

SuspensionSim 2023.1 New Features

| | |
|---|---|
| VS Math Model..... | 1 |
| Suspension Design Factors (SDFs)..... | 1 |
| VS Commands | 1 |
| Other Improvements | 1 |
| VS Browser | 2 |
| 64-bit Version of the Browser..... | 2 |
| SuspensionSim System Library Screen | 2 |
| Other Improvements | 2 |
| VS Visualizer | 2 |
| Licensing | 2 |
| Documentation | 3 |
| Database | 3 |
| Updates to Previous Examples..... | 3 |
| New Examples | 4 |

This document lists notable new features in SuspensionSim version 2023.1.

VS Math Model

Suspension Design Factors (SDFs)

Five new output variables have been added to the list of wheel-based SDFs: wheel travel angle, roll center height, support angle, ride camber rate, and ride toe rate. These are calculated using partial derivatives of the wheel position and orientation with respect to jounce, and they establish instantaneous information about the knuckle’s motion at a particular operating point. To support these calculations, there is a new math model keyword for the tire radius used, `RADIUS_SDF`. For more information, refer to the updated **SuspensionSim Commands and Parameters** reference manual.

VS Commands

- `SET_OUTPUT_SHORT_NAME` was added to allow the manual creation of short (ERD compatible) output names by the user.
- Error checking was added for lengths of new variables and parameters. The name lengths were extended to 48 characters; longer names now generate error messages.
- A new function `SAFE_DIV` is available for user-defined expressions to avoid divide-by-zero issues.

Other Improvements

- The embedded Python included has been updated to 3.10.2.

- All error messages were reviewed; many were updated to provide more specific information about the cause of the error.

VS Browser

64-bit Version of the Browser

The browser `SuspensionSim.exe` is a 32-bit application that runs on both 64 and 32-bit versions of Windows. As such, it can load 32-bit plug-in libraries such as the VS Solver `vs_suspsim_32.dll` but is not able to use 64-bit libraries.

Most users have been working with 64-bit versions of Windows, and many engineering software tools are now available only as 64-bit applications and libraries. For example, the last version of 32-bit MATLAB from MathWorks was 2015b. That means any recent versions of MATLAB will work only with the 64-bit VS Solver plug-in libraries.

The 2023.1 release includes two versions of the Browser: `SuspensionSim.exe` (still 32-bit) and `SuspensionSim_64.exe` (64-bit). The plan from Mechanical Simulation is to drop the 32-bit versions of our tools in a future release. (Recent releases have already included both 32-bit and 64-bit versions of the VS Solver libraries, VS Visualizer, and other tools.)

Mechanical Simulation recommends using the 64-bit version unless there is a need to maintain compatibility with 32-bit tools.

SuspensionSim System Library Screen

The **SuspensionSim System** library screen now sets math model keyword `RADIUS_SDF` to symbol stack variable `<<radius>>`. This allows the yellow fields for radius on the **Locations and Bodies** screen or the **SuspensionSim System** screen to be used for the new SDF calculations.

Other Improvements

- Two more plot links were added to the **Generic VS Commands** screen.
- The **Tools** menu was modified to clarify the searching of existing runs for uses of the dataset currently in view.

VS Visualizer

VS Visualizer has added a preferences option to force X or Y plot axis labels to show. Users with a small VS Visualizer window and many plots may have hidden axis labels due to automatic plot window scaling. Forcing the axis labels to show will allow users to view VS Visualizer at their preferred window size.

Licensing

The Command-Line License Manager can now run as a Windows Service, allowing for the application to be started automatically when the system is booted. Additionally, running the License Manager as a Service allows for the application to be started, paused, or stopped using the Microsoft Management Console.

Documentation

The following document was added to the **Help** menu:

- Tools > Database Builder.

The following documents in the **Help** menu have been updated:

- Home: The Run Screen
- Animator > Camera Setup
- Animator > Reference Frames
- Animator > Shapes and Groups
- Generic Data Screens > Data Groups
- Generic Data Screens > Generic Table
- Generic Data Screens > External Parsfile
- Model Extensions > Model Screens
- Model Extensions > Output Variables
- Plot Setup
- Procedures and Events
- SuspensionSim Models
- Tools > Calculator Tool for Tables
- Tools > Preferences
- Tools > VS/ERD File Utility
- Reference Manuals > SuspensionSim Commands and Parameters
- Reference Manuals > System Parameters in VS Math Models
- Reference Manuals > VS API
- Reference Manuals > VS Browser (GUI and Database)
- Reference Manuals > VS COM Interface
- Reference Manuals > VS Commands
- Reference Manuals > VS Commands Summary
- Reference Manuals > VS Math Models
- Reference Manuals > VS Visualizer
- Technical Memos > HPC Licensing
- Technical Memos > The VehicleSim License Manager Utility
- Technical Memos > VS Solver CLI Wrapper
- Technical Memos > Guidelines for Building SuspensionSim Models.
- Release Notes > SuspensionSim Backward Compatibility
- Release Notes > SuspensionSim Database Options
- Release Notes > System Requirements

Database

Updates to Previous Examples

The following examples have been updated to use the new SDF output variables:

- * * Quick Start Guide > Baseline (Ride Test)
- Miscellaneous > COM with Python

- Miscellaneous > Embedded Python
- Multi-Link Example > Ride Test
- RWD Performance > Front Susp. (2) Jounce
- RWD Performance > Rear Susp. (2) Jounce
- SLA Example > SLA w/ Asymmetric Parametric Templates
- SLA Example > SLA w/ Ball-Joint Bushings
- SLA Example > SLA w/ Nonlinear Ride Spring
- SLA Example > SLA w/ Rigid Axial Bushings
- SLA Example > SLA w/ Symmetric Parametric Templates
- SLA Example > SLA without templates
- Strut Example > Strut (Ride Test).

Several minor changes were made to these examples during this process. For example, the **SLA w/ Nonlinear Ride Spring** example has an updated nonlinear spring force table.

New Examples

There is a new example model called **Walking Beam**, representative of what could be used on the rear of a vocational truck with tandem drive axles. The front and rear axles are interconnected by beams which are located by trailing arms. This example model is exercised in three new runs:

- * Walking Beam > A. Design State
- * Walking Beam > B. Jounce Test
- * Walking Beam > C. Roll Test.