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 (stochastic) random variation. Monte Carlo simulation is available from JMP **Prediction Profilers** using the **Simulate** red triangle option.

Example Setup

1. Open **Tiretread.jmp** from **Help > Sample Data Library**. This data set contains results of a response surface design with four responses and three factors.
2. Use the **Column Properties > Spec Limits** window for the response MODULUS to add a Lower Spec Limit = 500.
3. Run the saved script **RSM for 4 Responses** to simultaneously fit models for the four responses.
4. 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.

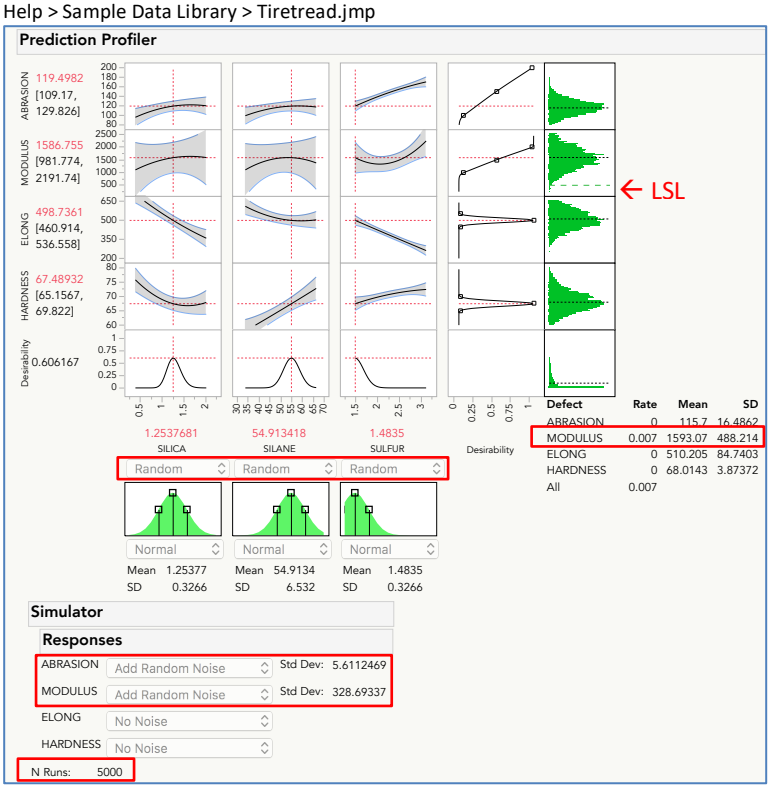
Using the Simulator

1. Select **Simulator** from the **Prediction Profiler** red triangle menu.
2. For each factor in the profiler, change the input variation from **Fixed** to **Random**.
3. Under the Simulator outline, select **Add Random Noise** for ABRASION and MODULUS.
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 less than 1%.

Help > Sample Data Library > Tiretread.jmp



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.

Notes: For additional details, see the book ***Profilers*** (under **Help > Books**) or search for "simulator" in the JMP Help.