



ARTICLE #4

**COMPLETE VEHICLE DYNAMICS
SIMULATION AND MODELING
SOLUTIONS**

**FOUR WAYS DRIVING SIMULATORS HAVE
INFORMED THE RESEARCH INDUSTRY
ARTICLE SERIES**



COMPLETE VEHICLE DYNAMICS SIMULATION AND MODELING SOLUTIONS

STATISTICS ALONE GIVE FEW INSIGHTS

Model-based design has transformed the automotive industry and automotive research. Today, a few engineers in a lab can rapidly evaluate hundreds of different engine control or powertrain designs without ever touching an actual vehicle. This has led to vast improvements in vehicle efficiency, safety, and huge leaps in the driving experience.

But vehicle dynamics research calls for more than just accurate and precise real-time multi-body dynamics modeling. In order to do meaningful work, vehicle simulation solutions need to translate those numbers into an authentic, coordinated, multi-sensory driving experience for test drivers. That platform also needs to make it easy to track what that experience means to those drivers. With these tools, you can greatly expand the role vehicle dynamics simulation plays in your design and development process.



INSIDE RDS-2000 FULL CAB SIMULATOR USING SIMVEHICLE

RTI SIMULATION TURNS DATA INTO DRIVER EXPERIENCE

SimVehicle is a complete, high-fidelity, multi-body, real-time vehicle dynamics simulation solution. It can model a wide range of vehicle types (four-, six-, or eight-wheeled, tracked, etc.) with any style of tire or tread. These vehicles can be unencumbered, loaded down, or pulling two- or four-axle trailers with varying load types and sizes. They can demonstrate any combination of vehicle dynamics, malfunctions, and be driven on accurate models of a wide range of road surfaces and conditions—with real-time external monitoring of all vehicle dynamics output.

This is all handled through user-selectable/configurable/customizable input data files. You can directly access and modify these via the included graphical **Vehicle Dynamics Editor**. Modify any vehicle with your engine map, breaking profile, gear ratios, or other dynamics. The SimVehicle system models all four corners



RDS-2000 FULL CAB SIMULATOR

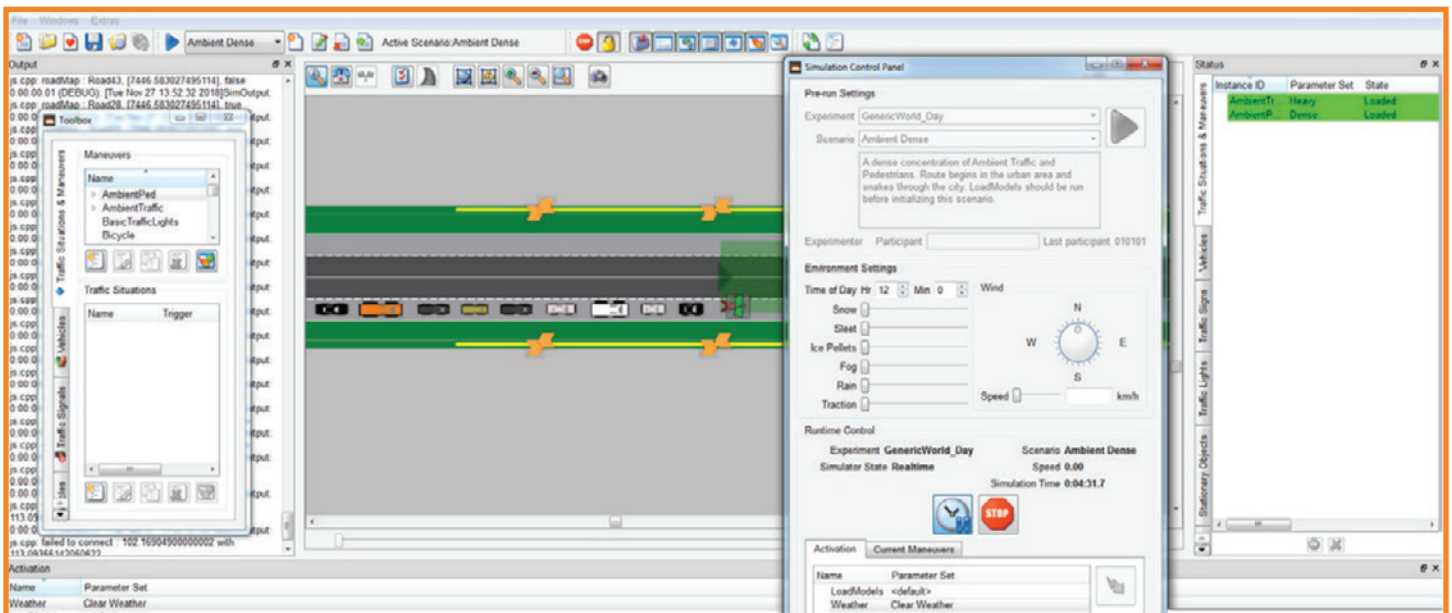


of the vehicle, incorporating spring and damping rates, bump stops, anti-sway bars, anti-squat, and anti-dive geometry coupled with a 6 degree of freedom body component. Advanced powertrain modeling calculates the torques at each wheel, taking into account both modeled inputs (engine, transmission, etc.) and any available user inputs (brake pedal, gear selector, accelerator pedal, steering angles, etc.), as well as roadway conditions and any equipment malfunctions you specify.

Built on Realtime Technologies' custom Multi-body Dynamics Component Library, these models will seamlessly mesh with **SimCreator DX**, RTI's premier simulation scenario authoring software. This allows for the highest degree of model fidelity while giving you full access to RTI's complete range of simulation and experiment design and development tools. Explore how drivers will experience your design in any scenario and under the widest range of terrain and operating conditions (day, night, poor visibility, inclement weather, variable traffic patterns, etc.)—before you spend a single cent on prototyping.

FEATURES

- Develop control strategies in a flexible software environment
- Evaluate engine control unit hardware design using hardware-in-the-loop simulation
- Perform human-in-the-loop testing using a robust vehicle model
- Use the simulation platform deployed at Stanford's Center for Design Research, the University of Michigan, MIT, the University of Florida, and elsewhere



ADVANCED SCENARIO GENERATION WITH SIMCREATOR DX

RESEARCH SIMULATION SIMPLIFIED



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