CarSim Model and License Options

This document summarizes model and license options for CarSim 2025.0. Unless otherwise noted, all features are supported on all operating systems.

CarSim for Windows

The basic CarSim installer provides a database and browser with a user interface, visualizer (plotting and animation), math model solver libraries, extensive documentation, and many example vehicles, procedures, and simulations. Two versions of the browser, math model libraries, visualizer, and other tools are provided to work with 32-bit and 64-bit environments.

The CarSim math models support a four-wheeled motor vehicle with or without a trailer (with one, two, or three axles), using any combination of independent and solid-axle suspensions, possibly a twist-beam rear suspension, and possibly an independent steered front suspension with a virtual kingpin on the motor vehicle. The model works as-is and can optionally be extended with the built-in scripting language (VS Commands), embedded Python, Simulink, and LabVIEW. The math model can also be extended using external programs written in MATLAB, Visual Basic, C/C++, Python, and other languages that can interact with Windows DLLs. Up to 200 built-in moving objects can be controlled to simulate traffic and safety-related scenarios.

The 32-bit and 64-bit versions of the CarSim math models run at the same speed, with the two versions being provided to support compatibility with third-party software. When CarSim is used alone, there is a choice between 32- and 64-bit browsers (`CarSim.exe` and `CarSim_64.exe`); when used with third-party software (e.g., 64-bit Simulink), the appropriate solver plugin library must be used.

CarSim for Linux

CarSim for Linux is identical to CarSim for Windows with two major differences; it does not include the CarSim browser, and the math model is 64-bit only.

CarSim for Linux includes a database, visualizer (plotting and animation), math model solver library, extensive documentation, and many example vehicles, procedures, and simulations.

CarSim for Linux is mostly used for automation for sites with many CarSim installations.

CarSim 2025.0 License Options

Starting in 2025.0, CarSim license managers will only accept a limited number of new licenses. Each of these new licenses will have access to what previously would have required multiple license checkouts. The intent is to streamline the licensing process by requiring only a single license checkout from the license manager. See below for the list of acceptable licenses in 2025.0 and newer license managers.

Table 1. New CarSim Feature Codes in 2025.0

Feature Name	Feature Code	Includes
CarSim Math Model Only	carsim	CarSim Math Model
CarSim Base	carsimbase	All standard functionality including VS Browser and CarSim Math Model
CarSim with Options	carsimoptions	Everything in CarSim Base as well as all add-on features in CarSim (excluding Real-Time)
CarSim Real-Time Base	carsimbasert	Everything in CarSim Base as well as access to all supported Real-Time Operating Systems
CarSim Real-Time with Options	carsimoptionsrt	Everything in CarSim Real-Time Base as well as access to all add-on features in CarSim
CarSim Headless	carsimheadless	All the functionality HPC licenses previously provided with the addition of access to all CarSim add-on features

CarSim Math Model Only

Grants access to basic solver functionality (no additional features), without access to the CarSim VS Browser. The CarSim solver supports all CarSim vehicle configurations based on a single vehicle unit (no trailer) with a rigid sprung mass (no frame torsional flexibility). Since this license does not grant access to VS Browser, it is not available for checkout from the VS Browser license manager.

CarSim Base

Grants access to basic solver functionality as well as CarSim VS Browser.

CarSim Base now also includes support for the Windows-based desktop driving simulator. Driving hardware is either a Logitech G29 or G920 steering wheel, shifter, and pedal set. Although no longer produced by Logitech, Mechanical Simulation maintains legacy support for the G27. The DS example datasets include software to support a single live connection between a vehicle math

model and the VS Visualizer. Additional live animation licenses are provided in CarSim with Options and CarSim Real-Time with Options licensing.

CarSim with Options

Grants access to all functionality provided in CarSim Base with the addition of all add-on features (excluding Run-Time features). Additional add-on features provided include:

ADAS Sensors

Allows activation of up to 99 built-in range and tracking sensors to sense moving objects (up to 200). Calculated sensor detection variables can be sent to external controller models in Simulink, LabVIEW, or other environments.

Engine Mount

Allows the use of vehicle models with an engine and torque rod with additional degrees of freedom (DOF). These are modeled as six mounts: four for the engine and two for the torque rod.

The Engine Mount feature cannot be used at the same time as the Frame Twist model feature.

Frame Twist

Allows use of models with frame twist DOF that represent the distribution of torsional compliance along the length of the Sprung Mass body and therefore affect the load transfer to the tires. When enabled, the Frame Twist option affects the motor vehicle and a trailer, if linked.

The Frame Twist feature cannot be used at the same time as the Engine Mount feature.

Trailer

Allows use of a trailer with one, two, or three axles. If the multiple vehicle license is used, trailers may be added for all the vehicles in the simulation.

CarSim Real-Time Base

Grants access to all functionality provided in CarSim Base with the additional ability to run on all supported Real-Time Operating Systems.

CarSim Real-Time with Options

Grants access to all functionality provided in CarSim with Options with the additional ability to run on all supported Real-Time Operating Systems.

CarSim Headless

This license allows additional process instances to simultaneously run CarSim simulations on a targeted machine (process-level parallelism). When distributed from a license server, it provides a lightweight licensing mechanism well-suited for High-Performance computing. Headless licensing is best suited for large scale deployments where no single external simulation master is in control and when several (up to thousands) of simultaneous simulations are needed. While this license provides similar functionality to the HPC license formerly used in CarSim, a key difference is the Headless license also includes the ability to run simulations utilizing all add-on features provided

in CarSim with Options. This license can only be checked out from the CLI license manager (cs-lm-cli).

Third-Party Tire Models (Siemens, COSIN, and Michelin Tires)

The CarSim Windows installation includes interfaces for tire models from Siemens (MF-Tyre/MF-Swift), COSIN (FTire) and Michelin (TameTire). Example datasets are included for each of these tire model options. The four license options are:

1. Siemens MF-Tyre v2212 natively connected with CarSim runs under any CarSim license together with all options <u>except</u> the **Enveloping contact**, **Rigid-ring**, **Turnslip** and **Temperature Model** options that run under Windows and Linux OS.

2. Siemens MF-Tyre v2212 connected with CarSim on Simulink requires an optional paid license from Siemens in addition to a basic CarSim license that runs under Windows OS.

3. Siemens MF-Swift v2212 (including **Enveloping contact**, **Rigid-ring**, **Turnslip,** and **Temperature Model** option) requires an optional paid license from Siemens in addition to a basic CarSim license. With this license the MF-Tyre/MF-Swift model will work together with all options that run under Windows and Linux OS.

4. COSIN FTire requires an optional paid license from COSIN in addition to a basic CarSim license. With this license the FTire model will work together with all options that run under Windows OS. Any version older than FTire 2021-3 is not supported.

5. Michelin TameTire requires an optional paid license from Michelin in addition to a basic CarSim license. With this license the TameTire model will work together with all options that run under Windows OS.

These external tire models support 32-bit and 64-bit versions of their respective solvers.

Siemens MF-Tyre/MF-Swift v2212 is also available for real-time (RT) use on dSPACE DS1006, SCALEXIO and Concurrent RT. The RT versions require a paid license from Siemens.

> **Note** As MF-Tyre/MF-Swift v2212 has technical issue on SCALEXIO/QNX running with CarSim, only v2022.1.1 is supported.

CarSim currently supports COSIN FTire model in standard operation mode on Windows. Accelerated FTire/HIL execution mode is currently being considered for future interface extension.

CarSim Real-Time

RT Platforms
The CarSim installer for Windows includes support for seven Real-Time platforms:

1. dSPACE DS1006/DS6001 and SCALEXIO

2. National Instruments LabVIEW RT/VeriStand (ETS OS and Linux RT OS)

3. Opal RT-LAB (QNX RT OS and Linux RT OS)

4. Concurrent Real Time System

5. A&D Technology

6. MathWorks Speedgoat

7. Vector CANoe

Either a CarSim Real-Time Base or CarSim Real-Time with Options license is needed to run on any of the above systems.

The CarSim Real-Time solvers do not work with the external component models from COSIN or AVL, with the exception that Siemens tire models are available for dSPACE DS1006/SCALEXIO and Concurrent RT.

Extra Live Animations

Included in CarSim Base and CarSim Real-Time Base licenses is support for a single connection between the math model and VS Visualizer. If more instances of VS Visualizer are required on the same or across multiple machines, CarSim with Options or CarSim Real-Time with Options both support up to eight such connections for all systems except dSPACE 1006.

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