This course is intended for previous Users of ProModel & MedModel who have completed Essentials Training but may not have used the software for a while.

Our hope is that this training will help these Users "brush up" on their skills so they can again use the software to benefit their business.

ProModel 2018 Basic Refresher Training Webinar

Instructor Info:
Dave Tucker, LSSMBB
ProModel Senior Consultant
Office: 321.567.5642
dtucker@promodel.com

1/2018 Version 10.0
PM 2018 Refresher Training Webinar
For Software Version: 10.0

556 E Technology Way
Orem, UT 84097
801-223-4600

Course Objectives

1. Review the basic features of ProModel
2. Provide demonstrations of how to use ProModel
3. Show model examples
4. Answer Attendees' questions (*as time allows*)

Poll #1

Agenda

Sections

1. How to use ProModel
2. Locations, Entities, Arrivals & Processing
3. Resources & how to use them
4. Path Networks
5. User-Defined Expressions
6. Output Viewer
7. Scenarios
8. Wrap Up

1. How to Use ProModel

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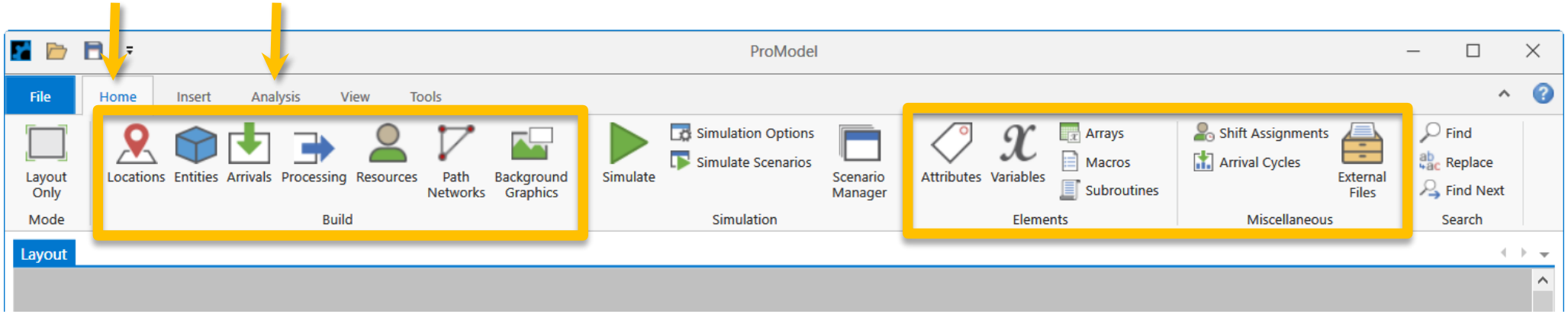
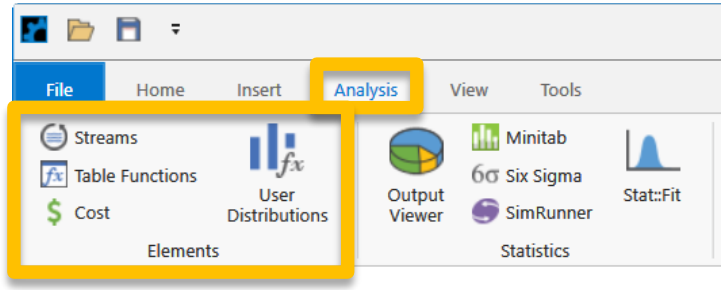
About the PM Interface

- PM is essentially driven by tables with records built directly by the User or built automatically in the background as the User works.

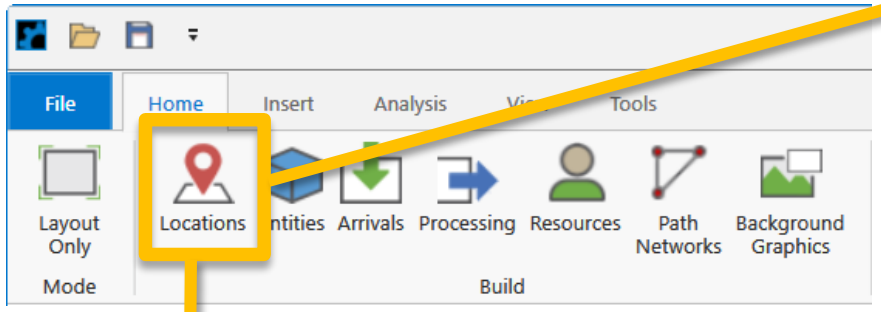


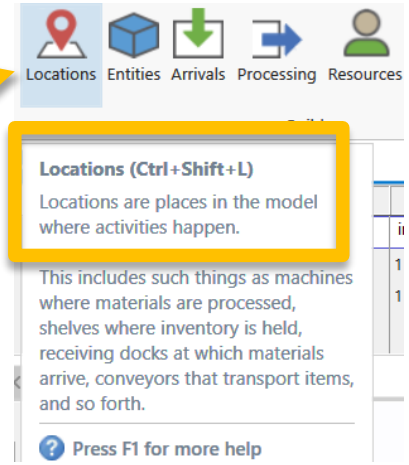


About the PM Interface

- Go to a model element table by using either the ribbon button or a keyboard shortcut.

Example: Locations



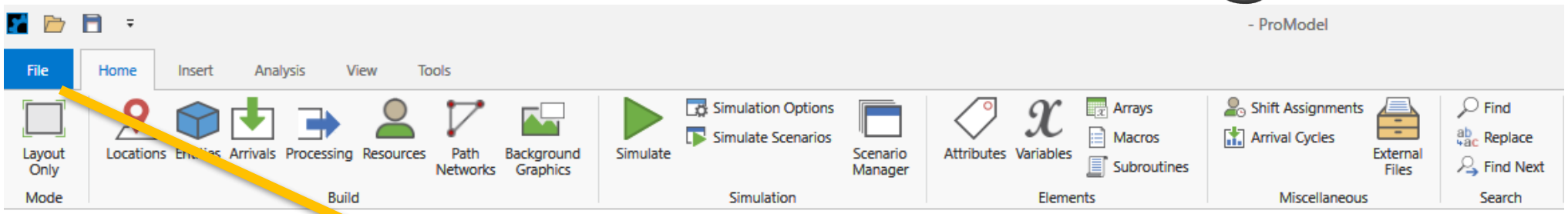


Hover over button to learn shortcut

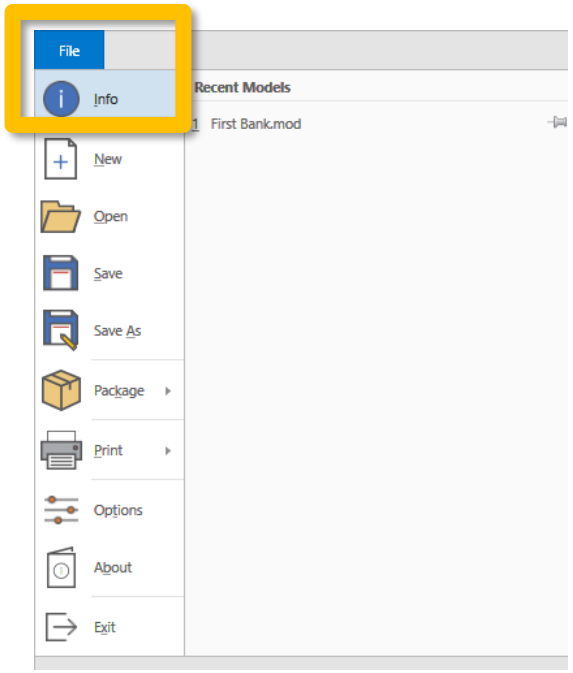
Locations

Icon	Name	Cap.	Units	DTs...	Stats	Rules...	Notes...
	Loc1	inf	1	None	Time Series	Oldest	
	Loc2	1	1	None	Time Series	Oldest	
	Loc3	1	1	None	Time Series	Oldest	

PM Home Ribbon – Getting Started



Select Info from the File menu



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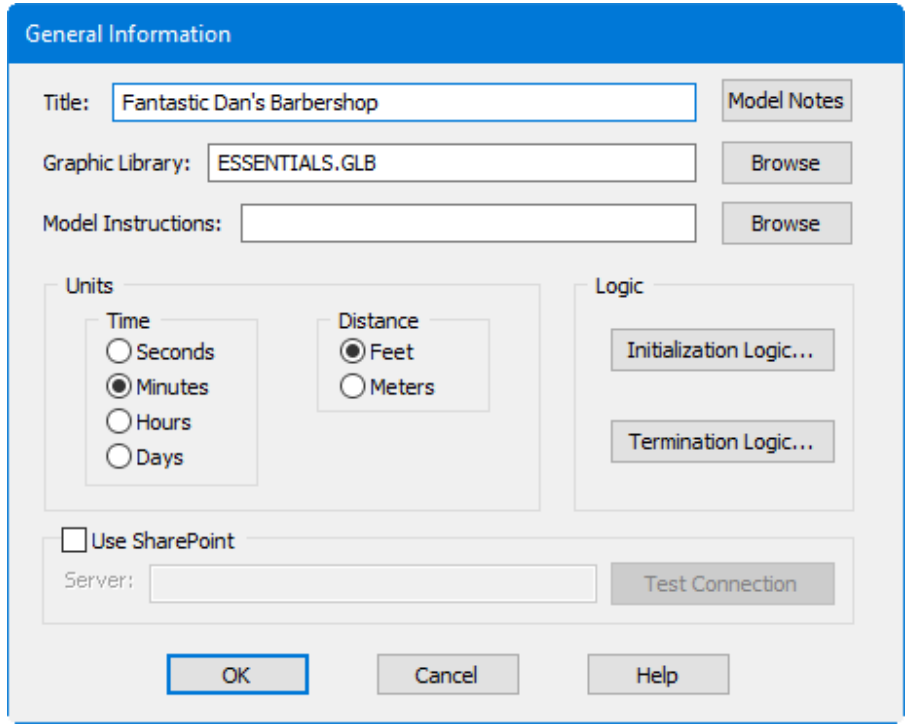
General Information

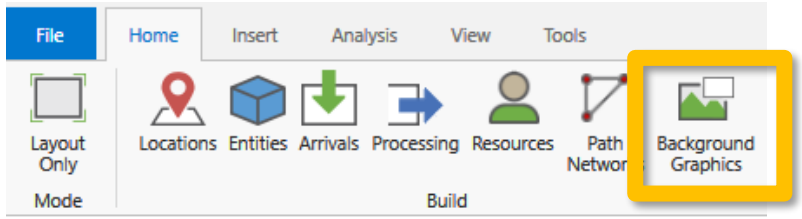
1. Give the model a title
2. Define the default model units
3. Define the graphics library
4. Hit "OK"
5. Go to "File … Save As" name, & save the model!

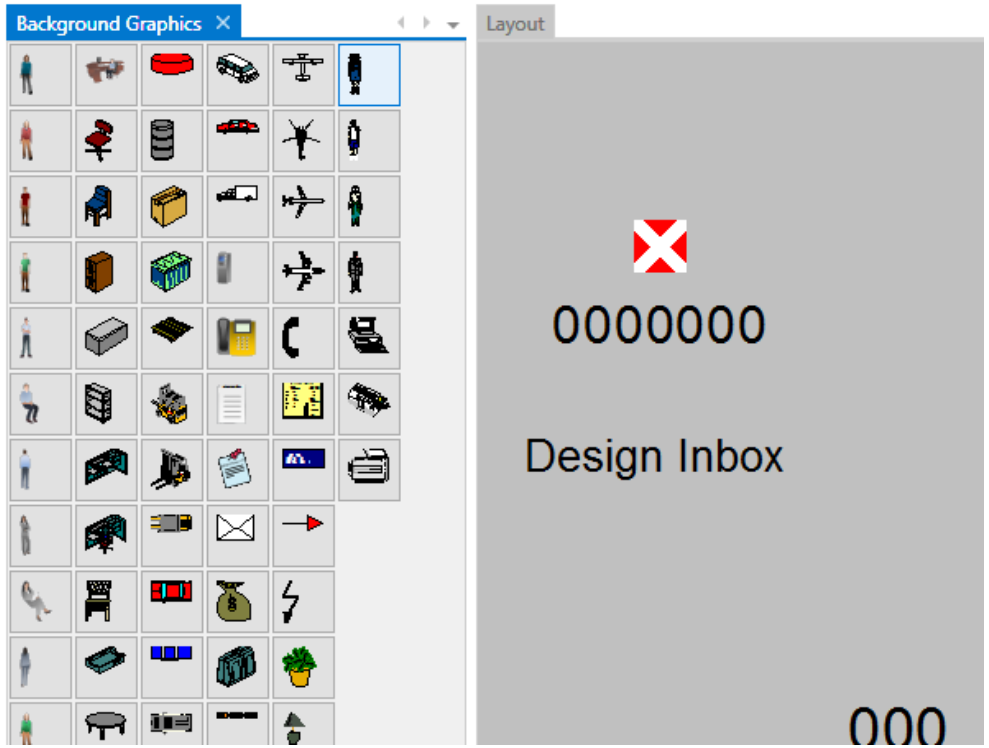


Note: Model will still work without a Title but you MUST have a file name!

Adding Background Graphics

- Select “Background Graphics”
- This opens the graphic library with images that can be used as background graphics

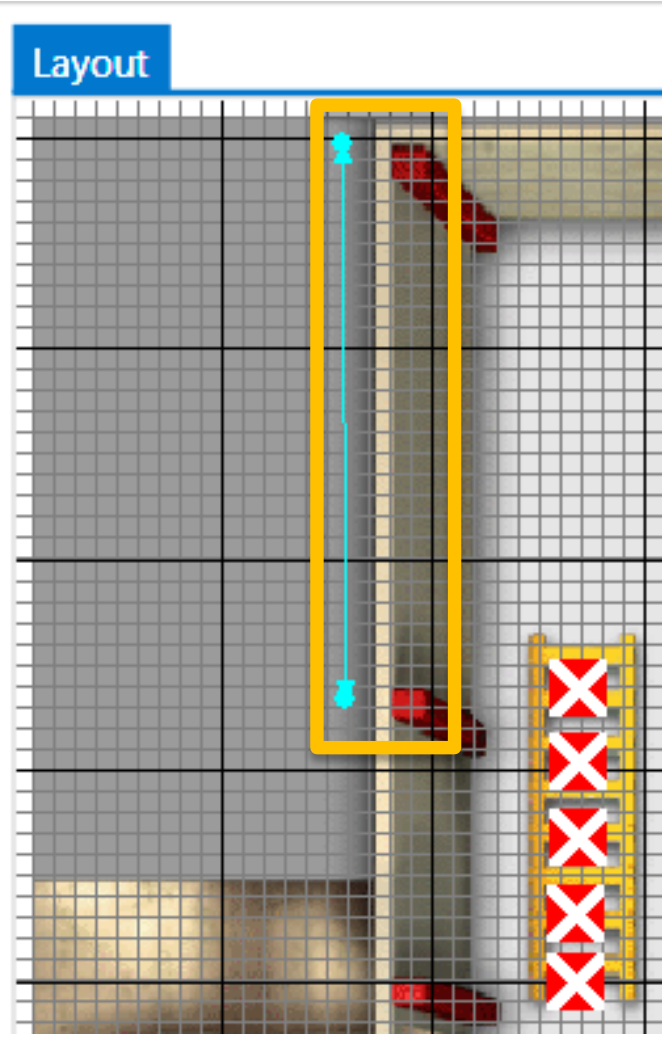




Scaling a background

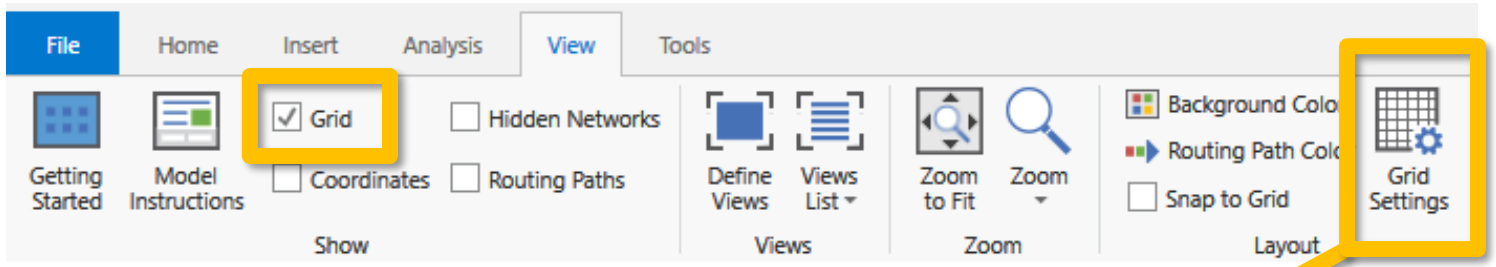
A scaled background means your path segments and conveyors that are subsequently created will automatically have the correct length.

Scale the background using a known dimension and the “Grid.”

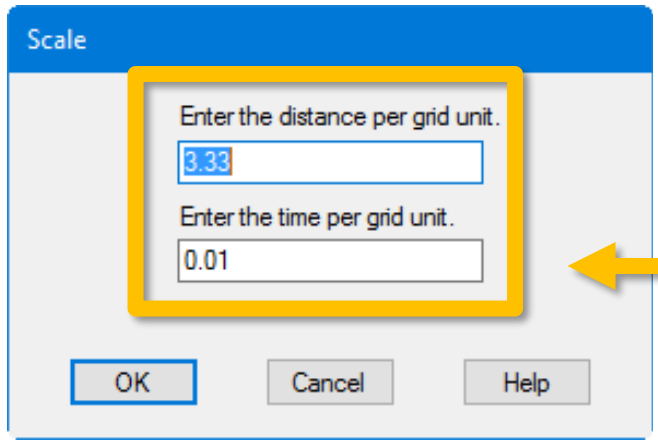


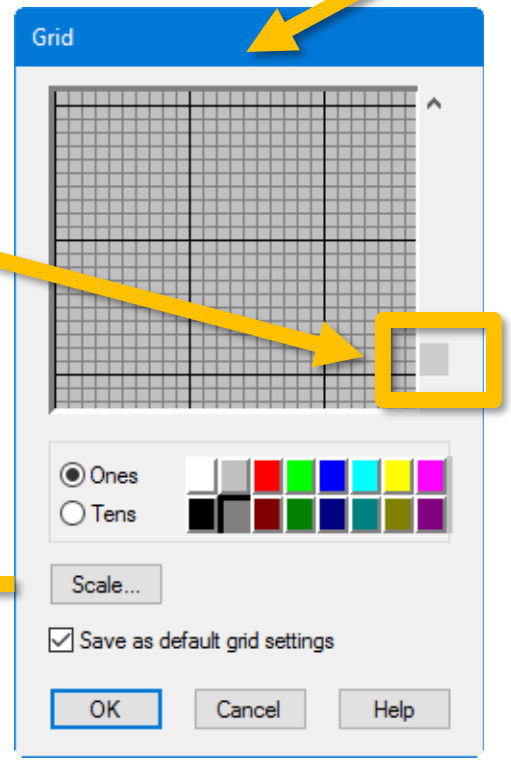
Scaling the Grid

- From the View ribbon, click on the Grid checkbox then select Grid Settings.
- You may adjust the size of grid units if needed and then select the Scale button.
- Enter the distance or time per grid unit.
- Distance / Grid Units = Distance per Grid Unit



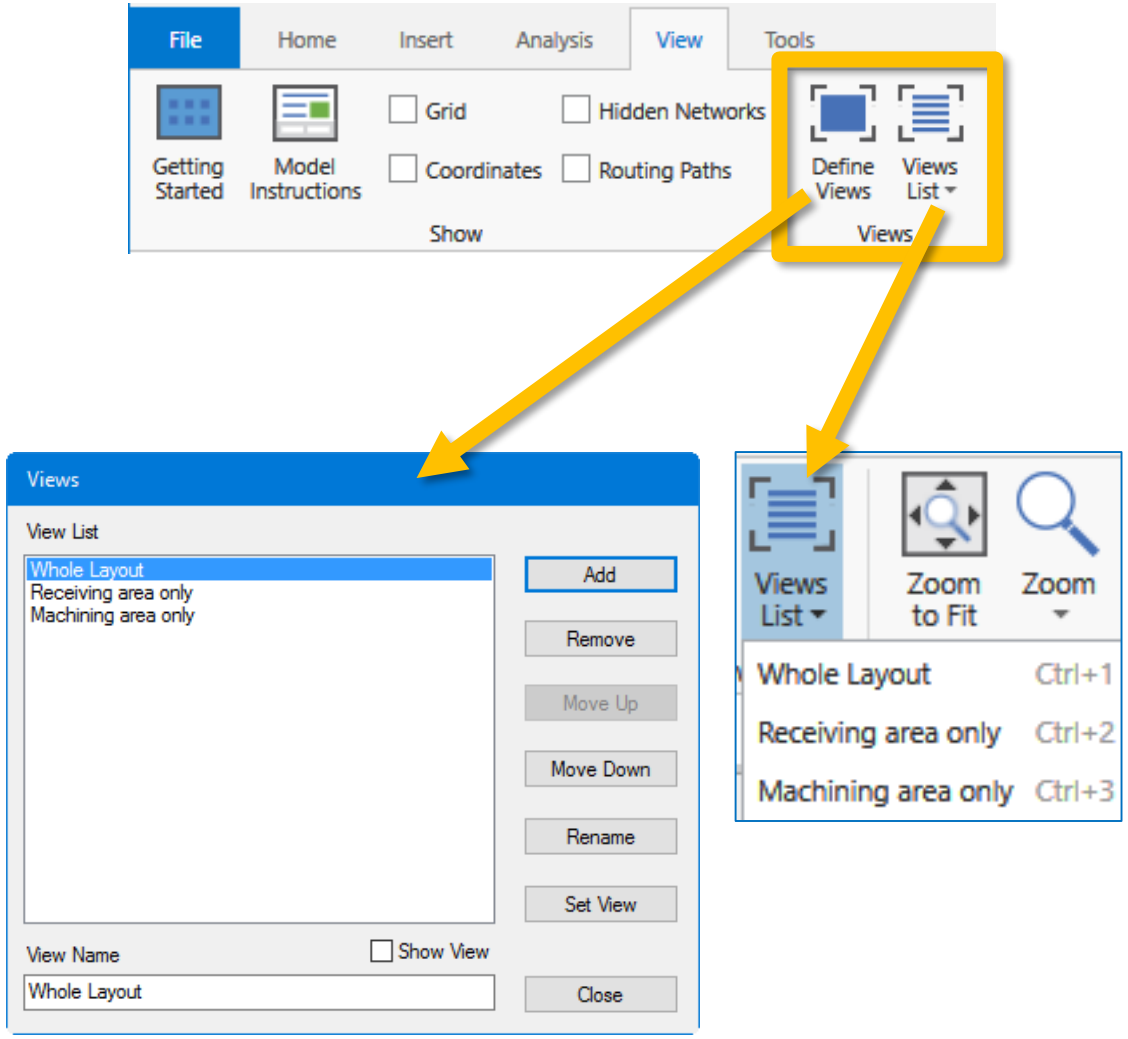
Slide to adjust Grid unit size





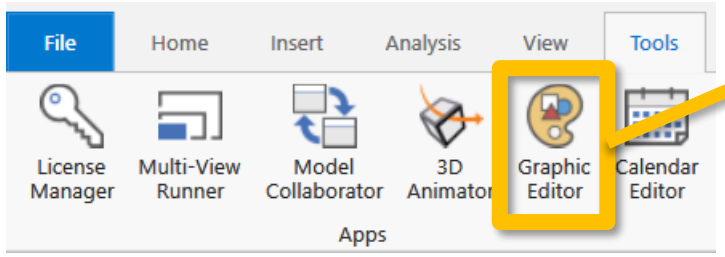
Saved Model Views

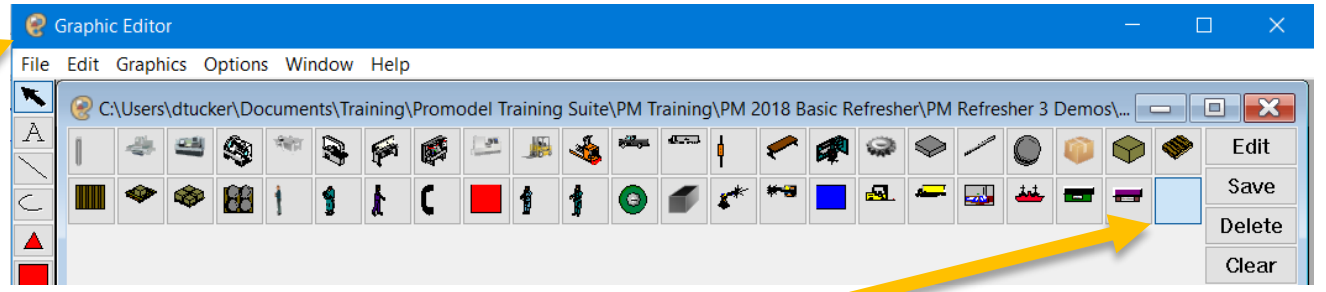
- Saved layout views can be created to help with screen navigation.
- From the View ribbon, select Define Views to Add to a list.
- The Views List shows all Views created.



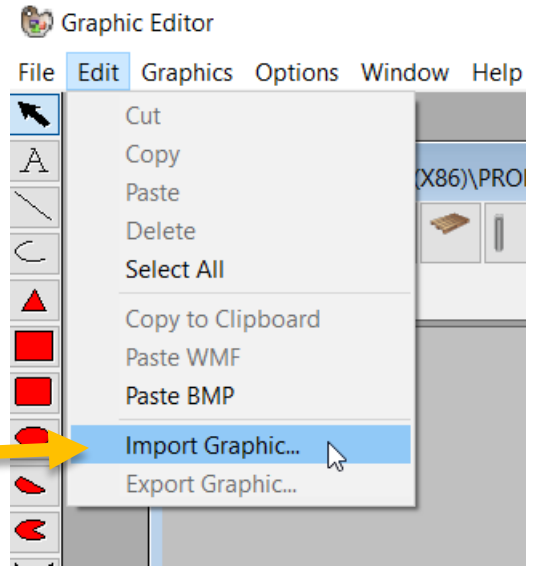
Creating New Graphics

Poll #2





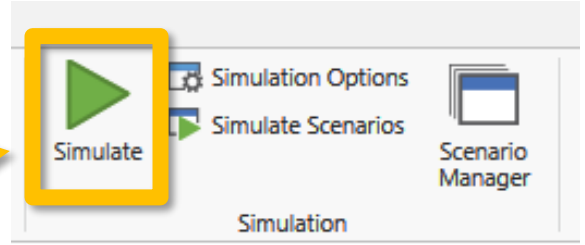
1. From the "Tools" menu, choose the "Graphics Editor" ribbon button.
2. To create a new graphic select the blank box and use the custom tools to design the new graphic.
3. If you have the graphic saved to the clipboard simply select "Paste BMP" or "Paste WMF."
4. To import a graphic click on the "edit" button in the top ribbon and select "Import Graphic…" to choose an image from your computer.

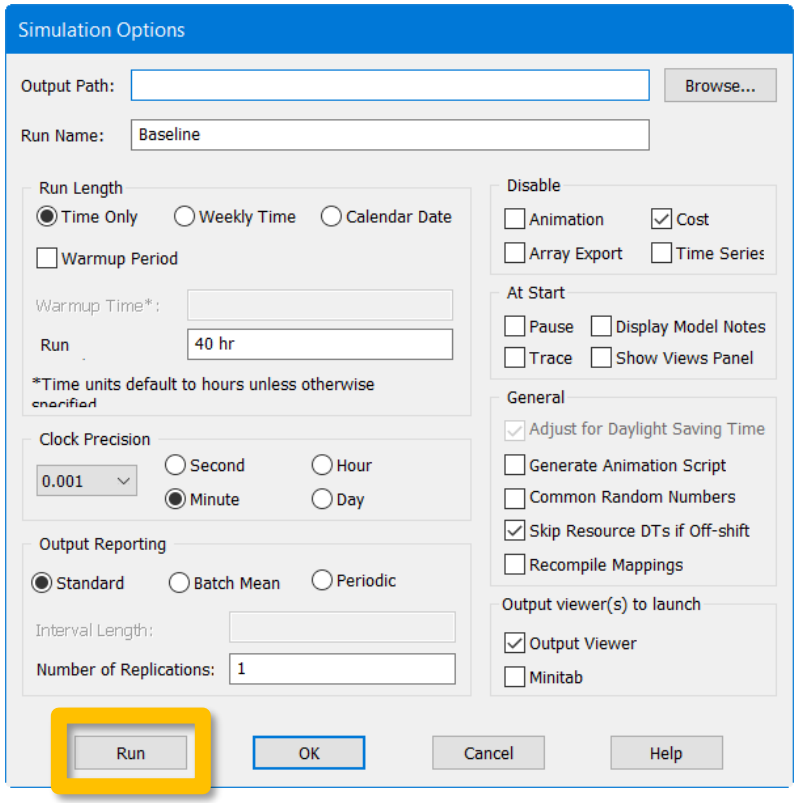


Note: Graphic images MUST be in a model's Graphic Library file if you want to use them as Entities, Resources, & Locations.

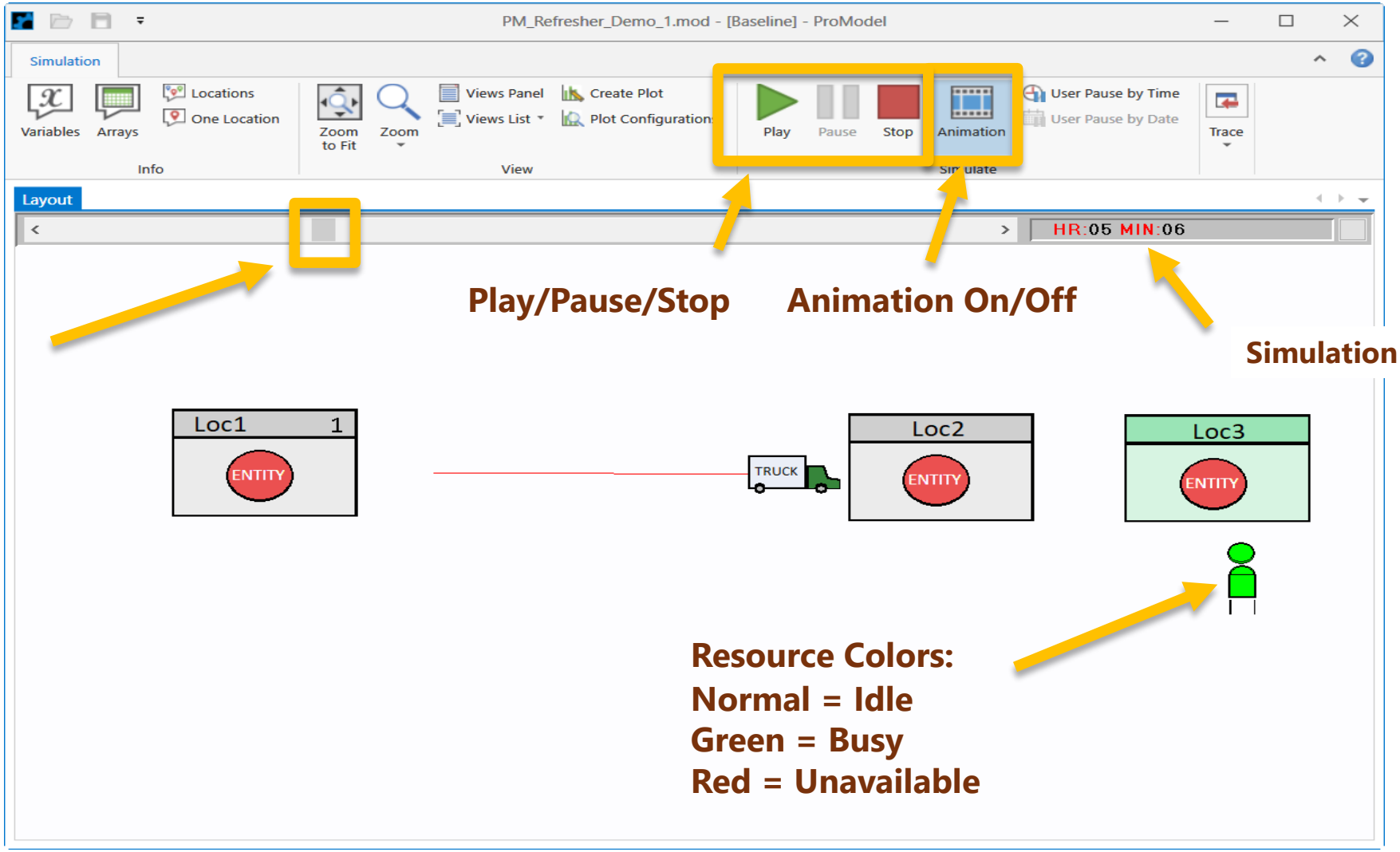
Run the Simulation

- To start the simulation
  - Click the Play button on the ribbon
  - Select Run in Simulation Options
  - Or use F10 key or (Fn + F10) keys





Runtime Control



Animation Speed (slider bar)

2. Locations, Entities, Arrivals & Processing (L.E.A.P.)

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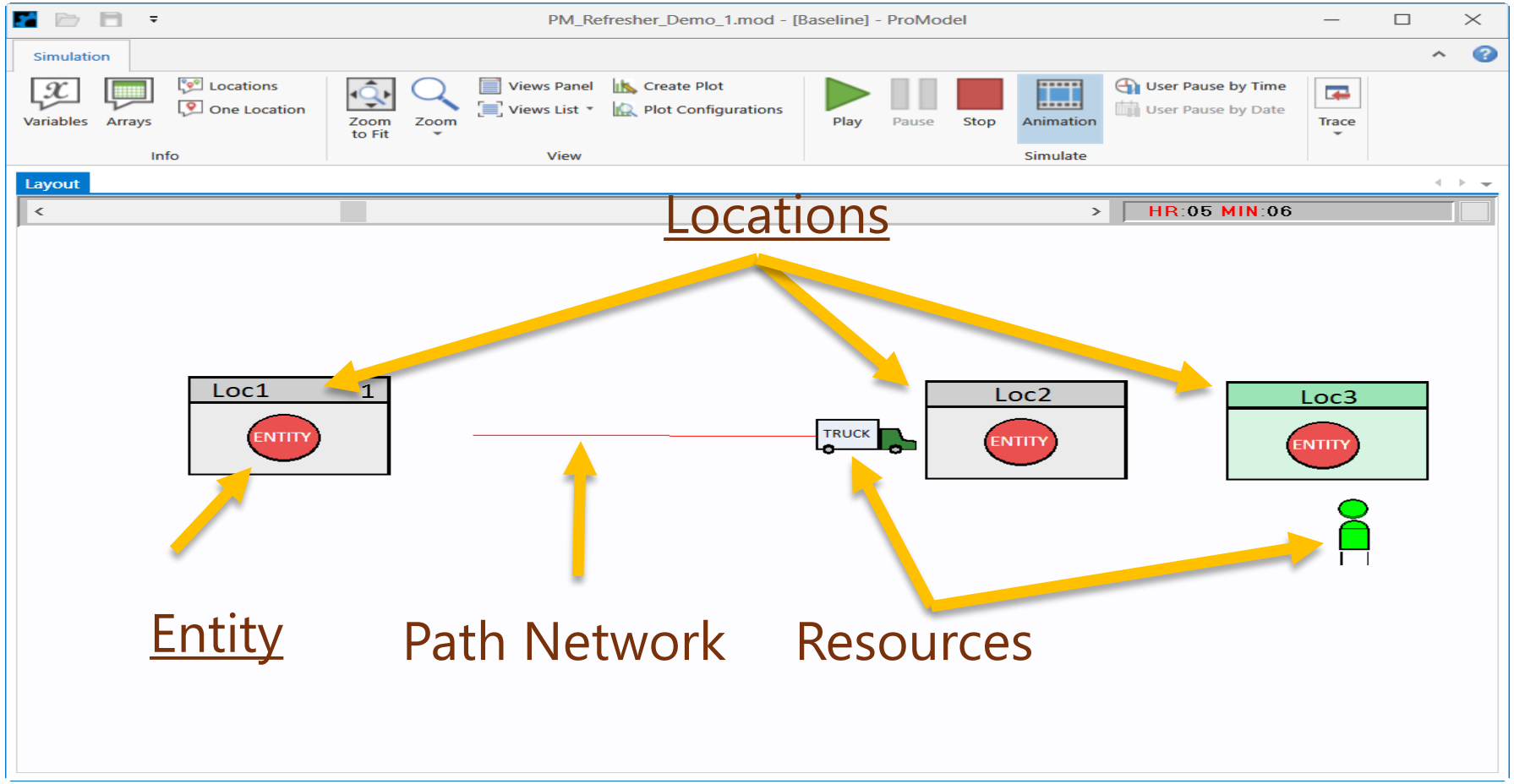
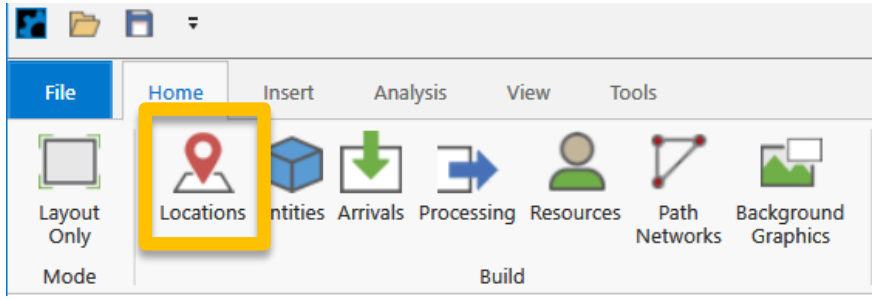
Basic Modeling Elements

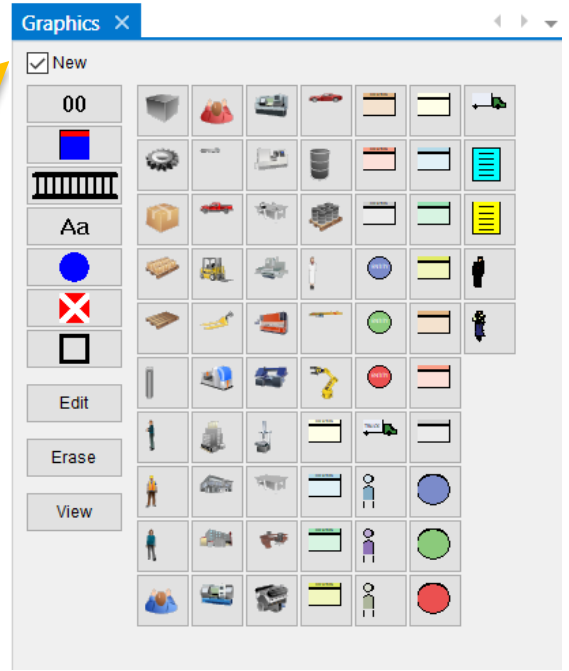


Note: Arrivals are not visible here!
Processing may be shown or hidden.

Create Location (Process Steps)

- Select “Locations” from the Home menu ribbon.
- Click your chosen graphic and click on the layout to add the graphic to your workspace.

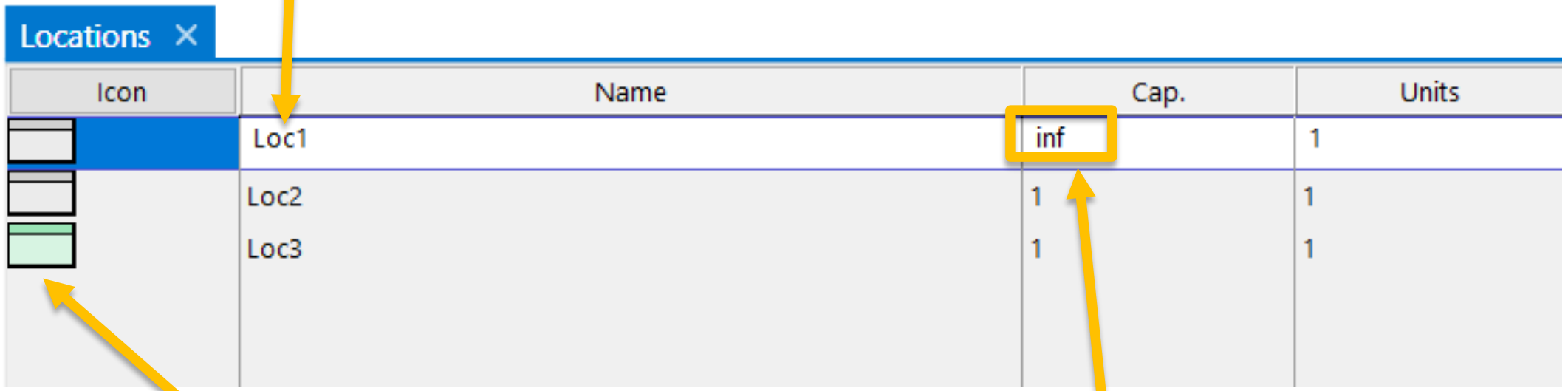




Tip: Remember to uncheck the New box if editing an existing Location record

Location Record & Parameters

Add the Location Name

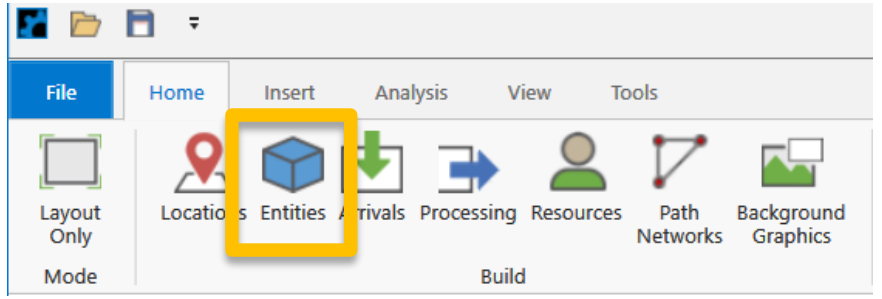


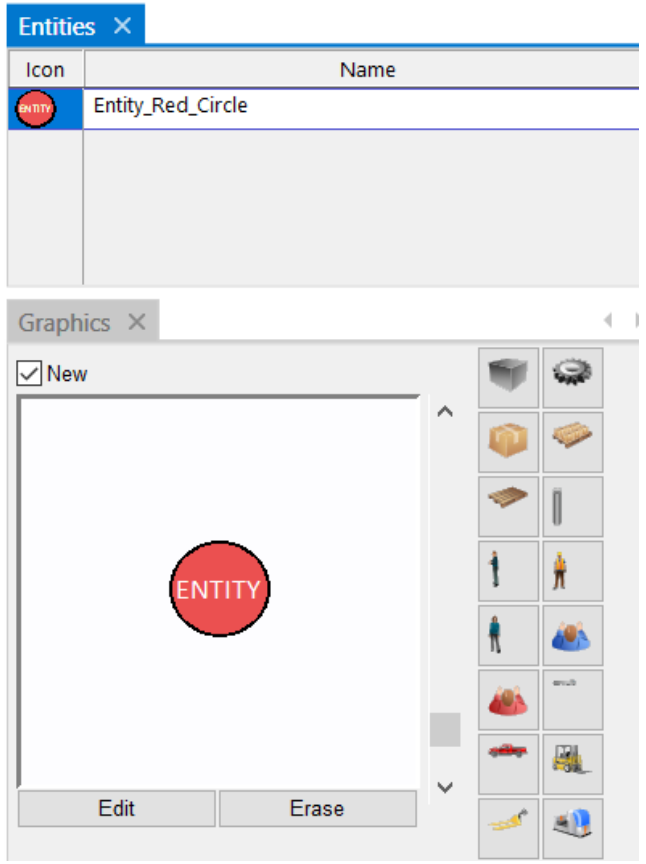
Location graphic

Set the Location Capacity (999, “inf” and “infinite” all work for unlimited capacity.

Create Entity

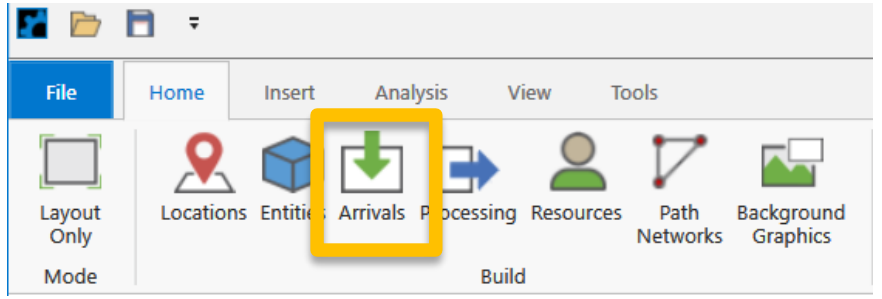
- Select “Entity” from your Home menu ribbon.
- Left-click an Entity graphic to add it to your model.
- Select the Entity’s Record to adjust its parameters.

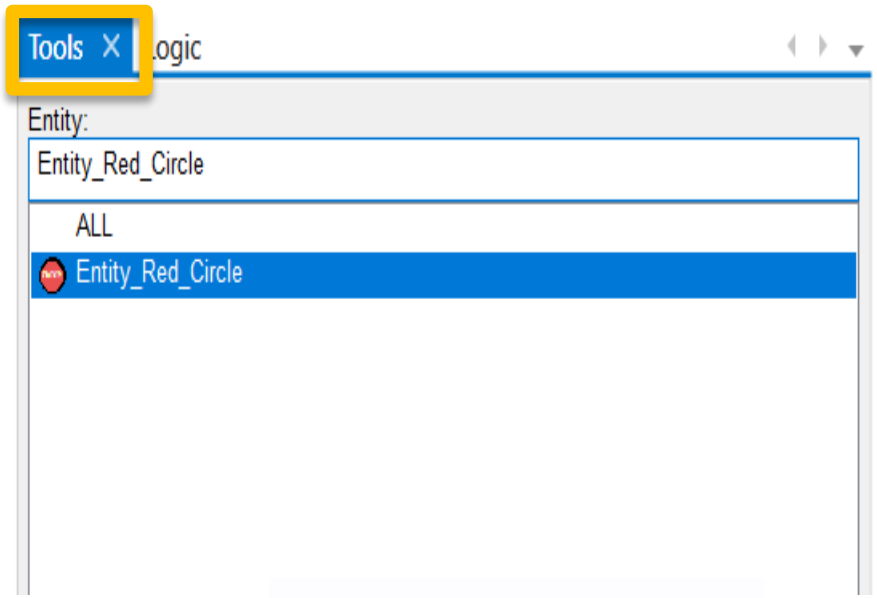


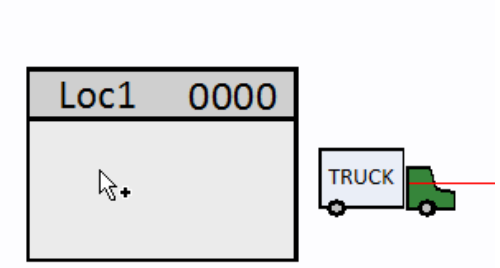


Arrivals

- To Create an Arrival:
- Select “Arrivals” from your Home menu ribbon.
- Use the “Tools” feature to create the Arrival automatically by left-clicking on the chosen location.







Arrival Parameters

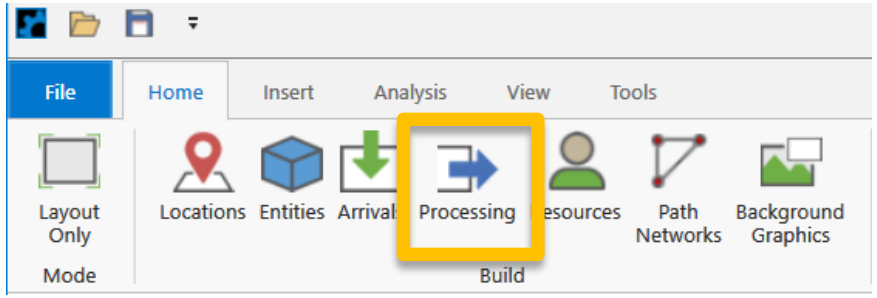
- In the Arrival Record manually adjust how the entities enter your model.

Arrivals

Entity...	Location...	Qty Each...	First Time...	Occurrences	Frequency	Logic...	Disable
Entity_Red_Circle	Loc1	1	0	INF	45 min		No

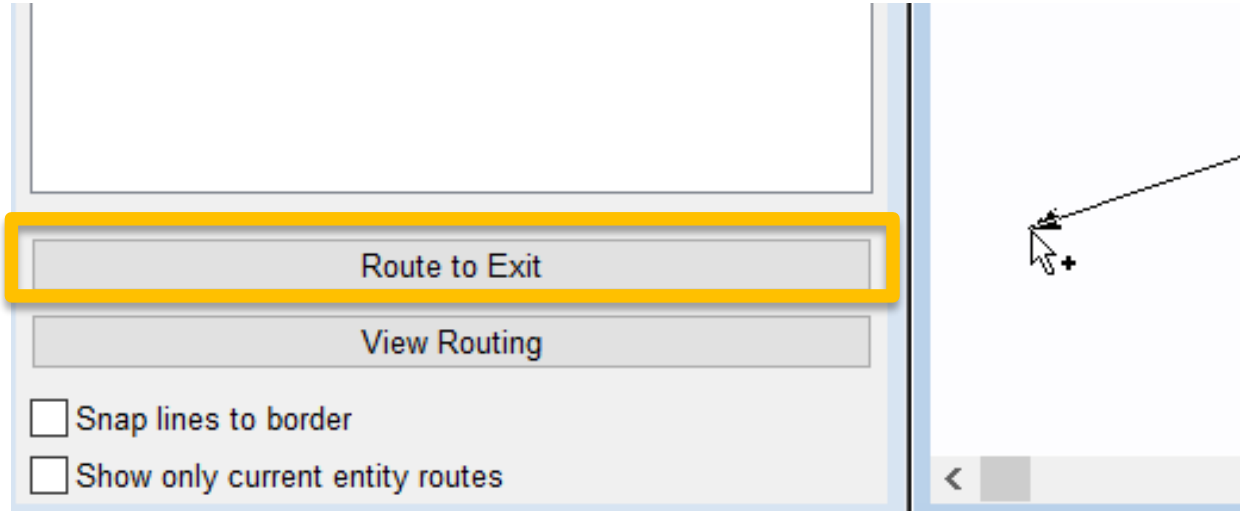
Processing

- Processing defines the process flow for entities from location to location, and to “Exit” (where the entity leaves the system).



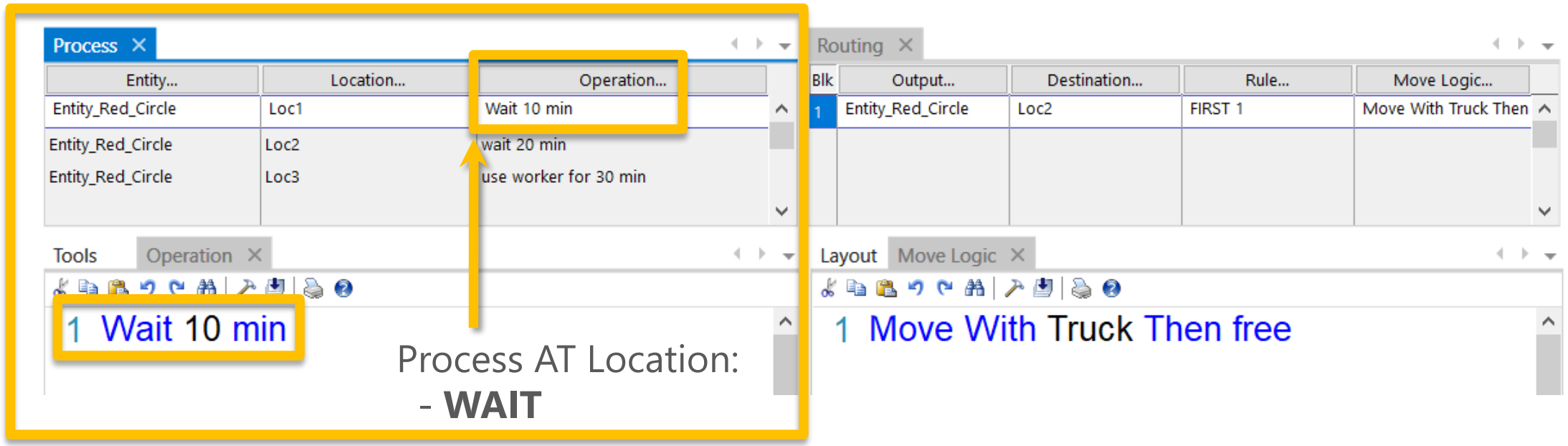
Processing

- To Create Processing:
- Select “Processing” from your Home menu ribbon.
- Use the “Tools” feature to create the process automatically by left-clicking on your first location and then left-clicking again on your second location (etc).
- Finish by clicking from your last location to the “Route to exit” button.



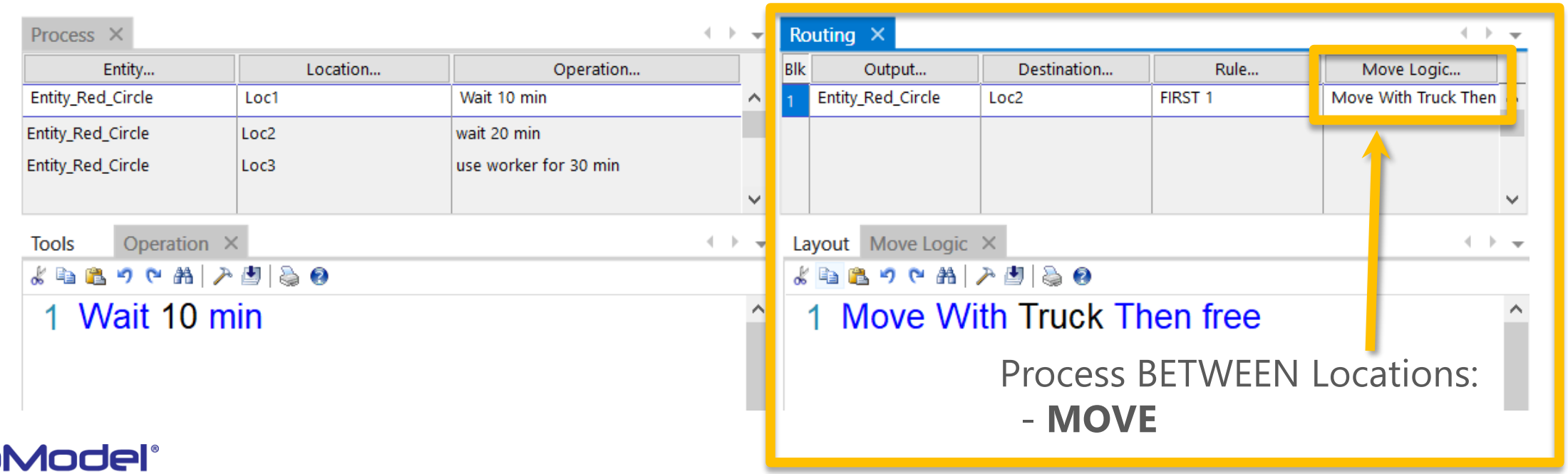
Process Record Information

- The “Process” window specifies what happens to an entity at a given location.
- You can specify a process time with a WAIT statement in the Operation logic window.
- You can also create complex logic to execute processes at each location.

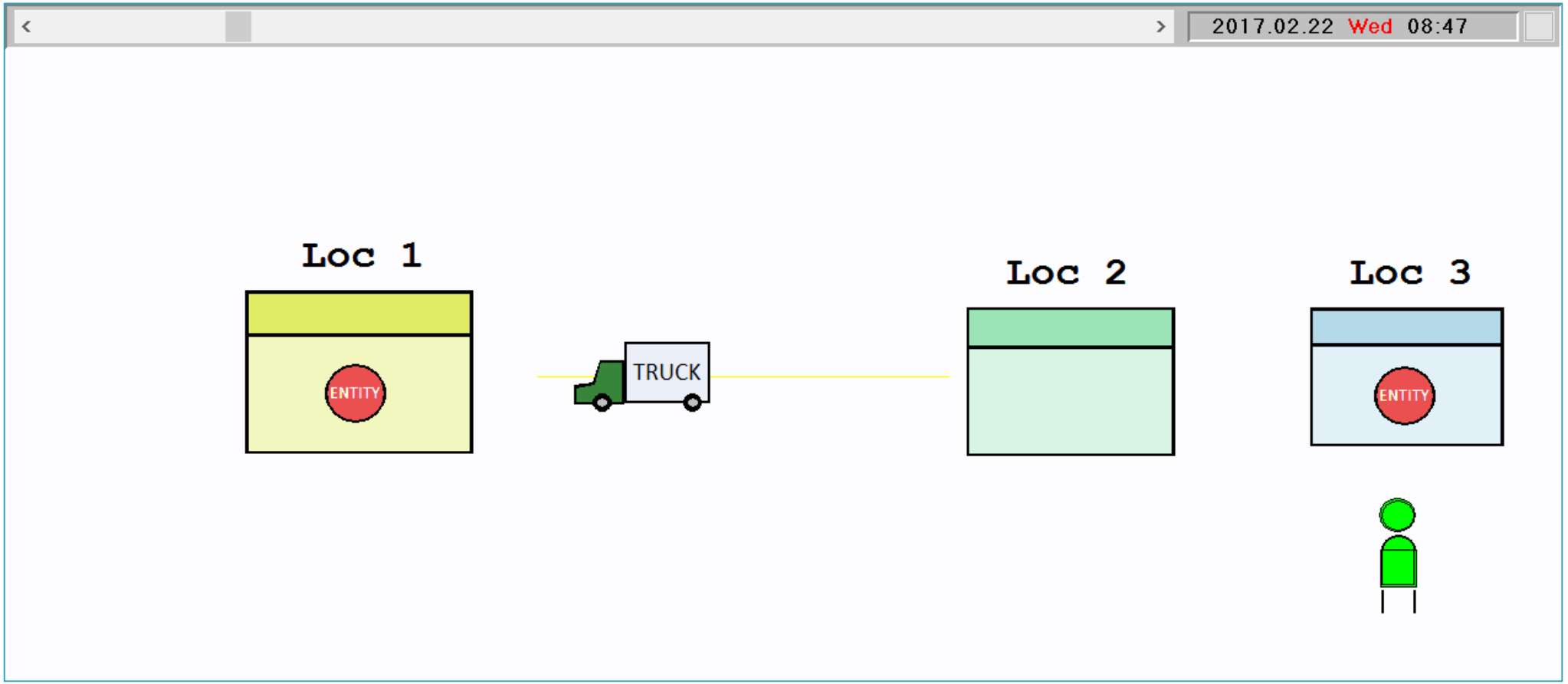


Process Routing Information

- The “Routing” window specifies how an entity moves from one location to another.
- When an entity moves between locations you can specify the amount of time it takes for that transportation using Move logic.
- You can also create complex logic or assign resources to the movement.



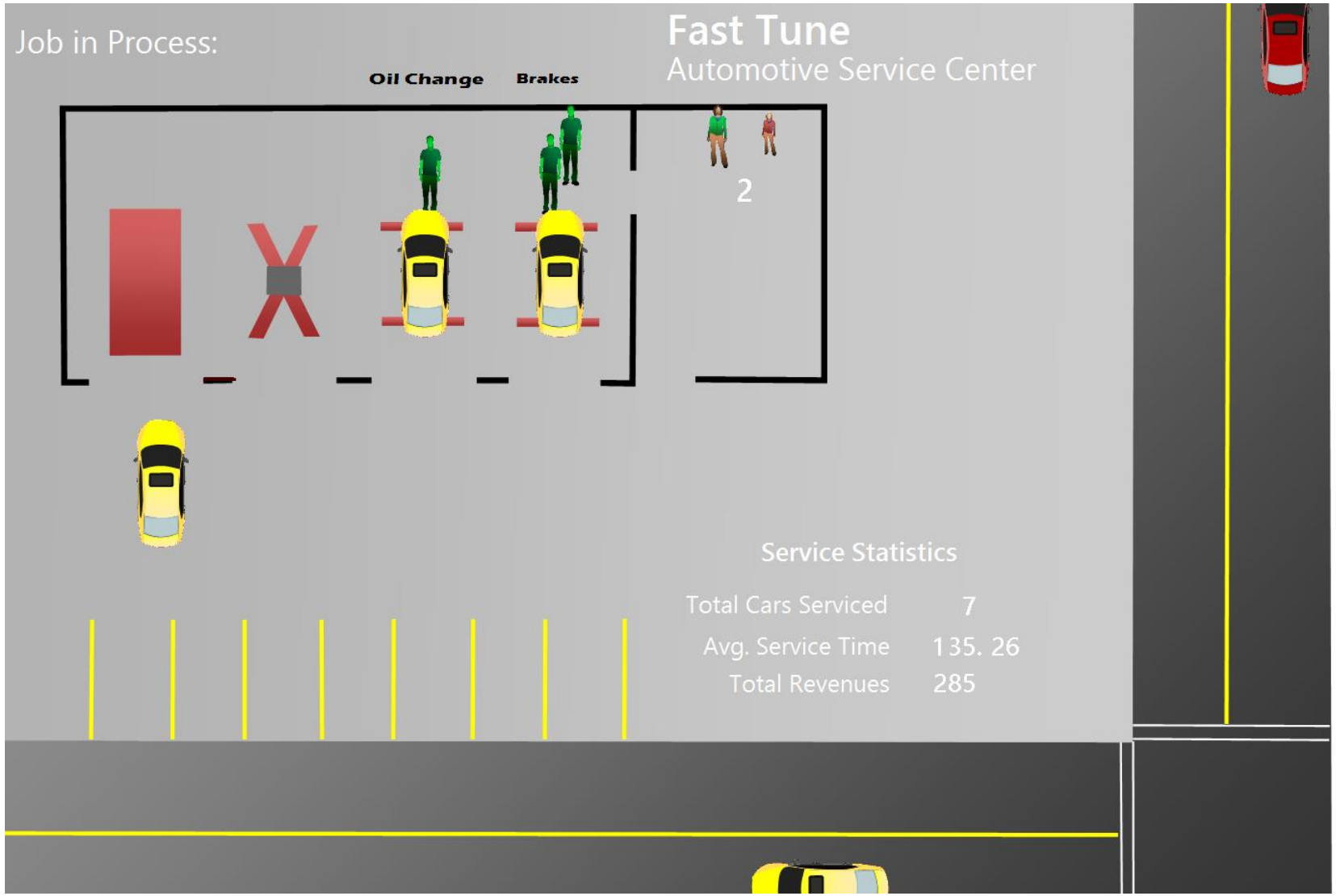
Demo 1: Build a Model Live



Poll #3

Demo 2: Model with LEAP

PM Demo: Automotive Service Center



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3. Resources & How to Use Them

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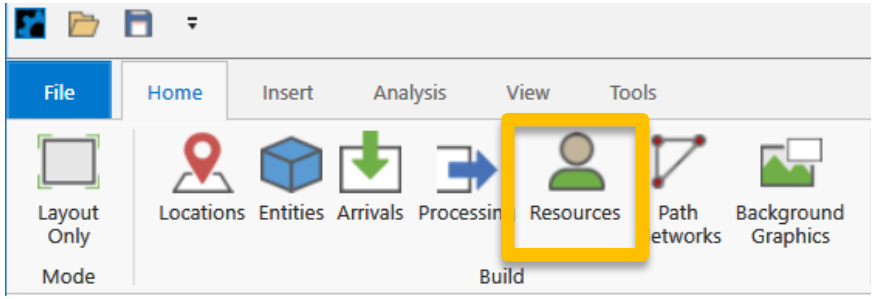
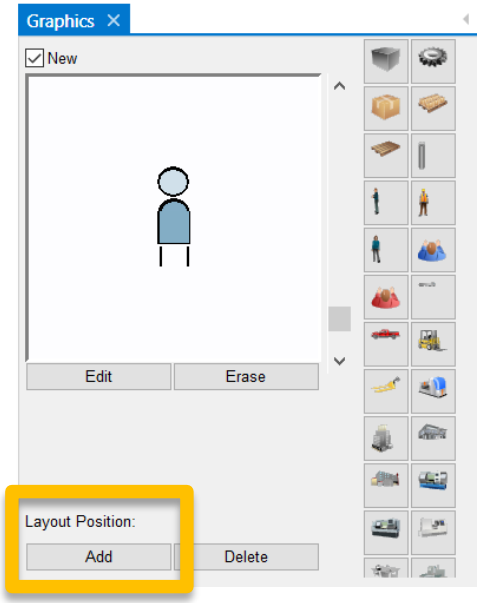
Resources

- Select “Resources” from the Home menu ribbon.
- Choose your graphic
- If the Resource is to remain in one spot (a static resource) then click the “Add” button to place it on the model layout





Resources

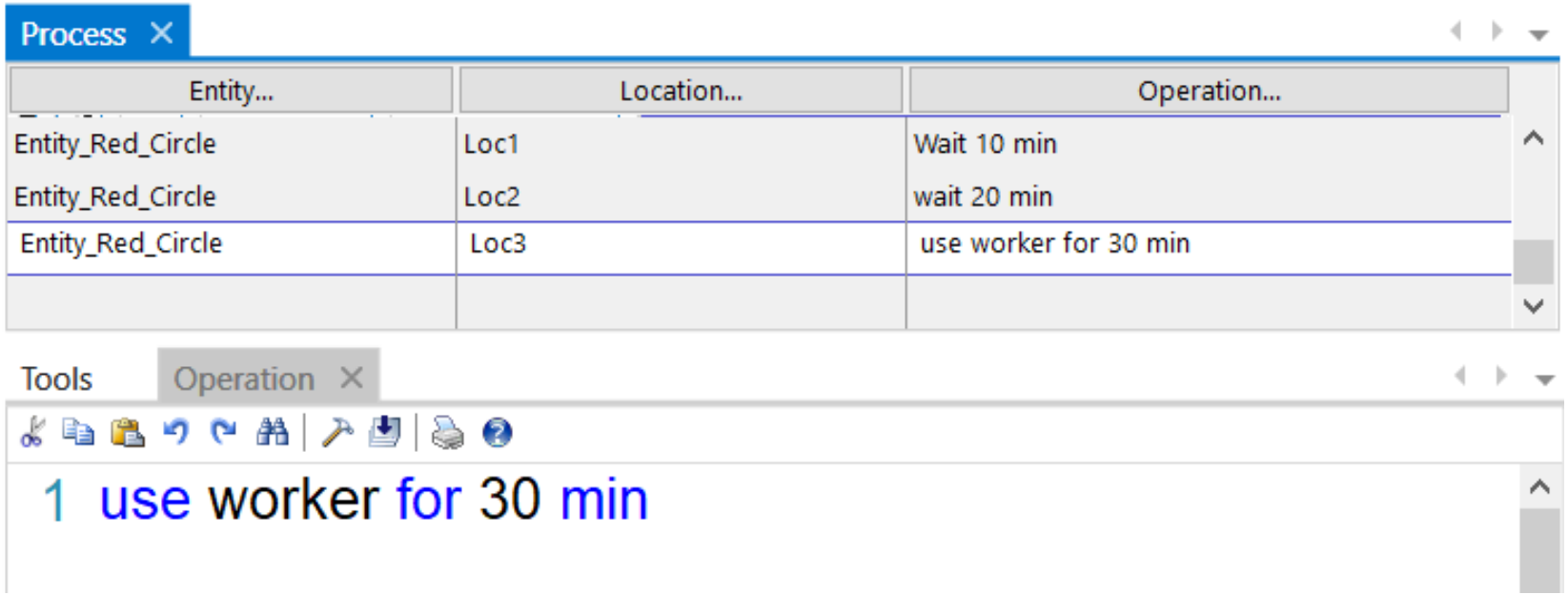
Icon	Name	Units	DTs...	Stats	Specs...	Search...	Logic...	Pts...	Notes...
	Worker	2	None	By Unit, Time Serie	No Network	None	0	1	
TRUCK	Truck	1	None	By Unit, Time Serie	Network_Truck, n_H	None	2	1	

Controlling Resources

- Sometimes a worker or a piece of equipment must be available for a process to continue. There are several ways of requesting resources.
- Additionally, the same resource is often required for multiple steps of a process. ProModel has the functionality to precisely control when we *capture* and *release* Resources:
  - **Use** (in Logic)
  - **Get** (in Logic)
  - **Free** (in Logic)

Use Statement

- The Use statement is a method to capture a Resource in the logic, retain the resource for the defined process time, then release the Resource. The Use statement works the same as Get, Wait, & Free.
- Syntax: **Use** <Resource Name> **For** <duration><units>



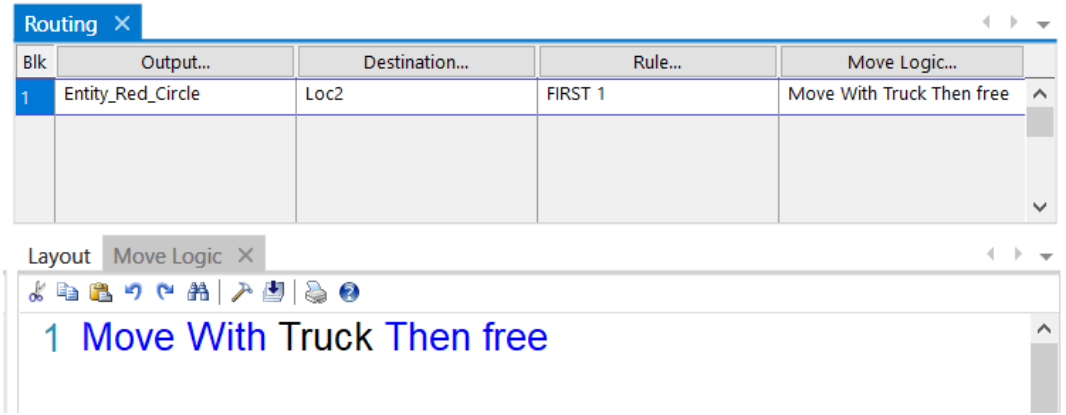
Get and Free Statements

- If we need more precise control over when we capture and release Resources, we can use the Get and Free statements.
- **Get** issues a request to capture the Resource. Once the Get statement is satisfied (the Resource is captured), the Entity will proceed to the next line of logic.
- **Free** will immediately free the listed Resource
- For example:

```
Wait 1 min
Get Worker 1
Wait 1 min
Get Worker 2
Wait 3 min
Free ALL
```

Move With

- If a resource has not been freed it will automatically move to the next location with the entity.
- To use a resource to move an entity to the next location (using the resources speed) create a **Move With** statement in the routing logic.
- Syntax: **Move With** <Resource Name> **Then Free** (optional)



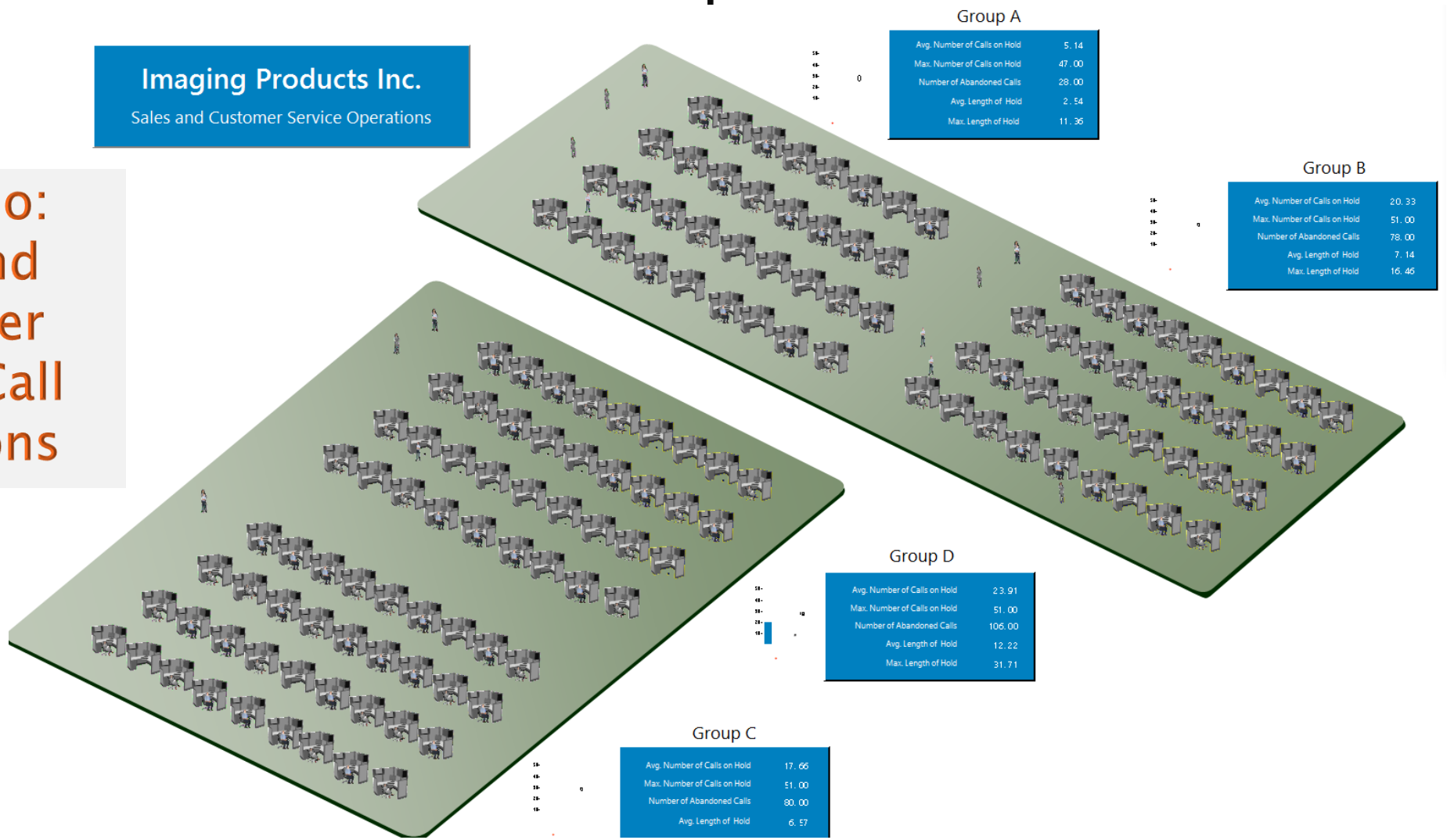
Note: Other Entity Move statements include:
Move On (a Path Network) & Move For (a set time)

Demo 3: Model with Multiple Resources

Imaging Products Inc.

Sales and Customer Service Operations

PM Demo: Sales and Customer Service Call Operations



10 Minute Break

Webinar will resume at 2:10 pm ET

4. Path Networks

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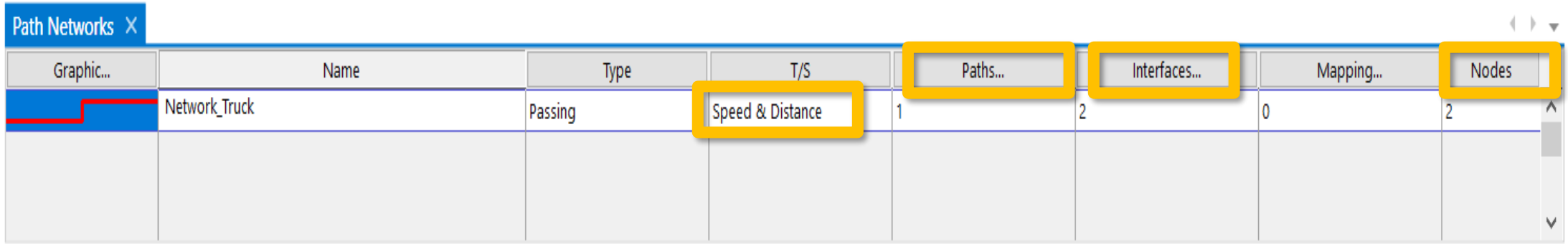
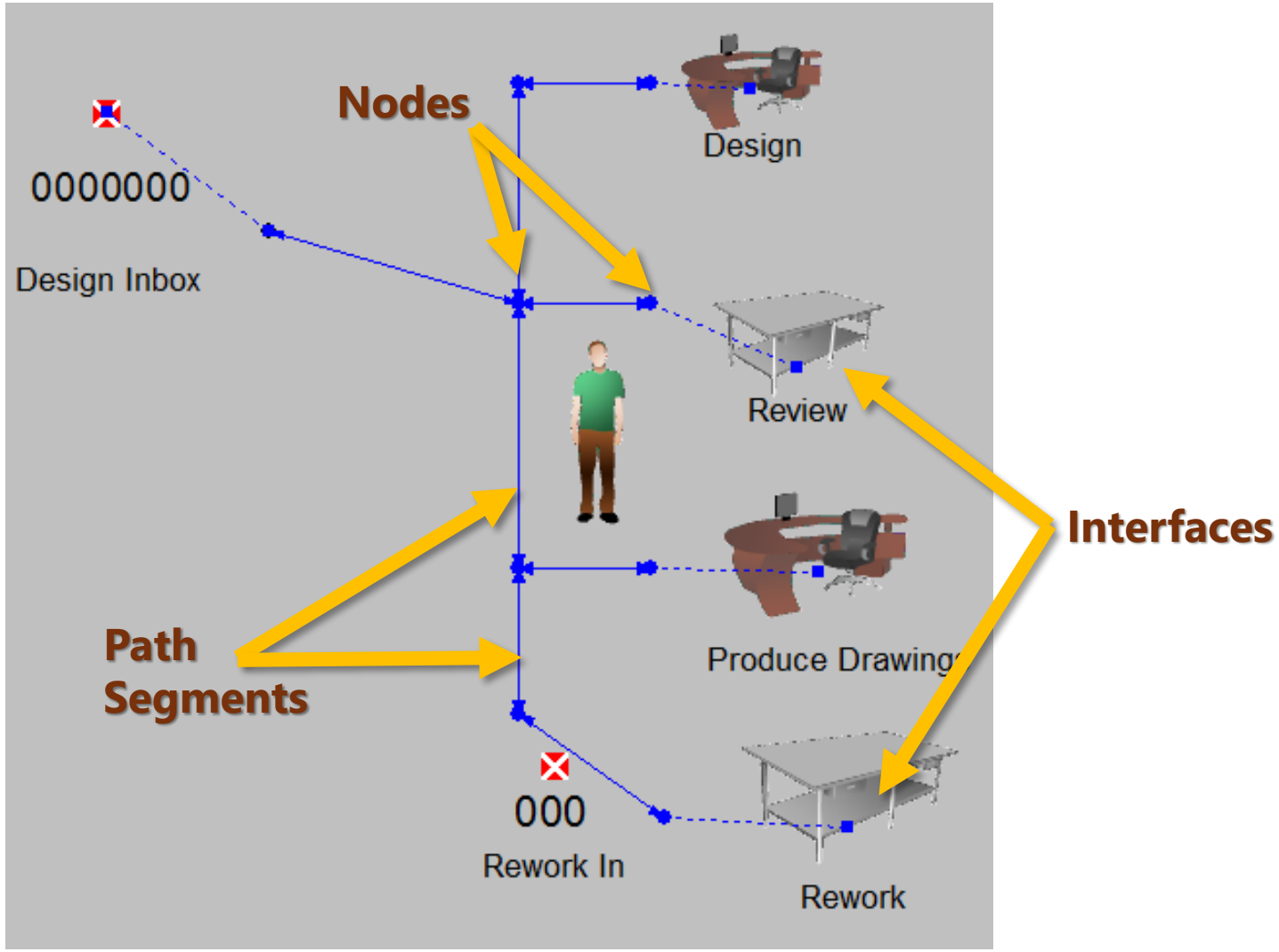
Path Networks

- Path Networks allow resources to move around the model
- Give you the ability to define the course of travel for Resources
- Selecting the *header* for: "**Paths**…" "**Interfaces**…" or "**Nodes**" takes you to other edit tables for these required elements.



Path Network Terminology

- Nodes
- Path Segments
- Interfaces



Nodes

- Nodes are used as decision points and interface points
- Create a node at each point the Resource might need to make a decision or interface with a location

Nodes

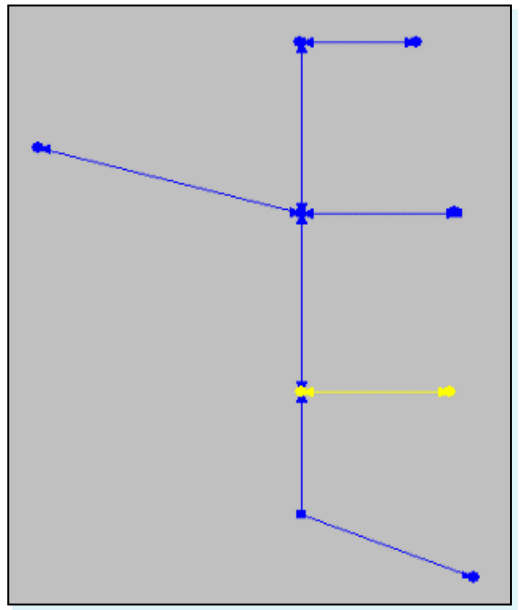
Node	Limit
NInbox	
N2	
NDesign	
N4	
NReview	
NProduce	
N7	
NRework	
N9	
N1	
N3	

Path Segments

- Path segments are the lines of travel between nodes
- Each segment can have its own time or distance properties defined, or Uni-directional or Bi-directional settings

Paths

From	To	BI	Distance
NInbox	N2	Bi	17.72
NDesign	N4	Bi	9.00
N2	N4	Bi	15.00
NReview	N2	Bi	9.00
NProduce	N7	Bi	9.00
NRework	N9	Bi	12.20
N7	N9	Bi	10.00
N7	N2	Bi	18.00

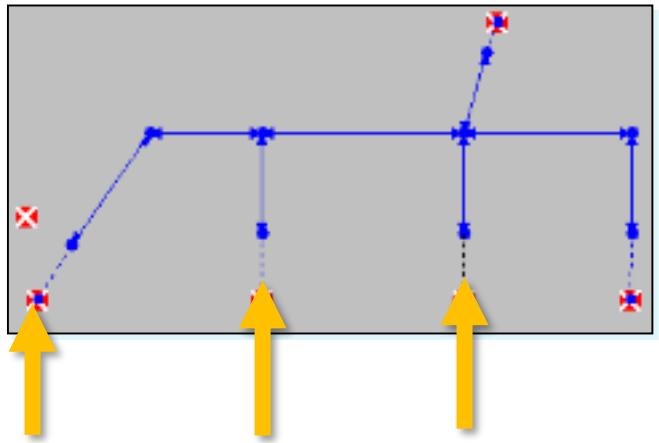


Interfaces

- Interfaces define the relationship between a node and a location
- If a Resource is told to work at a given location, the Resource will travel to the node associated with that location

Interfaces

Node	Location
NDesign	Design
NInbox	Design_Inbox
NReview	Review
NProduce	Produce_Drawings
NRework	Rework



Note: A location can have only one interface. However, a single Node could interface with more than one location.

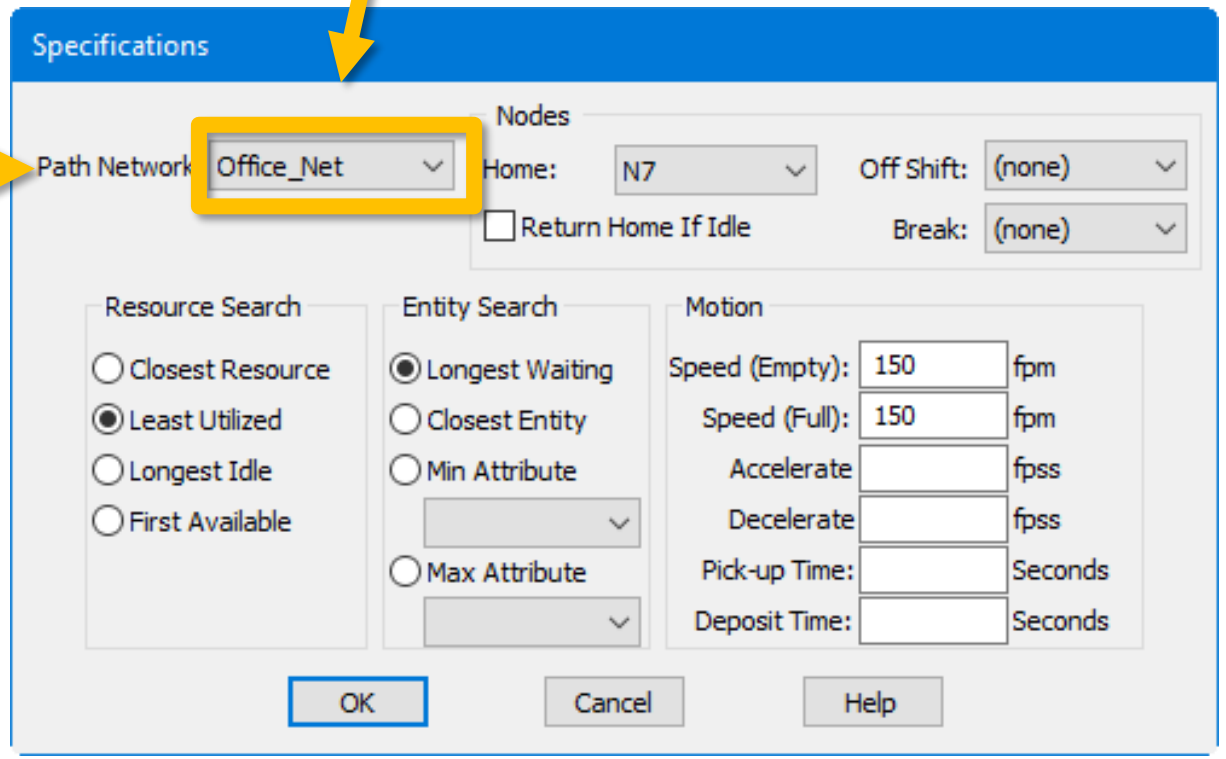
Interfaces show the relationship between path nodes and locations.

Dynamic Resources

Resources

Icon	Name	Units	DTs...	Stats	Specs...	Search...	Logic...	Pts...	Notes...
	Production_Bob	2	None	By Unit	Office_Net	None	0	1	

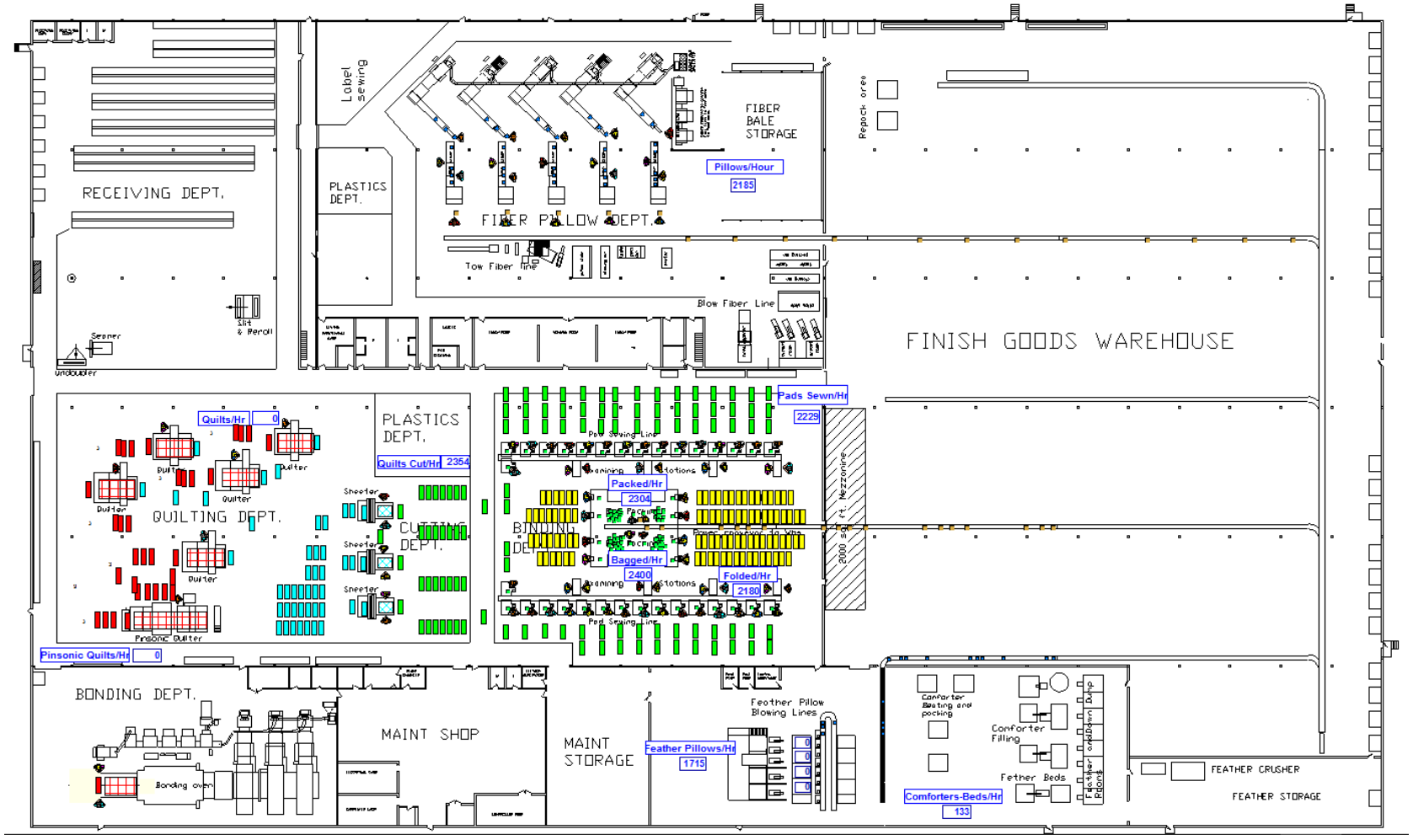
Select the Path Network name under "Specs" if you want a Resource to be dynamic and move between locations.



Demo 4: Model with Path Networks

Mattress Pad Factory Before

PM Demo: Plant Consolidation and Optimization



Poll #4

5. User-Defined Expressions

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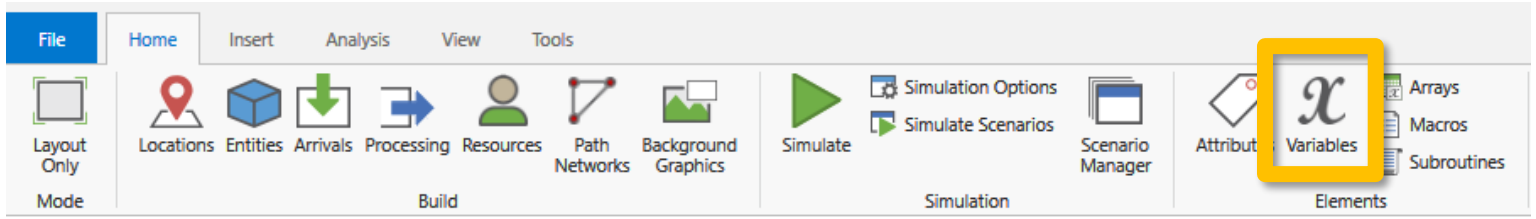
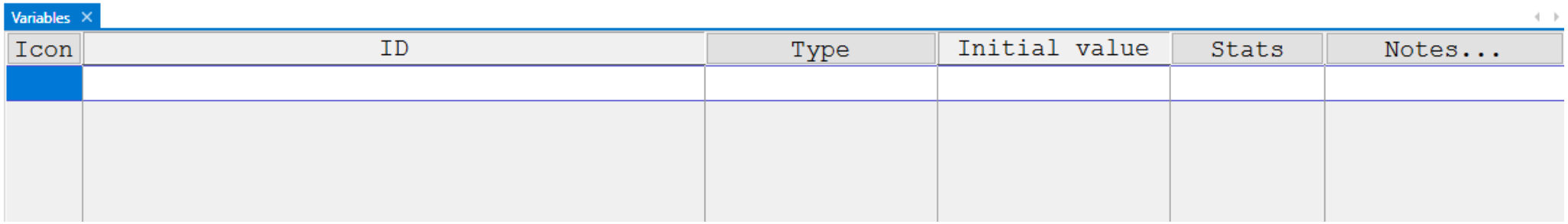
Variables

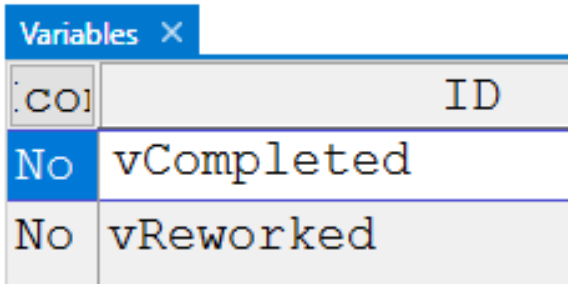


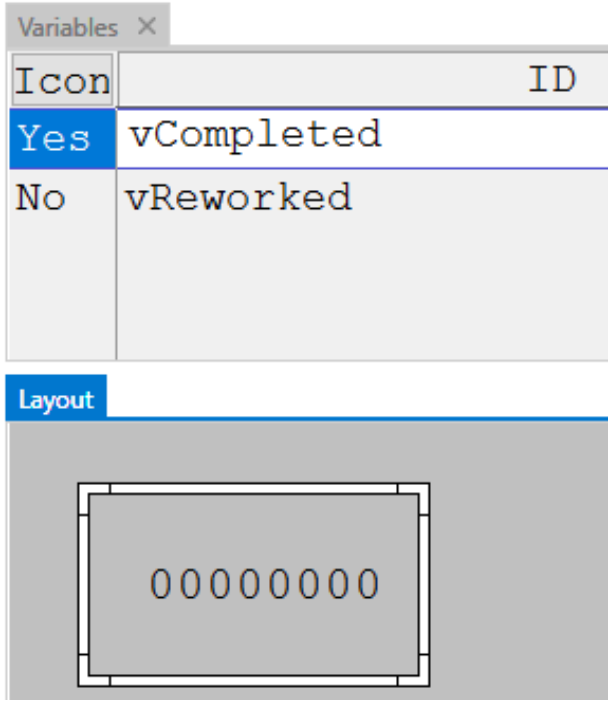
- Hold Real or Integer value
- Gather statistical information
- Perform calculations
- Provide more advanced logic control
- Display on-screen counters or system statistics



Variables

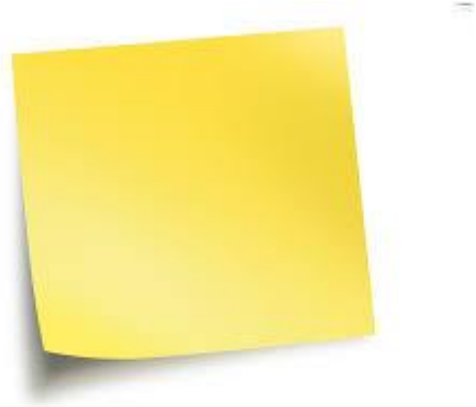
- Displaying on-screen counters or system statistics: Click in the icon column. Then click on the Layout area.





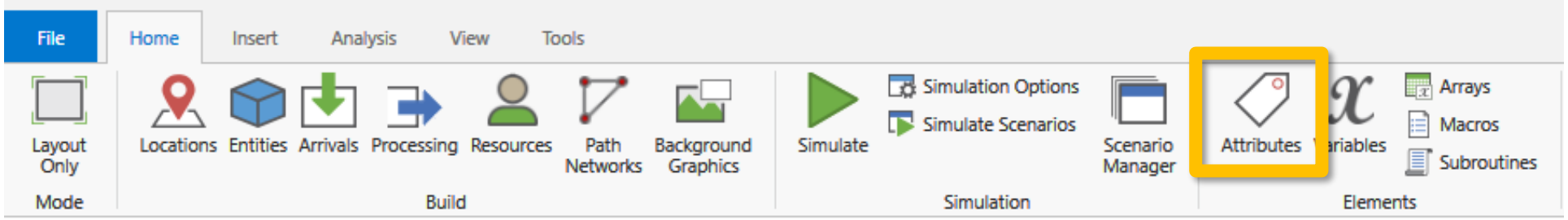
Attributes

- Used for identifying entities during processing or for tracking certain statistics.
- Not global—value is held by each entity independently.
- Initial value assigned to all entities as they enter the system.
- May be Real or Integer.



Attributes

- Access Attributes from the Home ribbon

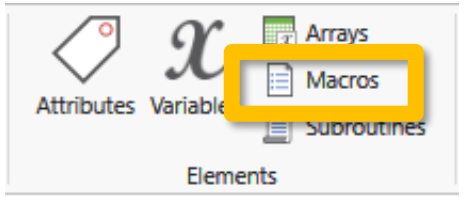


- Attributes edit table

Attributes

ID	Type	Classification	Notes...
aReworked	Integer	Ent	

Macros



- A Macro is an expression which can represent a number, a distribution, text, or a section of code that might be used repetitively throughout your model.
- Macros can also be used as parameters in the Scenario Manager for scenario analysis.
- Select “Macros” from the Home ribbon under Elements.
- Define the Macro (in the Macros table) and then enter the Macro in Location Properties or logic, for example.
- When you want to change a Macro value, do so in the Macros table or, if it’s a temporary change, you can modify it in the Scenario Manager.

Macros

- Macro Name
- Text (or Logic)
- Macro Options

Macros

ID	Text...	Options
mBobUnits	1	Scenari
mDesignCapacity	1	Scenari

Which Expression to Use?

Expression	Definition	Use When	Notes
Attribute	Integer or Real number	• Entity characteristic determines action or route • Needed along with a Variable to track items	• Not Global; they are independent to each Entity • No Output Viewer Stats! • Exist only during model run
Macro	Number, Distribution, or Text	• Value is repeated multiple places in model • Needed for Scenario parameter • Want a single table to edit many expressions used in logic	• Global to entire model • No Output Viewer Stats! • Exist only during model run • Value cannot be changed after model run begins!
Variable	Integer or Real number	• Counting items • Needed to trigger action • Value needs to change during model run	• Global to entire model • Yes, Output Viewer Stats! • Can be displayed onscreen

Demo 5: Model with User Defined Expressions

MM Demo: Emergency Dept with Scenarios

Poll #5

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6. Output Viewer

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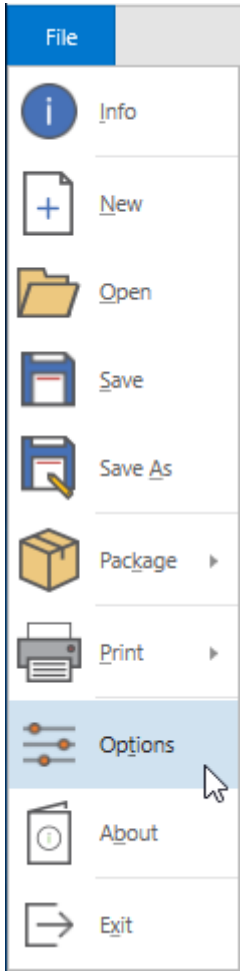
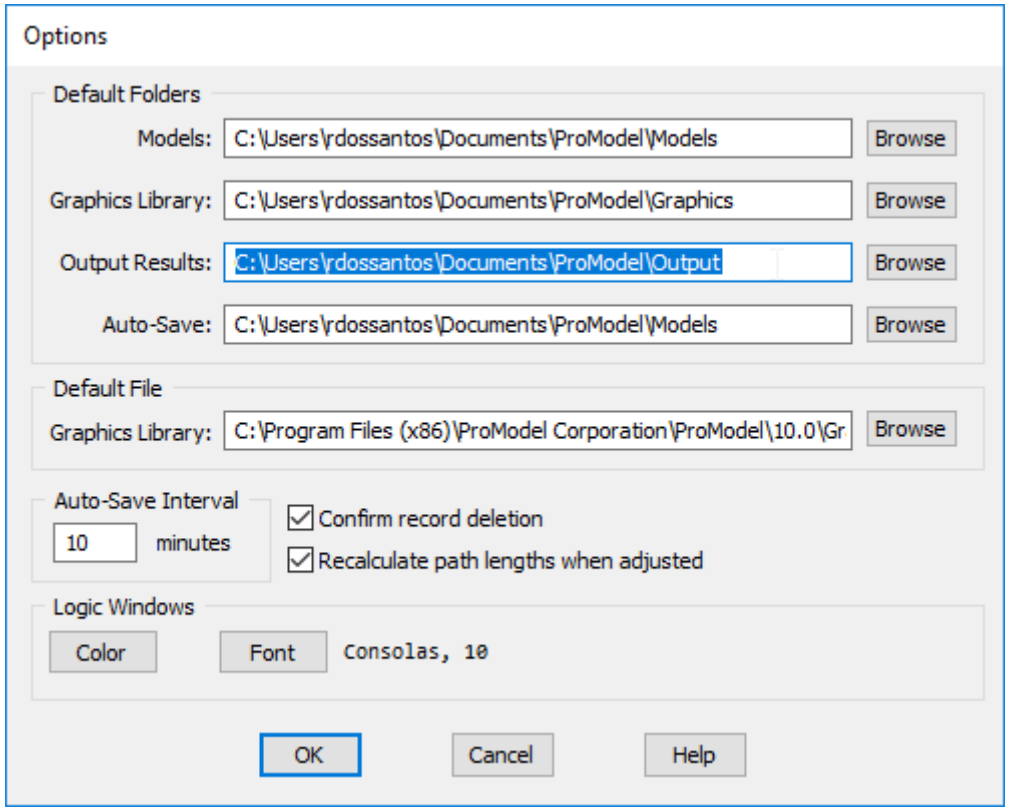
About the Output Viewer

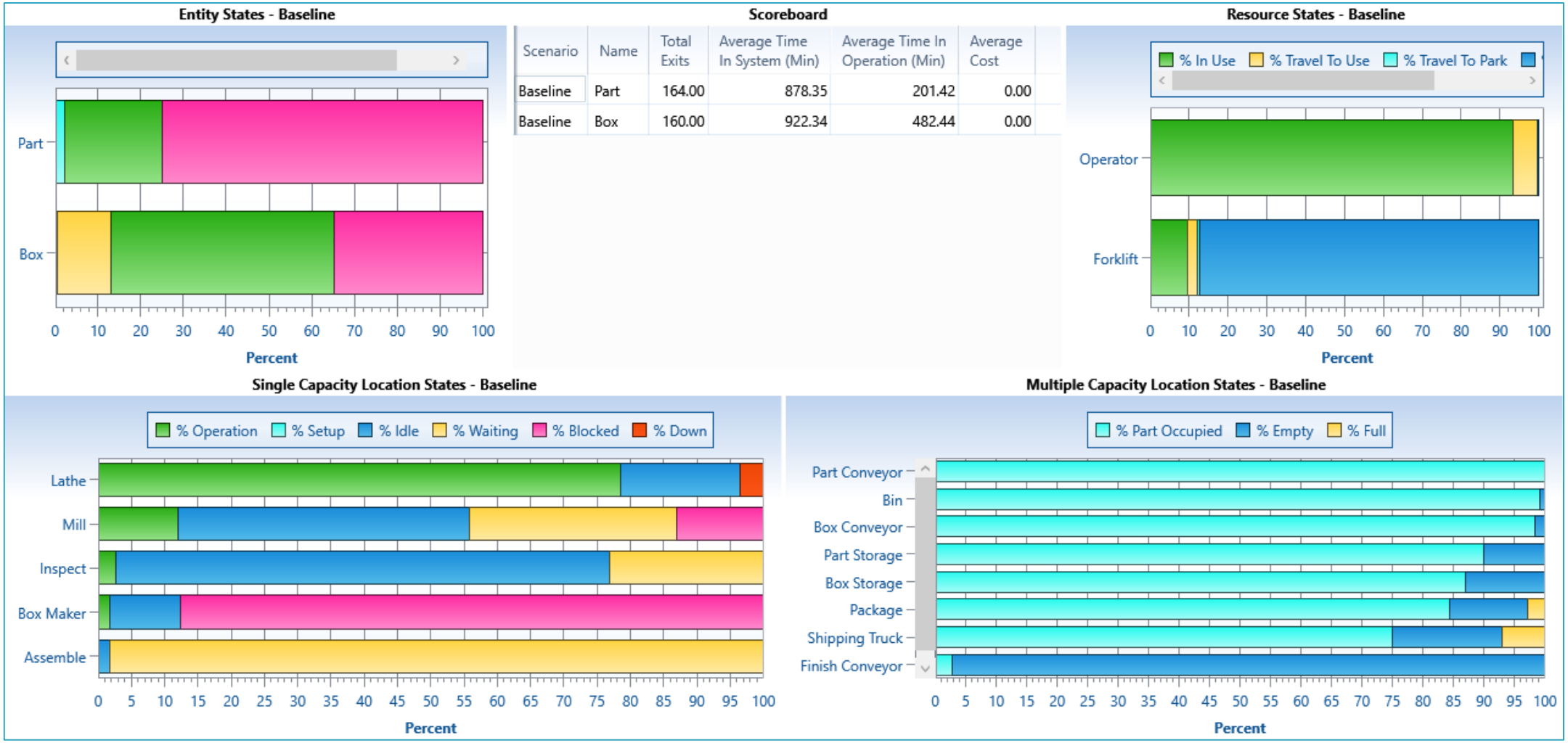
- A data file is generated every time a model runs
- The OV links to that file allowing data mining
- Use the OV to view different slices of data and examine the process model in detail
- Custom charts & tables can be built and saved so they populate with new data after each run
- TIP: Always determine some key process metrics early in a model project so you can compare output results later from different Scenarios

About the Output Viewer



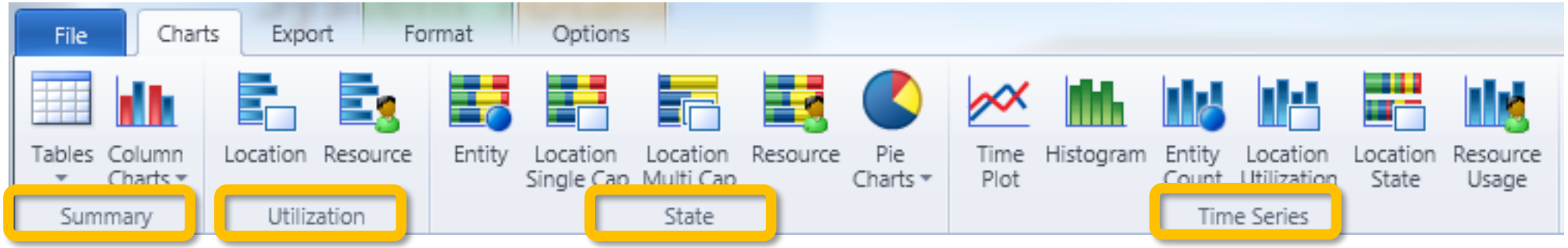


Results – Default View



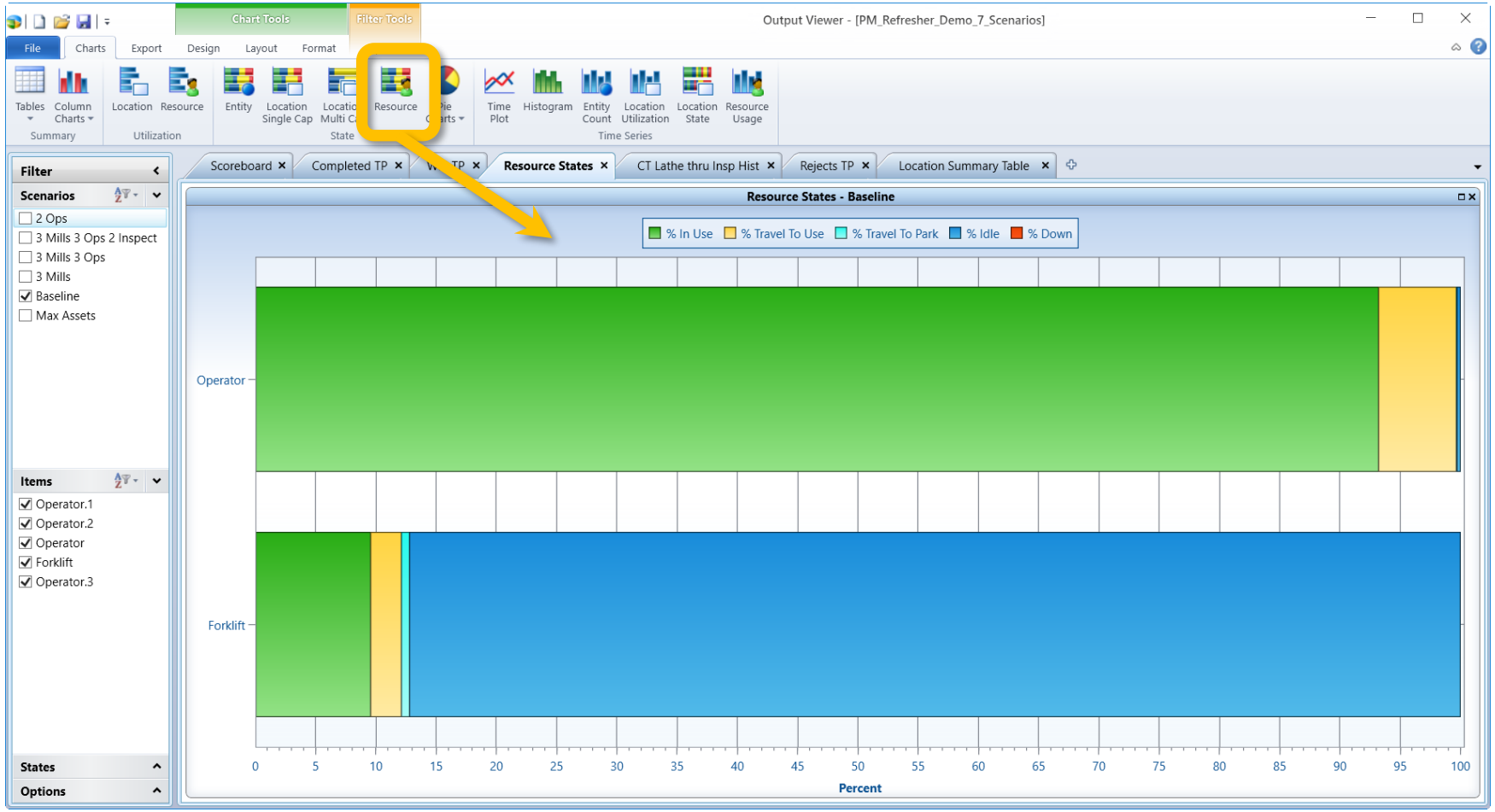
OV Chart Menu

- Summary – Tables & Column Charts
- Utilization – Locations & Resources
- State – Entities, Locations, & Resources
- Time Series – Data over the model run



Create a Chart

- Click on a button to create a new chart



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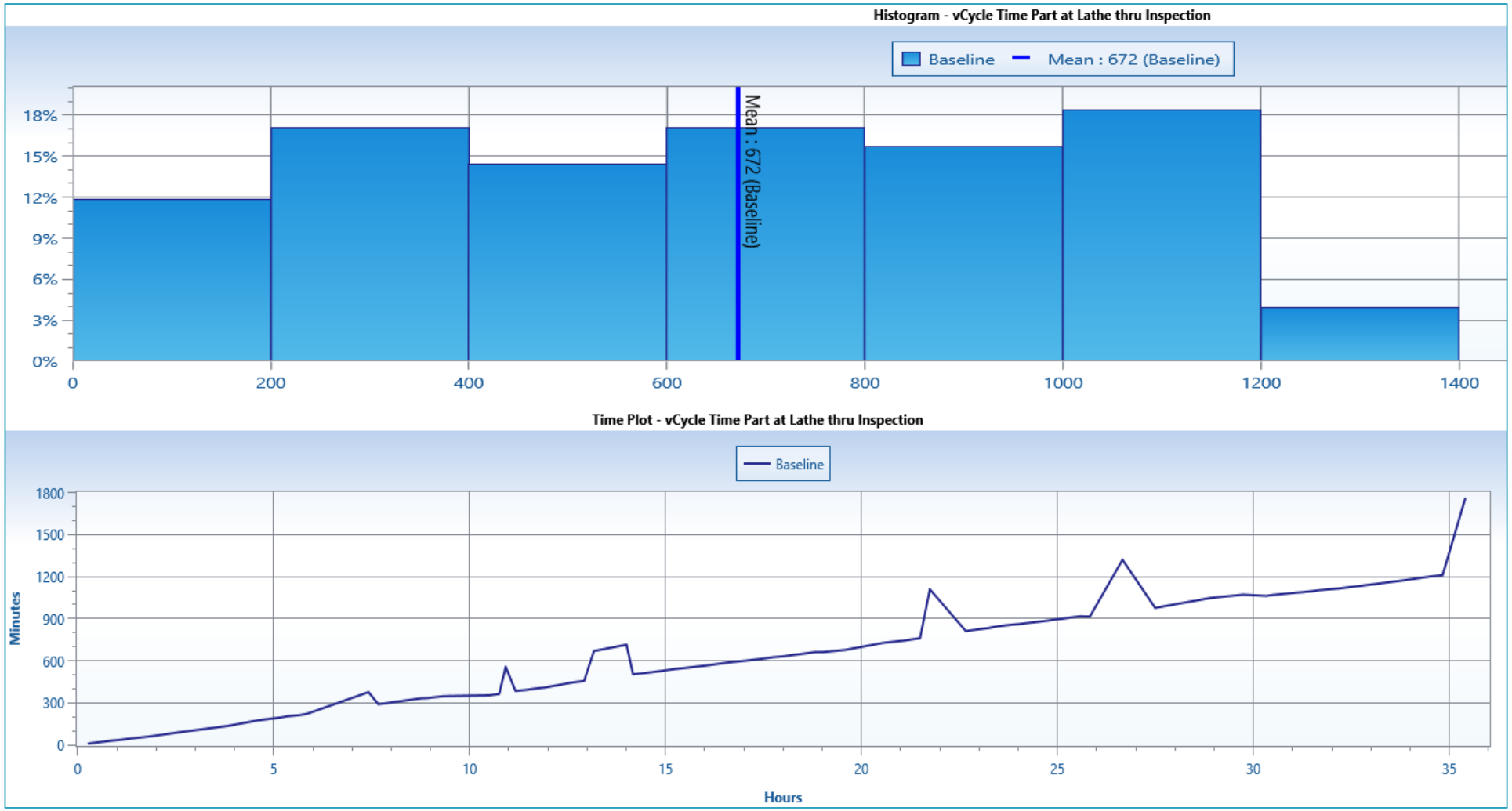
Output Views—User-Defined



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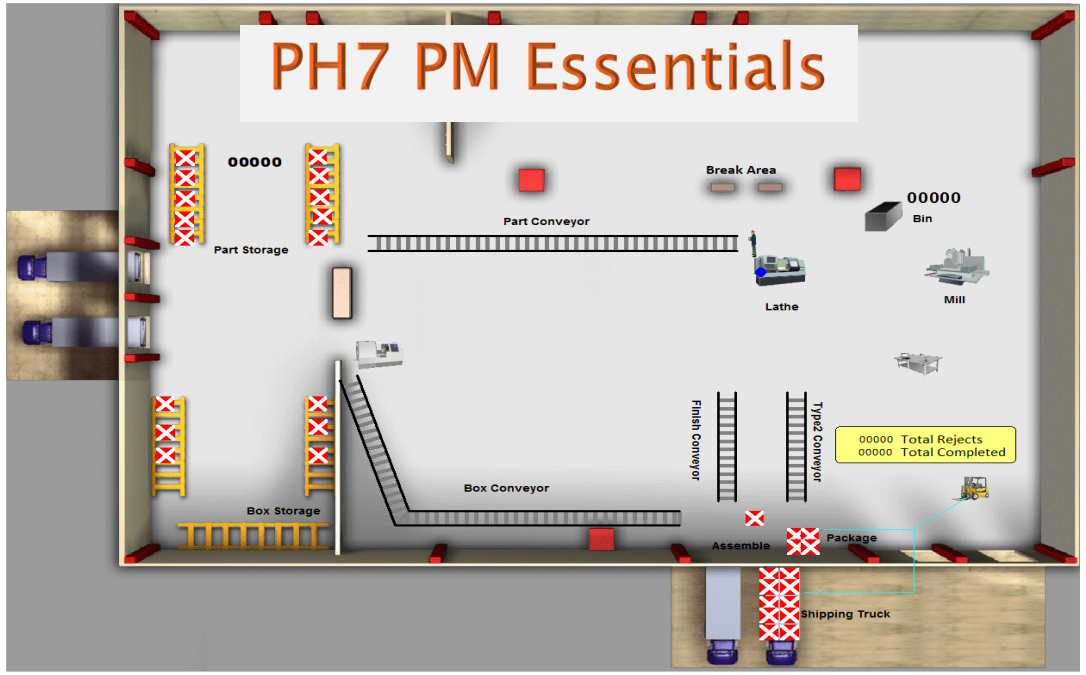
Poll #6

Demo 6: Model Results in Output Viewer



*Key Output Results you should Always analyze include:

- Throughput (i.e., Entity Exits)
- Cycle/Lead Time (process beginning to end)
- Work in Process (WIP)
- Location & Resource Utilization

Location Summary

Name	Scheduled Time (Hr)	Capacity	Total Entries	Average Time Per Entry (Min)	Average Contents	Maximum Contents	Current Contents	% Utilization
Part Storage	36.00	999,999.0(	540.00	322.44	80.61	195.00	190.00	0.01
Bin	36.00	999,999.0(	316.00	635.84	93.02	188.00	187.00	0.01
Part Conveyor	36.00	999,999.0(	350.00	277.91	45.03	50.00	50.00	90.06
Box Conveyor	36.00	999,999.0(	210.00	437.58	42.54	45.00	45.00	94.54
Box Storage	36.00	999,999.0(	42.00	654.44	12.73	28.00	27.00	0.00
Shipping Truck	36.00	16.00	164.00	94.04	7.14	16.00	4.00	44.62
Package	36.00	4.00	164.00	24.17	1.84	4.00	0.00	45.89
Lathe	36.00	1.00	300.00	5.66	0.79	1.00	1.00	78.56
Mill	36.00	1.00	130.00	9.36	0.56	1.00	1.00	56.31
Finish Conveyor	36.00	999,999.0(	58.00	1.03	0.03	1.00	0.00	0.15
Type2 Conveyor	36.00	999,999.0(	106.00	0.44	0.02	1.00	0.00	0.24
Inspect	36.00	1.00	76.00	7.34	0.26	1.00	0.00	25.84
Box Maker	36.00	1.00	15.00	128.79	0.89	1.00	1.00	89.44
Assemble	36.00	1.00	165.00	12.87	0.98	1.00	1.00	98.35

Resource Summary

Name	Units	Scheduled Time (Hr)	Work Time (Min)	Number Times Used	Average Time Per Usage (Min)	Average Time Travel To Use (Min)	% Utilization
Operator	1.00	34.00	2,032.90	700.00	2.72	0.19	99.65
Forklift	1.00	36.00	261.54	164.00	1.26	0.34	12.11

7. Scenarios

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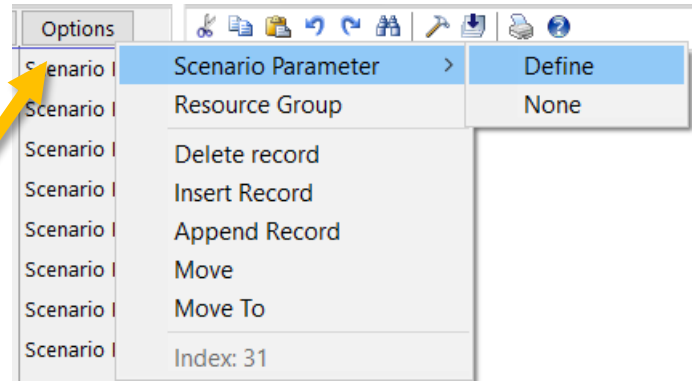
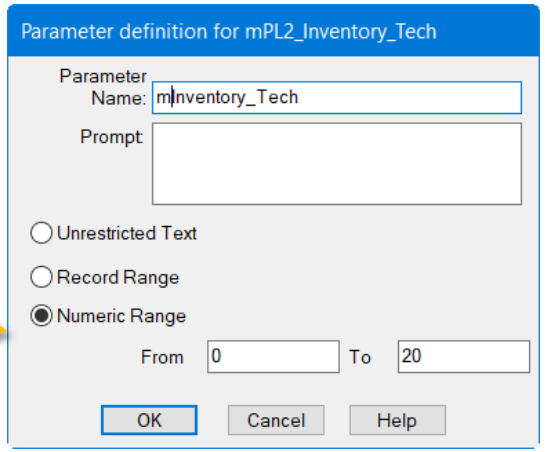
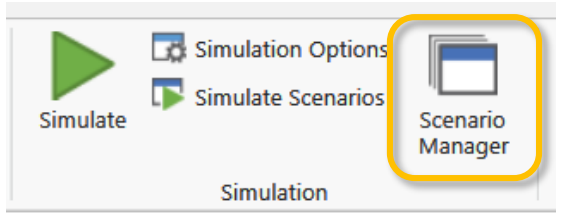
Macro as Scenario Parameter

- You can't run a scenario if you don't have some element of your model to experiment with.
- You can ONLY run Scenarios in PM using Macros!
- Select the "Options" button located at the far right corner of the Macro table and select "Define."
- Edit the Macro's scenario parameters.



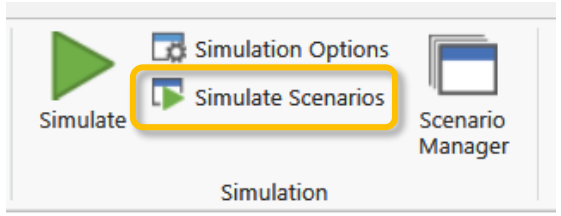


Scenario Manager

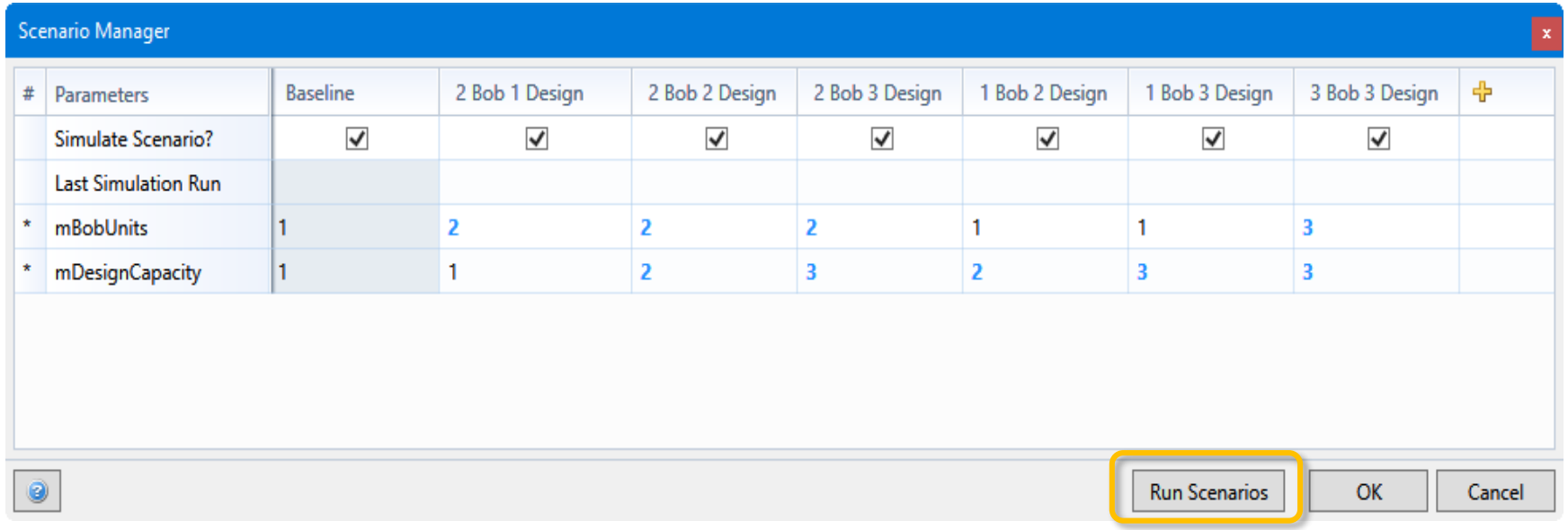


- Scenario Manager allows you to adjust the “levels” of the macros you defined for each run of the model.
- Click the “Plus” button next to the baseline scenario to create a new scenario.
- Choose a descriptive name for your scenario and edit the macro values.
- Note: It’s best to change only one macro per scenario initially. Later you can combine significant factors by changing more than one macro as needed in additional scenarios.

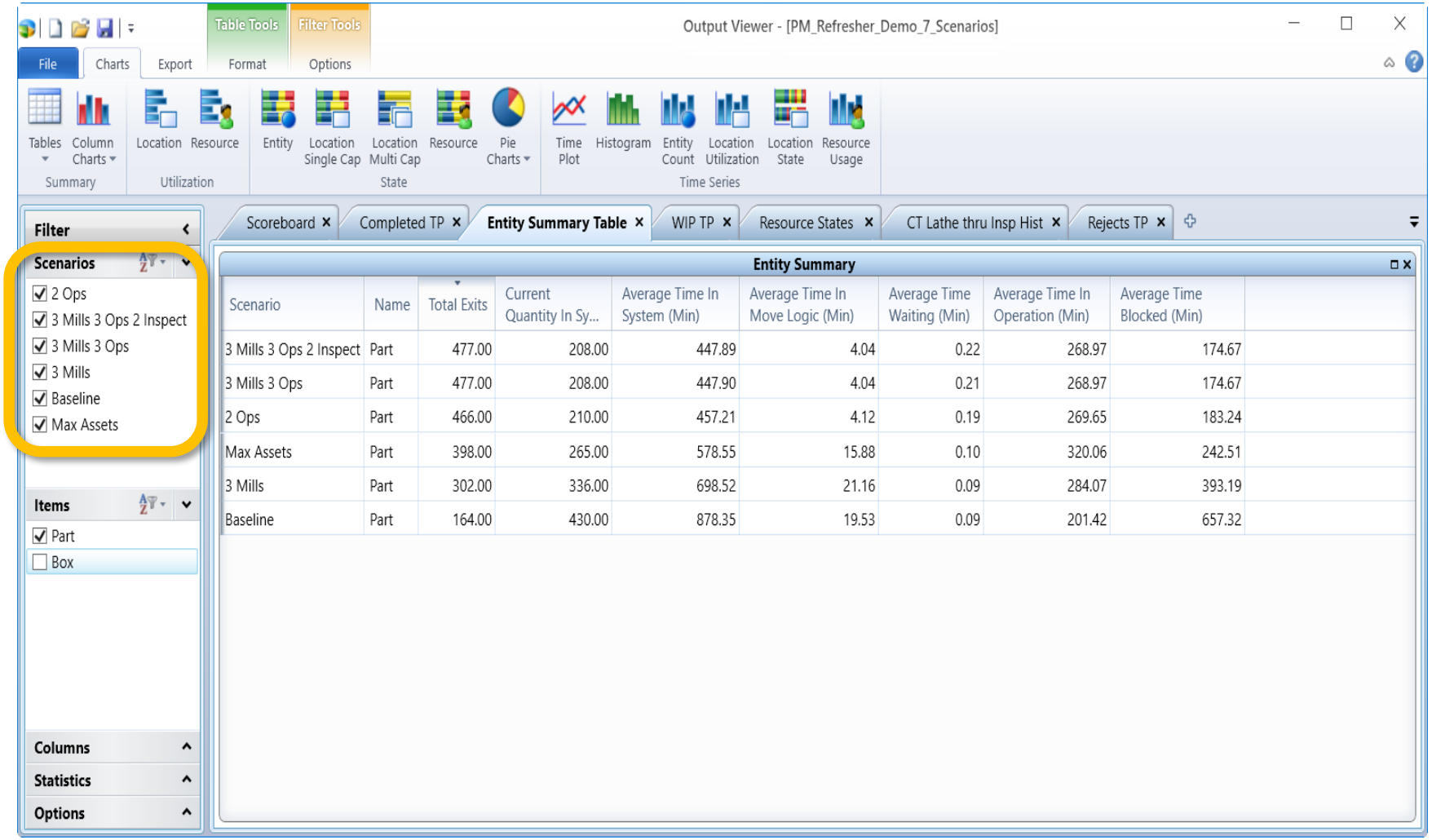
Simulate Scenarios



- You can enable or disable each scenario for comparison by clicking on the checkbox under the Scenario title.
- Run the enabled Scenarios by clicking the Run Scenarios button



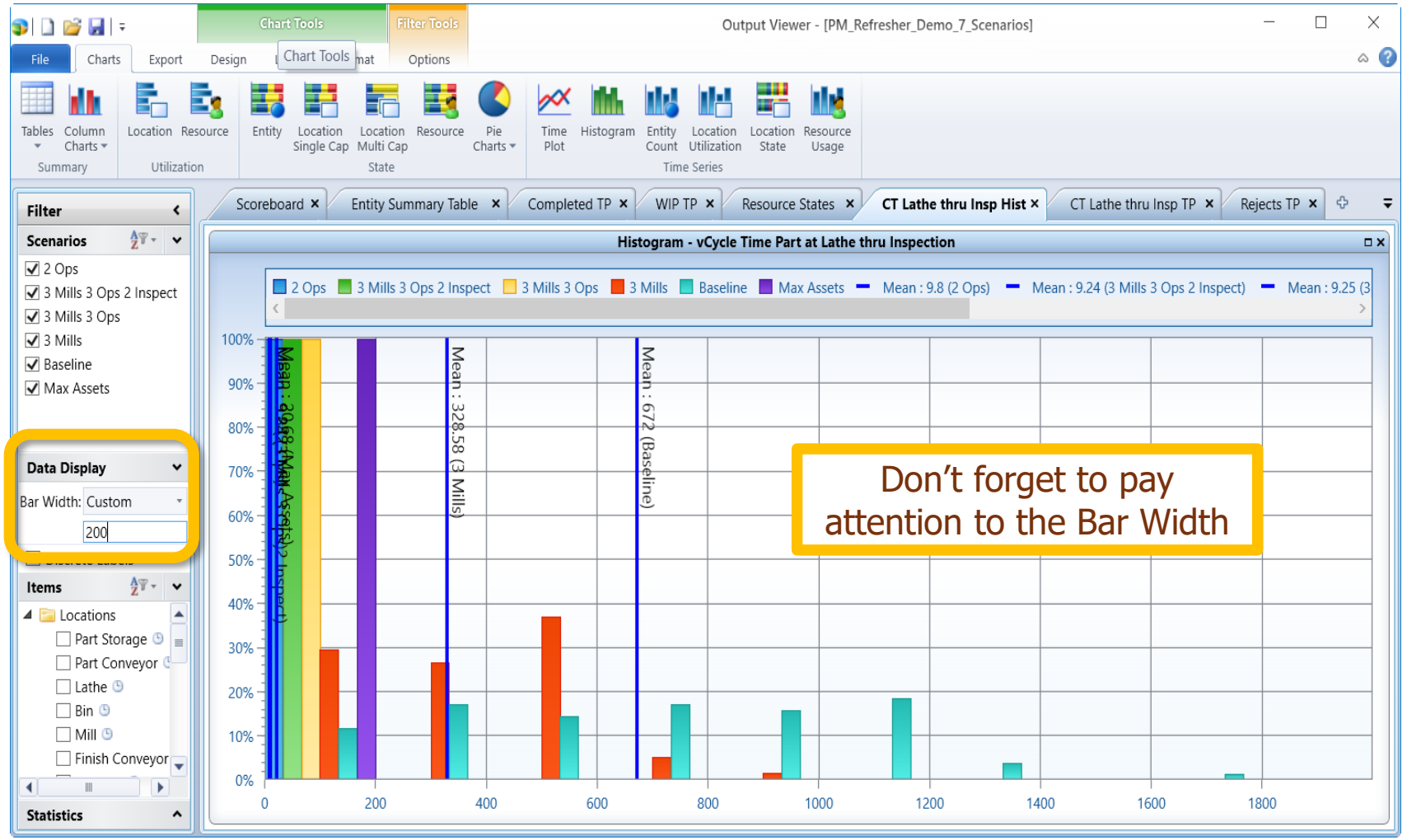
Scenario Analysis - Tables



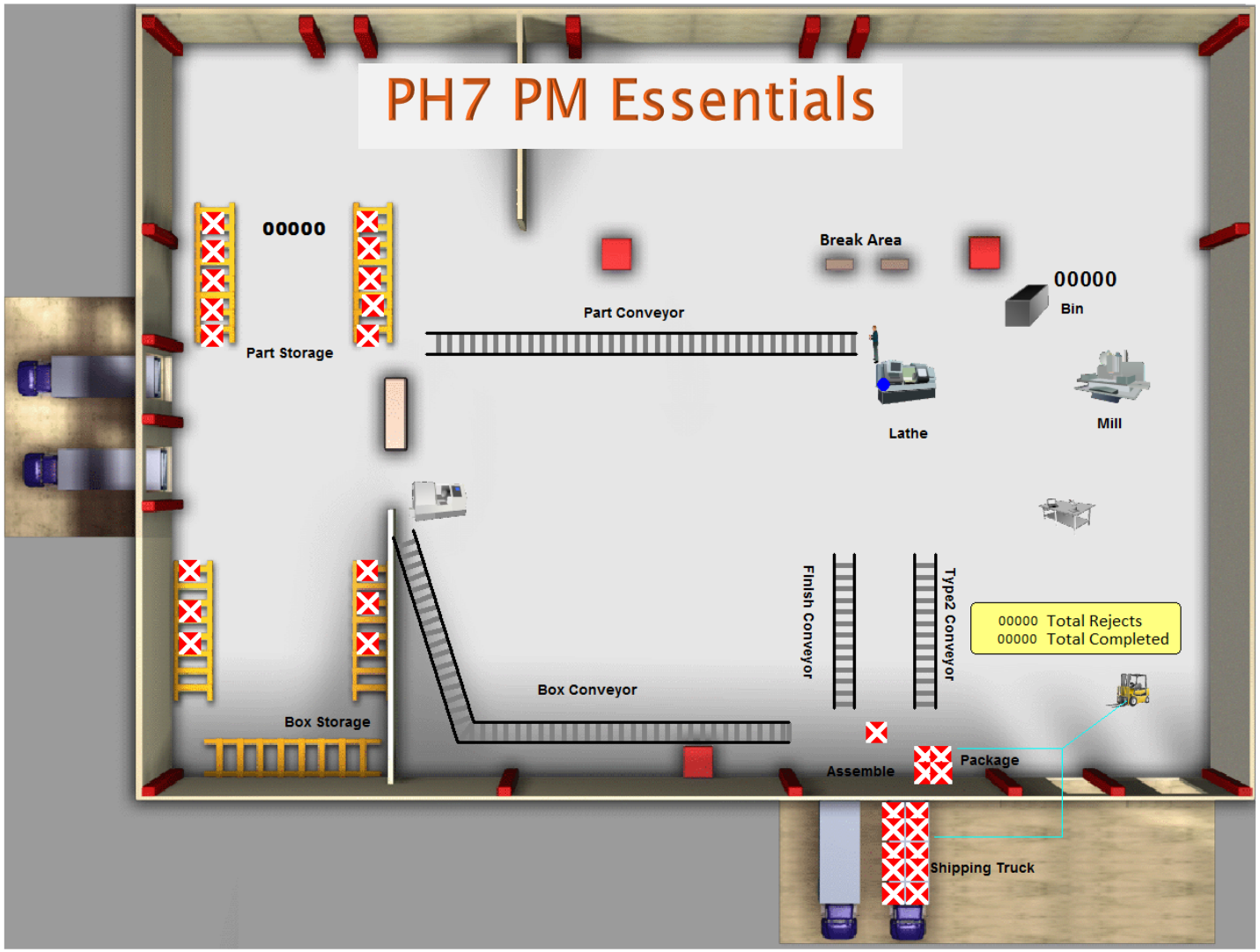
Scenario	Name	Total Exits	Current Quantity In Sy...	Average Time In System (Min)	Average Time In Move Logic (Min)	Average Time Waiting (Min)	Average Time In Operation (Min)	Average Time Blocked (Min)
3 Mills 3 Ops 2 Inspect	Part	477.00	208.00	447.89	4.04	0.22	268.97	174.67
3 Mills 3 Ops	Part	477.00	208.00	447.90	4.04	0.21	268.97	174.67
2 Ops	Part	466.00	210.00	457.21	4.12	0.19	269.65	183.24
Max Assets	Part	398.00	265.00	578.55	15.88	0.10	320.06	242.51
3 Mills	Part	302.00	336.00	698.52	21.16	0.09	284.07	393.19
Baseline	Part	164.00	430.00	878.35	19.53	0.09	201.42	657.32

Scenario Analysis - Charts

- Histograms (Cycle Time)



Demo 7: Model with Multiple Scenarios



Poll #7

Wrap Up

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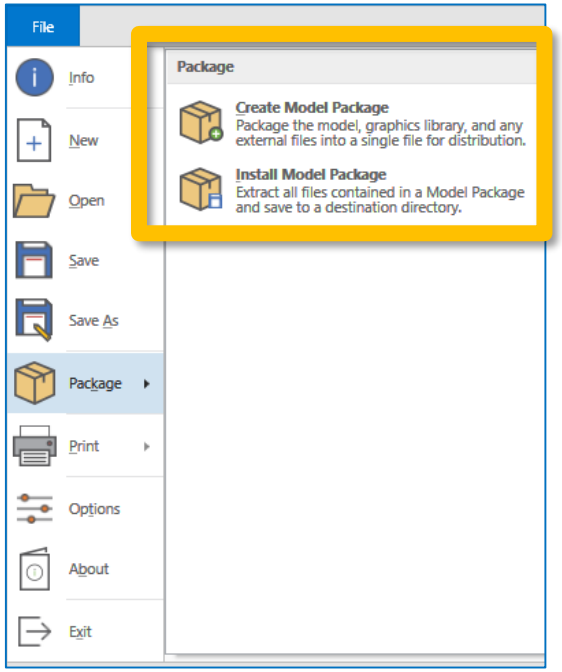
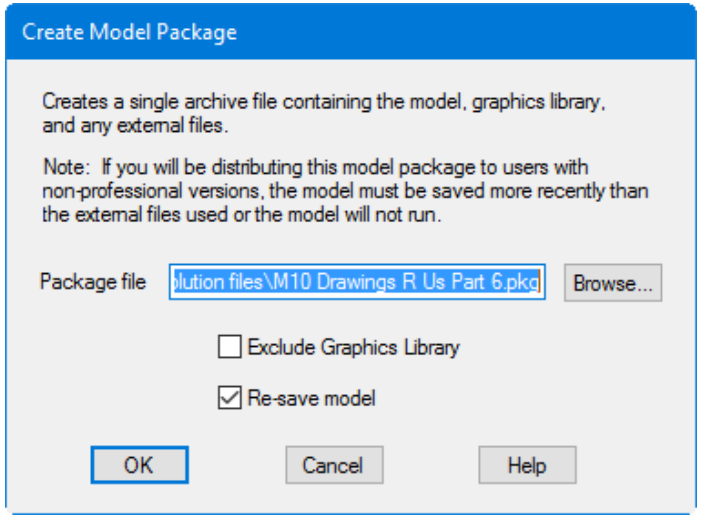
Creating Model Packages

- Sharing or archiving models is easy.
- Click on the File menu, select Package, and then "Create Model Package."
- This prompts you for a name for your model "Package."
- A model package is saved with a .pkg extension and combines: the .mod file, .glb file, and any other referenced files (such as calendar files, excel spreadsheets, or associated docs).
- This .pkg file can then be copied or emailed to others. They can run the model by selecting "Install Model Package."





Arrays

- An array is a matrix of values
- Each cell works like a variable
- A reference to a cell in an array can be used anywhere a variable can be used
- Refer to a specific array value by using the Array name followed by the specific value's row & column cell address. For example, the value 18 located in row 2 and column 3 has a cell address of [2,3] so it would be referred to as Array1[2,3].

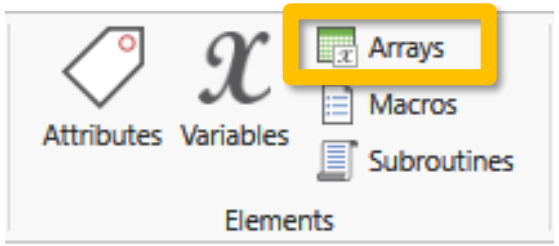
Array1:

	1	2	3	4
1	10	15	15	20
2	12	15	**18**	25
3	15	15	10	10

Array1 Cell Addresses:

Cell [1,1]	Cell [1,2]	Cell [1,3]	Cell [1,4]
Cell [2,1]	Cell [2,2]	**Cell [2,3]**	Cell [2,4]
Cell [3,1]	Cell [3,2]	Cell [3,3]	Cell [3,4]

Arrays



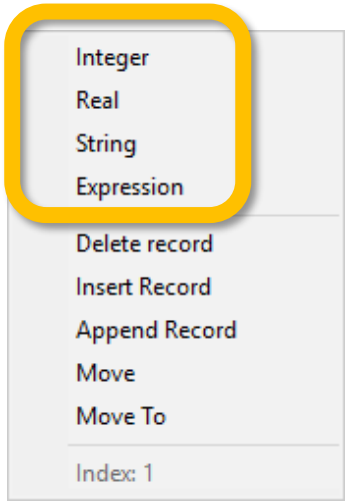
Arrays

ID	Dimensions	Type	Import File...	Export File...	Disable	Persist	Notes...

Name of the Array

Row and Column Dimensions

Array Type



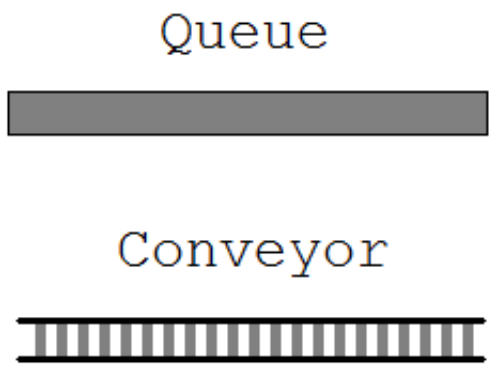
Re-import (clear) or keep data between replications

Note: Arrays can be created by importing directly from Excel files! Arrays can also be exported to Excel files!

Poll #8

Queues vs Conveyors

- Although both Queues & Conveyors are created using the same Location Icon, they do have a number of differences.



Capacity	Speed	Entity Exits	Op Logic	Move
Set in Location Table	Set in Entity Table	Can exit in any order	Executes upon Entry of Entity	Can use "Move for" in Op Logic
Entity size or Loc Table (lower of two)	Set in Conv Option	FIFO only	Can execute before and/or after Move	Can use "Move" in Op Logic

Poll #9

FINISHED

- Thanks for attending this PM 2018 Basic Refresher training course! We hope it was helpful.
- For more information on the PM 2018 Essentials or Advanced training courses, please contact the ProModel Sales Director that works with your company.
- Remember, help is only an email or phone call away.
- Good luck and happy modeling!

Technical Support
888-776-6633
support@promodel.com
6 am - 6 pm M-F, Mountain Time

Poll #10