

NEWS RELEASE



YOKOHAMA

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Yokohama Develops Third-Generation Fundamental Technologies for Tire Design Range and Accuracy Greatly Improved

Tokyo—The Yokohama Rubber Co., Ltd., has developed third-generation fundamental technologies for tire design. The new technologies comprise the Company's highly accurate Multiscale Simulation and Multi-performance Map, which displays information on thousands of optimal design proposals. The new technologies provide significantly greater range and accuracy in tire design and enable the creation of tires offering a sophisticated balance of such factors as riding comfort, stable handling, and minimal noise and vibration.

Multiscale Simulation employs biomechanical principles that clarify the relationships between the mechanisms of human body, the different sizes of individuals, and organs and cells. Traditionally, tires have been considered at a single level. But this new technology enables simulations for multiple scales—including for polymers and other micromaterials, structures and other macro tire characteristics, and tire installment on vehicles. This enables, for example, predictions of physical properties based on combinations of compounds and of frictional coefficients for compounds used on paved roads—even the smoothest of which actually have considerable surface variations. As a result, we can make more realistic performance predictions for vehicles based on more accurate wear forecasts of front and rear tires and other factors.

For the Multi-performance Map, Yokohama applied a multi-objective genetic algorithm that imitates the genetic evolution of living organisms and allows the simultaneous pursuit of many optimal solutions. Tires have many performance requirements, which forces manufacturers to decide which to prioritize or sacrifice. So, while there are several possible solutions to ensure an optimal performance balance, traditional optimization technologies have only offered a single optimization recommendation. The Multi-performance Map computes thousands of optimal solutions and resulting design information, displaying the data on a map. For example, this makes it easy from the design concept stage to identify an optimal balance of riding comfort, safe control, and low noise when comfort is optimized.

Conventionally, tire design involves repeated modifications to shape, structure, materials, pilot production, and performance assessment after determining initial performance targets to ensure a commercial result that balances comfort and stable handling. The traditional approach was to assess tire performances at the test production stage. The use of second-generation computer simulation systems has greatly shortened development cycles. Yokohama's new basic tire design technologies are a third-generation advance on these systems.

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