bikeSIM®
MECHANICAL SIMULATION®

World's most established motorcycle simulation platform enables accelerated engineering throughout the complete product design cycle

BikeSim delivers the most accurate, detailed, and efficient methods for simulating the performance of two-wheeled vehicles. With more than twenty years of real-world validation, BikeSim is universally the preferred tool for analyzing motorcycle dynamics, developing active controllers, calculating overall system performance, and engineering next generation active safety systems.

With manufacturers facing compressed product release cycles, BikeSim provides an intuitive set of tools for engineers to quickly evaluate complete motorcycles, sub-components, and active controllers in complex, simulated driving environments. As more companies and motorsports organizations embrace simulation based engineering, BikeSim provides a system-based modeling approach to help users focus on their area of expertise while keeping the rest of the simulation environment constant.

BikeSim keeps up to date with emerging industry trends by providing frequent software updates that include features such as: sensors and traffic vehicles for developing ADAS systems, interfaces to 3rd party powertrain tools, and Vehicle-to-Vehicle and Vehicle-to-Infrastructure wireless communication protocols.

BikeSim's Intuitive Visualization and Plotting Tools

High Fidelity Motorcycle models: BikeSim includes detailed models for all motorcycle sub-systems and models describing the complex interaction between the rider and machine.

Modular Vehicle Definition: each bike sub-system is defined with discrete properties and performance tables. This modular, parameter-based design approach lets you modify parameters and run simulations any time during the design cycle.

Integrate your own technologies using standard design tools: Mechanical Simulation provides seamless interfaces to other standard simulation and design tools such as MATLAB/Simulink and LabVIEW. Advanced users can develop stand alone technologies using Visual Studio and BikeSim's API.

Performance Metrics: BikeSim provides open-loop and closed-loop driver models with advanced features to help engineers quickly discover a bike's limit capabilities or its optimal path through complex maneuvers. These technologies are demanded by manufacturers who must certify compliance with worldwide ISO and ECE stability control regulations.

VS Commands: this powerful scripting language provides tools to automatically control test runs, extend our vehicle model, control complex driving maneuvers, and model auxiliary sensors.

Linear Analysis: BikeSim includes VS Commands that linearize the system via numerical perturbation at any time during a simulation run. Linearization results are written to A, B, C, D matrices that can be loaded into MATLAB to provide Eigenvalues, Bode plots, Root Locus, etc.
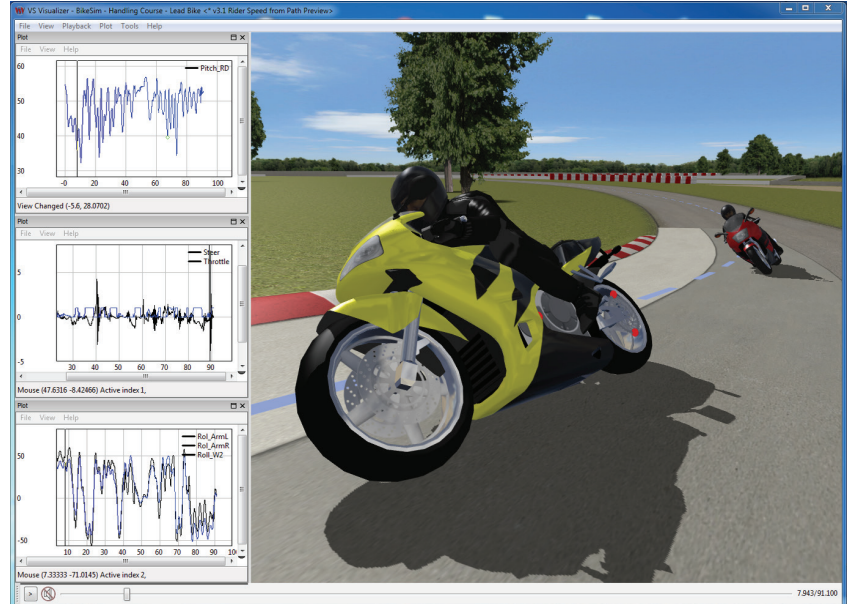
BikeSim Applications

- ABS Braking
- Electronic Stability Control
- Adaptive Cruise Control
- Active Suspensions
- Riding Simulators
- Durability Studies
- Roadway Engineering
- Vehicle-to-Vehicle (V2V)
- Weave, Wobble, and Chatter Studies

New BikeSim Features

- CVT Powertrain
- Rider model improvements
- Linear Analysis
- Photo-realistic Visualizer

carsim.com

Top Reasons Engineers Select BikeSim

- BikeSim is a standalone application. It does not require any other software to perform simulations.
- BikeSim has a standard interface to MATLAB/Simulink.
- BikeSim is used extensively by 7 largest motorcycle OEMs.
- BikeSim can run complex scenarios and test event sequences.
- BikeSim can scale from:
  - Software-in-the-loop to
  - Model-in-the-loop to
  - Hardware-in-the-loop to
  - Rider-in-the-loop
- BikeSim provides an intuitive graphical user interface and powerful analysis tools.
- BikeSim can provide vehicle sensors and interactive traffic for V2V and ADAS development.
- BikeSim includes a standard set of example vehicles, roads, and procedures to assist first time users.
- CarSim, TruckSim, and BikeSim have over 3,500 active users at OEMs, suppliers, and leading universities.
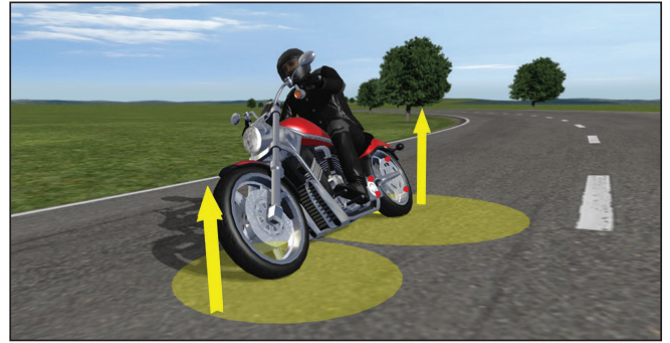

Closed-loop driver model and detailed road profile

DATA DRIVEN PRODUCT DESIGN

From conception to product launch—BikeSim provides sophisticated tools to streamline your design, engineering, and testing processes. With BikeSim, you can quickly transition between product development tasks by reusing parameters and test procedures developed in the previous tasks.

BikeSim supports industry standard engineering tools which allow you to add your own technologies into your simulation environment. BikeSim's support for industry standard HIL platforms allows you to choose the hardware that is best for your real time application—without locking you into expensive, proprietary hardware.

BikeSim is an economical tool for engineers who use multiple software tools and must produce results quickly. BikeSim features an intuitive user interface, online help, and a complete set of example vehicles, 3D roads, and fully documented example test procedures and plots.
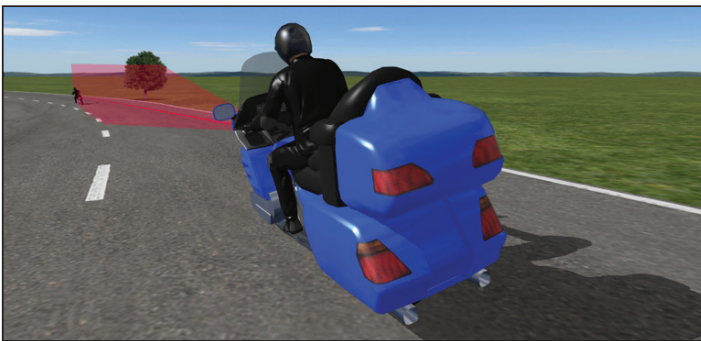
Sensor feature for developing active safety systems

PRODUCT HIGHLIGHTS

Bundled Data Sets
- More than 10 example test vehicles
- More than 15 roads and test tracks
- More than 90 test runs with comprehensive design notes

Engineering Tools
- Interactive 3D Visualizer
- Engineering plots
- Spectrum Analyzer
- Linear Analysis (requires MATLAB)

Integration Technologies
- Microsoft COM API
- Excel import and export

Control Development Support
- MATLAB/Simulink
- LabVIEW
- Visual Studio

Optional BikeSim Modules
- Sensors
- Real Time / HIL

Tire Models
- Combined slip
- Extended shear with camber
- MF-Tyre
- COSIN FTire (optional)
- MF-Swift (optional)

VehicleSim (VS) Commands
- Powerful programming language
- Automate complex riding maneuvers
- Create new variables and imports
- Add differential equations
- Control interactive traffic vehicles

Animator Features
- Data driven heads-up display
- Synchronized plotting
- Rider mirrors and multiple cameras
- Tracking camera
- Overlay compare of multiple tests
- Ghost vehicle path
- Photo realistic, user defined driving environments—trees, buildings, signs, textured roads.
- Tire skid marks and tracks
- Sounds—engine, wind, and tire

BikeSim RT Supported HIL Platforms
- A&D
- Concurrent
- dSPACE
- ETAS LabCar
- NI-RT
- Opal-RT RT-Lab

Mechanical Simulation®

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