4 Icons

4.1 Basics

It is helpful to use a realistic layout for the simulation model. The layout is divided into several levels:

1. The background of the Frame.
2. The icons of the static objects.
3. The icons of the mobile objects and their movement through the Frame.

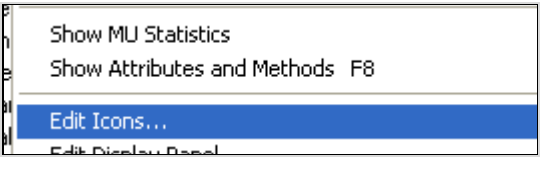
All objects of a class share a set of icons. You, therefore, have to duplicate enough classes in the class library for representing a more complex model. For a large quantity of objects, we recommend to organize them in folders.

4.2 The Icon Editor

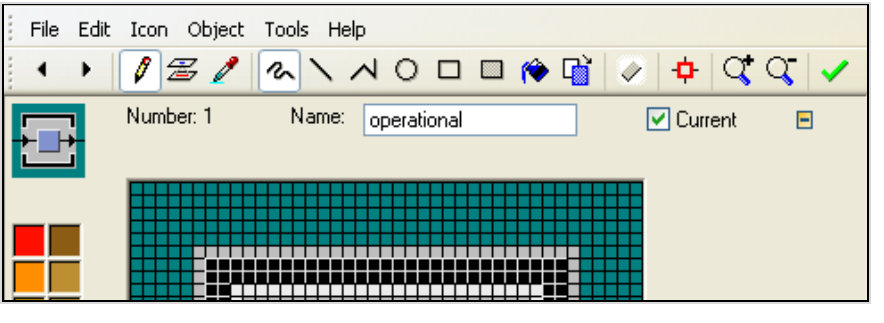
Every Frame and almost every basic object has a set of icons.

Example 31: Icon Editor

Duplicate a SingleProc in the class library. Open the context menu by clicking the object with the right mouse button and select ***EDIT ICONS****.*



This opens the icon editor:

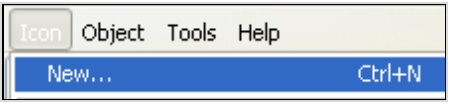


S. Bangsow: Manufacturing Simulation with Plant Simulation, Simtalk, pp. 75 – 83, 2010.

Most objects have two icons:

- No. 0 is the icon that Plant Simulation displays in the toolbar.
- No.1 is the icon that Plant Simulation displays when you insert the object in a Frame.

You can always extend the pool of icons. Select ***ICON – NEW*** *in the icon editor.*



You can replace the existing icon by

1. Drawing a new icon (…). So that the icon is displayed without limitation in the icon library (No. 0); it may have a maximum size of 40 x 40 pixels. All other icons are limited to a size of 4000 x 4000 pixels.
2. Importing existing graphics (file or clipboard).

4.3 Drawing Icons

You can create and edit simple icons in the Plant Simulation icon editor. The following tools are available:

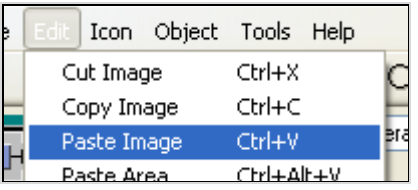
	Freehand line		Filled rectangle
	Line		Fill range
	Polyline		Copy range
	Ellipse		Delete all
	Rectangle		

You can select colors for the drawing functions by clicking in the color palette or you can select a color from the image with the eye dropper tool.

4.4 Inserting Images

4.4.1 Insert Images from the Clipboard

You can insert pictures with copy and paste. Keep in mind that you cannot control the size of the picture after inserting it into Plant Simulation. Copy the image to the clipboard. In Plant Simulation select:

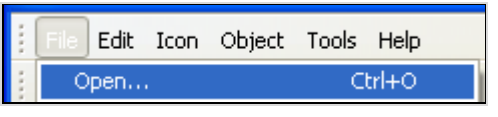


If necessary, the image can be modified in the icon editor. You can insert pictures from some applications in the icon editor with drag and drop. To do so, drag the image from the source application to the icon editor (on the representation of the image).

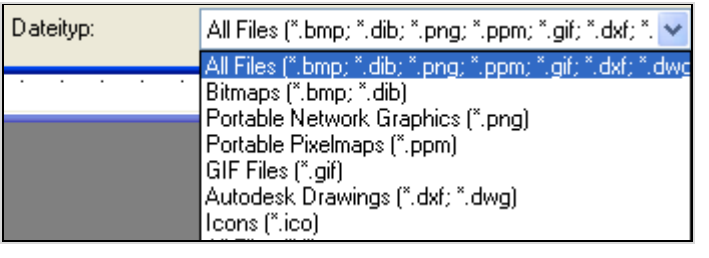
4.4.2 Inserting Images from a File

You can also create the object icons from existing files.

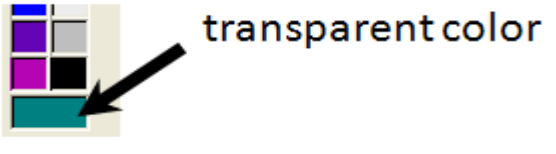
SELECT FILE – OPEN in the icon editor: …



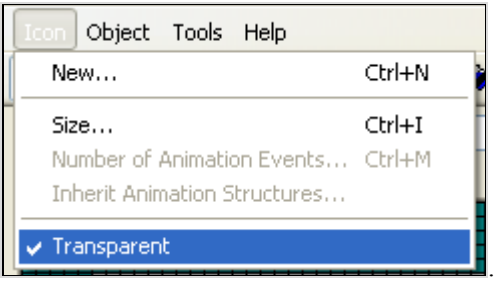
Plant simulation supports importing the following file types:



Note that you can even convert CAD drawings into pixel images. When you insert an image from the clipboard or from a file, the transparency information in GIF and PNG files is lost. Plant Simulation provides a transparent color (dark green). It is located at the bottom of the color palette:

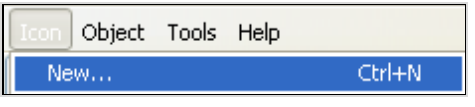


Fill all pixels, which should be transparent in the model with this color. Activate the transparency of these pixels with the command **ICON – TRANSPARENT**.

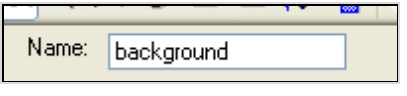


4.5 Changing the Background Color of the Frame

For Frames you can define an image with the name "background". This image is displayed in the background of the Frame. Proceed as follows:
Select **EDIT – NEW** in the icon editor of the Frame:



This creates an empty icon. Rename the icon to "background".



Now you can insert a graphic with copy and paste …

Another way is to import an existing file. Select **FILE – OPEN** in the icon editor: The selected file is displayed as the background. If you show everything true to scale, you can generate a realistic model.

Note:
Here, you can also drag a graphic (e.g., an AutoCAD drawing) into a Frame object. A new icon (background) will be created, and the drawing remains visible in the background of the Frame.

4.6 Animation Structures and Reference Points

4.6.1 Basics

When you create your own icons, you have to determine where the MU is displayed on the icon and how the MU (e.g., on a track) will move on the icon. You can set these settings:

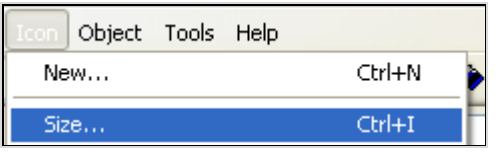
- With a reference point on the MU.
- With an animation structure on the material flow objects.

4.6.2 Set Reference Points

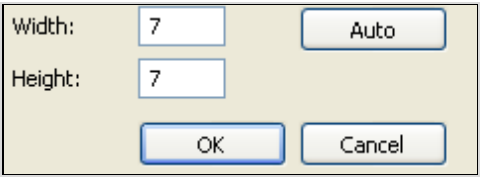
The reference point determines where Plant Simulation displays the icon of the part when you insert the object into the Frame or during the animation on another object. If it is an MU, it will be positioned so that its reference point lies on an animation point or an animation line. If the object is a basic object or a Frame, then it will be aligned to the grid in a Frame window. The reference point is positioned on a grid point. The reference point is displayed as a red pixel in the icon editor. You can move the reference point by clicking the **Set Reference Point** button and by clicking a new pixel.

Example 32: Reference Points and Animation Structures

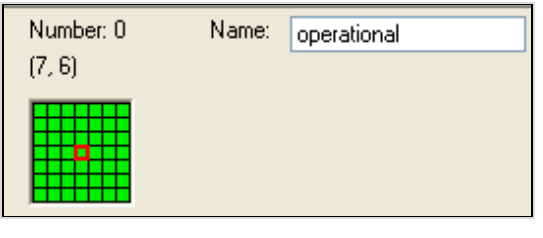
Duplicate the entity in the class library (right mouse button – Duplicate). Name the new class "Part". This part will have a size of 7 x 7 pixels and will be green. Open the icon editor (right mouse button – Edit icons ...). First, change the icon size. Select the menu item: Icon – Size.



Enter a height and a width of 7 and click OK:



Next, remove everything that is left from the previous icon. Use the "Delete All":  *button. Click on a green color (not the color of transparency in the color palette). First, click the fill icon (*  *) on the toolbar, then click the icon. You have to reset the reference point (in the middle of the icon at the position on 4 x 4 pixels). Click Set Reference Point*  *on the toolbar. Then select the pixel at the position 4 x 4.*



Note:
If you change the size of an MU, you have to do this for the entire set of icons. The entity has two icons that you have to change:

– operational (number 0)
– waiting (number 1)

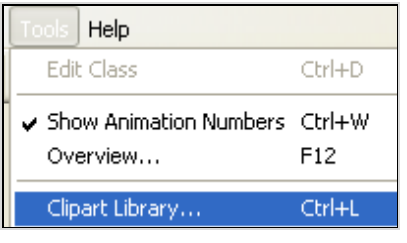
The fastest way is to copy the current icon (Edit – Copy Image) switch to the next icon and then paste it again (Edit – Paste Image). You have to set the reference point in the second icon (before Plant Simulation version 8).

4.6.3 Animation Structures

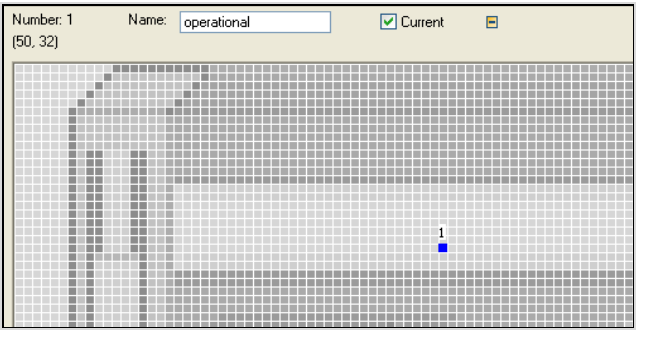
In animation mode you can set animation points or animation lines in the icon editor.

Example 33: Animation Structures

Duplicate a SingleProc in the class library. Rename the object to "press". Open the icon editor. Plant Simulation shows a number of simple icons. Select Tools – Clipart Library…

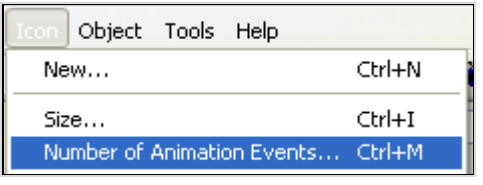


Select the folder machine, and drag the file Press2.gif to the icon editor. Change to animation mode. Click on the icon:  *. In animation mode, the icon will be shown with a grayed out. The built-in SingleProc already has an animation point. If you change the size of the icon, then you have to manually move the animation point. Click the button*  *. Now you can change the position of the animation point by dragging it. The MU will then be animated on this position on the press.*



You can also delete animation points and insert new animation points. Place-Buffer, Line, Track, and Sorter use animation lines and animation polylines. If you also want to watch animation, you have to specify how often the MU will be displayed on this line.

Example: Select the PlaceBuffer and open the icon editor. Switch to animation mode. You see a line on the icon. If, for example, more than one animated part is located on the block, you have to specify a number of animation events greater than one. Click on: **ICON – NUMBER OF ANIMATION EVENTS** …



Enter a number less than or equal to 250 in the dialog that opens. The default is 1, which means that the MU is animated only at the beginning and end of the object, not in between.

4.7 Animating Frames

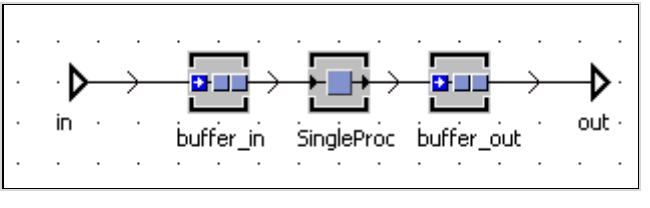
Often, it is necessary to split simulations that are quite complex. The simulation takes place in various parts or segments, which are connected with each other through connectors. At the top level is an overview of all the objects (Frames) of the simulation. For a better presentation of the sequences, you can animate the flow of mobile units on the Frame.

Example 34: Machine with a Ringloader, Animation on a Frame

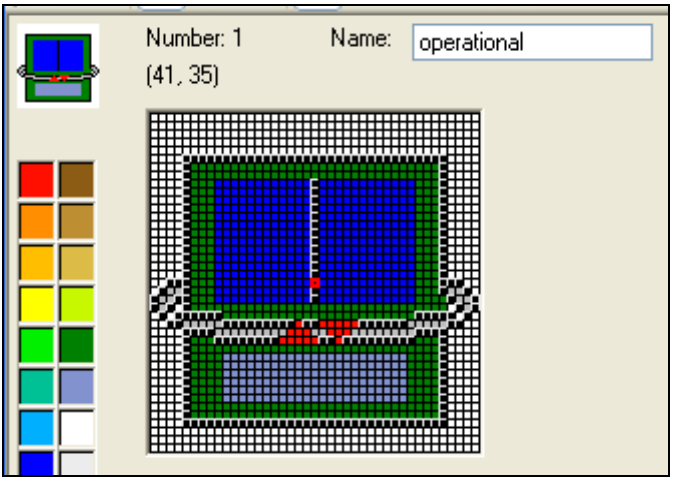
We want to simulate a machine. The machine is equipped with a ring loader, which offers 15 places each for unfinished and finished parts. The ring loader is "accumulating". Insert a Frame (e.g., Machine_ringloader). To simulate this machine, we need (for example) three objects:

EntranceBuffer
SingleProc (processing time: 1 minute)
ExitBuffer

Next connectors are necessary for the connections with other objects. The Frame for the machine might look like this:



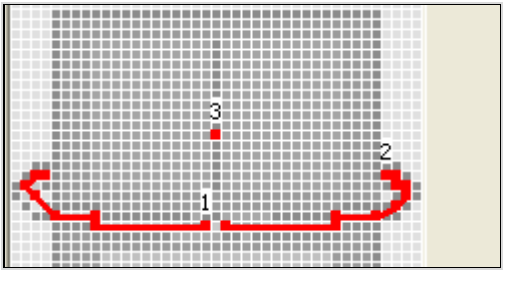
Change the Frame icon (so that indicates the ring loader):



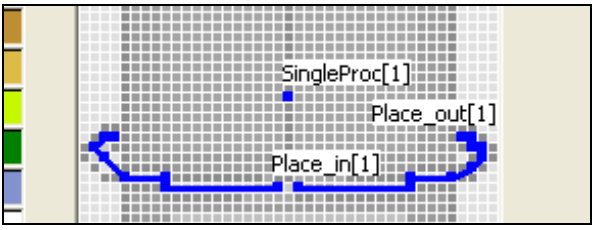
Change to animation mode: Draw three structures on the icon. One each for the:

- *EntranceBuffer*
- *SingleProc (processing time: 1 minute)*
- *ExitBuffer*

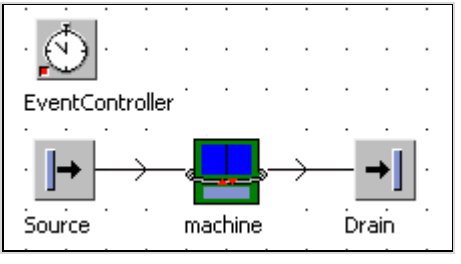
You can do this with polylines:  *. Click on the icon Polyline. Then click on separate points; Plant Simulation connects these points with a polyline. To finish the line, click the right mouse button. Plant Simulation numbers your animation structures. It should look like this:*



Now the animation structures on the icon of the Frame must be connected with the animation structures of the objects within the Frame. First, click on the icon CONNECT ANIMATION POINT…  *. Then, click on the structure for the input buffer (number 1). It opens a window in which you have to select the respective object and possibly the animation structure of the object. The names of the objects will be listed on the animation structure.*



For testing, we build the following Frame:



The MUs are now animated on the object (Frame).