

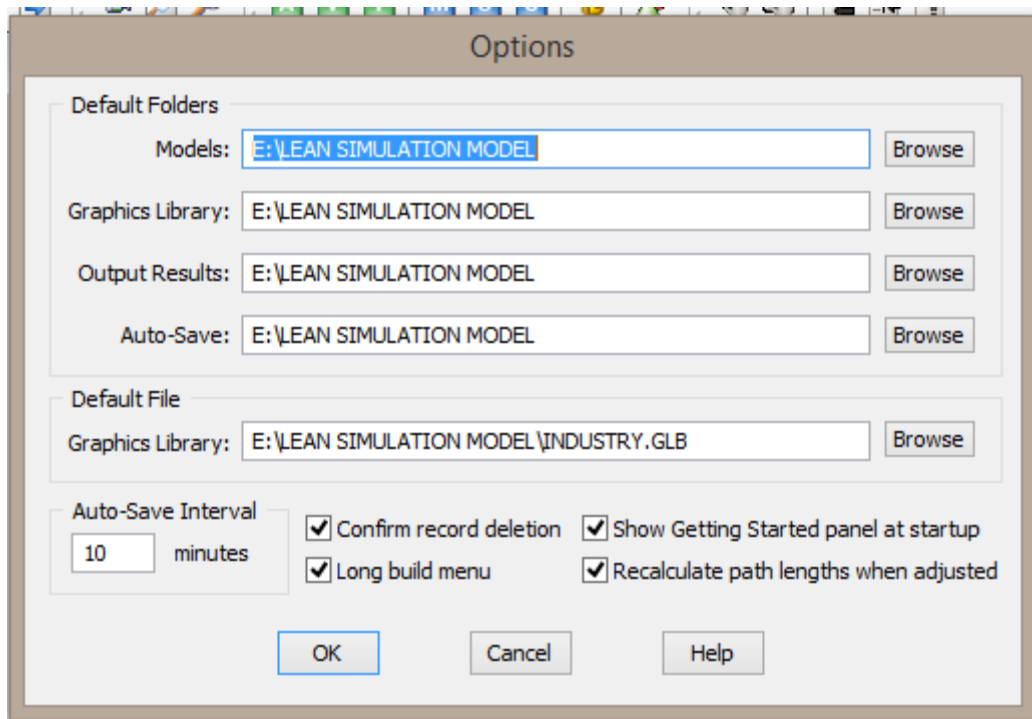
Part 4 ProModel Instructions

ProModel Instructions

1. On your USB storage device, create a folder called: **Lean Simulation Model**
2. From the source provided by your instructor, save the following files to the directory called **Lean Simulation Model** on USB storage device:¹

Tri-Star Lean Model.mod
Industry.glb
OrderFile.xls
BudgetTracker.xls

3. Open the ProModel.
4. Select the **Tools** tab. Then select **Options**. You should see the following screen (with different settings for the Default Folders): You may need to perform this step each time you open ProModel.]



5. Set the **Default Folders** to the device (USB) and folder created in Step 1. Do this for Models, Graphic Library, Output Results, and Auto-Save.
6. Set the **Default File: Graphics Library** to the same device, folder. You should see the file, INDUSTRY in the area at the top. Select the INDUSTRY file and it will appear on the "File Name" line. The "Files of type" line will show Library(*.GLB). Click the "Open" button.

¹ For instructors, access the demonstration case package provided by the author or journal website.

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7. Make sure all options (Auto-Save Time Interval, etc.) are set to match the settings shown above.

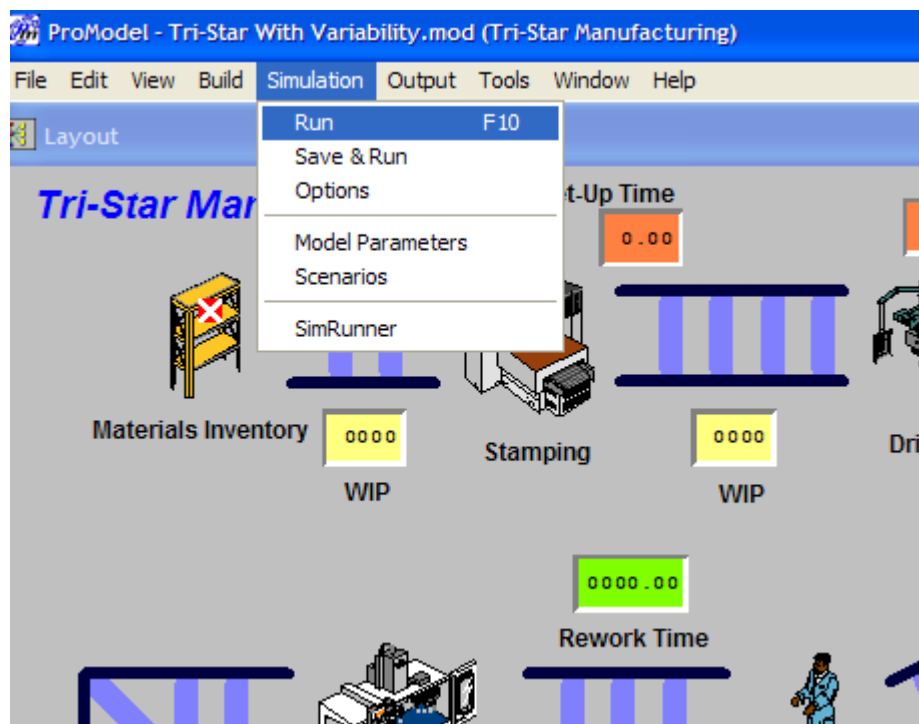
Then click “OK”

8. Open the ProModel Simulation Model by going to:

File>Open>Specify Device and Folder containing the file:

Tri-Star Lean Model.mod

9. To run the simulation, select **Simulation** and then select **Run**

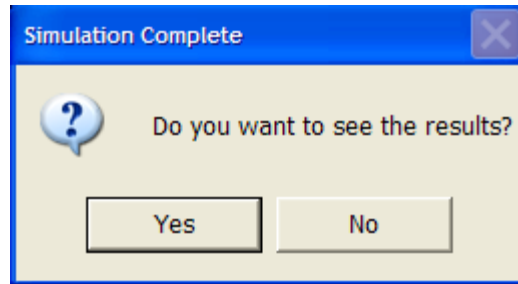


Note, the first time you run the model you will be running the baseline scenario (see Figure 4)

When running the simulation, you can speed up the processing two ways. The slide bar at the top can be moved to the right. (You can slow it down to see the parts move by moving to the left.) You can also turn the animation off by clicking on **Simulation**. Then select **Options** and **Animation Off**. Reverse the process to turn the animation back on.

At the end of a simulation run of 120 simulated hours (about five-minutes real time at default speed setting), you will be given the option:

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To see output statistics, click on **Yes**. You will then be able to view an extensive array of statistics that have been computed during the running of the model. Select one of the tabs, such as 'Locations', for viewing. A portion of statistics are shown as follows:

File View Options Window Help

General Report
 Output from C:\Documents and Settings\Patrick Shannon\My Documents\MyStuff\Opermgt 408\Lean ProModel\
 Date: Sep/29/2006 Time: 09:52:03 AM

Scenario : Normal Run
 Replication : 1 of 1
 Simulation Time : 120 hr

LOCATIONS

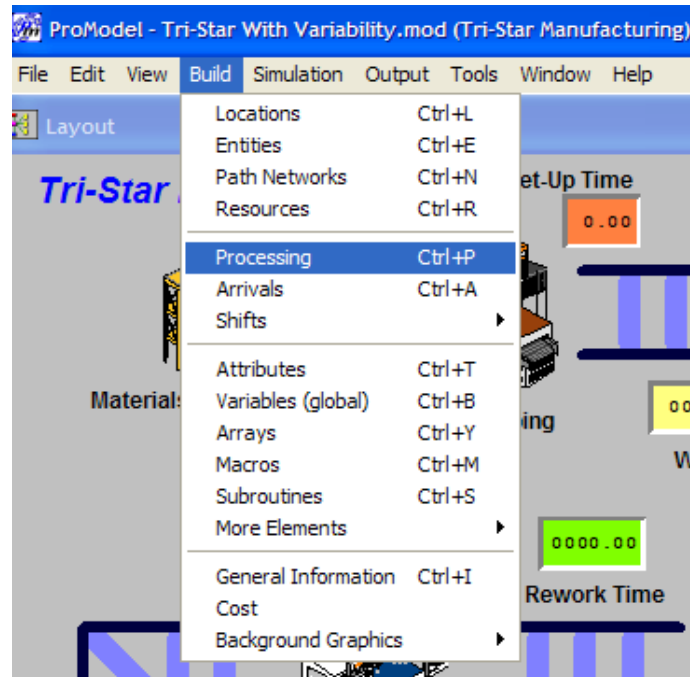
Location Name	Scheduled Hours	Capacity	Total Entries	Average Minutes Per Entry	Average Contents	Maximum Contents	Current Contents	% Util
Order Entry	120	30000	3560	0.0	0	1	0	0.0
Materials Inventory	120	20000	3560	4775.70	2361.32	3247	2933	11.81
Stamping WIP	120	20	627	229.47	19.98	20	20	99.92
Stamping	120	1	607	10.86	0.91	1	1	91.57
Drill WIP	120	300	606	1220.83	102.75	197	196	34.25
Drill Press	120	1	409	15.94	0.90	1	0	90.60
Paint WIP	120	300	409	1076.72	61.16	111	111	20.39
Paint Booth	120	1	298	21.18	0.87	1	1	87.67
Inspect 1 WIP	120	300	297	298.24	12.30	22	17	4.10
Inspection 1 Station	120	1	280	4.93	0.19	1	0	19.17
Polish WIP	120	300	280	186.33	7.24	20	0	2.42
Polish	120	1	280	11.15	0.43	1	0	43.38
Inspection 2 WIP	120	300	280	193.22	7.51	20	16	2.50
Inspection 2	120	1	264	7.84	0.28	1	1	28.78
Packaging WIP	120	300	263	141.71	5.17	20	3	1.73
Packaging	120	1	260	4.96	0.17	1	0	17.93
To FGI	120	300	260	57.01	2.05	20	0	0.69
Finish Goods	120	10000	13	79.37	0.14	1	0	0.0
To Customers	120	999999	260	0.10	0.0	3	0	0.0
Truck	120	1	260	0.0	0	1	0	0.0

Scroll down to see all the available statistics in addition to those that are displayed as the model is running. These statistics should be of value in helping you determine how best to allocate resources to reduce waste in the Tri-Star process.

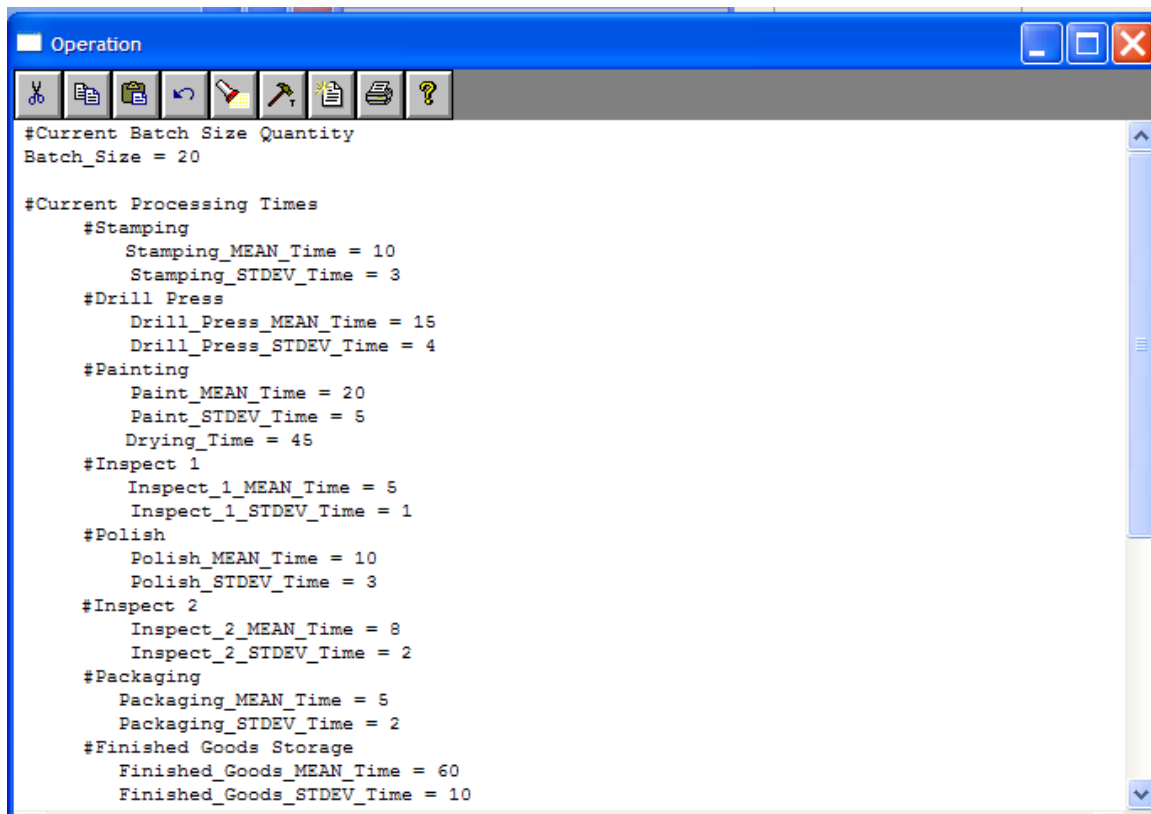
[Remember to create a new version of the model each time you make changes that you wish to keep.]

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10. To make changes to work station processing times click on **Build** and then select **Processing**

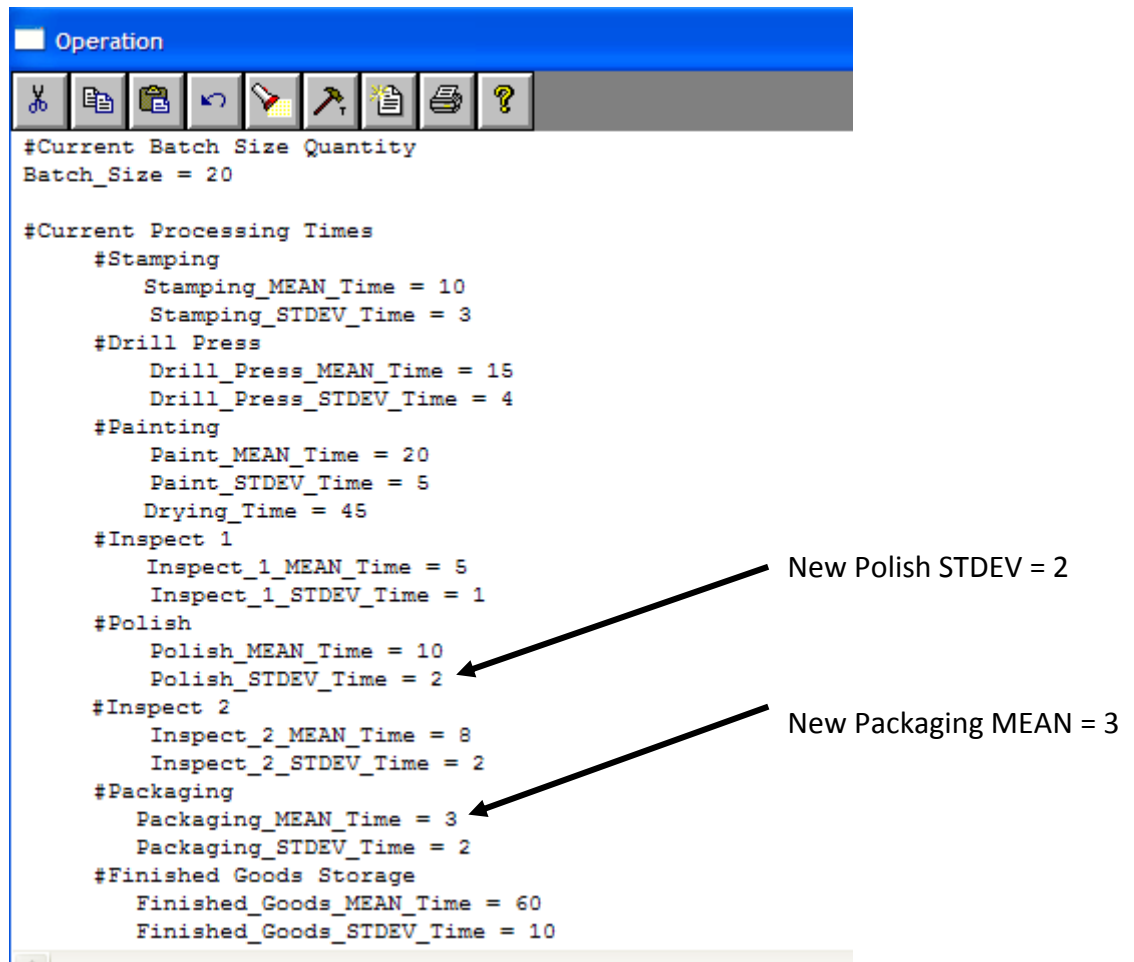


11. Make sure that **Entity** is *Belle_Regal_X* and **Location** is *Order_Entry*. Then double click in the **Operation** cell. This yields [scroll down to see example statistics below]:



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To change either a mean processing time or a standard deviation in processing time, move the cursor to the desired position, delete the current value, and insert the desired changed value. For a change in Packaging mean time from 5 minutes to 3 minutes and a change in the standard deviation of Polish time from 3 minutes to 2 minutes is shown as follows:



```
Operation
#Current Batch Size Quantity
Batch_Size = 20

#Current Processing Times
#Stamping
Stamping_MEAN_Time = 10
Stamping_STDEV_Time = 3
#Drill Press
Drill_Press_MEAN_Time = 15
Drill_Press_STDEV_Time = 4
#Painting
Paint_MEAN_Time = 20
Paint_STDEV_Time = 5
Drying_Time = 45
#Inspect 1
Inspect_1_MEAN_Time = 5
Inspect_1_STDEV_Time = 1
#Polish
Polish_MEAN_Time = 10
Polish_STDEV_Time = 2
#Inspect 2
Inspect_2_MEAN_Time = 8
Inspect_2_STDEV_Time = 2
#Packaging
Packaging_MEAN_Time = 3
Packaging_STDEV_Time = 2
#Finished Goods Storage
Finished_Goods_MEAN_Time = 60
Finished_Goods_STDEV_Time = 10
```

New Polish STDEV = 2

New Packaging MEAN = 3

To see the results of these changes, repeat step 6 (**Simulation – Run**)

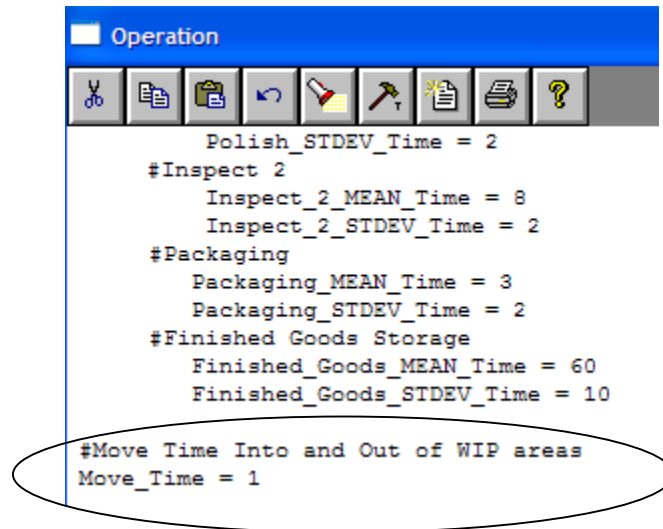
12. To Save the current model (with most recent changes), click on **File**. Then select **Save As**. Set the directory to **Lean Simulation Model** (see step 1). Then assign a new file name such as

Tri-Star Lean Model Version X

where X begins with 1 and increments for each new version of the model to be saved. Thus, if you make undesirable changes to the model, you can return to the most recent “good” version.

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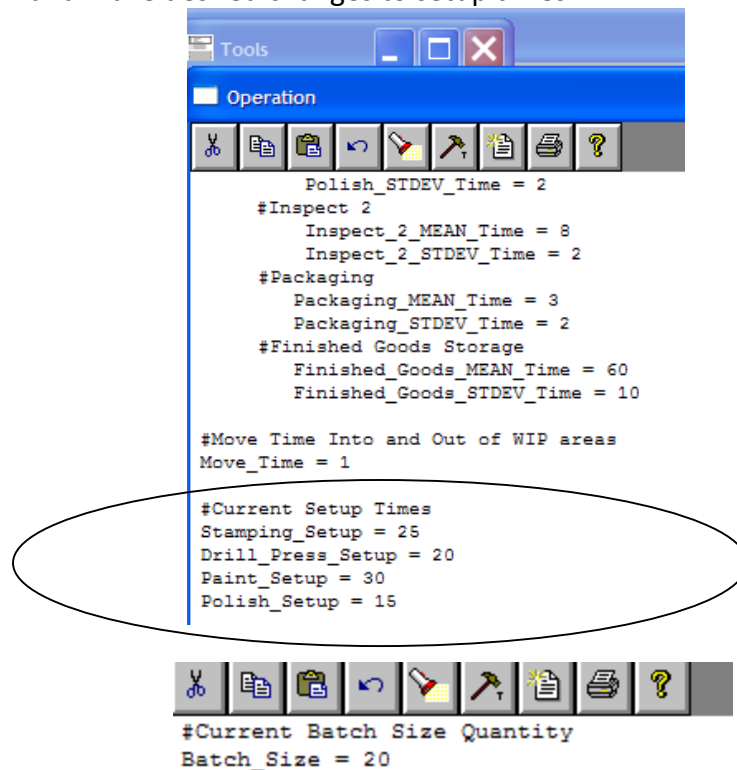
- To change **Batch Size**, repeat step 7 and change the Batch Size in the same manner as work station processing times.
- To change the **Move Times** into and out of WIP storage areas, follow step 7. Scroll down until you see:



```
Operation
Polish_STDEV_Time = 2
#Inspect 2
Inspect_2_MEAN_Time = 8
Inspect_2_STDEV_Time = 2
#Packaging
Packaging_MEAN_Time = 3
Packaging_STDEV_Time = 2
#Finished Goods Storage
Finished_Goods_MEAN_Time = 60
Finished_Goods_STDEV_Time = 10
#Move Time Into and Out of WIP areas
Move_Time = 1
```

Make changes to the **Move Time** in the usual way.

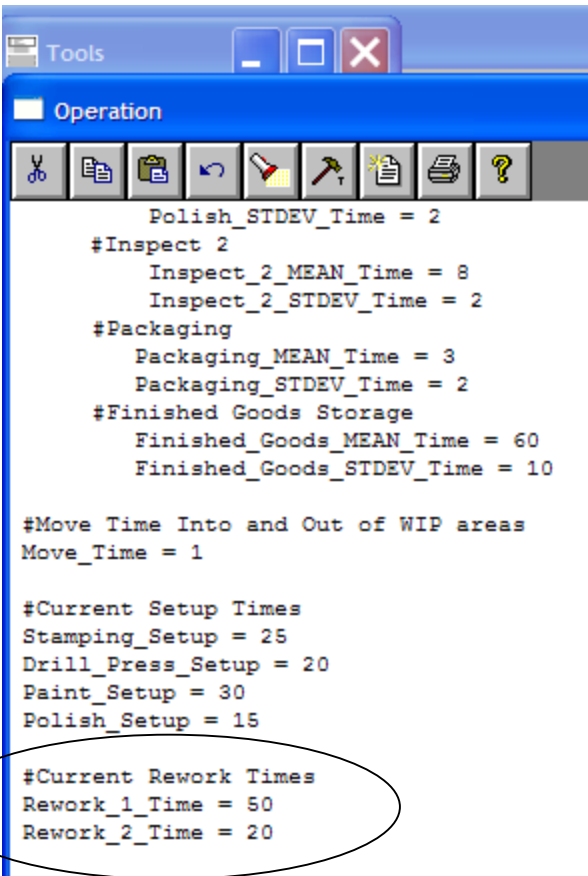
- Change **Setup Times** by repeating Step 7. Scroll down until the **Setup Times** section is shown and make desired changes to setup times:



```
Tools
Operation
Polish_STDEV_Time = 2
#Inspect 2
Inspect_2_MEAN_Time = 8
Inspect_2_STDEV_Time = 2
#Packaging
Packaging_MEAN_Time = 3
Packaging_STDEV_Time = 2
#Finished Goods Storage
Finished_Goods_MEAN_Time = 60
Finished_Goods_STDEV_Time = 10
#Move Time Into and Out of WIP areas
Move_Time = 1
#Current Setup Times
Stamping_Setup = 25
Drill_Press_Setup = 20
Paint_Setup = 30
Polish_Setup = 15
#Current Batch Size Quantity
Batch_Size = 20
```

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16. Change **Rework Times** by following step 7 and changing the rework times to the desired values:



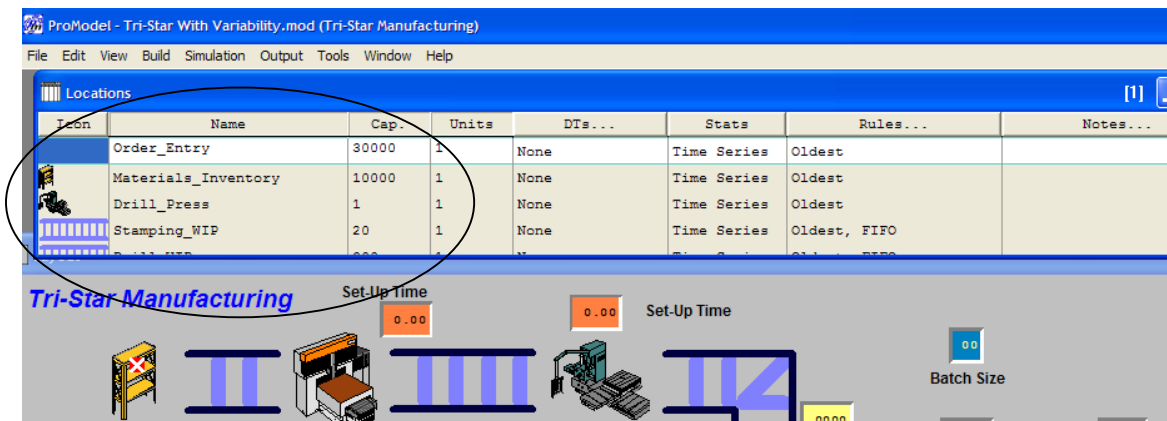
```
Polish_STDEV_Time = 2
#Inspect 2
Inspect_2_MEAN_Time = 8
Inspect_2_STDEV_Time = 2
#Packaging
Packaging_MEAN_Time = 3
Packaging_STDEV_Time = 2
#Finished Goods Storage
Finished_Goods_MEAN_Time = 60
Finished_Goods_STDEV_Time = 10

#Move Time Into and Out of WIP areas
Move_Time = 1

#Current Setup Times
Stamping_Setup = 25
Drill_Press_Setup = 20
Paint_Setup = 30
Polish_Setup = 15

#Current Rework Times
Rework_1_Time = 50
Rework_2_Time = 20
```

17. To change the capacity of any work station (piece of equipment), Inspector, or WIP Storage Area, Click on the **Build** tab. Then select **Locations** as follows:

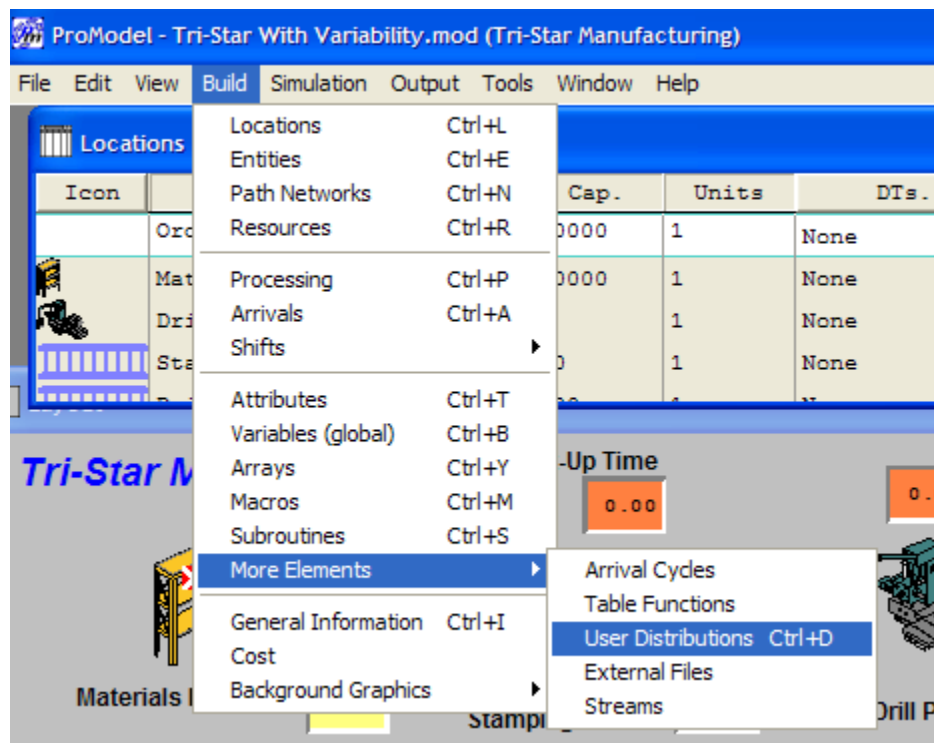


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Locations in ProModel are the work stations and WIP storage areas. To change **Capacity**, scroll down to the appropriate **Location**. Then enter the desired **Capacity**. Note, changing a location's capacity changes the number of products that the location can have active at any point in time.

18. To change the number of **Units** at a work center or inspection station, follow step 13 but change the number of units (Units must have a value of at least 1.) Adding a unit, changes the physical number of machines (or inspectors) at the work center.

19. To change the **Defect Rate** at **Inspection Station 1** or **Inspection Station 2**, Click on **Build**. Then select **More Elements**. Finally, select **User Distributions**:



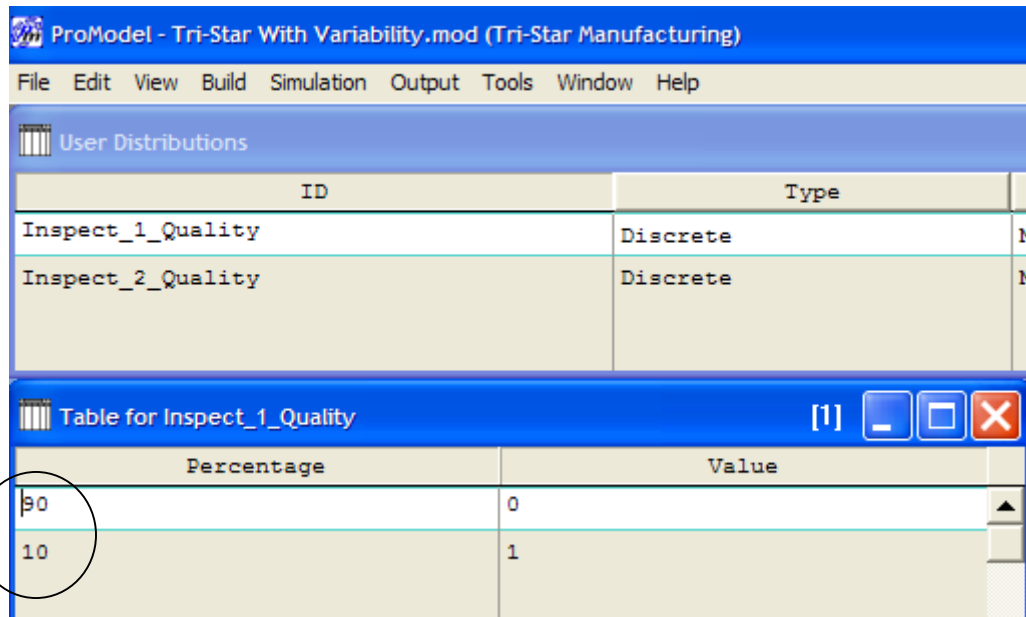
There are two **User Distributions** that define the probability distribution for the defect rate at the two inspection stations.

The screenshot shows the 'User Distributions' table in the ProModel software. The table has four columns: ID, Type, Cumulative, and Table... The 'Table...' column for both rows is circled in red.

ID	Type	Cumulative	Table...
Inspect_1_Quality	Discrete	No	Defined
Inspect_2_Quality	Discrete	No	Defined

To modify the percentage defects, double click on the **Table** cell for the desired distribution. For instance, suppose you wish to change **Inspect_1_Quality**, after double clicking on the correct **Table** cell, you get the following:

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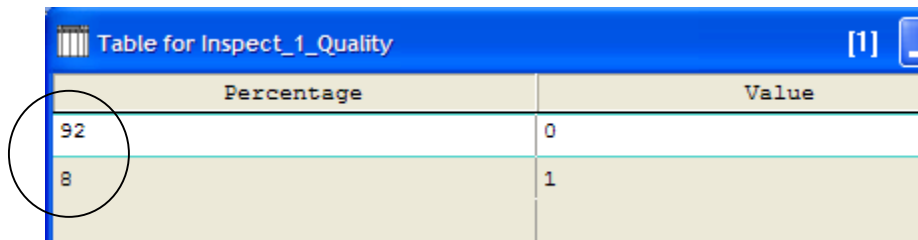


The screenshot shows the ProModel software interface. The main window is titled "ProModel - Tri-Star With Variability.mod (Tri-Star Manufacturing)". Below the menu bar, there is a "User Distributions" table with two entries: "Inspect_1_Quality" and "Inspect_2_Quality", both of type "Discrete". Below this is a smaller window titled "Table for Inspect_1_Quality" which contains a table with two columns: "Percentage" and "Value". The first row has "90" in the "Percentage" column and "0" in the "Value" column. The second row has "10" in the "Percentage" column and "1" in the "Value" column. A circle is drawn around the "90" and "10" values in the "Percentage" column.

ID	Type
Inspect_1_Quality	Discrete
Inspect_2_Quality	Discrete

Percentage	Value
90	0
10	1

In this model a Value = 1 indicates a defective product will be produced. Initially the defect rate is 10 percent. To change the defect rate, you must change both percentages to keep the total summing to 100. For example, if you want to show a reduction in defect rate to 8 percent you would change the percentages to:



The screenshot shows the "Table for Inspect_1_Quality" window with updated values. The "Percentage" column now contains "92" and "8", and the "Value" column contains "0" and "1". A circle is drawn around the "92" and "8" values in the "Percentage" column.

Percentage	Value
92	0
8	1

[Remember to save versions of the model. Also, if you plan to change the order file, save a master copy of the original order file.]