

# Monte Carlo Simulation

The JMP **Profiler**, with the **Monte Carlo Simulator**, can be used to optimize process performance in the presence of random variation. This enables you to estimate response distributions as a function of real-world random variation. Monte Carlo simulation is available from JMP **Prediction Profilers** using the **Simulate** red triangle option.

## Example Setup

1. Use the **Column Properties > Spec Limits** window for the response MODULUS to add a Lower Spec Limit = 500.
2. Run the saved script **RSM for 4 Responses** to simultaneously fit models for the four responses.
3. Scroll down to the **Prediction Profiler**, and select **Optimization and Desirability > Maximize Desirability** under the red triangle to find optimal settings for the three factors.

## Using the Simulator

1. Select **Simulator** from the **Prediction Profiler** red triangle menu.
2. Choose to have the inputs **Fixed** or **Random**.
3. Under the Simulator outline, **Add Random Noise** to all the responses.
4. Click the button **Simulate** to simulate 5000 values for each response.

Simulation results:

- Histograms and summary statistics for the simulated values are displayed for each response.
- The **Defect** rate for MODULUS is .5%.

## Tips:

- Set **Response Limits** to optimize responses, and set **Specification Limits** to produce defect rates.
- Select distributions for input variation and noise for the response to match real conditions.
- Click **Make Table** to simulate values to a data table with the specified number of rows (**N Runs**).
- Additional options are available under the red triangle for **Simulator**, including **Simulation Experiment**, which can optimize defect rates using Space-Filling Designs and Gaussian Process modeling.
- Right-click on the simulation results table and select **Columns > PPM** to report PPM values.

Visit **Profilers > Simulator** in **JMP Help** to learn more.

Help > Sample Data Folder > Tiretread.jmp.

This data table contains results of an analysis of a response surface design with four responses and three factors.

