

## SilentRoll

*SilentRoll* suite of software tools offer solutions to unique challenges faced by tire design and engineering teams while designing and producing better tires satisfying ever-demanding automotive vehicle specifications. The *SilentRoll* suite of efficient simulation and analysis tools are used for tire noise simulation and tire uniformity improvement. Globally some of the best tire design and engineering teams use *SilentRoll* to solve specific problems related to tire noise reduction at design stage and improving tire uniformity on tire production lines.



## Tire Noise Simulation

Tire noise is the second largest component of vehicle noise on the road after engine noise. With today's growth of electrical vehicles, tire noise is the largest source of cabin noise for electrical vehicles. Tire rolling noise must be controlled within specified limits to meet design and regulatory requirements. To accomplish this, *SilentRoll* enables tire designers to simulate tire noise the design phase and then be able to optimize tire design to quantifiably reduce noise. *SilentRoll* is used by leading companies across the globe to improve tire noise simulation and design tire treads with lower noise output.

## Tire Uniformity Improvement

Tire uniformity testing machines are used to inspect tires for uniformity. Uniformity machine output data is used to study and help improve tire uniformity by analyzing radial and lateral force waveforms. *SilentRoll Waves* provides the optimum spotting specifications as an output.

## Design of Experiment (DoE) – Quality Improvement

DoE approach is used to optimize various parameters to improve the uniformity and quality of tires. This is accomplished by designing a set of experiments to evaluate and optimize the tire building process. In each tire participating in the DoE, various components are placed at pre-defined angular locations and then uniformity test machine data is collected for each tire. *SilentRoll DoE Data Analyzer* allows you to quickly configure and efficiently study tire uniformity machine out for further processing the data before optimum spotting analysis can be performed. Implementation of a 3-component DoE, 2-component DoE and press & mold DoE can help engineering teams determine root cause of non-uniformity in detail and determine whether the issue is caused by the mold, or by a defect in the building process.

## Detecting Root Cause of Non-Uniformity Using Harmonic Analysis and Optimum Spotting for Component Placement

Harmonic analysis of tire waveform data enables engineers to identify the cause of tire non-uniformity and address the same to exercise process control early in the production line. Regular exercise of these techniques keeps the production process within control limits. The Spotting algorithm in *SilentRoll Waveform* enables you to determine optimum component placement in such a manner that peak-to-peak (P-P) amplitude of force waveform is optimized. Before the DoE generated data is used for spotting, Scatter Analysis is performed to assess the quality of DoE data to ensure that the tires participating in DoE were built as expected and data is good to take decision for corrections in component placement.



## Machine Vision and AI

Camera based machine vision systems can be used to inspect tire components in the manufacturing process. We have expertise in designing and developing custom vision solutions for specific requirements. Our team's knowledge in the field of Artificial Intelligence (AI) based analysis engine development enables *SilentRoll* Machine Vision AI to solve some of the trickiest tire manufacturing process quality control issues.

## To Learn More

Contact us for further details and to schedule a demonstration of *SilentRoll* today.

