

ProModel Extended Features Webinar

Using Extended Features in ProModel



ProModel®

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3/2018 Version 10.0.0.3218
ProModel Extended Features Webinar
For Software Version: 10.0.0.3218
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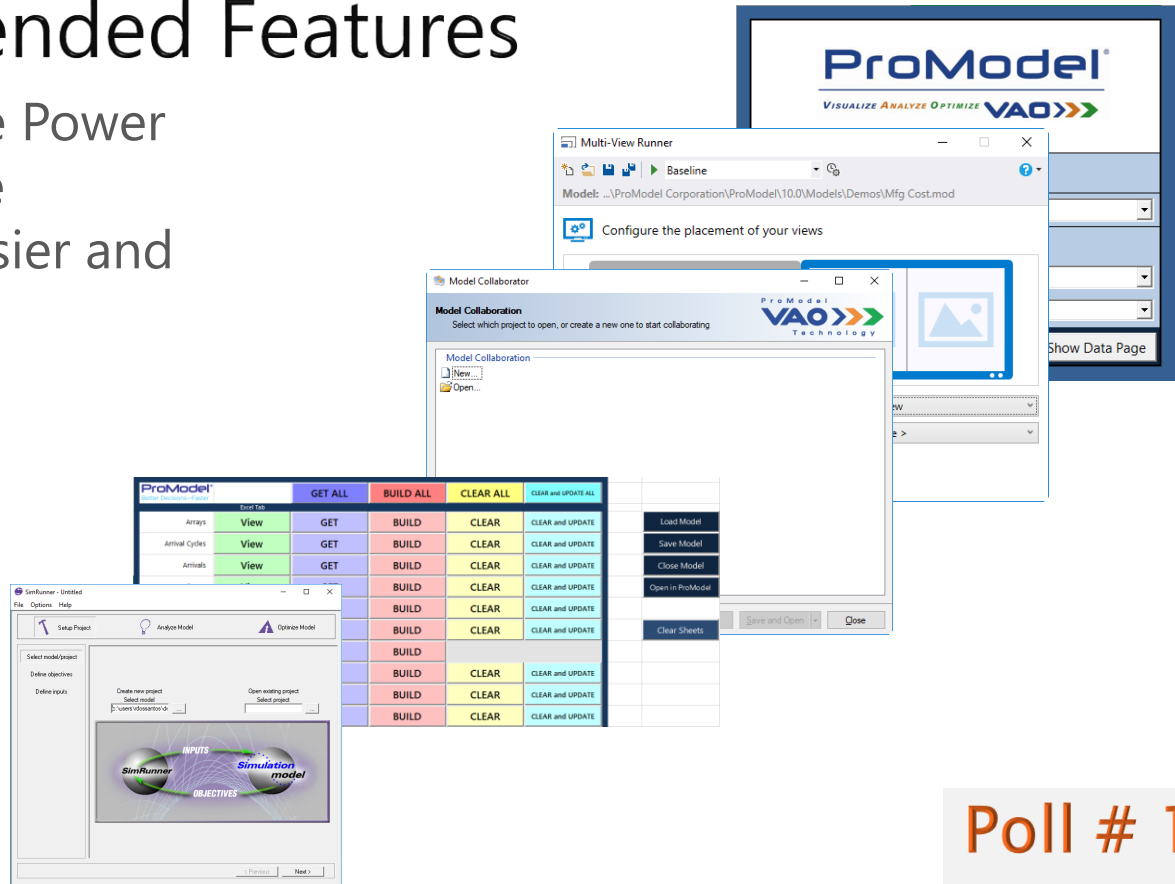
Course Objectives

During this Webinar on ProModel Extended Features you will learn how to:

- Create models in collaboration with coworkers
- Watch more than one view during the simulation
- Analyze and Manipulate RDB files in Excel
- Use Excel to create and edit models
- Optimize simulation models

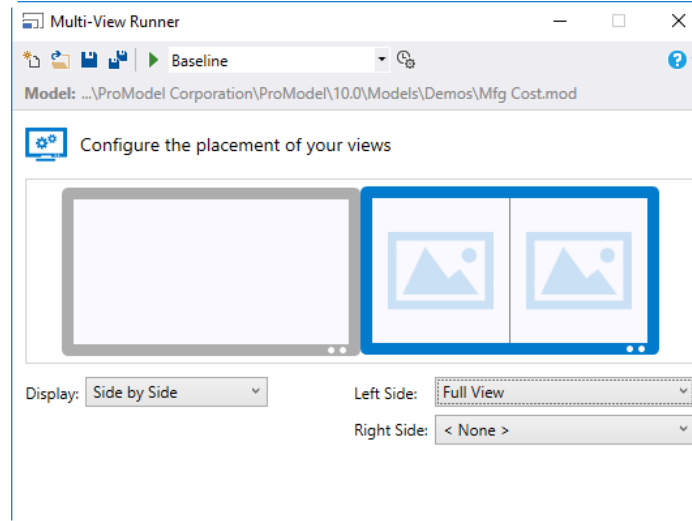
ProModel Extended Features

- ProModel has some Power Tools that can make building models easier and faster.
 - Multi-View Runner
 - ProRDB
 - Model Collaborator
 - ProActiveX
 - SimRunner



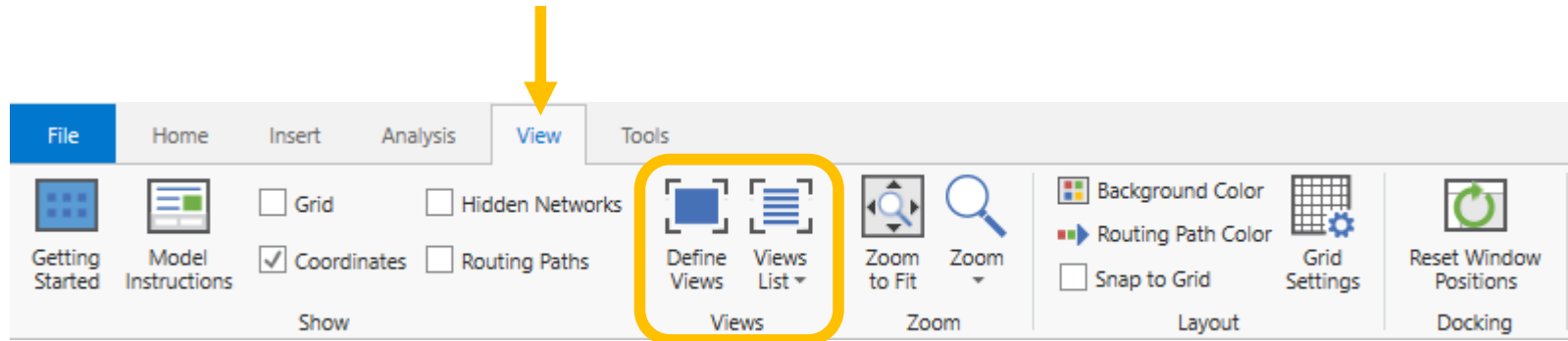
Poll # 1

1) Multi-View Runner



Views in ProModel

- It is possible to define views in ProModel



Views in ProModel

Receiving Dock Model

Presented by
High Performance Concepts, Inc.
4129 River Cliff Chase
Marietta, Ga. 30067
(404) 859-0161

Total Semi Trucks	0000
Total Small Trucks	0000
Pallets Put Away	0000
Items Put Away	0000
Avg. Pallets Per Load	0.00
Avg. Items Per Load	00.00

Cycle Times (min.)	
Semi-Trucks	000.00
Small Trucks	000.00
PalletLoads	000.00
Items	000.00

Break Area

Staging 1C Staging 1B Staging 1A

Staging 2C Staging 2B Staging 2A

Staging 3B Staging 3A

Pallet Storage

Box Staging

Factory Office

Traffic Desk

Driver Door

Box Handling

Factory

Dock 1

Dock 2

Dock 3

Semi Queue

Define Views Views List Views

Views

View List

Add

Remove

Move Up

Move Down

Rename

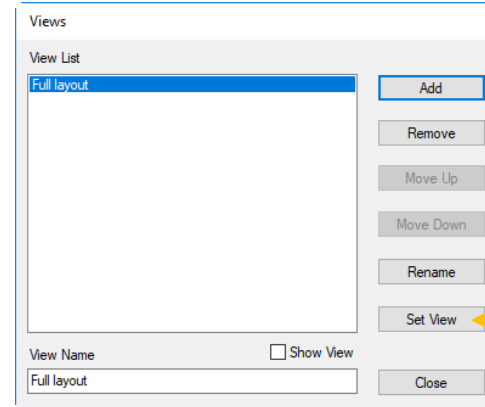
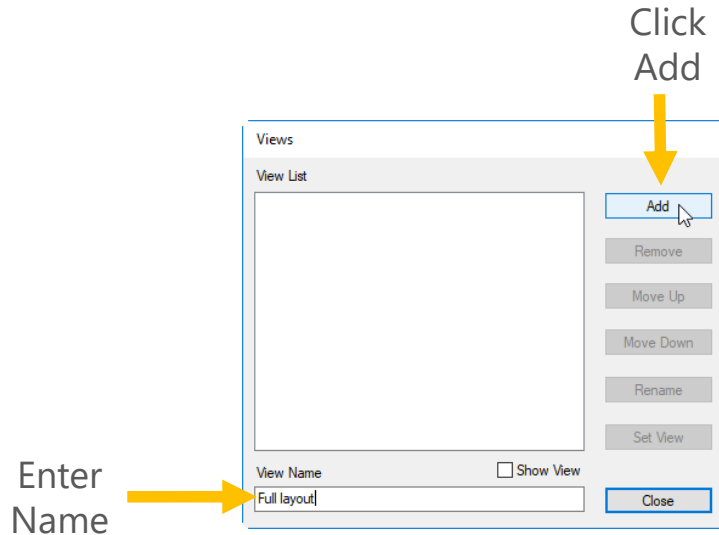
Set View

View Name Show View

Full layout

Close

Views in ProModel



Views in ProModel

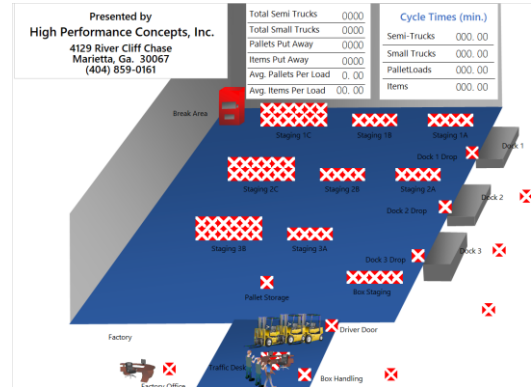
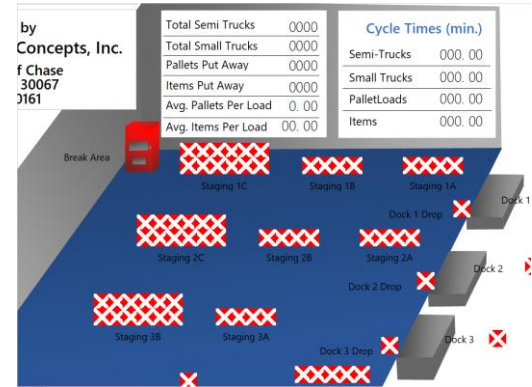
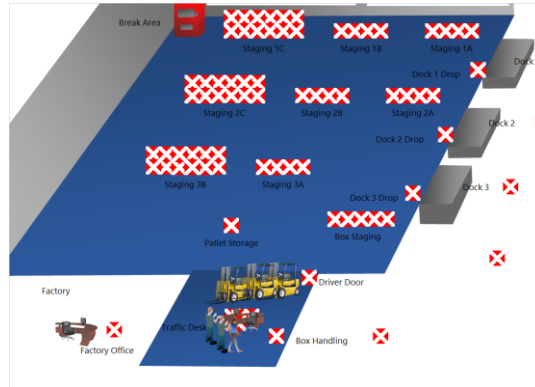
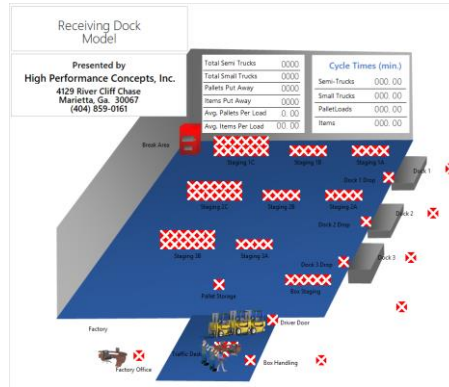
Views

View List

- Full layout
- Statistics
- Dock activities
- Activities & Statistics

Buttons: Add, Remove, Move Up, Move Down, Rename, Set View, Show View, Close

View Name: Full layout



Views in ProModel

Receiving Dock Model

Presented by
High Performance Concepts, Inc.
4129 River Cliff Chase
Marietta, Ga. 30067
(404) 859-0161

Total Semi Trucks	5
Total Small Trucks	3
Pallets Put Away	10
Items Put Away	31
Avg. Pallets Per Load	5.50
Avg. Items Per Load	16.00

Cycle Times (min.)	
Semi-Trucks	26.75
Small Trucks	7.51
PalletLoads	29.04
Items	26.00

Views

- Full Layout
- Statistics
- Dock activities
- Activities & Statistics

Break Area

Staging 1C Staging 1B Staging 1A

Staging 2C Staging 2B Staging 2A

Staging 3B Staging 3A

Dock 1 Drop

Dock 2 Drop

Dock 3 Drop

Factory

Factory Office

Traffic Desk

Box Staging

Box Handling

Driver Door

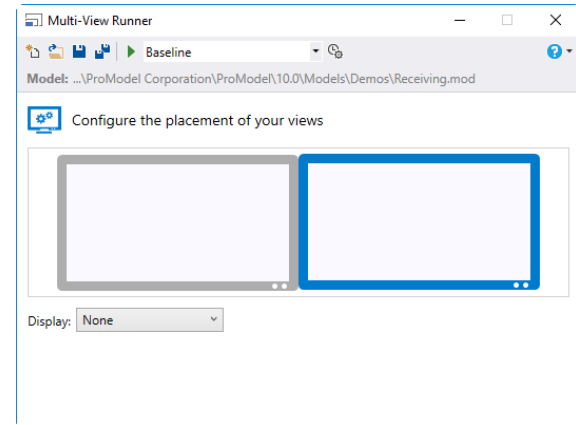
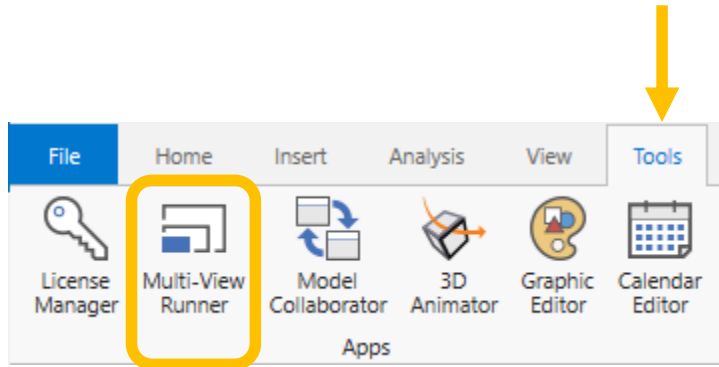
Pallet Staging

2006.03.20 Mon 13:31

The Views window shows up during the simulation letting the user select which view he/she chooses to watch. However, it's only possible to watch one view at a time.

Multi-View Runner

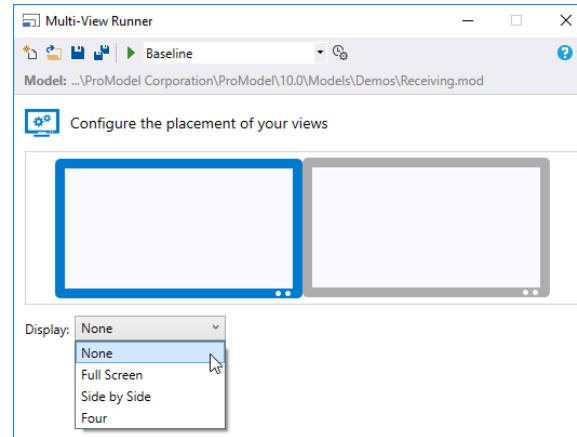
- Multi-View Runner allows you to watch more than one view at a time



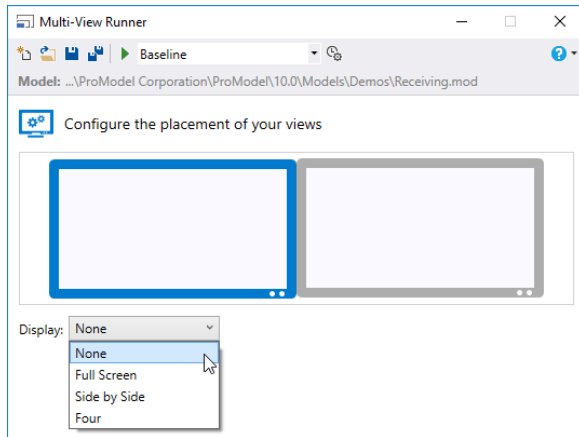
- Creates a .pmvr file

Multi-View Runner

- A monitor selection portion of the Multi-View Runner dialog box allows you to select what views you want to be displayed on the monitor.



Multi-View Runner



None



Full Screen



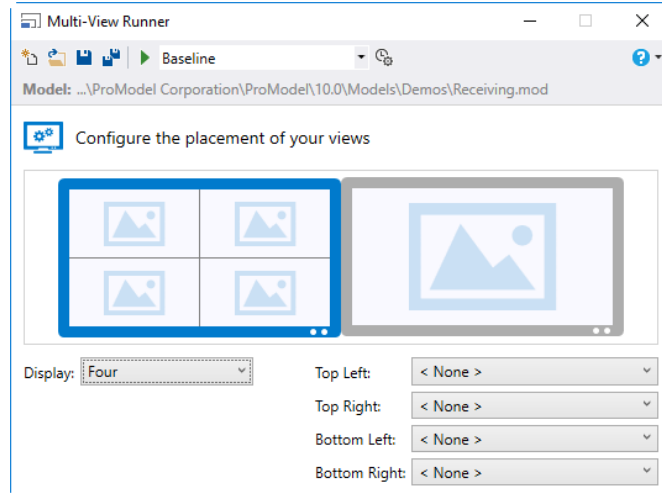
Side by Side



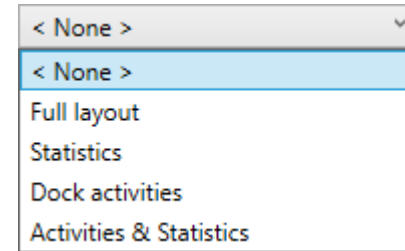
Four



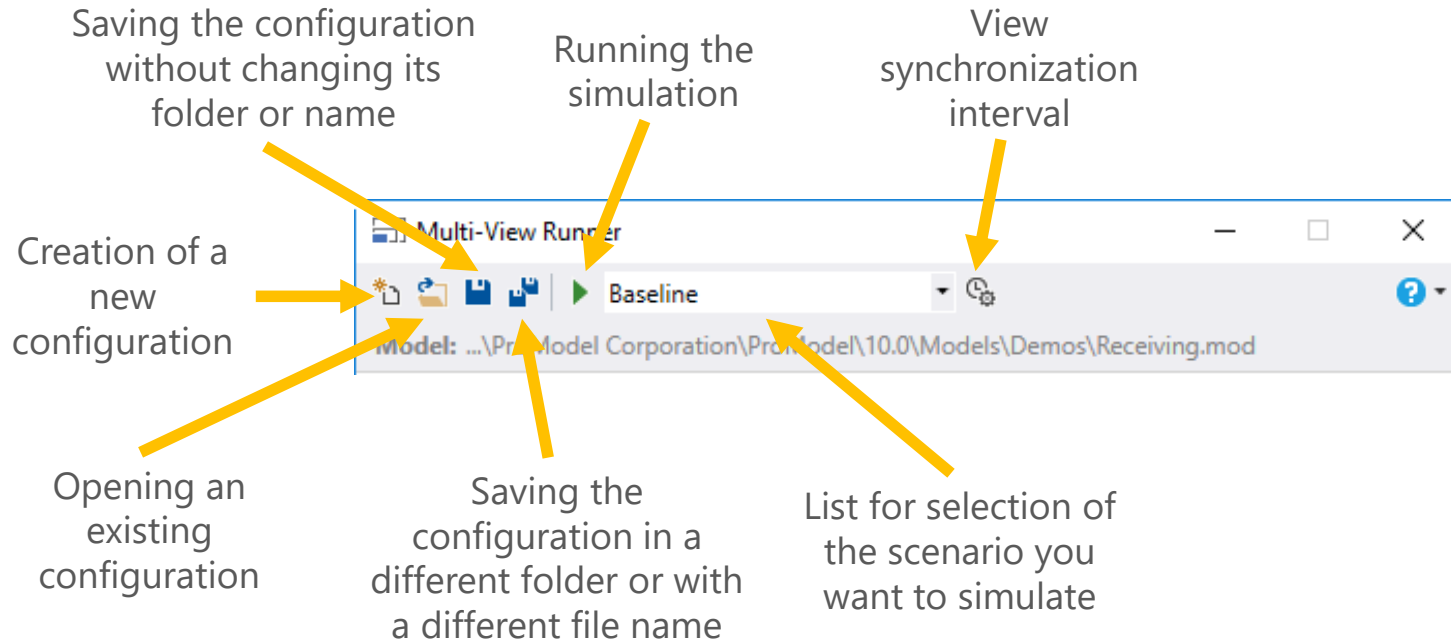
Multi-View Runner



The drop-down list allows the user to select the views they want to display on each screen



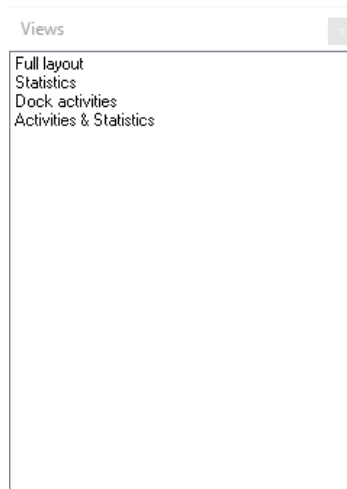
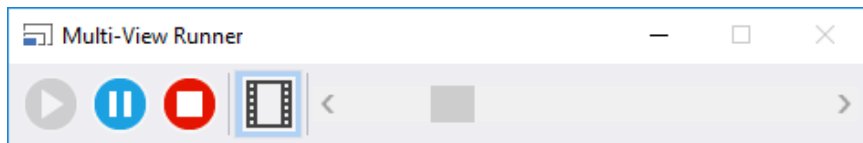
Multi-View Runner





Multi-View Runner

While the simulation is running the Views window and a pop-up simulation control bar box is displayed.



2) ProRDB

The screenshot displays the ProModel software interface. At the top, the ProModel logo is shown with the tagline "VISUALIZE ANALYZE OPTIMIZE VAO" and a graphic of three green arrows pointing right. Below the logo, there is a dark blue sidebar on the left containing the following labels: "Output File...", "Summary Table:", "Scenario:", "Replication:", and "Period:". To the right of these labels are input fields: a text box for "Output File...", a dropdown menu for "Summary Table:", a text box for "Scenario:", a dropdown menu for "Replication:", and a dropdown menu for "Period:". At the bottom of the sidebar area, there are two buttons: "Get Data" and "Show Data Page".

RDB Files

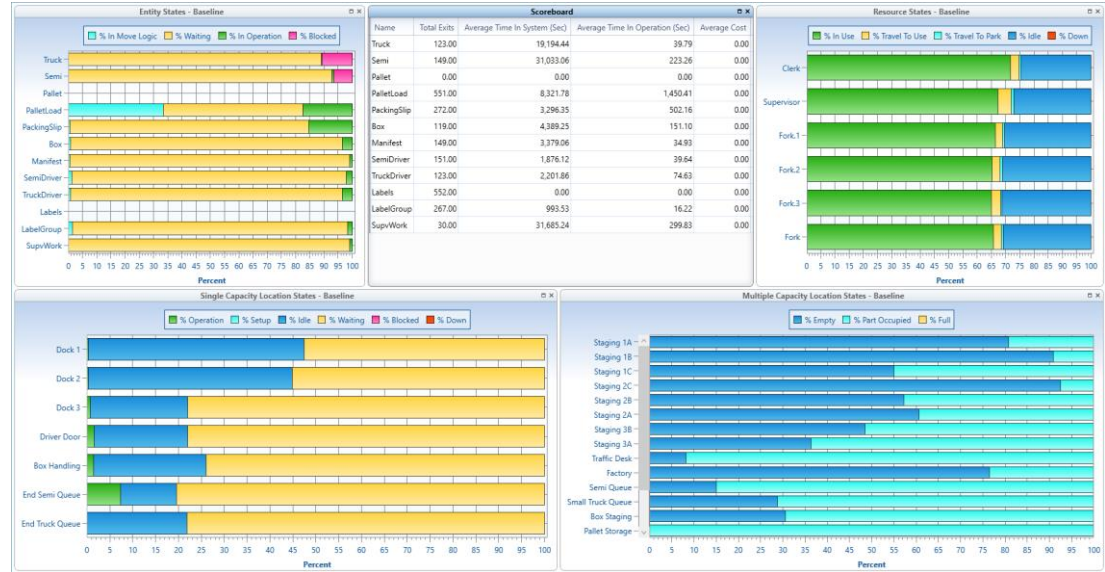
- When a simulation is run RDB files are created
- These files contain the basic statistics created during the simulation
- Each scenario will have its own RDB file



Receiving.Baseline.rdb

RDB Files

- The information stored in the RDB files is the data displayed on Output Viewer.

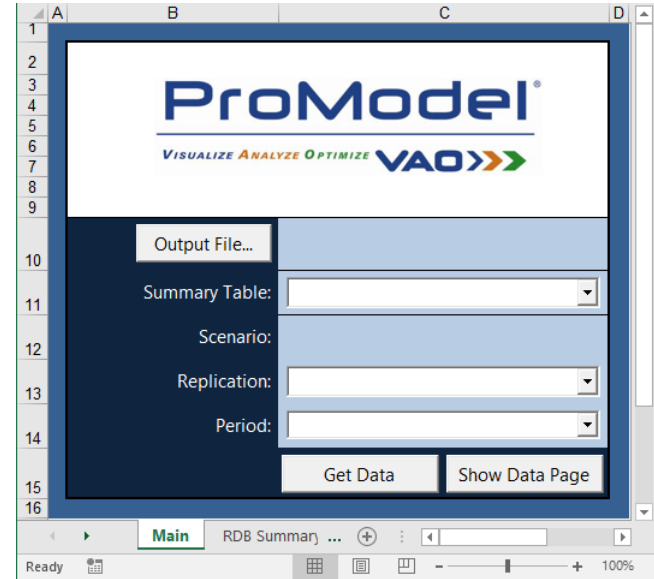


- They are located under:

C:\Users\\Documents\ProModel\Output

ProRDB

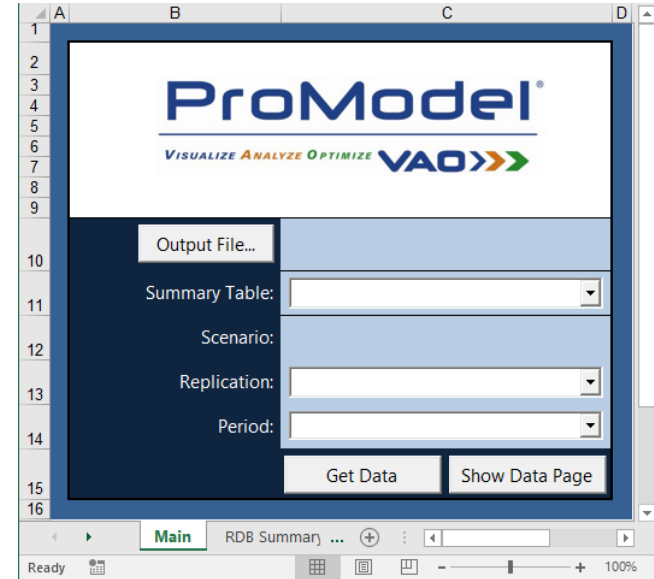
- Extract all or part of the standard ProModel output statistics



C:\Program Files (x86)\ProModel Corporation\ProModel\10.0\Power Tools

ProRDB

- Allows using Excel to retrieve model output data
- Granted, of minimal benefit, given the power of the standard ProModel output viewer
- Nevertheless, allows non-ProModel users to extract key metrics from output data



ProRDB

- Open ProRDB
- Specify the RDB file
- Specify the Replication and Period of interest
- Get Data

ProModel®
VISUALIZE ANALYZE OPTIMIZE VAO>>>

Output File... C:\Users\Ken\Documents\ProModel\Output\Mfg_cost kad1.Baseline.rdb

Summary Table: All Tables

Scenario: Baseline

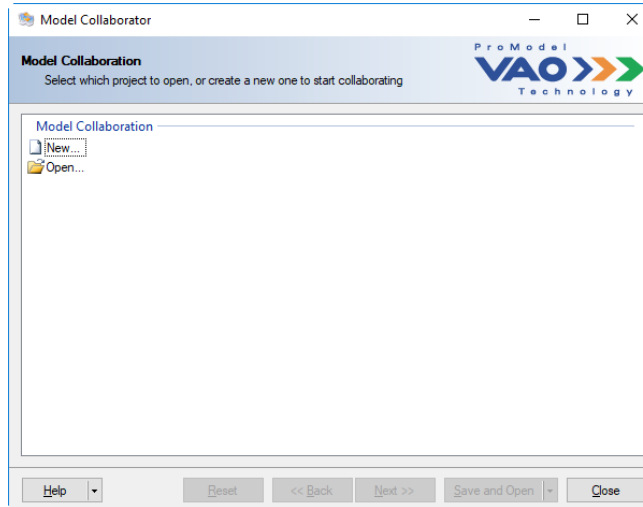
Replication: All

Period: All

Get Data Show Data Page

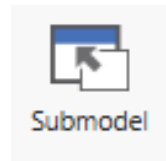
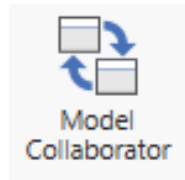
All Tables										
Location Name	Scheduled Hours	Capacity	Total Entries	Average Minutes Per Entry	Average Contents	Maximum Contents	Current Contents	% Util		
Receive	22	2	41	64.3902439	2	2	2	100		
NC_Lathe_1	22	1	117	10.54194017	0.934399242	1	1	93.44		
NC_Lathe_2	22	1	117	10.5701453	0.936899242	1	1	93.69		
Degrease	22	2	234	10.63760684	1.885757576	2	2	94.29		
Inspect	22	1	233	4.82064378	0.850814394	1	1	85.08		
Bearing_Queue	22	100	190	46.30951579	6.665763636	17	11	6.66		
Loc1	22	5	237	27.84810127	5	5	5	72.02		
InspectQ1	22	1	24	53.717625	0.976684091	1	1	97.67		
InspectQ2	22	1	25	51.6416	0.978560606	1	1	97.81		
InspectQ3	22	1	24	54.50166667	0.990939394	1	1	99.09		
InspectQ4	22	1	25	52.3008	0.990545455	1	1	99.05		
InspectQ5	22	1	24	53.77108333	0.977656061	1	1	97.77		
InspectQ6	22	1	24	53.88633333	0.979751515	1	1	97.98		
InspectQ7	22	1	24	54.50166667	0.990939394	1	1	99.09		
InspectQ8	22	1	24	53.82804167	0.978691667	1	1	97.87		
InspectQ9	22	1	24	54.50166667	0.990939394	1	1	99.09		
InspectQ10	22	1	24	54.36504167	0.988455303	1	1	98.85		
Location Multi Cap States										
Location Name	Scheduled Hours	% Empty	% Partially O-% Full					% Down		
Receive	22	0	0	100	0	0	0			
Degrease	22	0	11.42	88.56	0	0	0			
Bearing_Queue	22	11.4111	88.56	0	0	0	0			
Loc1	22	0	0	100	0	0	0			
Location Single Cap States										
Location Name	Scheduled Hours	% Operat % Setup	% Idle		% Waiting	% Blocked	% Down			
NC_Lathe_1	22	26.39	0	5.47	3.78	63.27	1.09			
NC_Lathe_2	22	26.5	0	4.78	3.61	63.58	1.53			

3) Model Collaborator



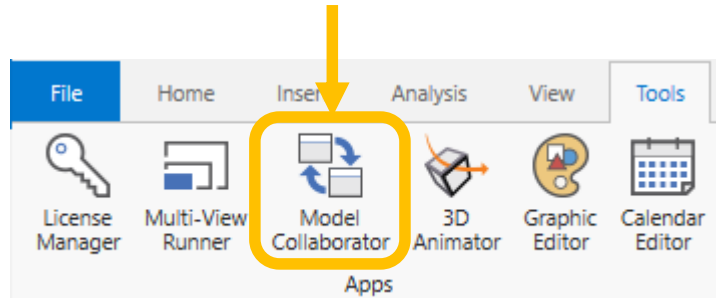
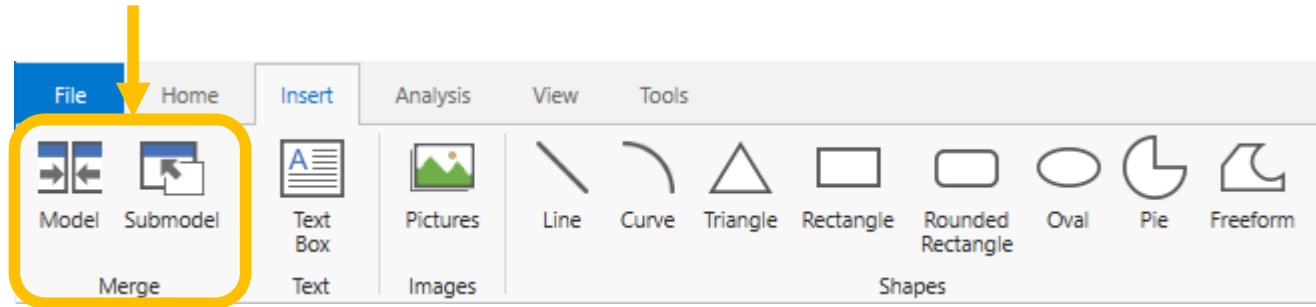
Collaborating on Model Creation

- Collaboration on model creation can speed up the process
- ProModel offers 3 tools that can help in this process:
 - Model Collaborator
 - Merge
 - Submodel
 - Model



Poll # 2

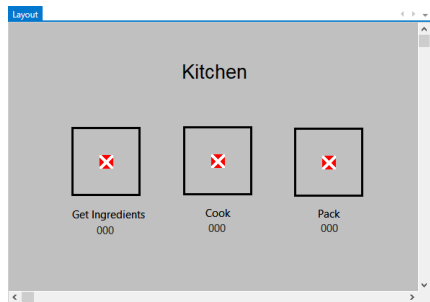
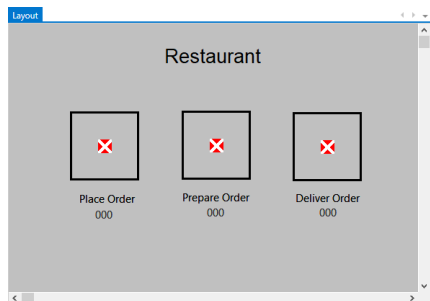
Collaborating on Model Creation





Model Merge

- Allows merging two different models



SubModel Merge

- Allows you to merge two different models even if they have duplicated locations, entities, attributes or variables.
 - If there are locations, entities, attributes or variables with the same name it will add a suffix or a prefix to the duplicate locations, entities, attributes or variables of the model that is being merged to the main model.

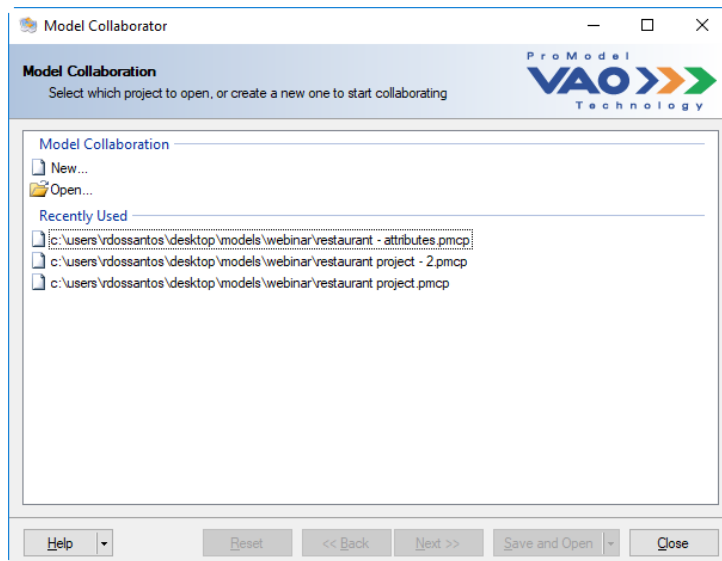


Icon	Name
	Step_1
	Step_2
	Step_3
	PO_Step_1
	PO_Step_2
	PO_Step_3



Model Collaborator

- Guides you through the merging Process in w wizard-like interface



4) ProActiveX

ProModel [®] Better Decisions—Faster		GET ALL	BUILD ALL	CLEAR ALL	CLEAR and UPDATE ALL
Excel Tab					
Arrays	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Arrival Cycles	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Arrivals	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Attributes	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Entities	View	GET	BUILD	CLEAR	CLEAR and UPDATE
External Files	View	GET	BUILD	CLEAR	CLEAR and UPDATE
General Info	View	GET	BUILD		
Locations	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Location Graphics	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Macros	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Path Networks	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Processing	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Resources	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Scenarios	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Shift Assignments	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Simulation Options	View	GET	BUILD		
Streams	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Subroutines	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Table Functions	View	GET	BUILD	CLEAR	CLEAR and UPDATE
User Distributions	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Variables	View	GET	BUILD	CLEAR	CLEAR and UPDATE

- Load Model
- Save Model
- Close Model
- Open in ProModel

- Clear Sheets

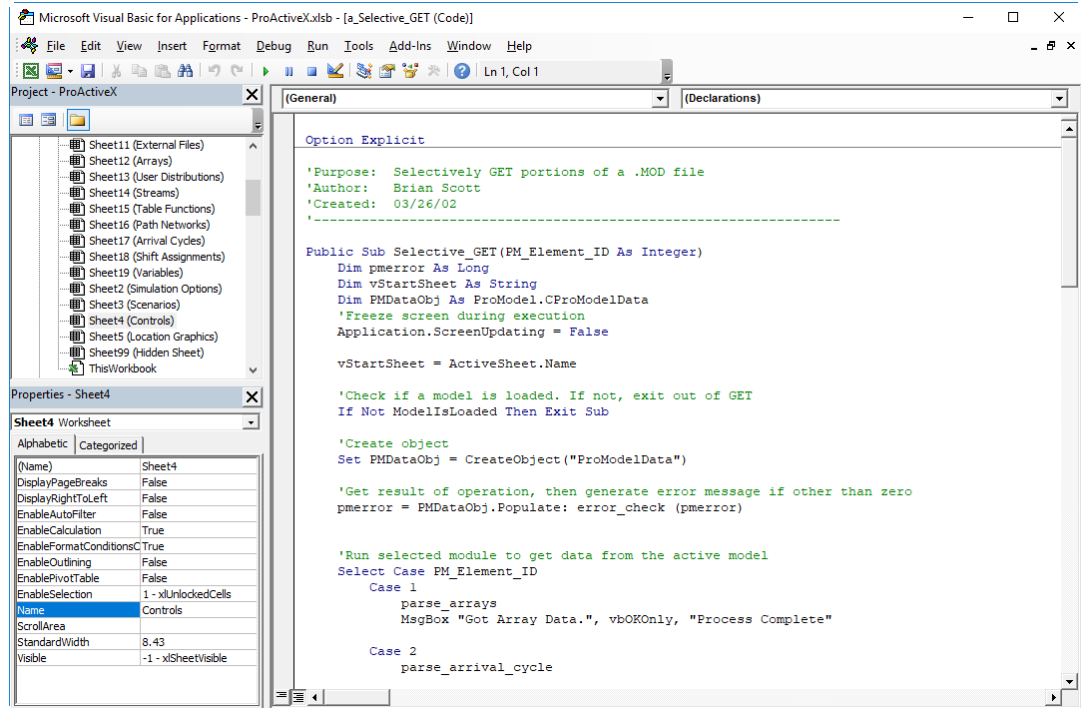
ProActiveX

- Extract & Build text and graphics items in a model
- Use Excel techniques to construct items
 - COPY / PASTE sections of items
 - FILL DOWN (iterating numbers & names)
 - CONCATENATE items to build other items
- Automate model Open & Save & Run

	View	GET ALL	BUILD ALL	CLEAR ALL	CLEAR and UPDATE ALL	
Arrays	View	GET	BUILD	CLEAR	CLEAR and UPDATE	Load Model
Arrival Cycles	View	GET	BUILD	CLEAR	CLEAR and UPDATE	Save Model
Arrivals	View	GET	BUILD	CLEAR	CLEAR and UPDATE	Close Model
Attributes	View	GET	BUILD	CLEAR	CLEAR and UPDATE	Open in ProModel
Entities	View	GET	BUILD	CLEAR	CLEAR and UPDATE	
External Files	View	GET	BUILD	CLEAR	CLEAR and UPDATE	Clear Sheets
General Info	View	GET	BUILD			
Locations	View	GET	BUILD	CLEAR	CLEAR and UPDATE	
Location Graphics	View	GET	BUILD	CLEAR	CLEAR and UPDATE	
Macros	View	GET	BUILD	CLEAR	CLEAR and UPDATE	

ProActiveX

- Written in VBA
- Allows you to edit the code.



The screenshot shows the Microsoft Visual Basic for Applications editor. The title bar reads "Microsoft Visual Basic for Applications - ProActiveX.xlsb - [a_Selective_GET (Code)]". The menu bar includes File, Edit, View, Insert, Format, Debug, Run, Tools, Add-Ins, Window, and Help. The Project Explorer on the left shows a project named "Project - ProActiveX" with a list of worksheets: Sheet11 (External Files), Sheet12 (Arrays), Sheet13 (User Distributions), Sheet14 (Streams), Sheet15 (Table Functions), Sheet16 (Path Networks), Sheet17 (Arrival Cycles), Sheet18 (Shift Assignments), Sheet19 (Variables), Sheet2 (Simulation Options), Sheet3 (Scenarios), Sheet4 (Controls), Sheet5 (Location Graphics), Sheet199 (Hidden Sheet), and ThisWorkbook. The Properties window for Sheet4 is open, showing various worksheet properties. The main code window displays the following VBA code:

```
Option Explicit

'Purpose: Selectively GET portions of a .MOD file
'Author: Brian Scott
'Created: 03/26/02
-----

Public Sub Selective_GET(PM_Element_ID As Integer)
    Dim pmerror As Long
    Dim vStartSheet As String
    Dim PMDataObj As ProModel.CProModelData
    'Freeze screen during execution
    Application.ScreenUpdating = False

    vStartSheet = ActiveSheet.Name

    'Check if a model is loaded. If not, exit out of GET
    If Not ModelIsLoaded Then Exit Sub

    'Create object
    Set PMDataObj = CreateObject("ProModelData")

    'Get result of operation, then generate error message if other than zero
    pmerror = PMDataObj.Populate: error_check (pmerror)

    'Run selected module to get data from the active model
    Select Case PM_Element_ID
        Case 1
            parse_arrays
            MsgBox "Got Array Data.", vbOKOnly, "Process Complete"
        Case 2
            parse_arrival_cycle
    End Select
End Sub
```

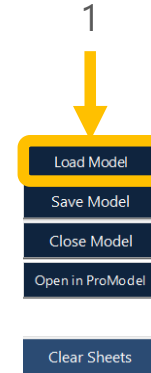
ProActiveX

- Can be found at "C:\Program Files (x86)\ProModel Corporation\ProModel\10.0\Power Tools\ProActiveX.xlsb"
- The released version ProModel 2018 has a ProActiveX file that brings up the old User Interface. This was fixed and the new version of ProActiveX can be found in the Solutions Café (<https://www.promodel.com/solutionscafe/>).

ProActiveX

- Load the model so you can start working on it.

ProModel [®] Better Decisions—Faster		GET ALL	BUILD ALL	CLEAR ALL	CLEAR and UPDATE ALL
Excel Tab					
Arrays	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Arrival Cycles	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Arrivals	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Attributes	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Entities	View	GET	BUILD	CLEAR	CLEAR and UPDATE
External Files	View	GET	BUILD	CLEAR	CLEAR and UPDATE
General Info	View	GET	BUILD		
Locations	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Location Graphics	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Macros	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Path Networks	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Processing	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Resources	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Scenarios	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Shift Assignments	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Simulation Options	View	GET	BUILD		
Streams	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Subroutines	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Table Functions	View	GET	BUILD	CLEAR	CLEAR and UPDATE
User Distributions	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Variables	View	GET	BUILD	CLEAR	CLEAR and UPDATE



ProActiveX

2



- Click on GET ALL to import the model information to ProActiveX

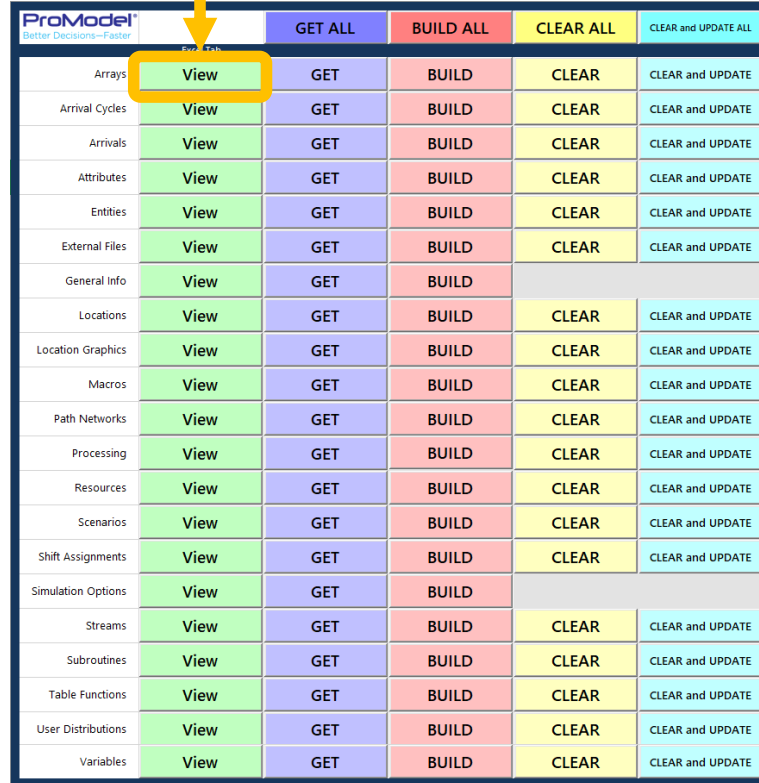
ProModel [®] Better Decisions—Faster		GET ALL	BUILD ALL	CLEAR ALL	CLEAR and UPDATE ALL
Excel Tab					
Arrays	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Arrival Cycles	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Arrivals	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Attributes	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Entities	View	GET	BUILD	CLEAR	CLEAR and UPDATE
External Files	View	GET	BUILD	CLEAR	CLEAR and UPDATE
General Info	View	GET	BUILD		
Locations	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Location Graphics	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Macros	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Path Networks	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Processing	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Resources	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Scenarios	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Shift Assignments	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Simulation Options	View	GET	BUILD		
Streams	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Subroutines	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Table Functions	View	GET	BUILD	CLEAR	CLEAR and UPDATE
User Distributions	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Variables	View	GET	BUILD	CLEAR	CLEAR and UPDATE

- Load Model
- Save Model
- Close Model
- Open in ProModel
- Clear Sheets

ProActiveX

- Click on View start editing

3



	GET ALL	BUILD ALL	CLEAR ALL	CLEAR and UPDATE ALL	
Arrays	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Arrival Cycles	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Arrivals	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Attributes	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Entities	View	GET	BUILD	CLEAR	CLEAR and UPDATE
External Files	View	GET	BUILD	CLEAR	CLEAR and UPDATE
General Info	View	GET	BUILD		
Locations	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Location Graphics	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Macros	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Path Networks	View	GET	BUILD	CLEAR	CLEAR and UPDATE
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Shift Assignments	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Simulation Options	View	GET	BUILD		
Streams	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Subroutines	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Table Functions	View	GET	BUILD	CLEAR	CLEAR and UPDATE
User Distributions	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Variables	View	GET	BUILD	CLEAR	CLEAR and UPDATE

- Load Model
- Save Model
- Close Model
- Open in ProModel
- Clear Sheets

ProActiveX

- Click on Build ALL when you finish editing

4
↓

ProModel [®] Better Decisions—Faster		GET ALL	BUILD ALL	CLEAR ALL	CLEAR and UPDATE ALL
Excel Tab					
Arrays	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Arrival Cycles	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Arrivals	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Attributes	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Entities	View	GET	BUILD	CLEAR	CLEAR and UPDATE
External Files	View	GET	BUILD	CLEAR	CLEAR and UPDATE
General Info	View	GET	BUILD		
Locations	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Location Graphics	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Macros	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Path Networks	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Processing	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Resources	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Scenarios	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Shift Assignments	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Simulation Options	View	GET	BUILD		
Streams	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Subroutines	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Table Functions	View	GET	BUILD	CLEAR	CLEAR and UPDATE
User Distributions	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Variables	View	GET	BUILD	CLEAR	CLEAR and UPDATE

- Load Model
- Save Model
- Close Model
- Open in ProModel

- Clear Sheets

ProActiveX

- Save your model and click Open in ProModel

ProModel [®] Better Decisions—Faster		GET ALL	BUILD ALL	CLEAR ALL	CLEAR and UPDATE ALL
Excel Tab					
Arrays	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Arrival Cycles	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Arrivals	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Attributes	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Entities	View	GET	BUILD	CLEAR	CLEAR and UPDATE
External Files	View	GET	BUILD	CLEAR	CLEAR and UPDATE
General Info	View	GET	BUILD		
Locations	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Location Graphics	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Macros	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Path Networks	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Processing	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Resources	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Scenarios	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Shift Assignments	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Simulation Options	View	GET	BUILD		
Streams	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Subroutines	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Table Functions	View	GET	BUILD	CLEAR	CLEAR and UPDATE
User Distributions	View	GET	BUILD	CLEAR	CLEAR and UPDATE
Variables	View	GET	BUILD	CLEAR	CLEAR and UPDATE

Load Model

Save Model 5

Close Model

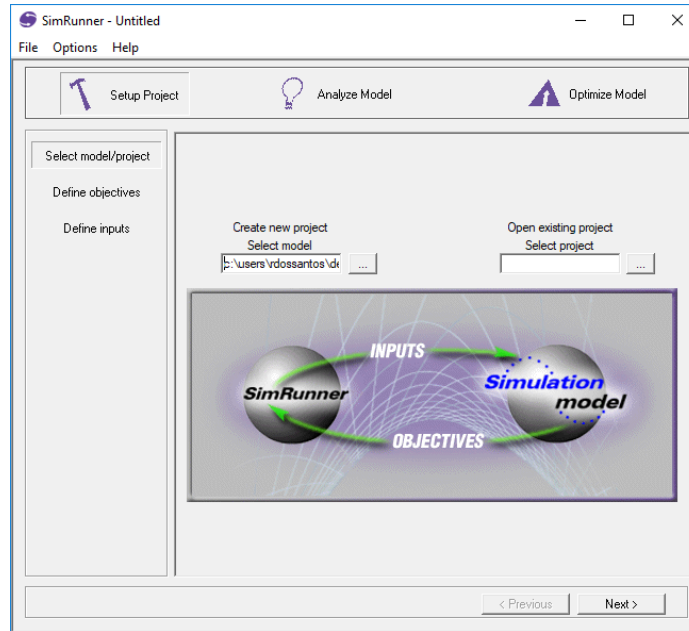
Open in ProModel 6

Clear Sheets

ProActiveX

- Special notes
 - Always Save a backup copy of your model before making any changes
 - Always carefully check to see if ProActiveX did what you expected

5) SimRunner



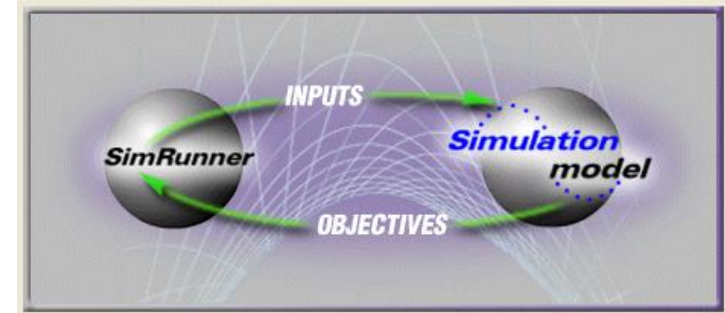
SimRunner

- Optimization tool

Finding the best solution
for a System (model)
given some constraints (inputs)
driving toward a Goal (objective function)

Poll # 3

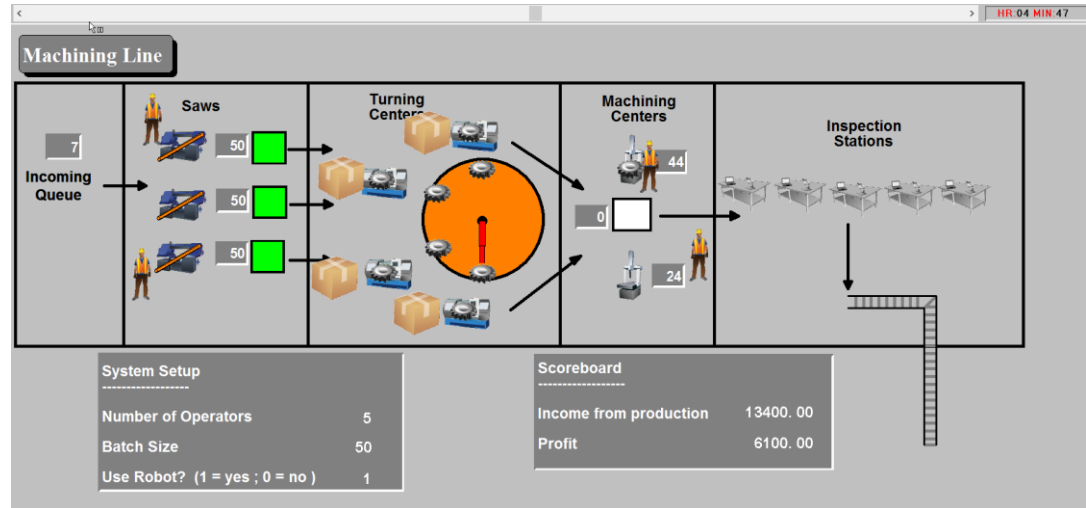
SimRunner



- When to use it
 - Want to play with certain key system controls to:
 - **Maximize** throughput; **Minimize** WIP; **Maximize** utilization of key bottleneck machine; **Minimize** delays; **Min/Max** whatever

Scenarios to Find "Best" Solution

- Goal: Maximize profit
- Can change:
 - Quantity of Operators
 - Batch Size
 - Use Robot or Not



Profit = Value of product * Quantity Produced - Cost of raw material - Cost of Labor - Cost of Robot

Scenarios

Scenario Manager

#	Parameters	Baseline	Model Parameters	1 operator, batch 1	1 operator, batch 50	5 operators, batch 1	5 operators, batch 50	5 operators, batch 25	1 operator, batch 25	With robot, 5 oper, batch 25	Without robot, 5 oper, batch 25
	Simulate Scenario?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Last Simulation Run		7/12/2017 4:15:57 PM	7/12/2017 4:15:59	7/12/2017 4:16:00 PM	7/12/2017 4:16:05 PM	7/12/2017 4:16:08 PM	7/12/2017 4:16:10 PM	7/12/2017 4:16:12 PM	7/12/2017 4:16:15 PM	7/12/2017 4:16:18 PM
*	Number_operators	5	5	1	1	5	5	5	1	5	5
*	Batch_size	50	10	1	50	1	50	25	25	25	25
*	Value_of_each_gear	50	15.55	15.55	15.55	15.55	15.55	15.55	15.55	50	50
*	Hourly_rate_operator	15	15	15	15	15	15	15	15	15	15
*	mUse_Robot_Y1_N0	1	1	1	1	1	1	1	1	1	0
*	mDaily_cost_of_Robot	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
*	mAnimation_speed	55	100	100	100	100	100	100	100	100	100

Run Scenarios OK Cancel

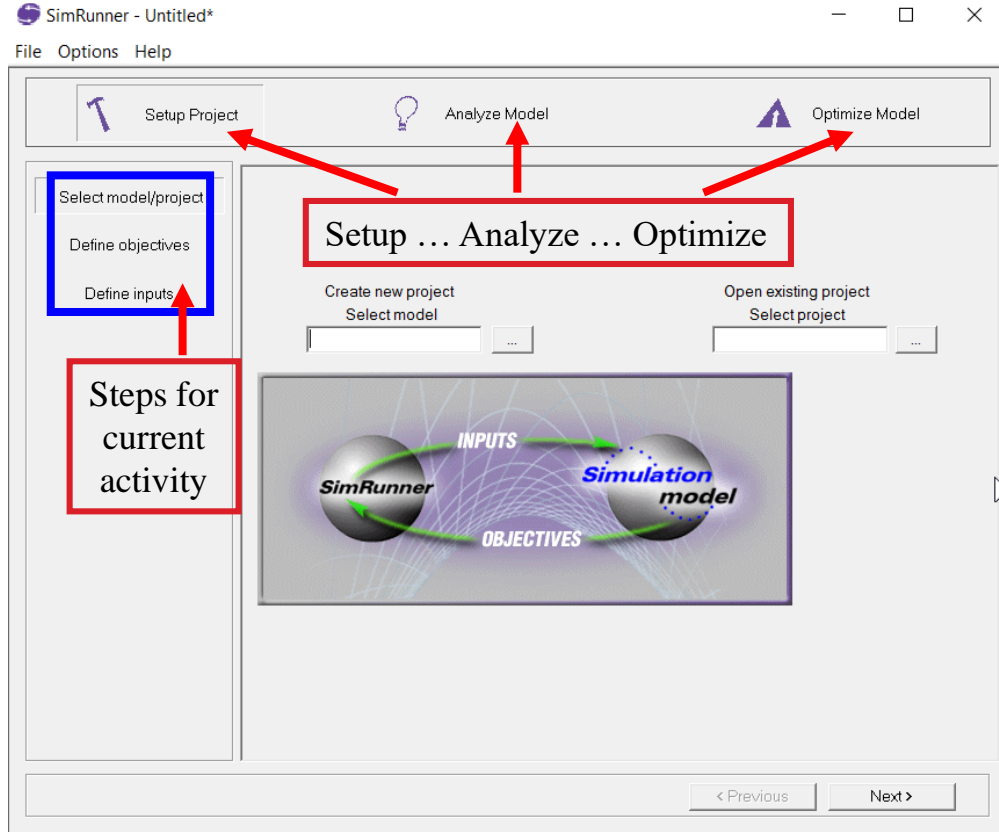
Scenarios

- How many Scenarios are possible?
 - Parameters choices * Parameters choices = BIG!!!
- For example:
 - Between 1 & 5 operators
 - Batch size between 1 & 50
 - Use a robot or not (2 choices)
 - Therefore: $(5) * (50) * (2) = 500$ Scenarios!!!
Do you want to create 500 scenarios to find the right solution?

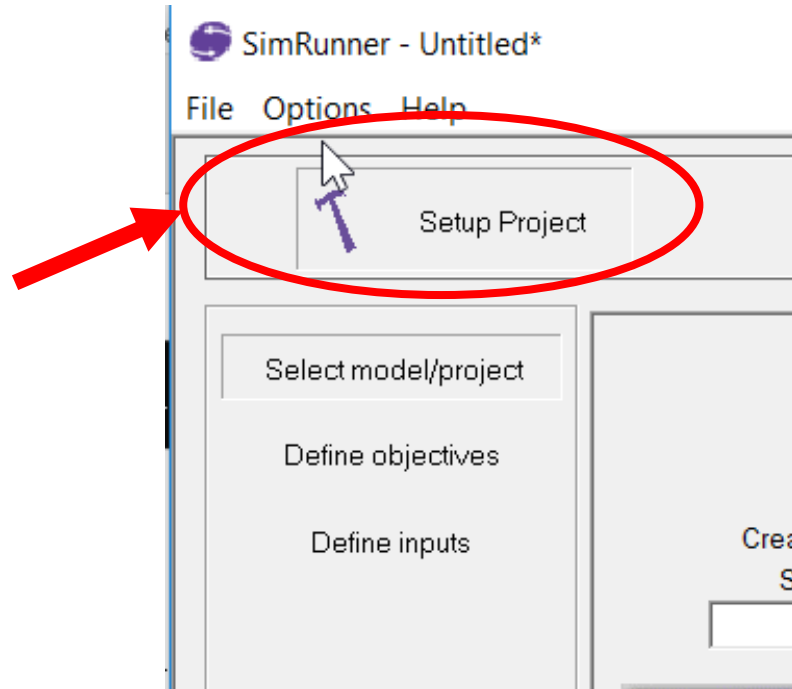
Steps for Using SimRunner

- Create simulation model
 - Scenario Parameter macros
 - Output metrics
- Open SimRunner
- Define Objective Function
- Define Input Factors
- Define Optimization control parameters
- Run Optimization
- Examine results ... We have a winner!!!

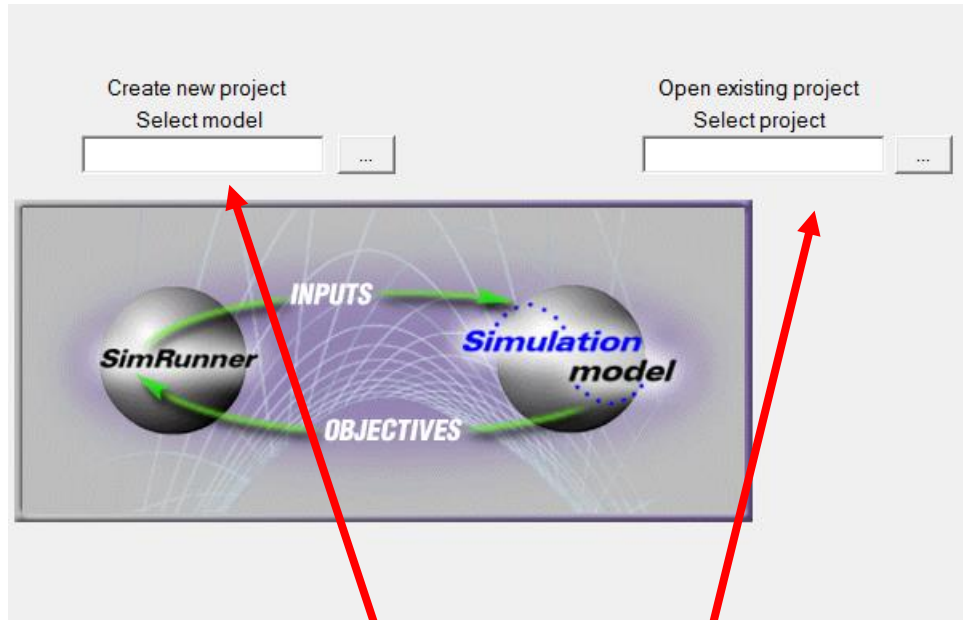
SimRunner Three Main Parts



Set Up Project



Select Model/Project



Select Model Name (if starting new Project)
or Project Name (if previously created)

What is an Objective Function?

- GOAL!!
- Desired Minimize or Maximize of item(s)
- Equation that calculates desired metric
 - Example: $v_Profit = v_Revenue - v_Cost$
 - Example: $v_WIP = (CONTENTS(x)+CONTENTS(y)+...)$
 - ...

Define Objectives

SimRunner - Untitled

File Options Help

Setup Project Analyze Model Optimize Model

Select model/project

Define objectives

Define inputs

Performance Measures

Response category	Response statistic
Location	vWIP - Total Changes
Single-Cap Location	vWIP - Average Time/Change
Multi-Cap Location	vWIP - Minimum Value
Entity	vWIP - Maximum Value
Resource	vWIP - Current Value
Variable	vWIP - Average Value
Entity Costing	vWIP_value - Total Changes
Location Costing	vWIP_value - Average Time/Change
Resource Costing	vWIP_value - Minimum Value

Objective for response statistic

Max Min Target Range

Weight 1

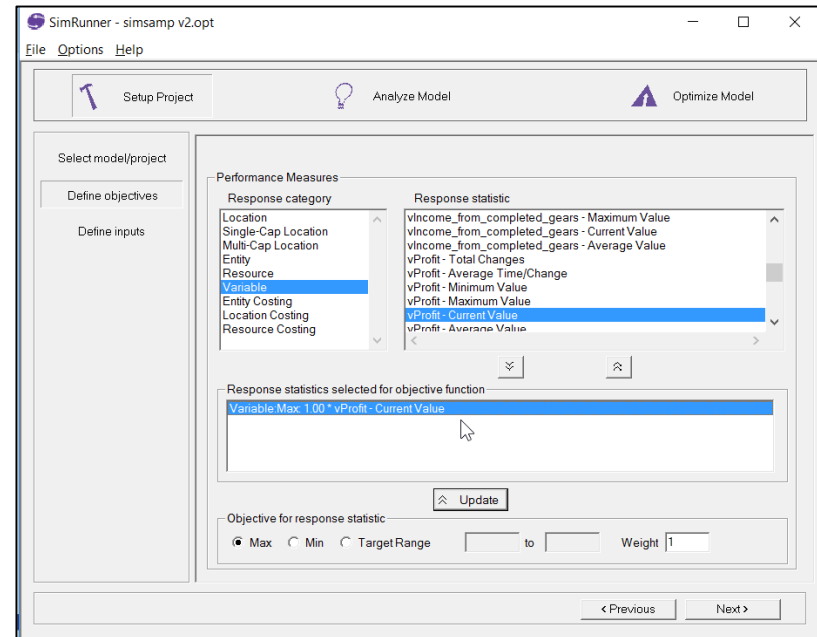
Pick anything in this list to Minimize or Maximize

Weight Factor

Target Range ... For identifying Infeasible Solutions

Define Objective Function

- Choose Item
 - For this model: v_Profit – Current Value (current value = At the End of the Run)
- Choose:
 - Maximize or Minimize
 - Target Range, if any
 - Weight
- If you change something, don't forget to press the Update button



Define Inputs

- The Changeable Parameter to use for creating Scenarios must be numeric Scenario Macros

The screenshot shows the ProModel software interface. The main window displays a list of macros with their IDs and values. A dialog box titled "Parameter definition for Number_operators" is open, showing the parameter name "Number_operators" and a prompt "Enter the number of operators". The "Numeric Range" option is selected, with "From" set to 1 and "To" set to 5. The "Scenario Parameter" list on the right is also visible, with "Scenario Parameter" selected.

ID	Text...
Number_operators	5.
Batch_size	50
Value_of_each_gear	50
Hourly_rate_operator	15
mUse_Robot_Y1_N0	1
mDaily_cost_of_Robot	1000
mAnimation_speed	55
Transfer1to2	.1
Transfer2to3	.1
Transfer3to4	.1
Transfer4to5	.1
Transfer5to6	.1
Transfer6to7	.1

Parameter definition for Number_operators

Parameter Name:

Prompt:

Unrestricted Text

Record Range

Numeric Range

From To

Scenario Parameter

Scenario Parameter

Scenario Parameter

Scenario Parameter

Scenario Parameter

Scenario Parameter

Scenario Parameter

None

None

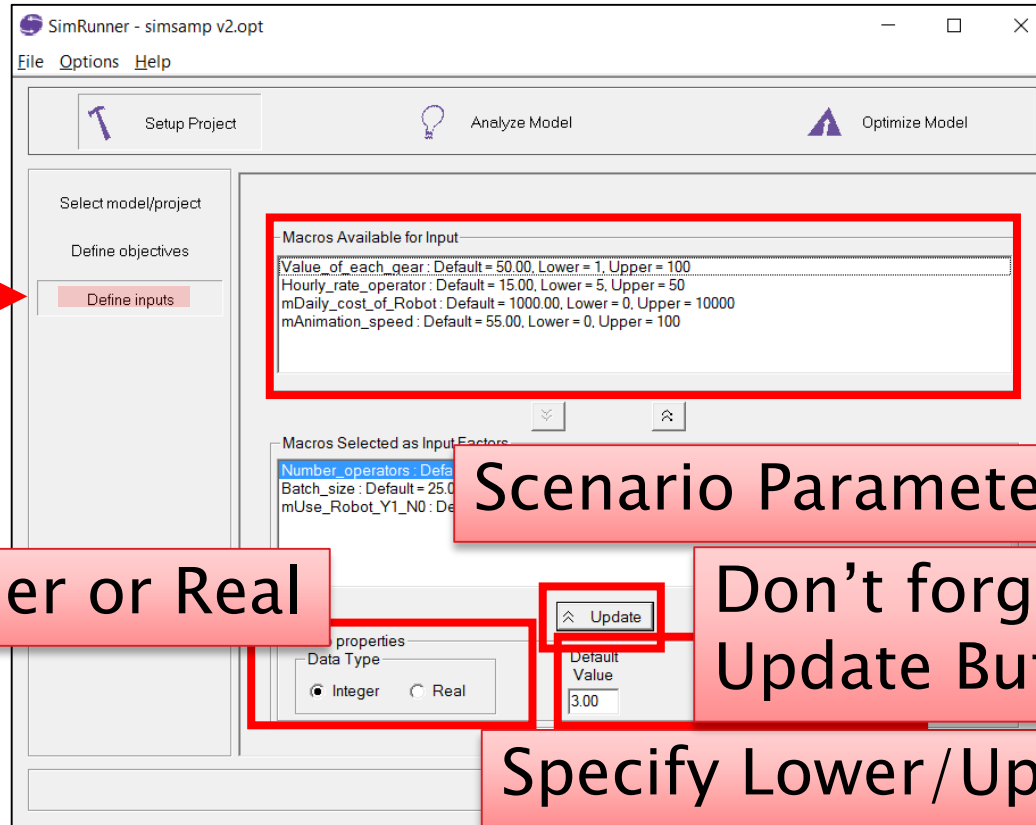
None

None

None

None

Define Inputs



Choose Integer or Real

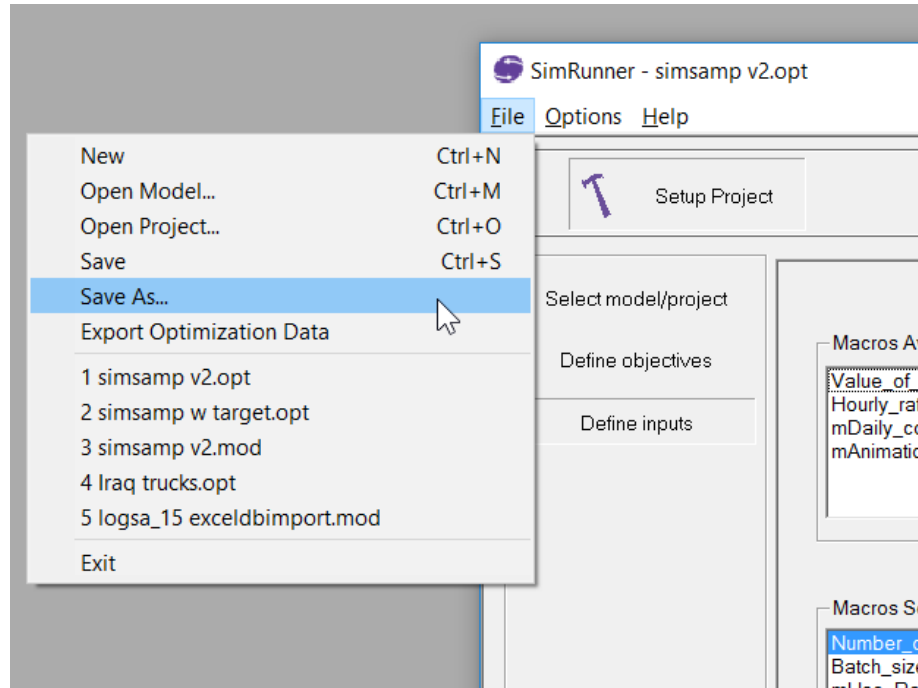
Scenario Parameter Macros

Don't forget the Update Button

Specify Lower/Upper Limits

SimRunner Project

- ▶ Save the Project
 - Creates a .OPT file



Analyze the Model

- Helps determine:
 - Number of replications
 - Warmup period
- However...
 - ~30 Reps usually OK
 - You'll know if Warm-up is appropriate

SimRunner - simsamp v2.opt*

File Options Help

Setup Project Analyze Model Optimize Model

Define experiment

Conduct analysis

1. Click the run button to start the analysis.

Run Final Report

Analysis status

Objective Value

Periods

Mvg Avg Raw Data

2.a. Warm-up detection for steady-state estimates

Moving Avg Window 1 periods

2.b. Estimate required number of replications

Warm-up 0 periods No. of replications: 11

8 hr

11 hr

30

5

99

< Previous Next >

Run Analyze... Reports suggestions

Run the Optimization - Settings

- Profile
 - Cautious, (more runs)
Moderate,
Aggressive (less runs)
 - Convergence %
- No Animation
- # of Replications
- Warmup/Run Time
- Confidence Level

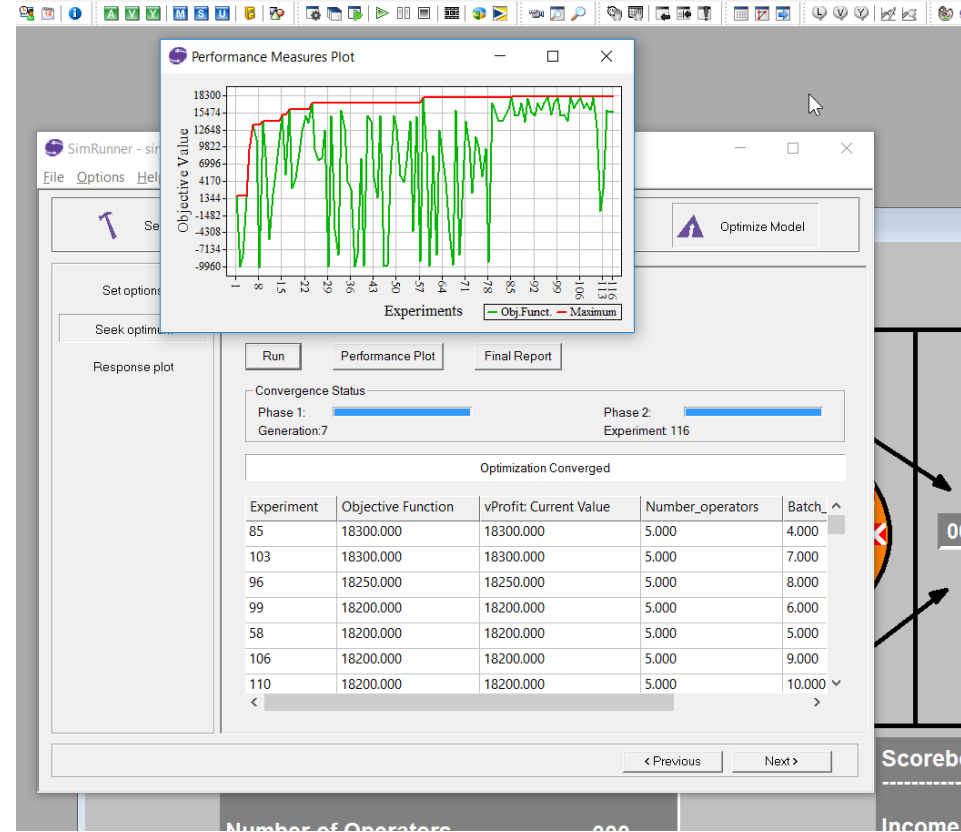
The screenshot shows the SimRunner - simsamp v2.opt* application window. The window title bar includes the application name and standard minimize, maximize, and close buttons. Below the title bar is a menu bar with 'File', 'Options', and 'Help'. The main interface is divided into three tabs: 'Setup Project', 'Analyze Model', and 'Optimize Model', with the 'Optimize Model' tab selected. On the left side, there is a vertical sidebar with three options: 'Set options', 'Seek optimum', and 'Response plot', with 'Set options' selected. The main area contains two sections of settings:

- Optimization options:**
 - Optimization Profile: Moderate (dropdown menu)
 - Convergence Percentage: 0.010000 (text input field)
- Simulation options:**
 - Disable animation:
 - Number of replications per experiment: 1 (spin box)
 - Warm-up time: 0 hr (text input with dropdown)
 - Run time: 8 hr (text input with dropdown)
 - Confidence level: 95 (dropdown menu)

At the bottom right of the window, there are two buttons: '< Previous' and 'Next >'.

Run the Optimization

- Run...
 - Results for each run...
"Performance Plot"
Green – Each run
Red – Best so far
 - Table of Results
- When finished...
"Optimization Converged"



Examine the Results

- Best solution is at the top
 - For our example:
 - \$18,300 profit for the day
 - 5 Operators
 - Batch size: 4 or 7
 - Yes, Use the Robot

Optimization Converged					
Experiment	Objective Function	vProfit: Current Value	Number_operators	Batch_size	mUse_Robot_Y1_N0
85	18300.000	18300.000	5.000	4.000	1.000
103	18300.000	18300.000	5.000	7.000	1.000
96	18250.000	18250.000	5.000	8.000	1.000
99	18200.000	18200.000	5.000	6.000	1.000
58	18200.000	18200.000	5.000	5.000	1.000
106	18200.000	18200.000	5.000	9.000	1.000
110	18200.000	18200.000	5.000	10.000	1.000
90	18050.000	18050.000	5.000	3.000	1.000

Examine the Results

- But more can be gleaned...
 - What if someone doesn't show up for work (4 Operators instead of 5): Profit of only \$17,260

Optimization Converged					
Experiment	Objective Function	vProfit: Current Value	Number_operators	Batch_size	mUse_Robot_Y1_N0
85	18300.000	18300.000	5.000	4.000	1.000
103	18300.000	18300.000	5.000	7.000	1.000
96	18250.000	18250.000	5.000	8.000	1.000
99	18200.000	18200.000	5.000	6.000	1.000
58	18200.000	18200.000	5.000	5.000	1.000
106	18200.000	18200.000	5.000	9.000	1.000
110	18200.000	18200.000	5.000	10.000	1.000
90	18050.000	18050.000	5.000	3.000	1.000
79	17300.000	17300.000	5.000	14.000	1.000
105	17260.000	17260.000	4.000	9.000	1.000
24	17250.000	17250.000	5.000	13.000	1.000
93	17250.000	17250.000	5.000	15.000	1.000
95	17250.000	17250.000	5.000	12.000	1.000
88	17250.000	17250.000	5.000	11.000	1.000

Examine the Results

- Regarding the Batch Size...
 - How sensitive is the Profit?
Not very (\$250/day), for sizes 3,4,5,6,7,8,9,10
 - What if there are “standard” containers?
Then don't fill every hole

Optimization Converged

Experiment	Objective Function	vProfit: Current Value	Number_operators	Batch_size	mUse_Robot_Y1_N0
85	18300.000	18300.000	5.000	4.000	1.000
103	18300.000	18300.000	5.000	7.000	1.000
96	18250.000	18250.000	5.000	8.000	1.000
99	18200.000	18200.000	5.000	6.000	1.000
58	18200.000	18200.000	5.000	5.000	1.000
106	18200.000	18200.000	5.000	9.000	1.000
110	18200.000	18200.000	5.000	10.000	1.000
90	18050.000	18050.000	5.000	3.000	1.000
79	17300.000	17300.000	5.000	14.000	1.000

Examine the Results

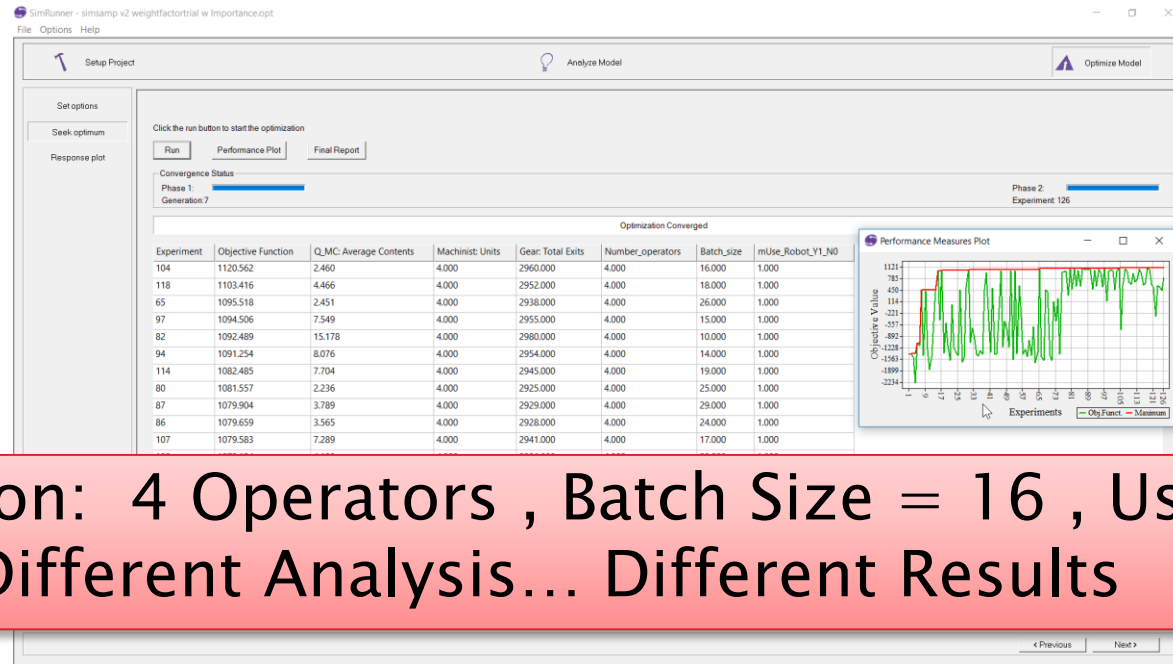
- Regarding the Robot...
 - What's it's worth?
 $\$13,600 - \$18,300 = -\$4,700$ day loss without

Optimization Converged

Experiment	Objective Function	vProfit: Current Value	Number_operators	Batch_size	mUse_Robot_Y1_N0
81	14200.000	14200.000	5.000	47.000	1.000
9	14200.000	14200.000	5.000	50.000	1.000
89	14150.000	14150.000	5.000	42.000	1.000
23	13910.000	13910.000	4.000	50.000	1.000
6	13600.000	13600.000	5.000	13.000	0.000
111	13260.000	13260.000	4.000	2.000	1.000
50	13050.000	13050.000	5.000	11.000	0.000
34	13000.000	13000.000	5.000	28.000	0.000
63	12800.000	12800.000	5.000	37.000	0.000
28	12750.000	12750.000	5.000	6.000	0.000
21	12600.000	12600.000	5.000	1.000	1.000
74	11650.000	11650.000	5.000	3.000	0.000
7	11170.000	11170.000	3.000	13.000	1.000
14	11070.000	11070.000	3.000	26.000	1.000

Examine the Results

- How about if we don't use Profit?
 - Max Throughput, Min WIP, Min Labor – w/ Weights



**Best Solution: 4 Operators , Batch Size = 16 , Use Robot
Different Analysis... Different Results**

FINISHED

- Thanks for attending this ProModel Extended Features Webinar! We hope it was helpful.
- Remember, help is only an email or phone call away.
- Good luck and happy modeling!

Technical Support
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6 am - 6 pm M-F, Mountain Time