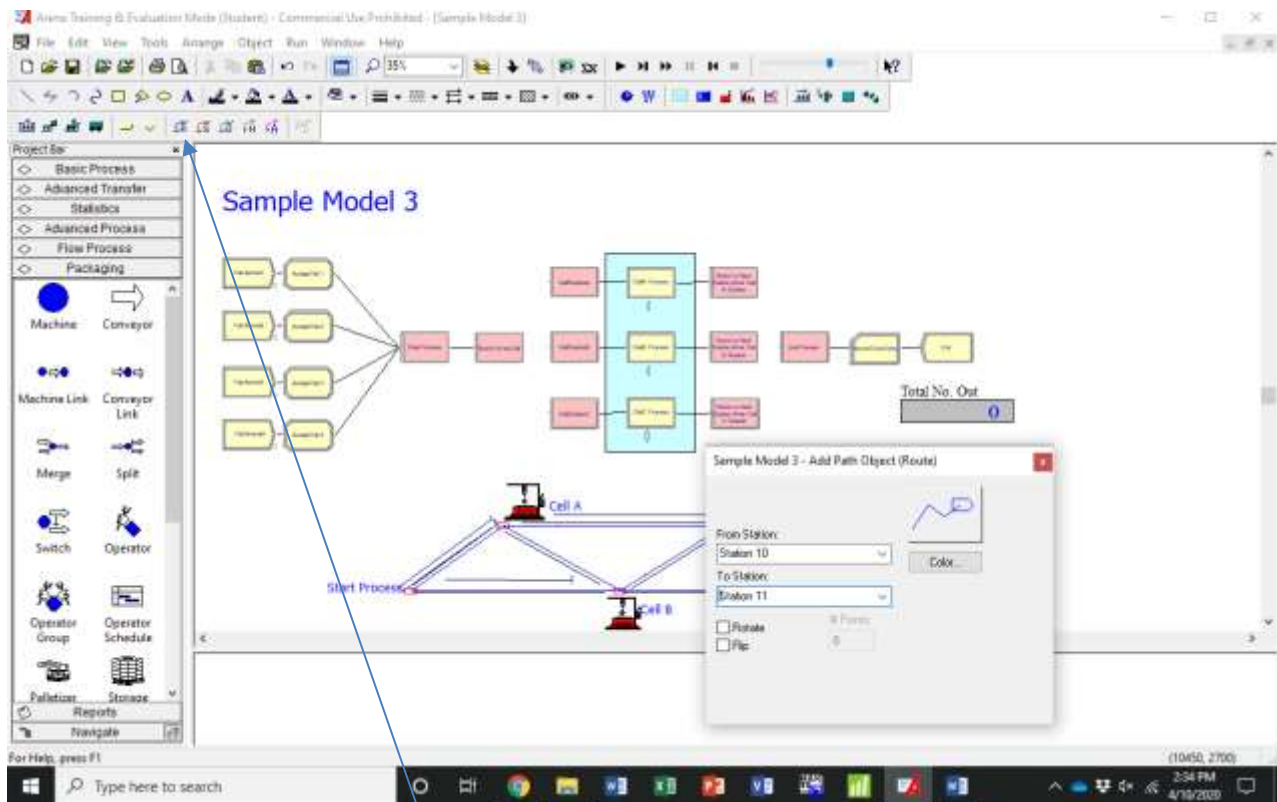


Figure 7.3. Dialog box for the Route icon.

Select the From Station and To Station in the respective drop-down menus. Once these selections have been made, click the X in the upper right-hand corner to close the dialog box, then use your cursor to click on the From Station segment and drag and click on the To Station segment, then double-click to release. This creates the blue route line that connects two segments (or Stations).

The second way to connect Segments is to click on the Route icon and simply bypass the dialog box that opens and directly click on the From Station segment and drag and click on the To Station segment, then double-click to release. This creates the same blue route line that connects two segments (or Stations) by eliminating one step.

The number of routes in the animation portion of the model should match the number of Route modules that were added in logic portion of the model in the Flowchart view.

The Default value for the number of points is 2, indicating a straight line with 2 end points. The analyst has the option to change the number of points to as many as desired.

7.1.3 Adding Static Images with Arena Symbol Factory

Static images are images that do not change states (i.e., from an idle state to a busy state). A static image is a “what you see is what you get” kind of image. We can find a wide assortment of templates, each with its own set of static images, in Arena Symbol Factory, as shown in Figure 7.4.

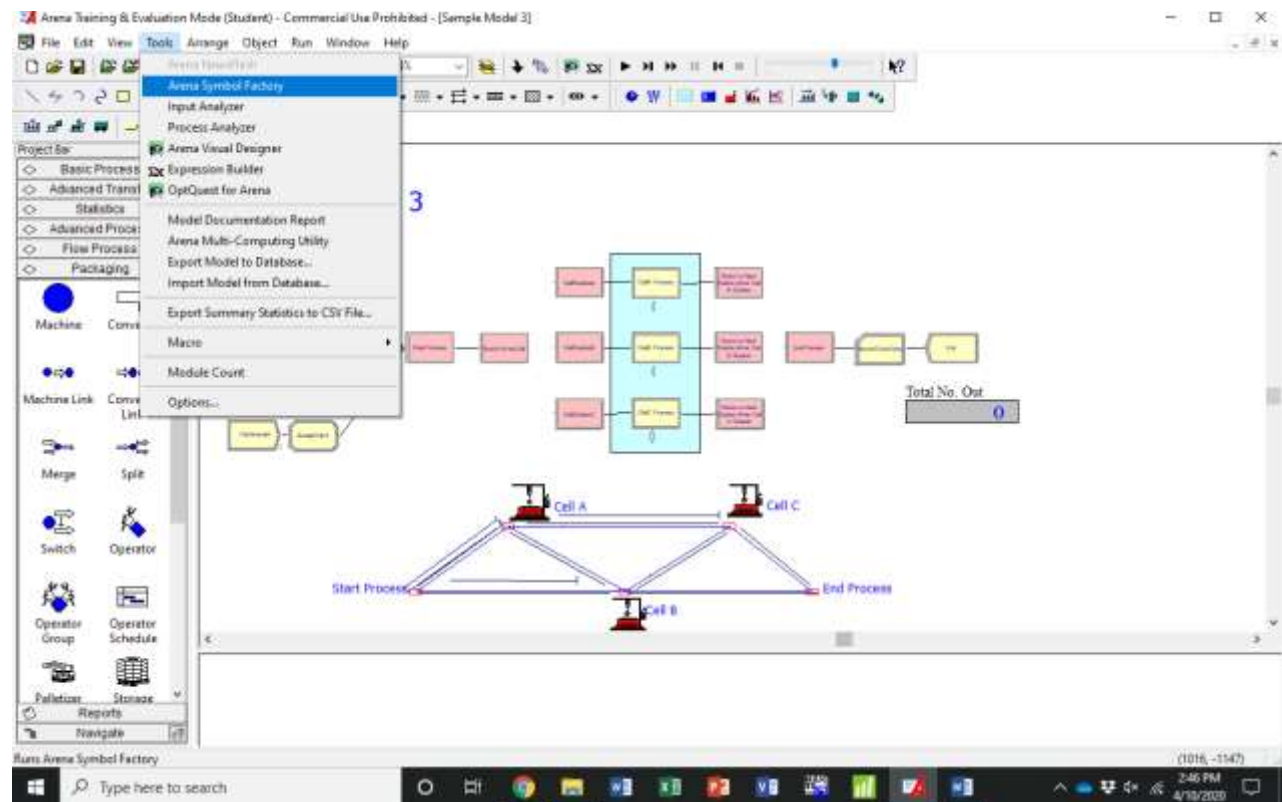


Figure 7.4. How to access Arena Symbol Factory.

To access Arena Symbol Factory, click on the Tools tab in the NavBar. Then scroll down and click on Arena Symbol Factory. It should open to what we see in Figure 7.5.

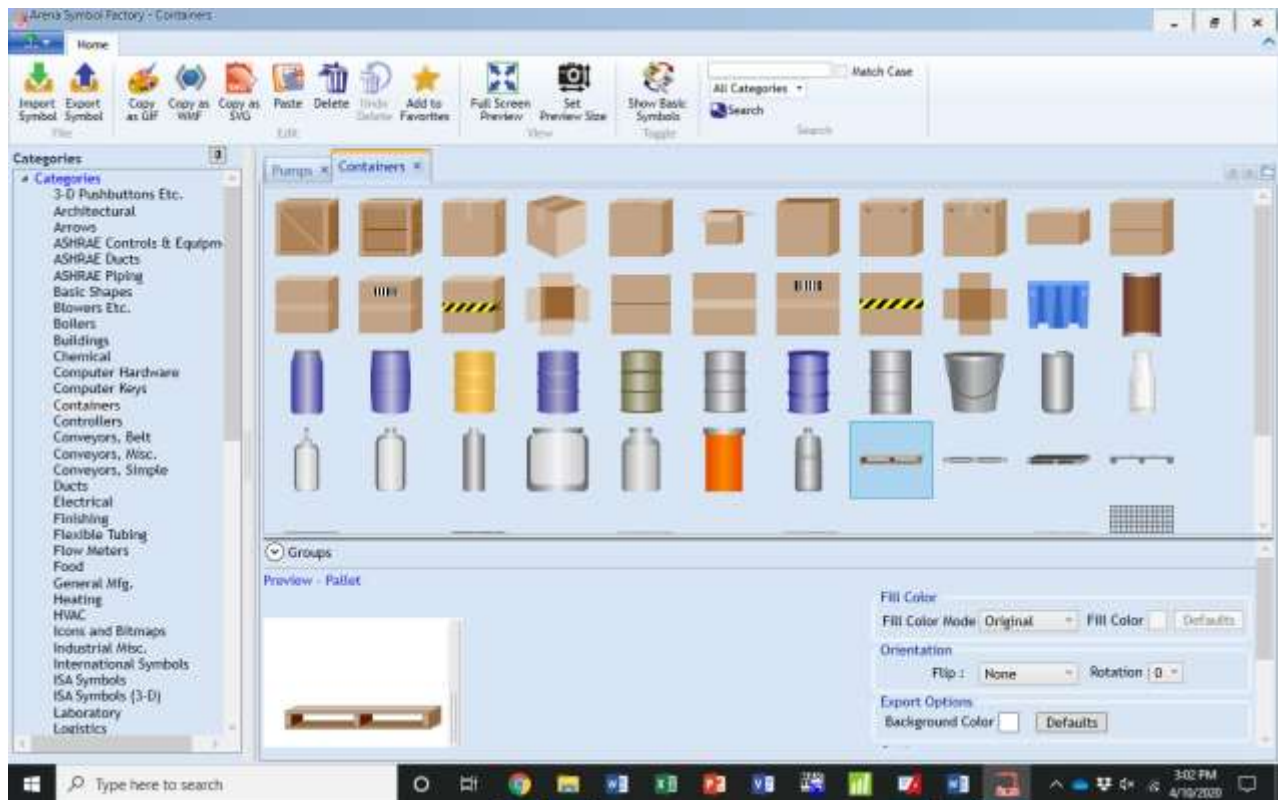


Figure 7.5. Arena Symbol Factory templates and images.

If you do not see what is shown in Figure 7.5, go through the following steps:

Open > This PC > Windows (C:), double-click to open

Program Files

Rockwell Software

Arena

Symbol Factory

Symbol Factory3 (the application file)

This will take you to what we see in Figure 7.5. Notice on the left-hand side, there are approximately 50 different templates, each with its own set of images. As an example, Figure 7.5 currently displays the Containers template and we can clearly see numerous images associated with containers. Click on any image of interest and it will be displayed in the Preview window pane to the right of the list of templates.

You can add this image to your Arena model simply by right-clicking on the image, then select Copy as GIF, go back to your model and right-click again to insert this image into your model. You can change the size by dragging one corner to increase or decrease the size of the image. You can also place it anywhere in your model by left-clicking on the image and moving it to the desired location, then click again to release the cursor. As an example, we have just added a static image of the wood pallet into our Sample Model 3 in Figure 7.6 by following the above steps.

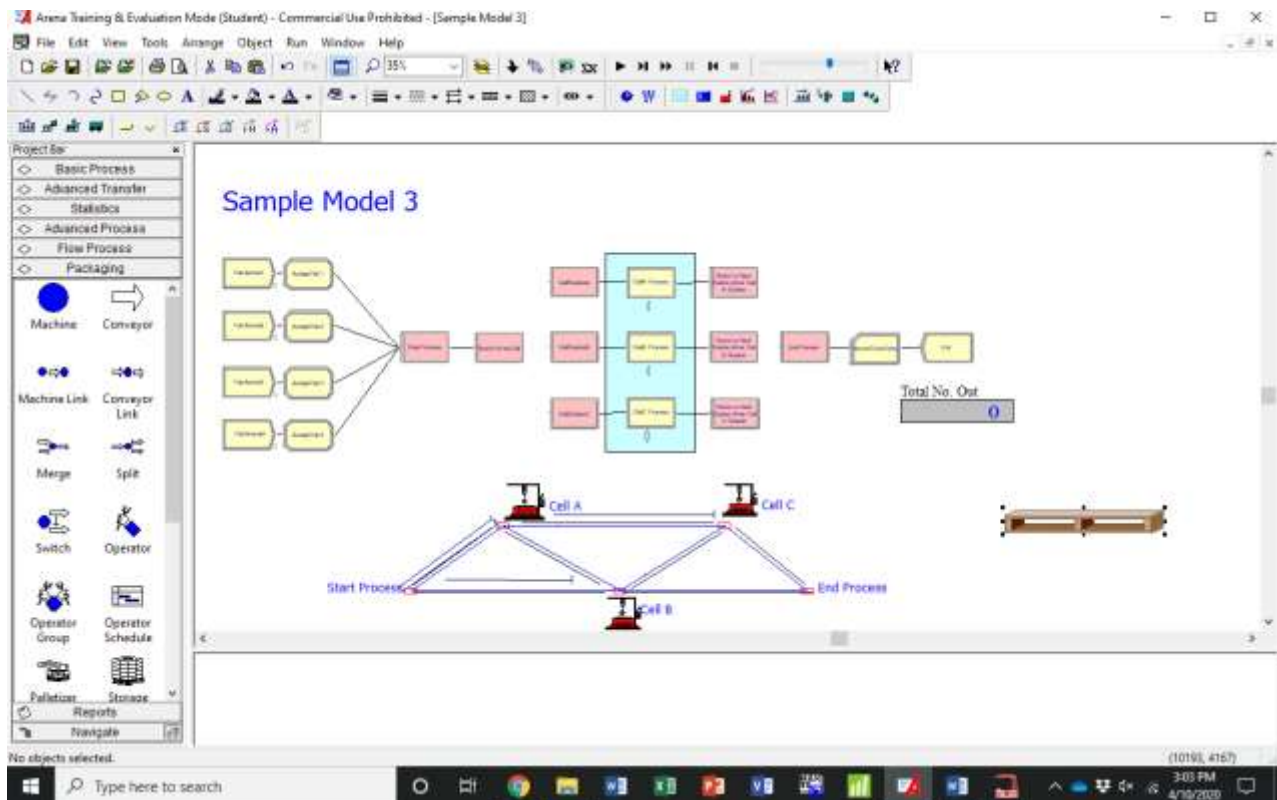


Figure 7.6. Adding a static image of a wood pallet from Arena Symbol Factory.

Take a few minutes to explore the many templates and see the images that you may one day want to add to your future simulation models.

7.1.4 Dynamic Resource Images

Dynamic resource images are images of resources that change states (i.e., from Idle state to Busy state) during a simulation run. These images are added by clicking on the Resource icon in the Toolbar. The Resource icon is a green icon that resembles a gasoline pump from yesteryear with a line arrow going through it from top left to right.

Clicking on the Resource icon opens a dialog box, as shown in Figure 7.7.

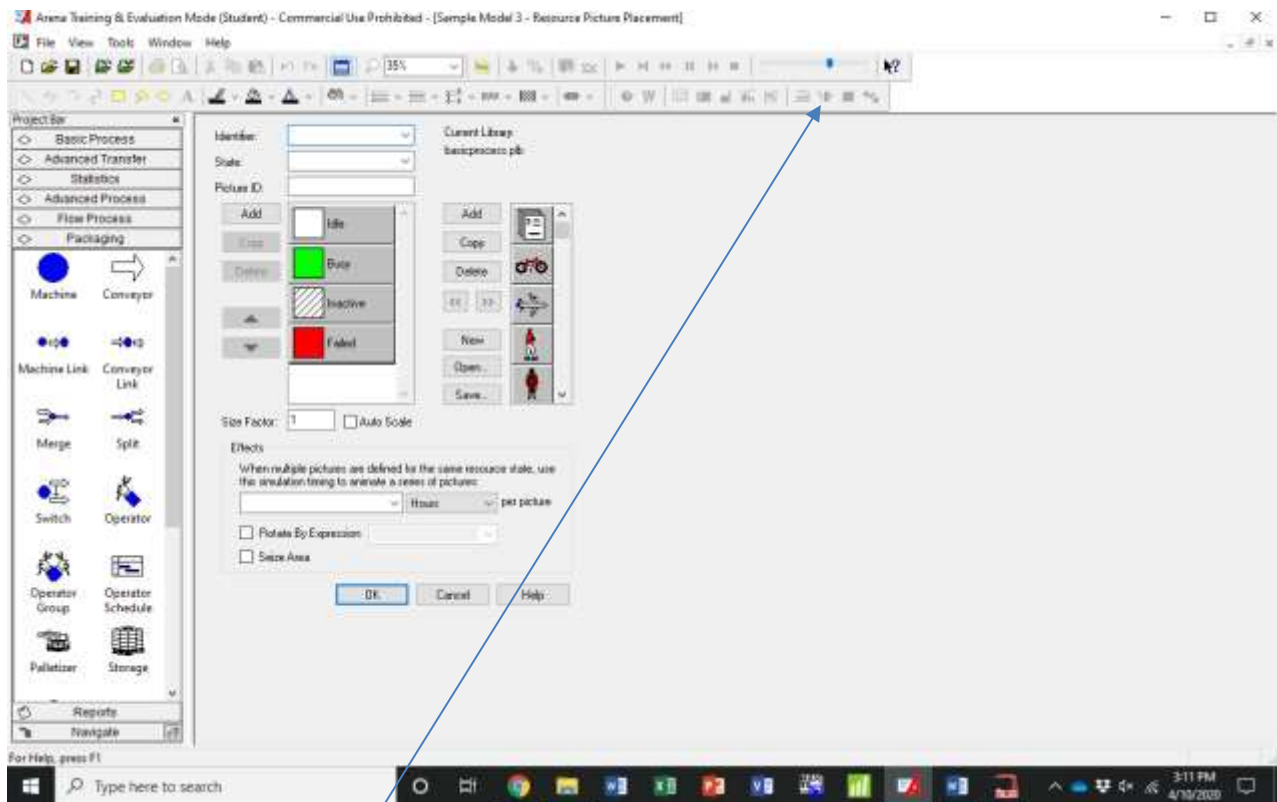


Figure 7.7. Dialog box of Resource icon.

In the Identifier field, select the appropriate Resource from the drop-down menu. The Identifier must be a previously defined Resource in your model, which typically comes from a resource that was added in a Process module. You can select an image to represent Idle and Busy states from a picture library file. The Basic Process picture library file is shown in Figure 7.7. The slider bar to the right of the images moves up and down to reveal all images associated with the Basic Process picture library. Other picture libraries are available by clicking on the Open button and then selecting another picture library, as shown in Figure 7.8. Remember where you saved this file so you can open it whenever needed.

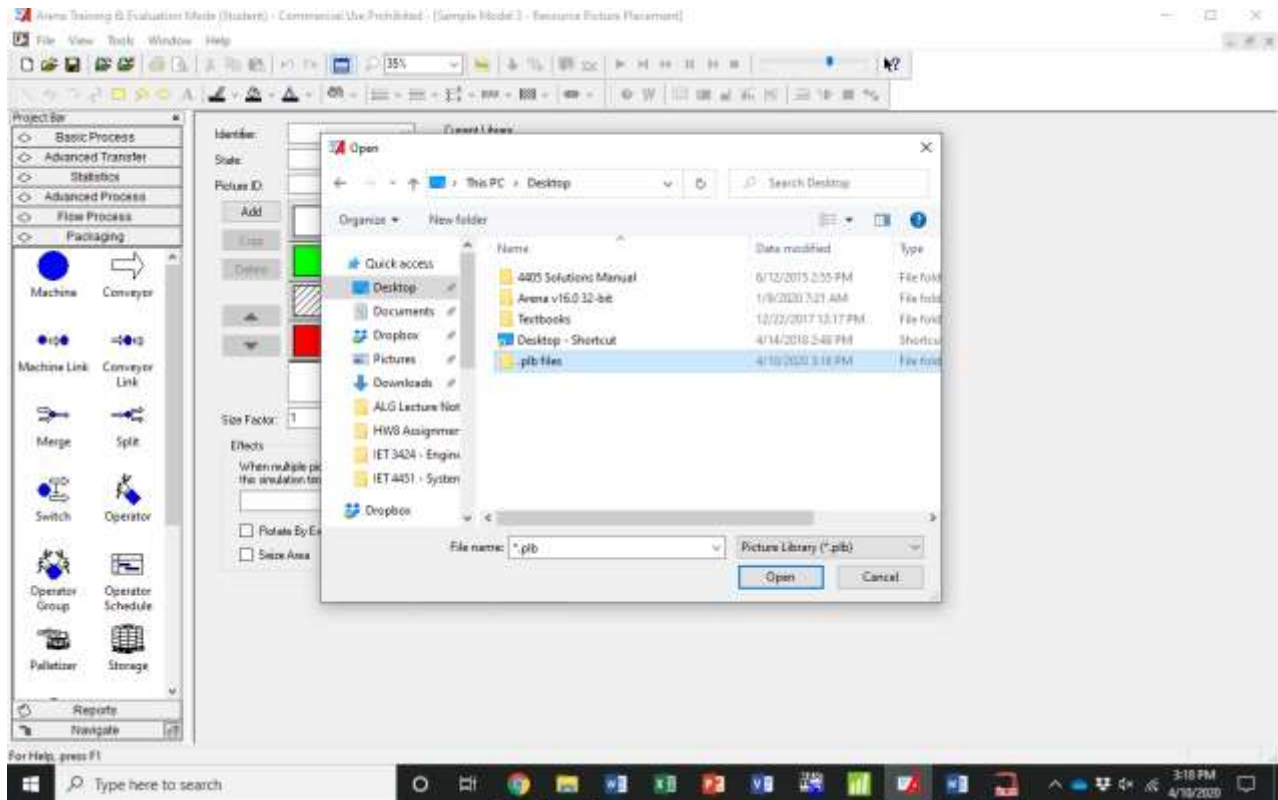


Figure 7.8. Finding the .plb files.

Once you locate the .plb files, click on the folder labeled .plb files to view all picture library files, as shown in Figure 7.9. Then select the picture library file of interest.

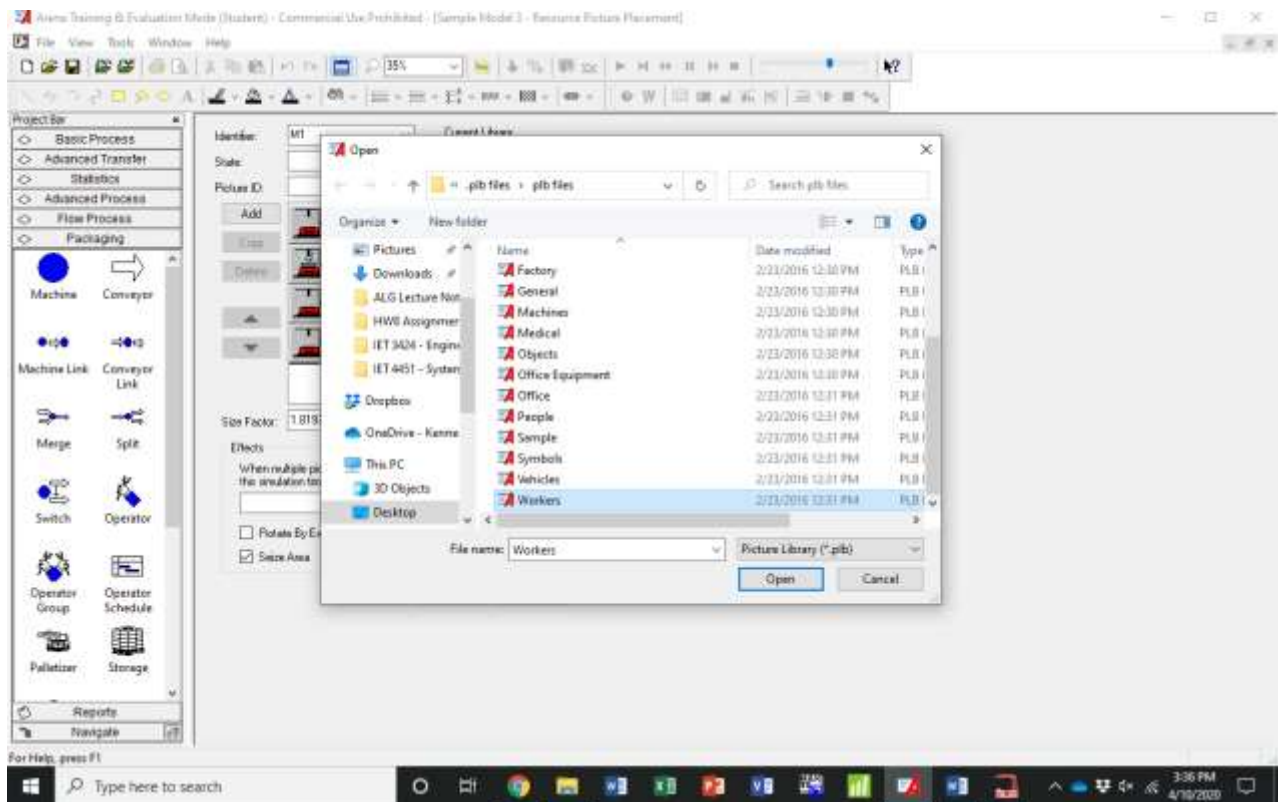


Figure 7.9. Viewing all .plib files from the .plib Folder.

Here, we've selected the Workers .plib file, which now appears in our Resources dialog box in Figure 7.10.

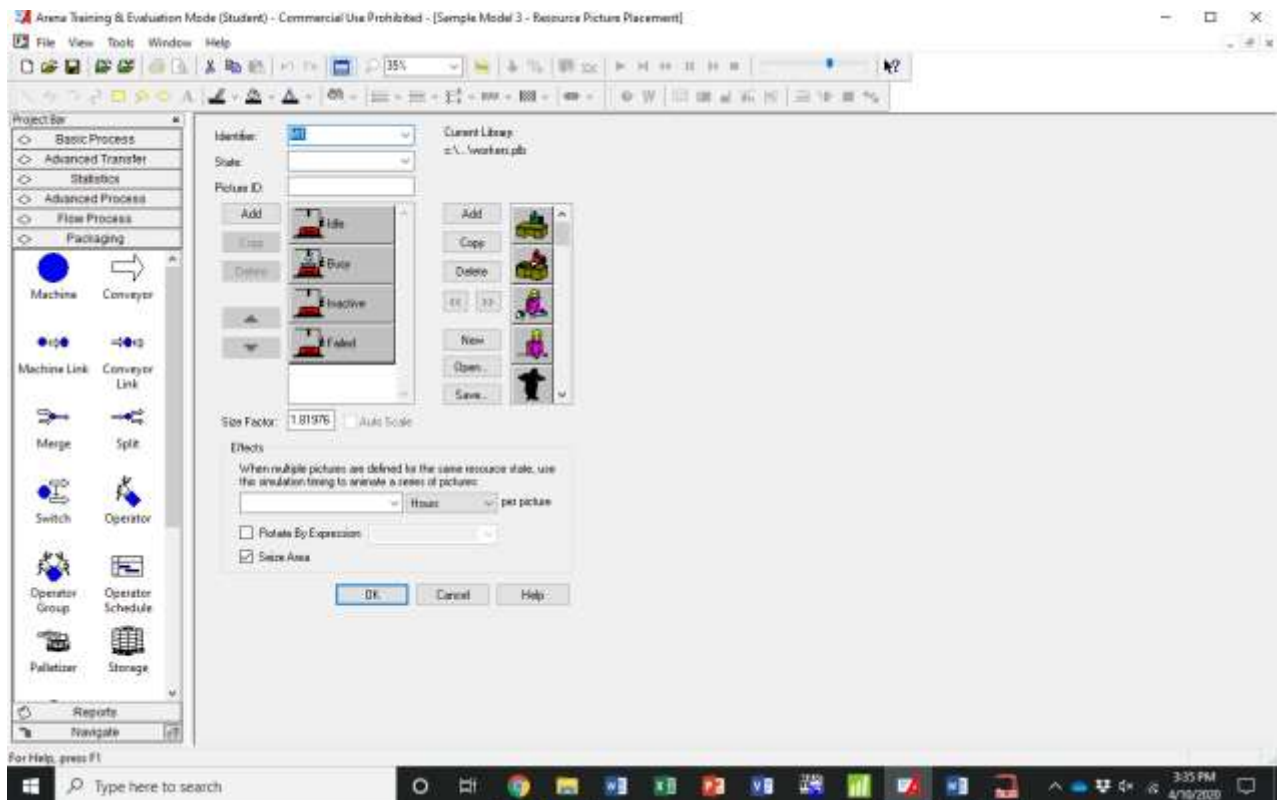


Figure 7.10. Workers.plb file.

When viewing the images within each picture library file, the analyst should select images that represent both an idle state and a busy state. For example, in Figure 7.10 above, the first two images are of a forklift. One image could represent an Idle state and the other image could represent a Busy state. To add an Idle state image, click on the Idle button with a white box first, then click on the image you want to represent the Idle state, then click on the << button to send the image over and replace the white box for the Idle state, as shown in Figure 7.11. The analyst should do likewise for the Busy state image.

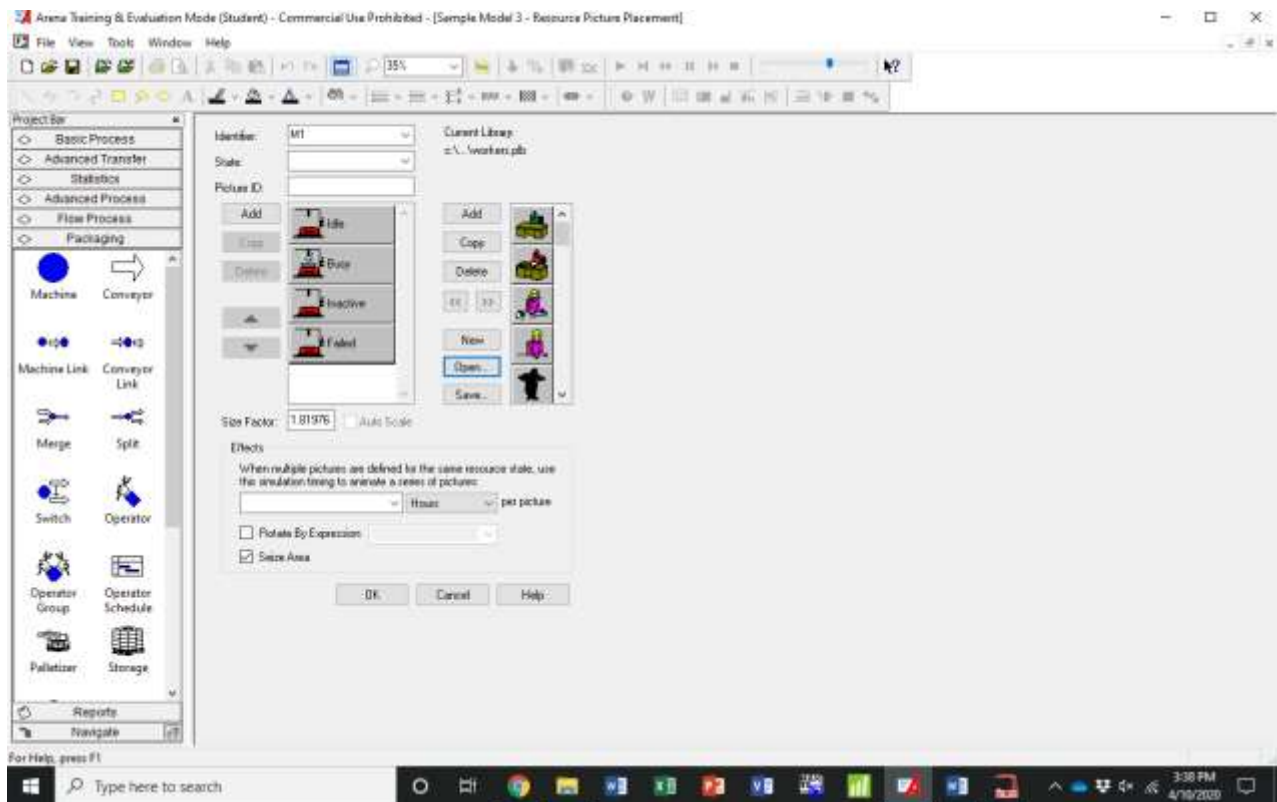


Figure 7.11. Idle and Busy state images.

Notice the Resource Picture Placement in the top middle of the screen. Observe that the State field and the Picture ID field changed when new images were added. Be sure to also select an Identifier image from the drop-down menu. Else, the model will have an error bug if this step is overlooked. You also have the option whether to click on the check box for Seize Area. By checking the box for Seize Area, the dynamic image in the model will have a circle with a dotted line. Click on the circle to move it where desired, normally in the middle of a Busy state image to show a part being worked on when the simulation runs.

Take time to explore the images contained in the various picture libraries to get an idea of what is available for your future simulation models.

7.1.5 Dynamic Transporter Images

Dynamic transporter images are images of transporter, such as a forklift, that change states (i.e., from Idle state to Busy state) during a simulation run. These images are added by clicking on the Transport icon in the Toolbar. The Transport icon is a green icon that resembles a green railroad car from yesteryear with two wheels, as shown in Figure 7.12.

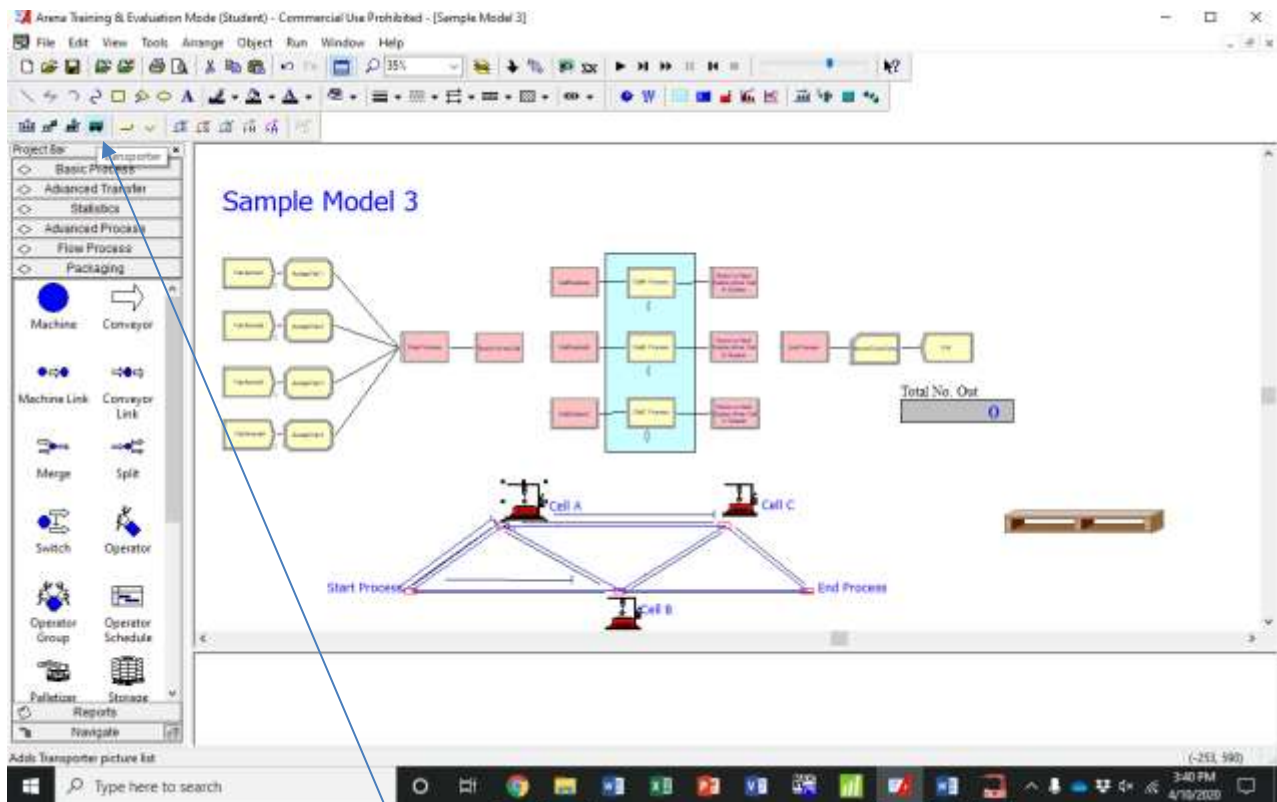


Figure 7.12. Clicking on the Transport icon.

Clicking on the Transport icon opens a dialog box, as shown in Figure 7.13.

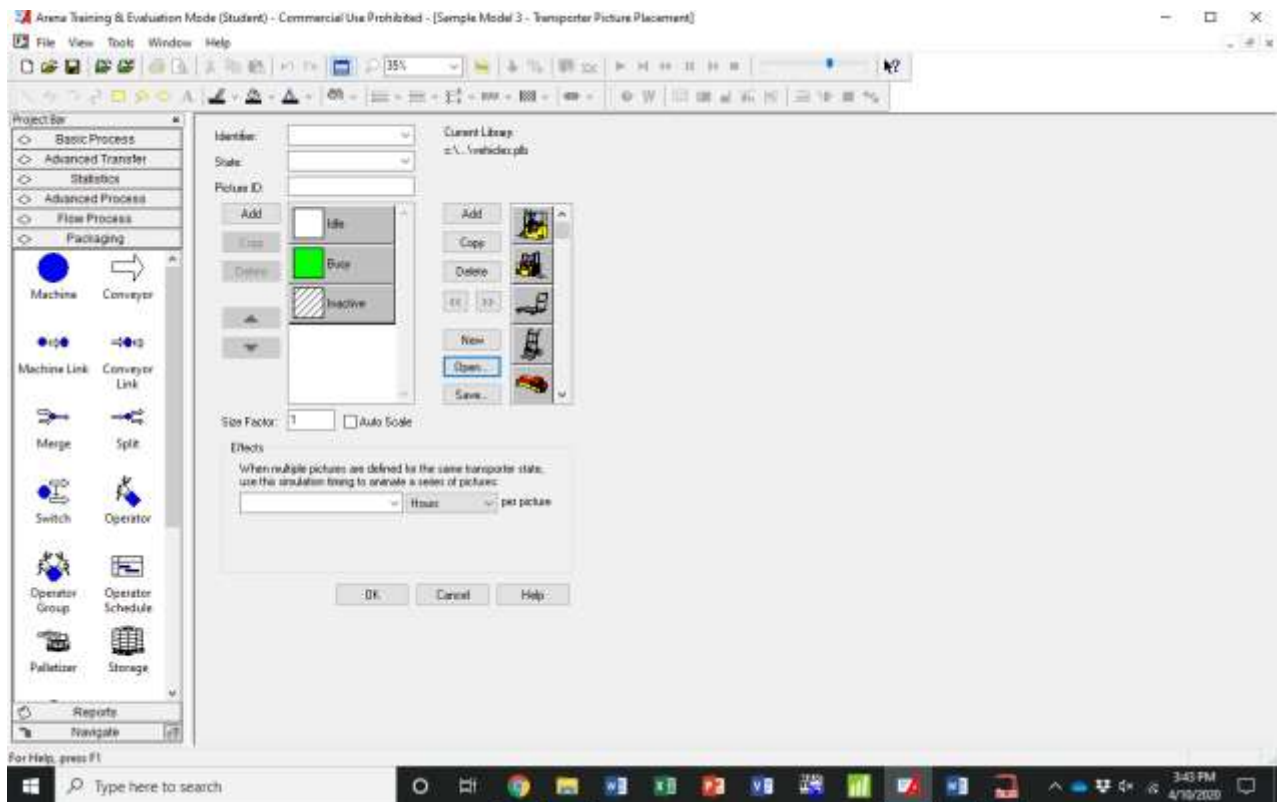


Figure 7.13. Dialog box for the Transporter icon.

Notice the Transporter Picture Placement in the top middle of the screen. Also observe that this dialog box very closely resembles the dialog box for the Resource icon; however, this dialog box pertains to transporters that would be added in a Request module rather than resources like machines, equipment, or people that would be added in a Process module.

The actions required to add Idle or Busy state images, Identifiers, and changing picture libraries is identical to those actions required in the Resources icon discussed in the previous section.

7.1.6. The Distance Icon

The yellow Segment icon appears in the bottom row of the Toolbar. It is mostly rectangular in shape. By clicking on the Segment icon, a dialog box will appear in the Flowchart view, as shown in Figure 7.14.

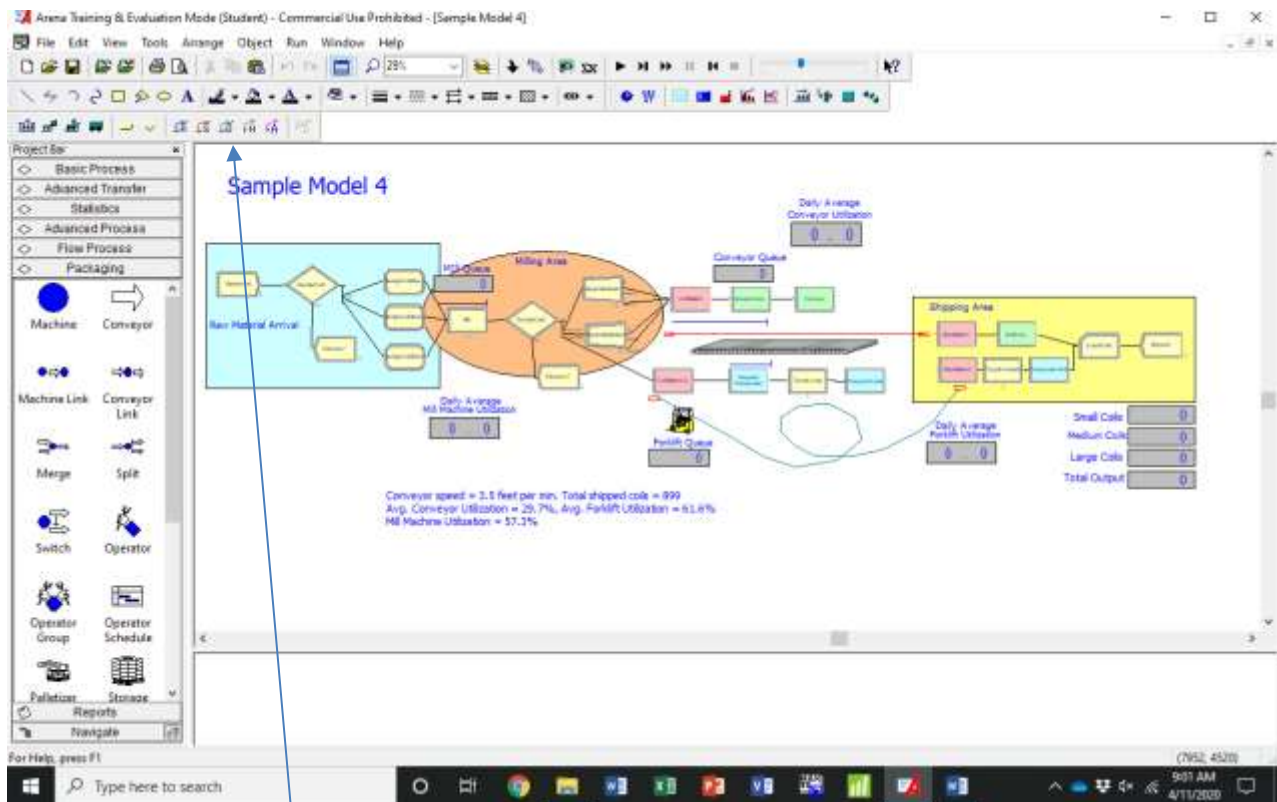


Figure 7.16. The Distance icon in Sample Model 4.

Connect Segments (or Stations) for Transporters by clicking on the Distance icon and then either 1) complete the dialog box as we did for the Segment icon, or 2) simply ignore the dialog box and make the appropriate Segment (or Station) connections directly. The Default value for the number of points is 2, indicating a straight line with 2 end points. The analyst has the option to change the number of points to as many as desired as we see in the green line loop-de-loop path configuration for the forklift in Figure 7.16.

7.1.6 Level Indicator

We will use Sample Model 6 to discuss how to add a Level Indicator or a Time Plot to your model.

A Level Indicator displays a fluctuating level, such as reservoir water level, during a simulation run. The Level Indicator icon is located in the same toolbar as the Resource icon, as shown in Sample Model 6 in Figure 7.17.

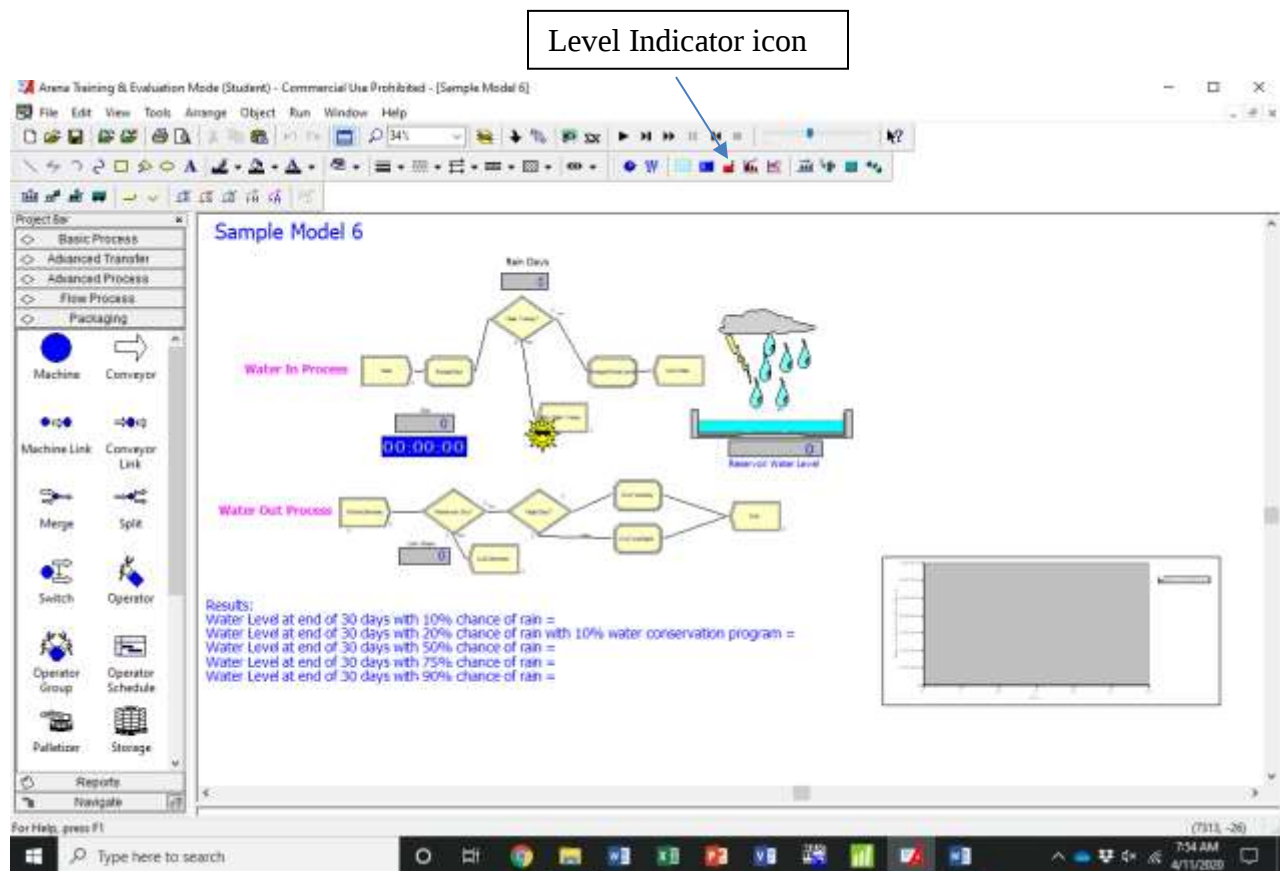


Figure 7.17. Level Indicator icon in Sample Model 6.

Click on the Level Indicator icon to open the dialog box (see Figure 7.18).

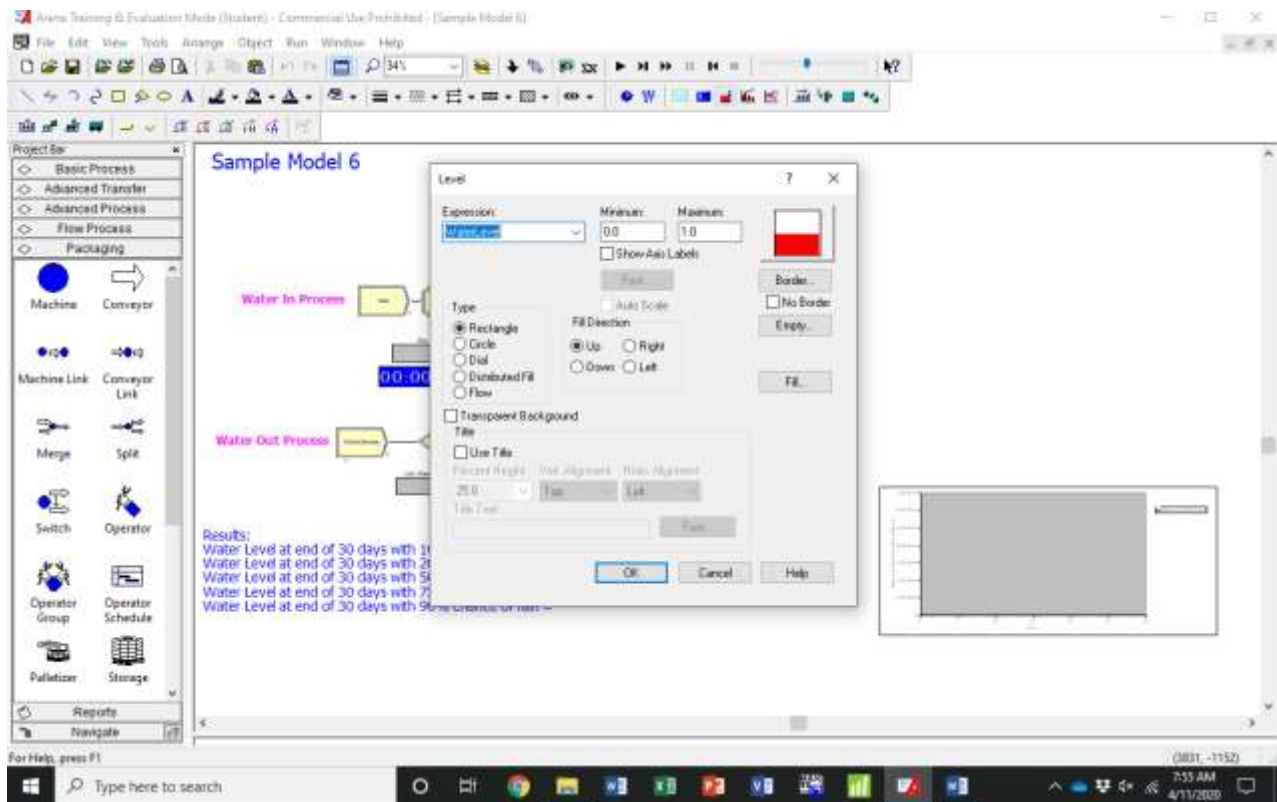


Figure 7.18. Dialog box for Level Indicator.

In the Expression field, select the variable that you want Arena to monitor from the drop-down menu. Manually enter the minimum and maximum values in the Minimum and Maximum fields. In the Type area, click on the radio dial for the type of display you want to see. Whatever you select will appear in the upper right-hand corner of the dialog box, such as the rectangle in Figure 7.18. In the Fill Direction area, make the appropriate selection. The analyst can also choose to remove border around the level indicator by clicking on the check box for No Border. Click the Fill button to open a color palette and you can select the color of choice for your level indicator. Check the box for Use Title to add a title to your image. Once you complete the dialog box and click OK, Arena will give you cross-hairs and you can decide where you want to put your level indicator in your model. You can move it around your model as well as increase or decrease the size of your level indicator by dragging one corner of the image in the appropriate direction. You can also add static images from Arena Symbol Factory to enhance the image in your model, as seen in Figure 7.17.

7.1.7 Time Plot

A Time Plot displays a graph that tracks the value of a variable over time. The Time Plot icon is in the same toolbar as the Resource icon, as shown in Figure 7.19.

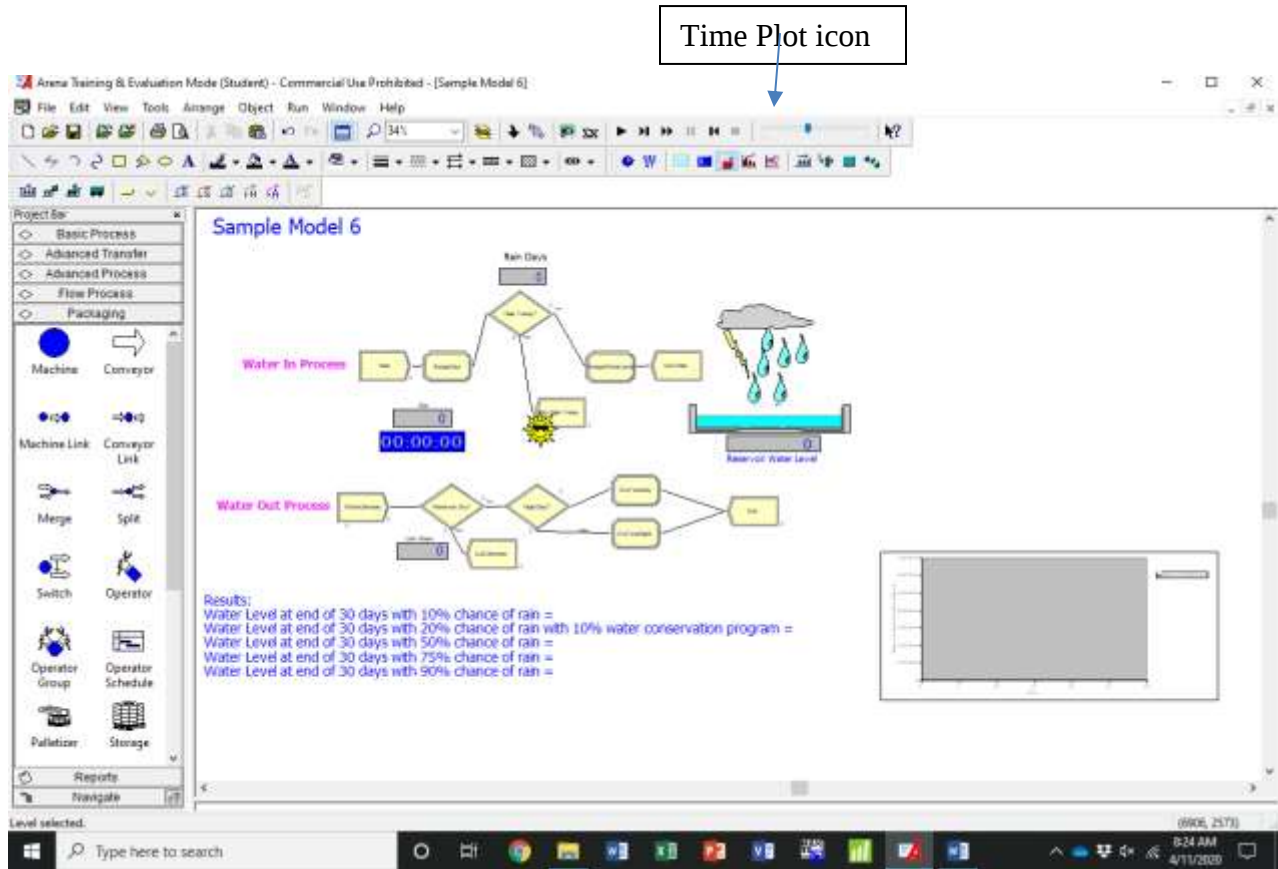


Figure 7.19. Time Plot icon in Sample Model 6.

Click on the Time Plot icon to open the dialog box, as shown in Figure 7.20.

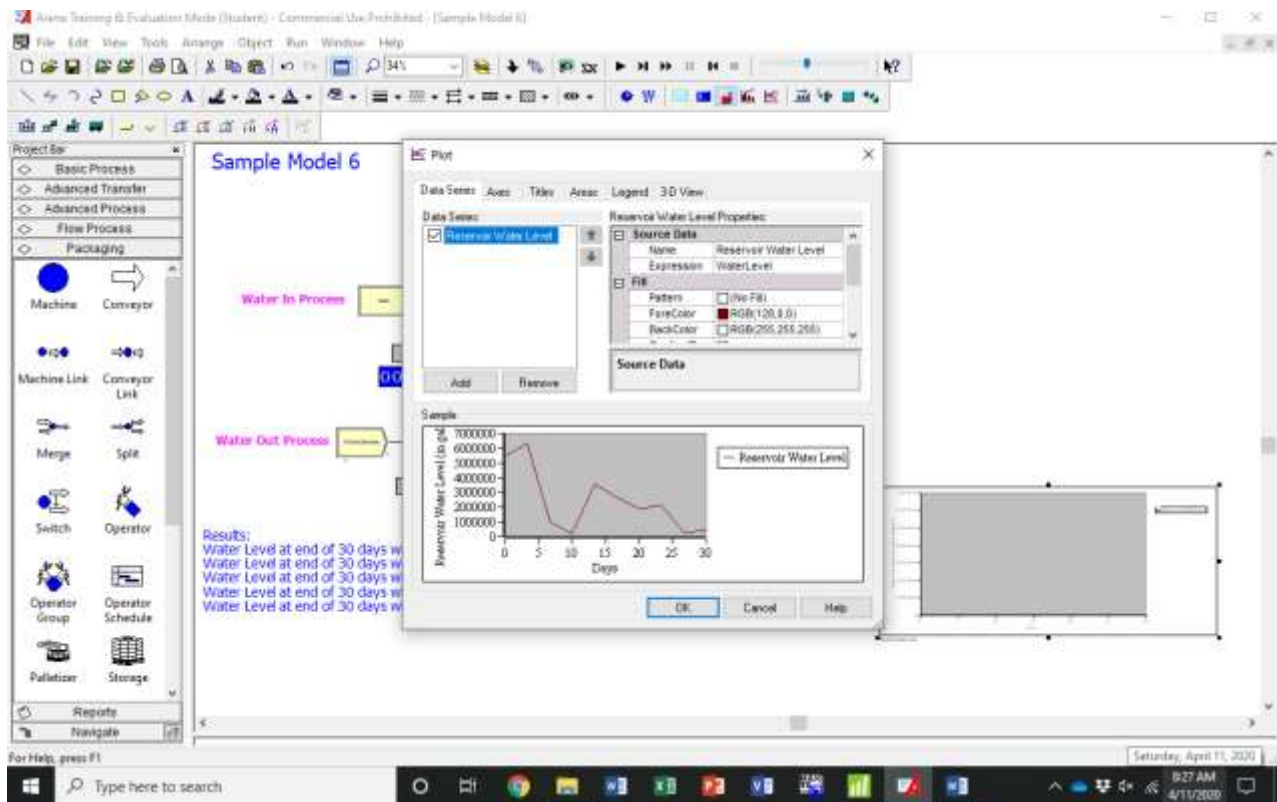


Figure 7.20. Dialog box for Time Plot icon in Sample Model 6.

You will notice six tabs in the dialog box of which we typically use only three. The Data Series tab will be blank; however, after you enter a name in the Name field of the Source Data section, Arena will automatically create a Data Series. Also in the Source Data section, select the variable that you want Arena to track over time from the drop-down menu.

Make appropriate selections in the Fill section, including your choice of color. In the Line section, the Draw Mode field offers two options as shown in Figure 7.21: Point to Point and Stairs.

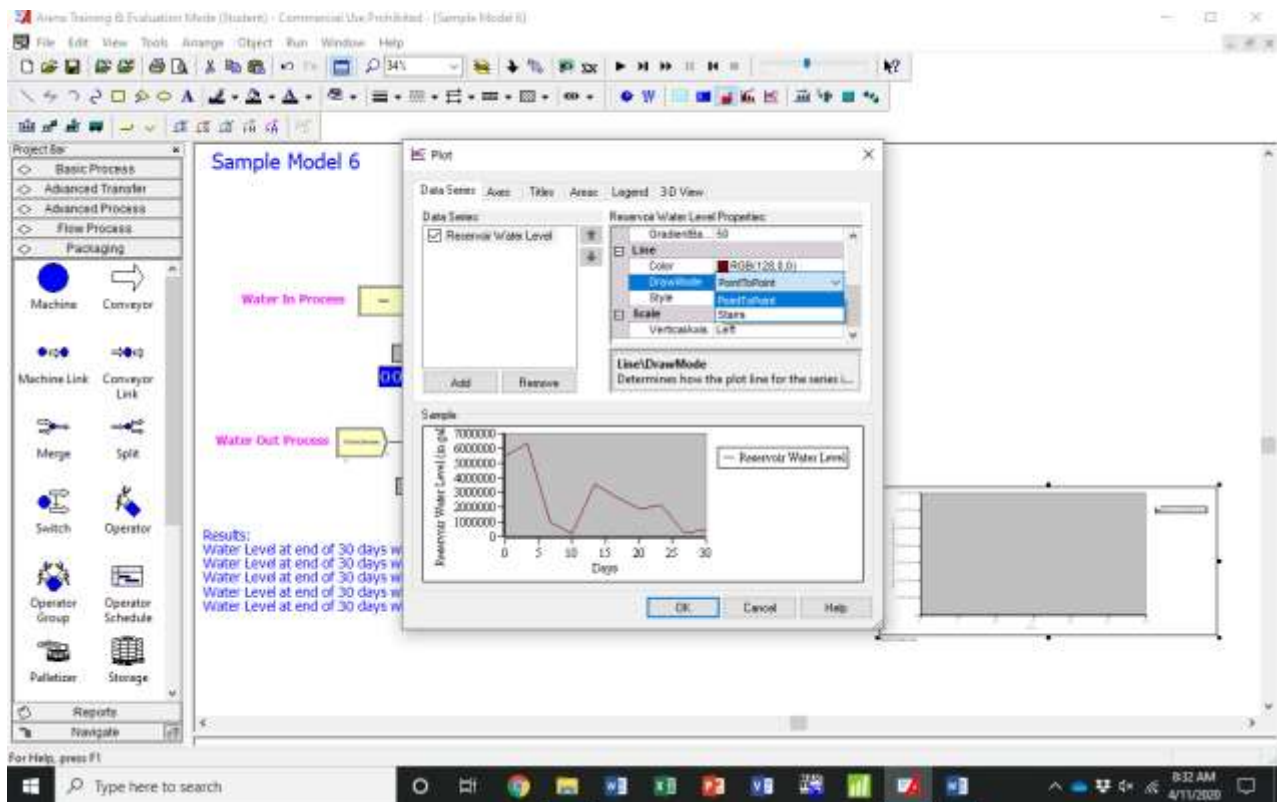


Figure 7.21. Line > Draw Mode options in Sample Model 6.

The Style field in Figure 7.22 offers different types of line style in your graph, such as Solid, Dash, Dot, Dash Dot, Dash Dash Dot, and Small Dots. Make the appropriate selection.

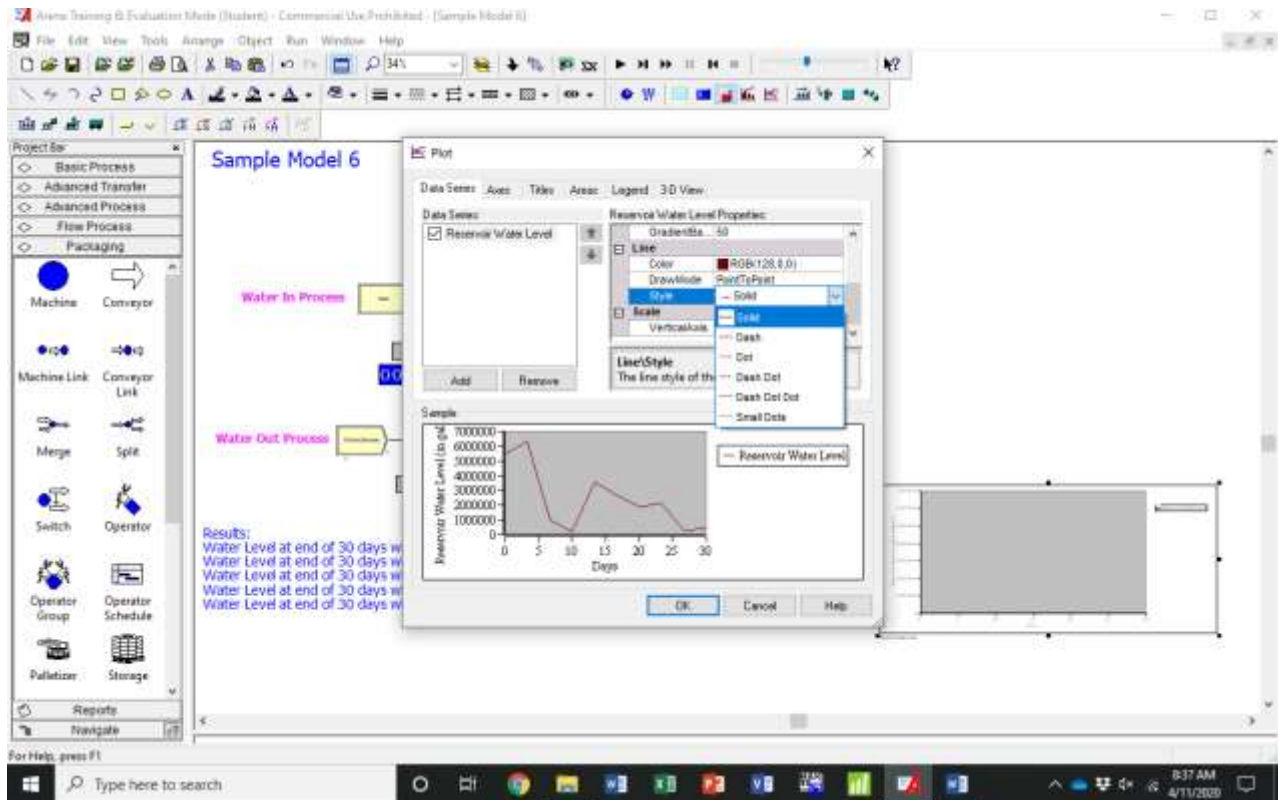


Figure 7.22. Line > Style options in Sample Model 6.

We use the Axes tab to label and create tic marks for both the X-axis and Y-axis, as shown in Figure 7.23.

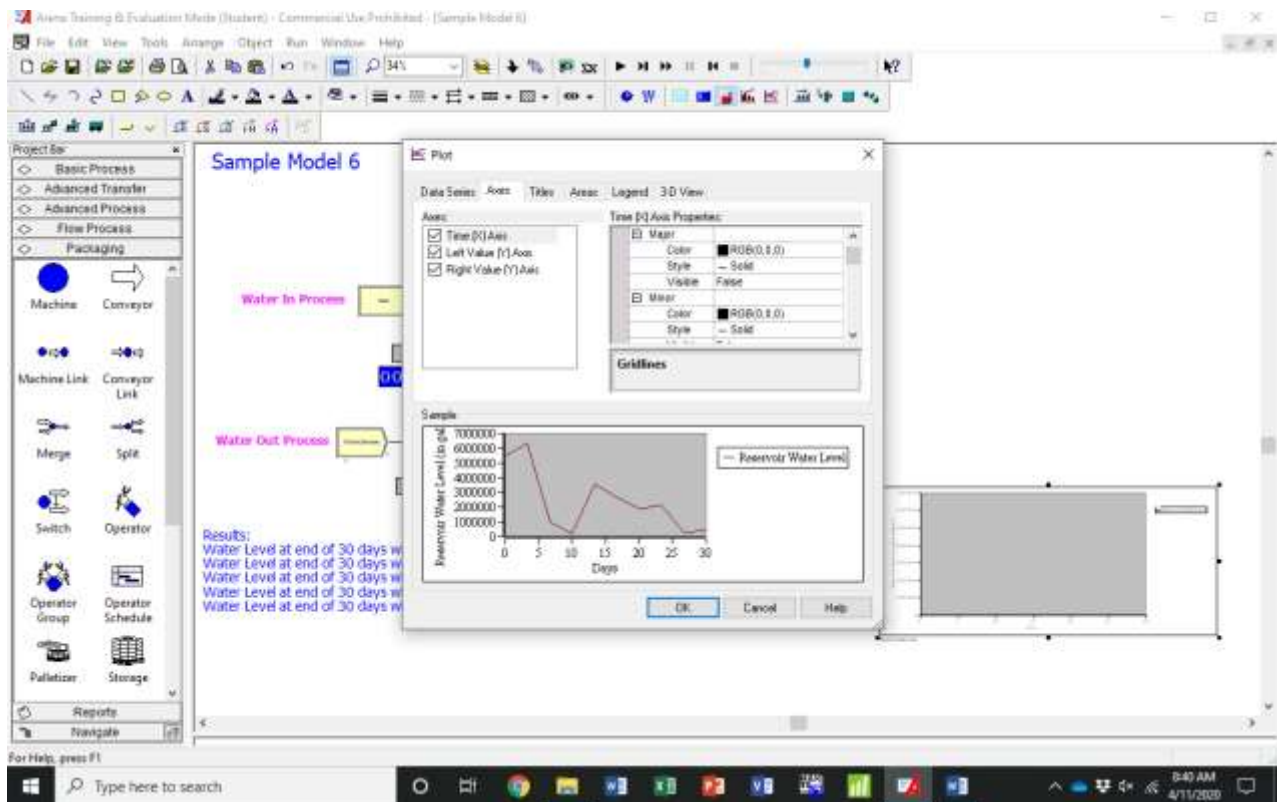


Figure 7.23. The Axes tab in Sample Model 6.

Select the (X) Axis option in the Axes window and then make appropriate selections in the fields to the right: Major and Minor Gridlines, Labels, Line, Scale, and Title. The Scale section allows the analyst to enter minimum and maximum values on the axis, as well as major increments (the tick marks), as shown in Figure 7.24.

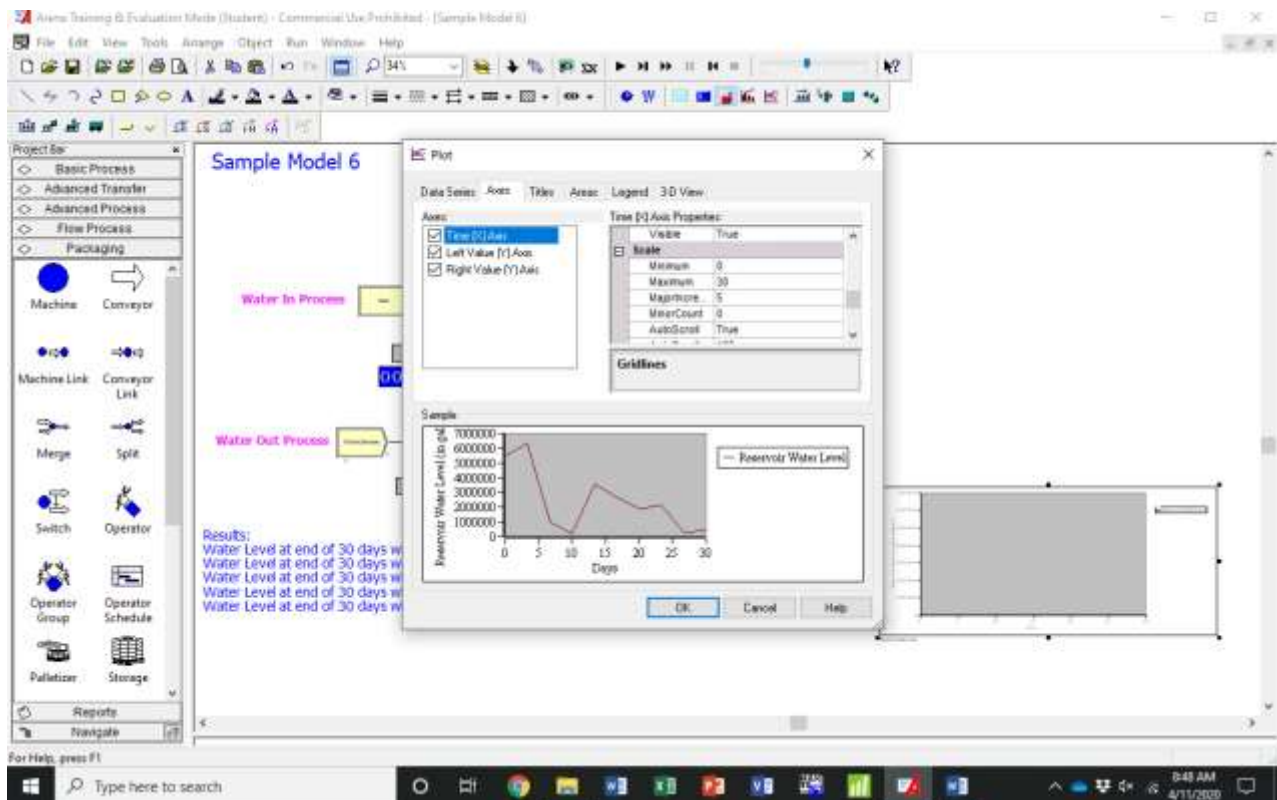


Figure 7.24. The Scale section for the (X) Axis in the Axes tab in Sample Model 6.

Then select the (Y) Axis option in the Axes window and then make appropriate selections in the fields to the right: Major and Minor Gridlines, Labels, Line, Scale, and Title. The Scale section allows the analyst to enter minimum and maximum values on the axis, as well as major increments (the tick marks), as shown in Figure 7.25.

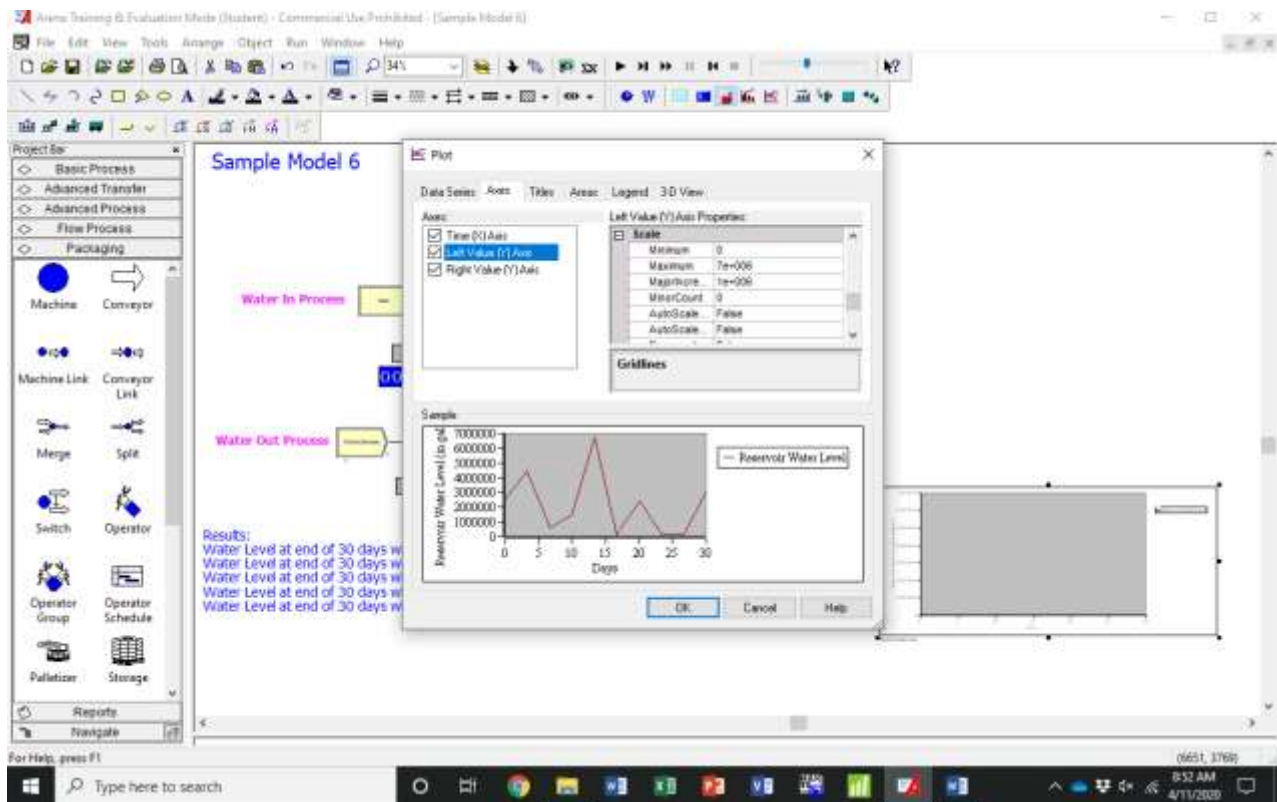


Figure 7.25. The Scale section for the (Y) Axis in the Axes tab in Sample Model 6.

In the Legends tab, the analyst has the option whether to add or not add a legend to the time plot graph, as shown in Figure 7.26.

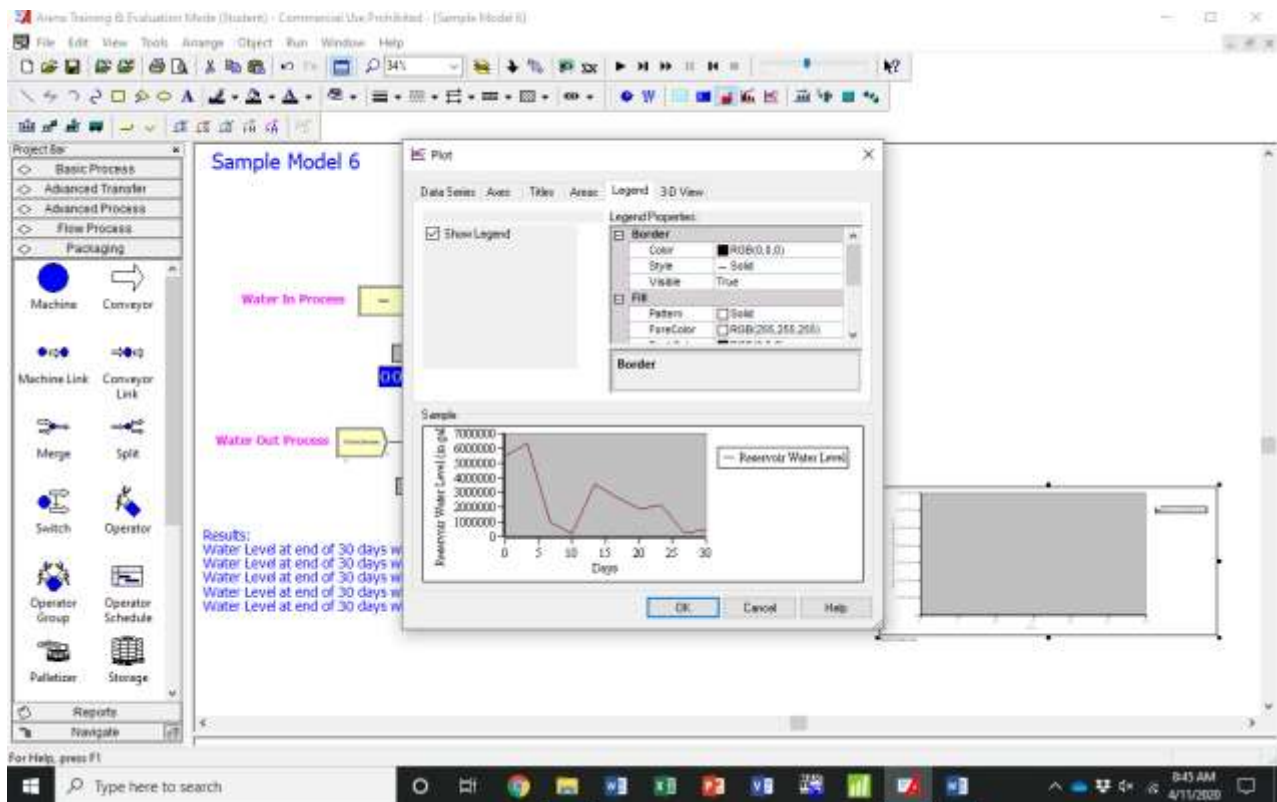


Figure 7.26. The Legend tab in Sample Model 6.

Check the box for Show Legend to display the legend “Reservoir Water Level” in the Sample Model 6 example. If the box is left unchecked, then no legend will appear and the window will be filled by the time plot graph.