Using Extended Features in ProModel

Instructor Info:
Rebecca Santos
Technical Support Engineer
Office: 801.223.4671
rdossantos@promodel.com

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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
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

Cycle Times (min.)
- Semi-Trucks: 0.00
- Small Trucks: 0.00
- Pallet Loads: 0.00
- Items: 0.00

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: 0.00

ProModel
Better Decisions—Faster
Views in ProModel

- Enter Name
- Click Add
- Change Zoom Options to Update Selected View
Views in ProModel
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

Configure the placement of your views

- 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

- Saving the configuration without changing its folder or name
- Running the simulation
- View synchronization interval
- Creation of a new configuration
- Opening an existing configuration
- Saving the configuration in a different folder or with a different file name
- List for selection of the scenario you want to simulate
While the simulation is running the Views window and a pop-up simulation control bar box is displayed.
2) ProRDB
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.
The information stored in the RDB files is the data displayed on Output Viewer.

They are located under:

C:\Users\<username>\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
3) Model Collaborator
Collaboration 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
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.
Model Collaborator

- Guides you through the merging Process in wizard-like interface
4) ProActiveX

<table>
<thead>
<tr>
<th>Category</th>
<th>View</th>
<th>GET</th>
<th>BUILD</th>
<th>CLEAR</th>
<th>CLEAR and UPDATE</th>
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<td>CLEAR and UPDATE</td>
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</table>
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
ProActiveX

- Written in VBA
- Allows you to edit the code.
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/).
Load the model so you can start working on it.
Click on GET ALL to import the model information to ProActiveX
- Click on View start editing
ProActiveX

- Click on Build ALL when you finish editing
- Save your model and click Open in ProModel
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)
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

\[
\text{Profit} = \text{Value of product} \times \text{Quantity Produced} - \text{Cost of raw material} - \text{Cost of Labor} - \text{Cost of Robot}
\]
### Scenarios

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Baseline</th>
<th>Model Parameters</th>
<th>1 operator, batch 1</th>
<th>1 operator, batch 50</th>
<th>5 operators, batch 1</th>
<th>5 operators, batch 50</th>
<th>5 operators, batch 25</th>
<th>1 operator, batch 25</th>
<th>With robot, 5 oper, batch 25</th>
<th>Without robot, 5 oper, batch 25</th>
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<td>5</td>
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<td>15.55</td>
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</tbody>
</table>
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

Steps for current activity

Setup … Analyze … Optimize
Set Up 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: $v_{\text{Profit}} = v_{\text{Revenue}} - v_{\text{Cost}}$
  - Example: $v_{\text{WIP}} = (\text{CONTENTS}(x) + \text{CONTENTS}(y) + \ldots)$
  - ...
Define Objectives

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
Define Inputs

Choose Integer or Real

Scenario Parameter Macros

Specify Lower/Upper Limits

Don’t forget the Update Button
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

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**
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
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
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

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Objective Function</th>
<th>vProfit: Current Value</th>
<th>Number of operators</th>
<th>Batch size</th>
<th>mUse_Robot_Y1_N0</th>
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</tbody>
</table>
Examine the Results

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