

CarSim 8.1.1 New Features

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CarSim 8.1.1 is a minor update to CarSim 8.1 with some bug fixes, improved documentation, and new features. This release is recommended for all users of CarSim 8.1. The new program works with existing databases; no updating is needed.

Note All of the standard output files and documentation for CarSim identify the new version as 8.1.1. The installer and some real-time interface utilities use an internal version number of 8.11; both are equivalent.

New Features

VehicleSim Visualizer (VsV)

The VehicleSim Visualizer (VsV) introduced with CarSim 8.1 provides better performance in this release, especially on older video cards. If you tried VsV with an older computer, try again with this release. It automatically detects the capability of the graphic processing unit (GPU) and uses less sophisticated methods for rendering displays if the advanced methods are not supported in hardware. It also loads faster on any machine.

Although VsV is still in a beta version, it performs much better than SurfAnim in many respects. It lacks some features that will be added before the release, such as built-in generation of video files, visualization of tire paths, and export of unified animation files (UAF) or self-contained archive files (EXE) that can be shared with colleagues who do not have CarSim licenses. However, we can recommend VsV for everyday use if the missing features are not needed.

Math Models

1. CarSim 8.1 introduced an option for using separate reference paths for driver control and defining road 3D geometry. CarSim 8.1.1 provides VS commands and VS API functions to access information about the separate paths.
2. The output variable `BetaR` (derivative of vehicle side slip angle) was removed in CarSim 8.1. It has been restored in 8.1.1. Also, another slip rate `BetaRdR` (derivative of side slip angle, defined relative to road surface) is now included. This completes a set of output variables defined using the road reference frame (including grade and cross-slope)

as an alternative to a horizontal reference for defining vehicle motion variables such as longitudinal, lateral, and vertical speed and acceleration; pitch and roll angle; and sideslip angle.

3. A new VS command was added: `RESET_EQS_ALL` for some advanced applications.
4. For the optional chassis twist model, a new parameter `H_NODE` was added. It describes the height of the node axis for the chassis twist.

AVL Cruise Interface

CarSim 8.1 introduced built-in, low-level integration with the commercial powertrain simulation software Cruise from AVL, using a CarSim block built into Cruise. CarSim 8.1.1 adds the capability to access up to 99 variables from Cruise using a second block. For example, the second block can provide powertrain variables from Cruise needed by controllers running from Simulink with CarSim.

An optional license is needed to use the AVL-Cruise interface, and the Cruise software and associated licenses from AVL must be installed.

Database Examples

The database provided with CarSim 8.1 includes example vehicles and procedures that were reviewed and tested to ensure that when used in simulations, they produce reasonable behavior for conventional tests covering full ranges of acceleration, braking, steering, handling, and stability.

One of the procedures was described in detail in the technical memo, “Making Advanced Procedures with VS Commands.” The procedure — Steady-State Circular Test (ISO 4138) — has been revised for better modularity (it is also being used with the TruckSim software). The updated procedure is installed in the CarSim 8.1.1 database, and the updated technical memo is installed in the online Help. Several runs have been made using the updated procedure. They can be found in the category **Handling and Stability Tests** from the **Datasets** menu when viewing the **Run Control** screen.

The GUI (carsim.exe)

1. The **Run Control** screen now works when no vehicle is selected. If the link is broken, a yellow field is shown to specify the vehicle code needed to select the appropriate VS solver. Also, a checkbox is available to use animation data from a previous run. These changes help advanced users continue from existing runs more easily.
2. The **Road: 3D Surface (All Properties)** screen has a checkbox for advanced settings that shows a scrollable yellow data field and a miscellaneous blue link. These can help advanced users associated other model properties with a road or add new properties via VS commands.
3. The symbol stack is now insensitive to case, in support of some advanced applications.

4. Support has been added for hitch animator shapes that are located automatically based on math model hitch coordinates. Miscellaneous links and yellow fields on the hitch screens were also added, to support advanced users.

Documentation

Existing documents have been extended and updated to provide more information about new features introduced in CarSim 8.1 and 8.1.1. Some notable updates were made in the following documents (available from the **Help** menu).

1. **Run Control** screen.
2. **Procedures** screen.
3. **Road: 3D Surface (All Properties)** screen.
4. **Making Advanced Procedures with VS Commands** tech memo.
5. **VS Commands** reference manual.
6. **VS API** reference manual.

Bug Fixes and Errata

The following bugs were identified and corrected.

1. A speed controller option introduced in CarSim 8.1 uses path preview to calculate target speed while taking into account the 3D road geometry (grade and cross slope). It had a bug that sometimes affected the calculated target speed on right-hand turns with cross-slope.
2. Output variables involving the acceleration of the instant mass center of an entire vehicle unit (motor vehicle, trailer) were calculated incorrectly the first time step when advanced users continued an existing run or used the `restore_state` VS command to jump back in time.
3. Range and tracking sensors behaved incorrectly when passing through cylinder target objects (an error occurred when one edge of the target was in front of the sensor and another edge was behind it).
4. The advanced brake model did not work with the speed controller due to a missing parameter relating pedal force to brake pressure.
5. Prior to CarSim 8.1, the parameters for spring seat height adjustment were associated with time variables. This made it possible for advanced applications to dynamically modify spring preloads during a run. A change implemented in version 8.1 had the side effect of removing the capability to modify these parameters dynamically. This capability has been restored.
6. In chassis twist models with trailers, the effect of the roll moment at the hitch on twist of the trailer had incorrect sign. It has been corrected. This affects only CarSim with optional chassis twist and trailers, on vehicles using trailers, with hitches that produce non-zero roll moments.