VI-CarRealTime 20.1 Release Notes

www.vi-grade.com

email: info@vi-grade.com

VI-CarRealTime 20.1 Release Notes

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1 Release Notes

Welcome to the release notes of VI-CarRealTime 20.1. The chapter contains information regarding new features, known issues and update history.

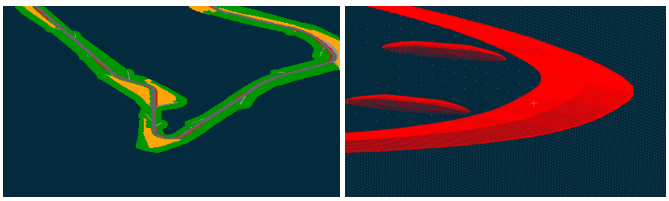
Please send your comments or support requests to support@vi-grade.com.

1.1 What's New

1.1.1 VI-CarRealTime 20.0

Road & Tires:

- The road/tire section of the VI-CarRealTime solver introduces a new data management structure (CDI) designed to grant better computational performance.
- A new road model, identified as GridMesh, is now included in the VI-Road suite. Such road model is designed to model complete environments with very high surface definition (1 cm), ensuring an extremely small response time regardless of the evaluation position and data resolution. The Initialization time is also extremely reduced compared to other road models like the VI-Road - Mesh one. The new model is designed to allow a straight forward connection for scanning data. As all other VI-Road variants, the GridMesh provides intellectual property protection through data obfuscation and licensing.



- This new VI-CarRealTime release supports most recent versions of 3rd party tires models:
  - **MF-Tyre/MF-Swift**
    - Support for version 2020.1
    - MF-Swift + Road enveloping + GridMesh is real-time capable
    - Support for National Instrument Hil platform
  - **FTire**
    - Updated interface to version 2020-2

- Switch to cti-loader making FTire installation independent from VI-CarRealTime and VI-DriveSim

- **RIDESuite**
  - Support for RIDESuite version 1.9 / 2.1
  - Tread wear effects in thermal and dynamic performance

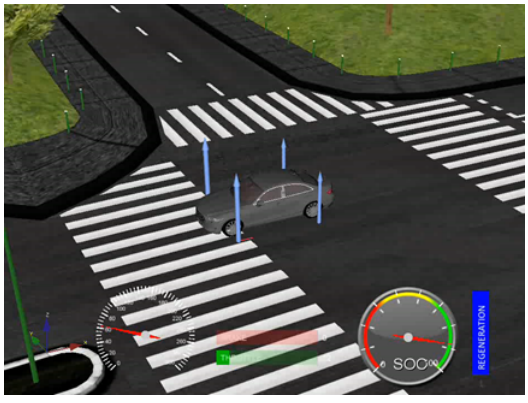
- **CDTire**
  - Direct interface replaced the former user tire integration leading to improved efficiency

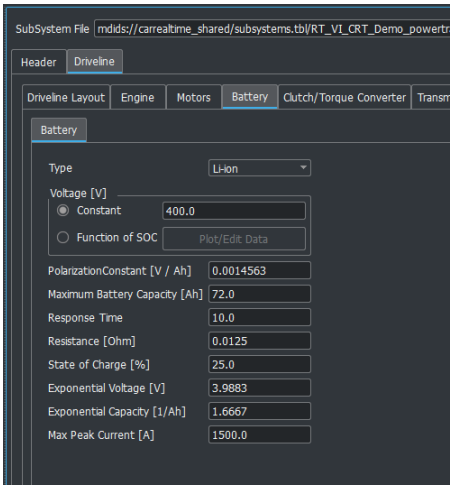
- **TameTire**
  - Rolling radius formulation improvement.
  - Some improvement in the friction law.
  - Vertical models are more dynamic.
  - New wear and degradation models.
  - Internal air temperature and pressure are now dynamic.

Modelling enhancements:

- Previous releases, introduced support for multiple configuration of electric drive-train but still rely on external models for the battery component. This VI-CarRealTime release introduces an internal **battery** suitable for different kind of chemistry like:
  - Lead-Acid
  - Li-Ion
  - Ni-Cd
  - Ni-Mh

  The model parameters are directly accessible in the UI and allow full parametrization of the model response
  - Voltage (Constant or Function of SOC)
  - Polarization Constant
  - Maximum Battery Capacity
  - Response Time
  - Resistance
  - State of Charge
  - Exponential Voltage
  - Exponential Capacity
  - Max Peak Current



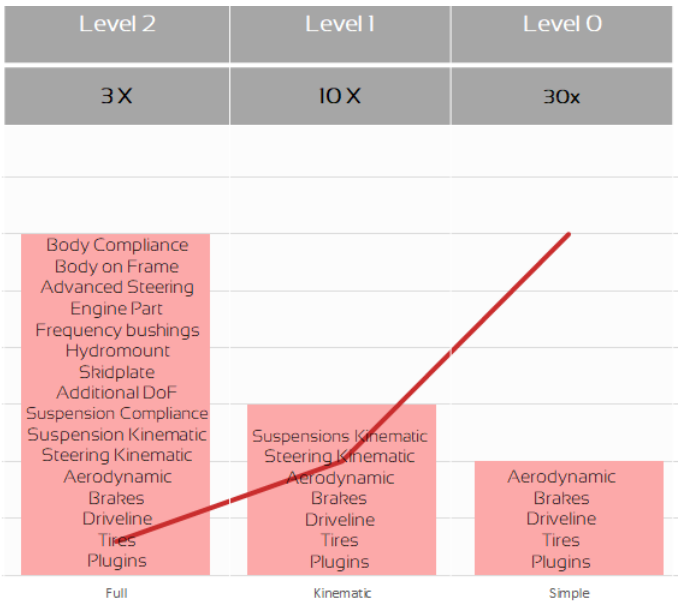


- **User sensors** component has been expanded to cover also rotational contribution for displacement, velocity and acceleration.

- **VI-MxMount** component is now supported as bushing type for chassis separated masses:
  - Engine
  - Body on frame

  Different modeling variant are supported
  - Elastomer - Sum of frequency dependent force component and amplitude dependent force component.
  - Hydrobushing / Hydromount - Two elastomer models (main rubber and chamber rubber) and a damped fluid mass arranged as shown in the scheme.

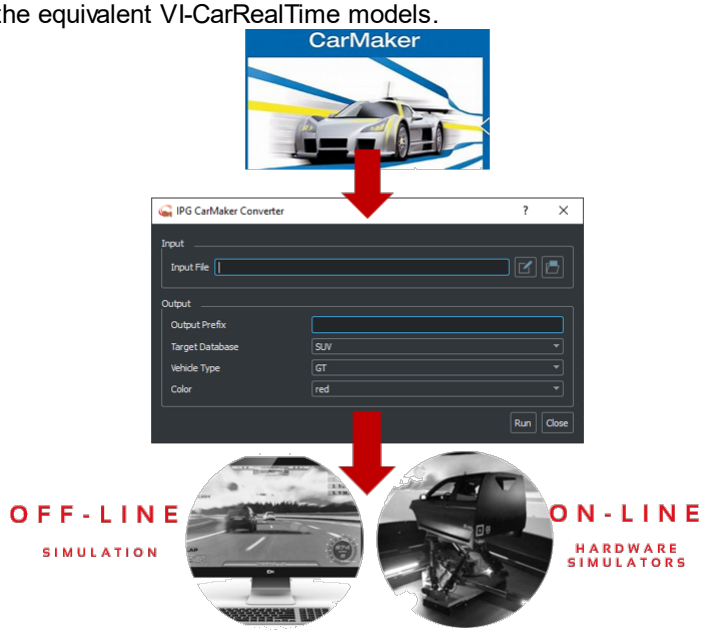
- The trade off between execution speed and modeling accuracy for any VI-CarRealTime model can be adjusted through the new **Variable Model Fidelity** option:



  Based on single switch, accessible in the system parameter tree, the user can define which fidelity level to use for a simulation task. The first application of this technology is in the context of the Press Maneuver event: using a less refined, but faster, model for the initial steps of the optimization process, grants an overall reduction in computation time with results equivalent to the usage of the full model for the entire process.

- The generation of VI-CarRealTime models starting from others vehicle dynamics packages like **CarSim** has been improved in different areas:
  - the import process is now much faster (seconds instead of minutes)
  - in addition to the already supported *par* files, the conversion now can start from the entire model database.
  - Improved data translation for:
    - air spring
    - compliances
    - asymmetric un-sprung mass
    - gear shifting tables
    - differentials inertia
    - clutch
    - aerodynamic

- A new addon module designed to handle **CarMaker** datasets is now available as VI-CarRealTime addon. As for the CarSim Converter, the conversion process is extremely fast and is able to map the most relevant features of the CarMaker model to the equivalent VI-CarRealTime models.



Solver enhancements:

- The **computational efficiency** of the VI-CarRealTime solver has been improved in many submodules: combined with improvements introduced for the road and tires component, the solution time can be reduced by 20%.

- **Kingpin moment** evaluation has been reviewed considering:
  - contribution of force elements acting on the upright
  - secondary contributions like the terms of the wheel inertia tensor perpendicular to the spin axis.

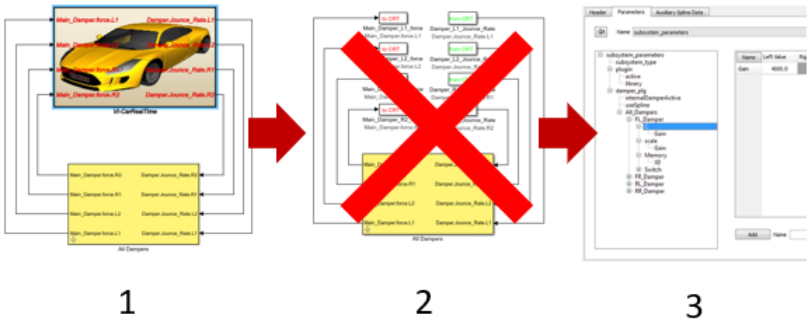
  leading to an even more accurate steering torque feedback computation

- Scaling factor for elements like:
  - dampers
  - antirollbars
  - suspension kinematics and compliance
  - motion ratio

  are now **runtime tunable** in all user scenario including MATLAB / Simulink and VI-DriveSim.

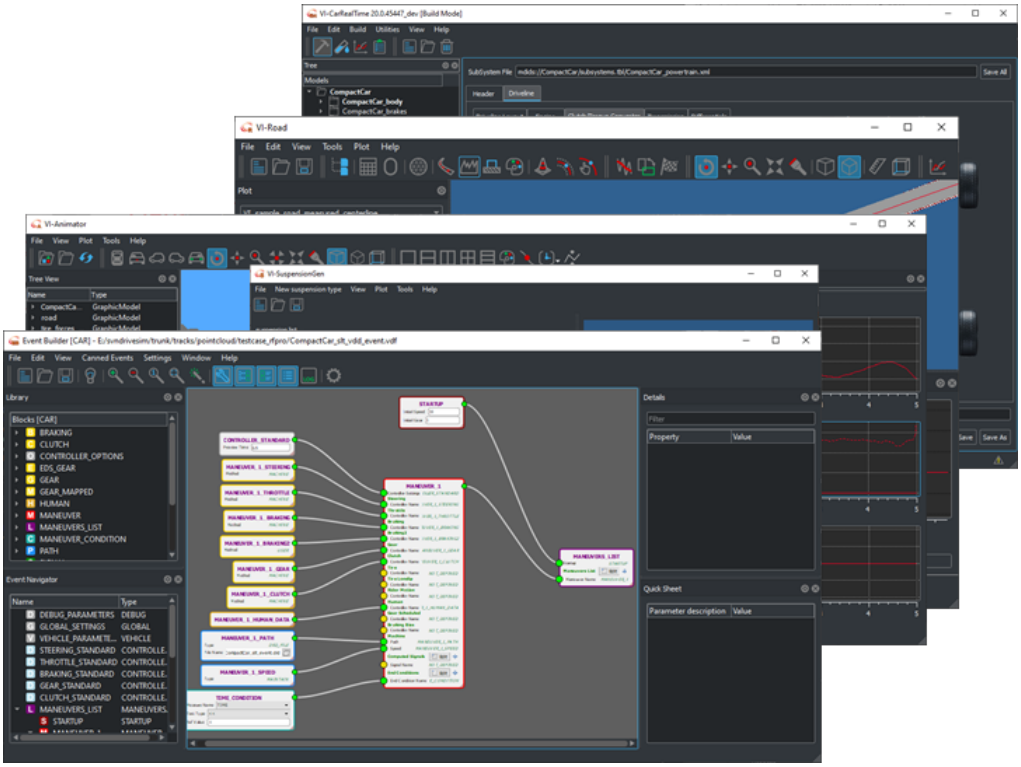
MATLAB Interface enhancements:

- The VI-CarRealTime plugins generation from Simulink feature has been redesigned to remove the need of manually creating a specific model based on the interface I/O blocks. With this release, a regular cosimulation model can be directly exported as a solver plugin.
- MATLAB structs are now correctly mapped to the auxiliary subsystem
- Complex model in which the VI-CarRealTime S-function is not at the top level are now supported.
- Support for MinGW compiler



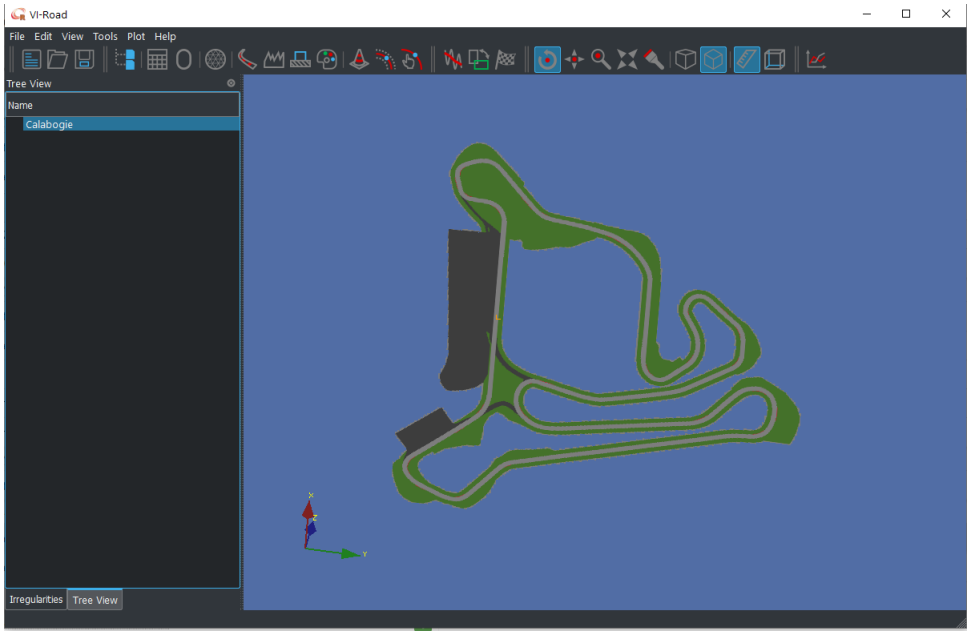
User Interface enhancements:

- The complete VI-CarRealTime suite now supports a **dark theme** in addition to the traditional light one.Both the main UI as well as all ancillary tools like VI-Road, VI-Animator, VI-SuspensionGen, VI-EventBuilder can switch live between the two themes. The background color of all plotting widgets is now customizable and all modules received more consistent icons.



1.1.2 What's New in VI-Road

The main focus of VI-Road v20 is the support for the new GridMesh model. On top of the solver support in combination with the most widely used tire models, the VI-Road User interface supports visualization of GridMesh datasets with different resolution levels and the capabilities connected to trajectories generation.



This release also introduces several corrections to the manipulation of openCRG datasets.

Please refer to the revision history chapter for the full list of changes.

1.2 Licenses

VI-CarRealTime 20.1 requires following set of license keys:

- `VI_CarRealtime_Core`
- `VI_CarRealtime_IFace`
- `VI_Driver_Basic_Core`
- `VI_Driver_EventBuilder`
- `VI_Road_Core`
- `VI_Road_Toolkit`
- `VI_Tire_Core`
- `VI_Tire_Toolkit`
- `VI_Tire_TireLimits`
- `VI_Animator`

The following add-on modules requires a specific license key (red indicates changes respect to previous versions):

• MaxPerformance	`VI_Driver_Advanced_Core`
• PressManeuvers	`VI_CarRealTime_PressManeuvers`
• K&C Interface	`VI_CarRealtime_KnC`
• Virtual Test Drive interface	`VI_CarRealTime_VirtualTestDrive`
• VI-Safety	`VI_Safety_CRT_IFace`
• Advanced rack-steering model	`VI_CarRealTime_AdvancedSteering`
• CarSim converter	`VI_CarRealTime_CarSim_Converter`
• CarMaker Converter	`VI_CarRealTime_CarMaker_Converter`
• FMI Master	`VI_CarRealtime_FMI`
• MaxPerformance Custom Logics	`VI_Driver_Advanced_Optmization_Core`
• SuspensionGen	`VI_SuspensionGen`
• TameTire Interface	`VI_Tire_TameTire`
• FTire interface	`VI_Tire_FTire`
• MFTyre/MFSwift Interface	`VI_Tire_MFTyre`

- CD Tire `VI_Tire_CDTire`

VI-CarRealTime can optionally use Adams/PostProcessor, as a postprocessing alternative to VI-Animator. In order to use it the following license key is required in conjunction with the MSC licensing system:

- `ADAMS_Postprocessor`

A full **Adams Car** installation is required to utilize VI-CarRealTime plugin. VI-CarRealTime plugin is protected by the license key:

- `VI_CarRealtime_ADAMS_IFace`

To run Adams Car you need the following keys in conjunction with the MSC licensing system:

- `ADAMS_View`
- `ADAMS_Solver`
- `ADAMS_Car_Suspension`
- `ADAMS_Vehicle_Solver`
- `ADAMS_Foundation_Classes`
- `ADAMS_TireHandling`

Additional (3rd party) license keys are required to enable tire models different from VI-Tire.

In order to run simulations with Cosin FTire model, please refer to the documentation stored in the acarrt/cosin subdirectory of the VI-CarRealTime installation.
In order to run simulations with Tass MF-Tyre and MF-Swift tire models please refer to the documentation stored in the acarrt/mftyre_mfswift or acarrt/mftyre_mfswift_v7 subdirectory of the VI-CarRealTime installation.
Please note that starting from v19.0 the FTire and MF-Tyre/MF-Swift interfaces requires a dedicated license.

This product is patly based on incorporated software libraries. Please refer to the acknowledgments.pdf document, included in the product documentation for a listing of the adopted components and the respective licenses.

1.3 3rd Party Compatibility

This table shows the compatibility of the VI-grade suite products with the main 3rd party software.

	VI-CarRealTime	VI-BikeRealTime	VI-DriveSim	VI-Driver/VI-Rider for Matlab	VI-Driver for FMI
Matlab®	from 2015b to 2019b	from 2015b to 2019b	from 2015b to 2019b*	from 2015b to 2019b	
SimWorkBench®	2018.3 2020.1	2018.3 2020.1	2018.3 2020.1		
Veristand™ (***)	2015sp1	2015sp1			
dSPACE® RCP & HIL (**)	2018b 2019a 2019b	2018b		2018b	
ETAS LABCAR-OPERATOR IP®	5.4.8				
SCANeR®	1.8r33, 1.9r22		1.8r33, 1.9r22		
Prescan®	7.3				
Virtual Test Drive®	1.4				
SolidThinking Activate	2017.1				
Dymola®	2015				2015
CarSim™	2017.1				
CarMaker™	9.0				
TameTire	6.1		6.1		
CDTire	4.2.8		4.2.8		
RIDESuite	1.9/2.1		1.9/2.1		
FTire	2020.2		2020.2		

(*): please refer to SimulationWorkBench documentation for Matlab version compatible with MLToolkit module.
(**): the following combinations of dSPACE toolchain and SCALEXIO firmware are supported: 2018b with firmware 4.3.1, 2019a with firmware 4.4.1p3, 2019b with firmware 4.5.2.

3rd Party Software included in VI-grade products:

	VI-CarRealTime	VI-BikeRealTime	VI-DriveSim	VI-Driver/VI-Rider for Matlab	VI-Driver for FMI
MF-Tyre/MF-Swift	6.2.0.3 2020.1	6.2.0.3 2020.1	6.2.0.3 2020.1		

The following table shows the 3rd party compatibility for Adams-based VI-grade product:

	VI-Motorcycle	VI-Automotive	VI-Rail	VI-Aircraft	VI-CarRealTime Plug-In	VI-Driver
MSC Adams™	2020.0	2020.0	2019.2	2020.0	2018.0, 2019.0, 2020.0	2018.0, 2019.0, 2020.0
Matlab®	*	*	*	*		

(*): please refer to Adams documentation for compatibility version.
(***) The NI-PXI integration requires Visual C++ 2010 / SDK 7.1 to complete the building procedure successfully. Please refer to the NI-VeriStand documentation for more detail.

The VI-Licensing LMX supported version is **4.9.20** both for Server and for Client.

1.4 System Requirements

Supported Operating Systems

VI-CarRealTime 20.1 is available for the following platforms:

Platform	Installer Name
windows x64	VI_Crt_20_1_x64_Setup.exe

This installer is compatible with:
- Windows 7 x64
- Windows 10 x64

Please note that this version of VI-CarRealTime is released exclusively for 64 bit OS.

Hardware Requirements

Minimum hardware capabilities:

- **Processor:** 1.0 gigahertz (GHz) processor
- **RAM:** 2 GB for 64 bit version
- **Hard disk space:** 2.0 GB for full package installation
- **Graphics:** Video card that runs at 1280 x 720 screen resolution

Recommended hardware capabilities:

- **Processor:** 2.2 gigahertz (GHz) processor
- **RAM:** 4 gigabyte (GB)
- **Hard disk space:** 2.0 GB for full package installation
- **Graphics:** Video card that runs at 1920 x 1080 screen resolution

Additional Packages

The optional VI-CarRealTime Adams module should be installed separately, based on the desired Adams version:

Package	Installer Name	Package Size
VI-CarRealTime Plug-in	VI_Crt_plugin_<adams_version>_20_1_x64_Setup.exe	180 MB

Specific overlays are available for supporting the following "hardware in the loop" platforms:

Package	Installer Name	Package Size
dSPACE SCALEXIO r2018b	VI_Crt_SCALEXIO_20_1_r18b_Setup.exe	35 MB
National Instrument Veristand and LabView	VI_Crt_ni_pxi_20_1_x86_Setup.exe	107 MB
ETAS LabCar Operator	VI_Crt_ETAS_20_1_Setup_x64.exe	40 MB

Note: The Concurrent SimWorkbench is also supported. Please contact VI-grade support to request a specific version of VI-CarRealTime for these environments.

1.5 Updating models

Automatic model updates guarantee in most cases the forward compatibility of models when switching to newer versions of VI-CarRealTime.
This section describes version specific situations where user actions may be required to properly use existing models or data files in updated version of the software.

- Updating to version 20
- Updating to version 19
- Updating to version 18

1.5.1 Updating to version 20

No specific model updates are required from v19 to v20.

1.5.2 Updating to version 19

When updating a powertrain subsystem from v17 to v18, C1 spline map for LSD differential could be created without units for inner torque independent data (assuming it as Newton-meter).
v19 automatically adds the units if missing. You need to update C1 spline map independent data in order to match v18 results.

1.5.3 Updating to version 18

VI-CarRealTime v18 powertrain model takes into account the engine inertia even when the clutch model is not active: if your v17 declared an engine inertia with clutch turned off, you will need to set the engine inertia to 0 in v18 in order to match v17 results.

In order to fully support the features implemented in VI-CarRealTime vehicle model during export procedure, VI-CarRealTime plugin for Adams Car may require that Adams Car model templates are updated by introducing specific entities (communicators and/or variables).
Please refer to the vehicle parameter extraction procedure and suspension sequence of analyses documentation for a detailed description of the supported entities.

1.6 Changed Behaviour

1.6.1 Version 20

VI-CarRealTime

Vehicle Model

Front suspension scaling factors are applied only to jounce dependent curve (e.g. applying a scaling factor of 2 to the toe curve vs. jounce vs. steer doesn't double the steering ratio, but only the variation of toe with jounce)

Investigation Mode

The name of the CSV summary file generated at the end of an investigation, has been modified to support investigations with multiple events.
It now contains a suffix with the name of the investigation events.

Custom Events

With release 20.0 VI-CarRealTime introduces a new Python interpreter. Custom events generated for earlier version of the product must be updated to work with version.

- Syntax changes due to Python 2.x to Python 3.x update

  Some of the changes are related to Python syntax modifications. In most of the cases the needed changes will be limited to a few common functions and keywords. For sure the most common error is due to the change in the Python print statement

  The following statement is valid in python 2.x but NOT in Python 3.x :

  ```
  print 'hello world!'
  ```

  The following statement is instead valid in both Python 3.x and in many recent version of python 2, including the one available in earlier VI-CarRealTime versions.

  ```
  print ('hello world!')
  ```

  For any other issue coming from Python 2 to 3 conversion we suggest to refer to one of the many conversion guides available on the internet.

- Syntax changes due to VI-CarRealTime Framework update

  A few changes are related to modifications in VI-CarRealTime framework. For example in the definition of the event Class, the type of member variables was assigned with specific types, as StringType, IntType, FloatType. These are no longer supported, but there is a simple workaround that allows to keep using them in VI-CarRealTime 20, maintaining compatibility with earlier versions.

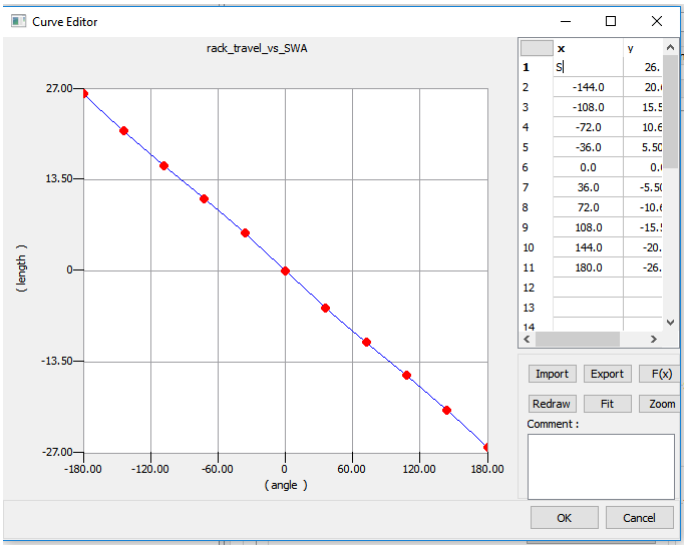
  It is enough to add the following code snippet at the beginning of the file containing the class definition:

  ```
  import sys
  if sys.version_info[0] > 2:
     ClassType = type
     ListType = list
     TupleType = tuple
     StringType = str
     FloatType = float
     IntType = int
  ```

1.6.2 Version 19

VI-CarRealTime

With v19, VI-CarRealTime has full support for different rack position layouts. During the export procedure, VI-CarRealTime plugin for Adams Car does not perform any sign adjustment for rack travel vs steering wheel angle spline. Spline will result monotonically decreasing if original model has a rack located backward with respect to kingpin axis.



Depending on rack position, differences on output channels for rack displacement and feedback may appear.
It is possible to restore previous behavior by setting to 1 the environment variable **VICRT_PLG_STEER_LEGACY** before running the export procedure.

KnC Wizard

in v19.1 the export of the compliance from aiding and opposing load cases is performed for the left and right side independently, unlike in v19.0 where the computation was done only for the in phase side and the other side was created symmetric.
It is possible to restore the symmetry of the exported model by setting the symmetry option in the panel of the KnC Wizard.

VI-SpeedGen

In previous VI-CarRealTime releases the vehicle mass geometry used to initialize speedgen model represented a snapshot of design configuration. Starting from version 19.0 the default configuration represents a snapshot of vehicle configuration after static/setup. This different mass configuration can lead to differences on results of speedgen and maxperformnce events. Previous version behavior can be obtained by using the system tree parameter speedgen->use_design_configuration=1.

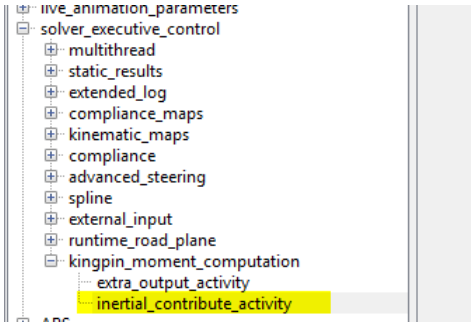
1.6.3 Version 18

VI-CarRealTime

With the introduction of the automatic transmission models, a new output channel (transmission.gear) has been added to report the currently engaged gear. With v18 this new channel is sent to VI-Animator in live animation mode instead of channel driver_demands.gear, sent in earlier versions. If you have created VI-Animator plot configurations or custom widgets associated to the old channel, please edit them to pick up the transmission.gear result component.

Solver

in v18.2 a new element in the parameter tree has been introduced to allow per model selection of the kingpin moment computation mode.



In previous v18 releases, the selection was possible using an environment variable (VI_KINGPIN_INERTIA_OFF). The default behavior is to include all supported contribution in the kingpin moment computation (1). The environment variable is still supported, but is considered deprecated and will removed in future version

In v18.2, the gear-shifting maps function of throttle are interpreted as depending on the raw throttle input: in previous versions, the effective throttle demand (including the contribution of the engine management system and slip controllers) was used.

Solver SDK

In v18.2 the behavior of the vehicle relocation C APIs has been modified in order to fix an inconsistent behavior to specified inputs:
1) `c_crt_set_sm_XY_position` now forces the estimation of vehicle elevation
2) `c_crt_set_sm_position` now relies on elevation provided in input instead of attempting an automatic estimation
if you developed code using one of these APIs you will likely obtain different responses: in order to get the desired behavior, please update your code in order to call `c_crt_set_sm_position` if you want to provide the vehicle initial elevation or `c_crt_set_sm_XY_position` in case you want VI-CarRealTime to compute the elevation.

VI-Driver

Thanks to some correction applied to reference engine torque input in standstill conditions, VI-CarRealTime will produce smoother throttle and brake signals when vehicle is idling.

The following key in the VDF file is now affecting also open loop throttle signal while in past version only machine mode was affected: `THROTTLE_CONTROL_ACTIVATION = 'TRUE'`
The consequence is that during a gearshift, the throttle will be released also when configured in open loop mode.

VI-Road

The suppport for parallel road computation required some changes to the STI road interface that may lead to slightly different contact patch evaluation. The current default VI-Road configuration grants consistent results for both sequential and parallel evaluation. Consistency with v17 version of VI-Road for sequential computation mode can be achieved with the key `LEGACY_MODE = 1` to the `MODEL` block.

1.7 Known Issues

The following limitations have been identified at release time:

- Using silent mode during installation will not display any message in the command window.

- Cross weight may lead to static analysis failures in models including live axle rear suspension.
- Simulink analyses with huge number of integration steps can cause memory problems (buffer overrun) due to the size of MATLAB workspace output. An immediate workaround is to reduce the number of outputs dumped to MATLAB workspace.
- Simulation statistics and output file formats different from *.res are only available with active buffer output option (Edit->Preferences…).
- The NI-PXI overlay requires Visual C++ 2010 to complete the building procedure successfully. Please refer to the NI-VeriStand documentation for more details.
- When loading data from a setup file the values stored in components property files (springs, dampers, etc.) are not updated.
- The target speed profile, generated by a VI-MaxPerformance simulation, can be referenced only through a drd file. The parameter System->Properties-->Output Files-->VDF is not supported in case of VI-MaxPerformance event.
- When exporting an MSC Adams/Car model for VI-CarRealTime, Bushings-in-series and Tolerance features of Bushings are not captured by the export and VI-CarRealTime model.
- In the Automatic Model Validation report, for asymmetric vehicles, the curves of track and wheelbase variation versus wheel travel may present an offset with respect to the equivalent Adams curves. Such offset is a constant quantity, added to the track/wheelbase variation curves, which allows VI-CarRealTime suspension model to take into account of wheel centers shifts with respect to the vehicle mid-plane.
- Executing a StaticLapTime or MaxPerformance event using a model with TassInternational MF-Tyre 6.2 tires, several errors are reported in the console: -- ERROR -- TNO TIRE Error opening road data file "DEFAULT_VITIRE_FLAT_ROAD". Such error is misleading because the core is actually using the right road: flat road (default) or the road selected by the user if Use Road Data File checkbox is activated. So such error can be neglected.
- Investigation run with Mode of Simulation set to *matlab_simulink* will throw errors when computing responses due to a compatibility problem of numpy library with MATLAB.
- Running an investigation which uses a FileDriven event with a VDF generated in a previous MaxPerformance event generates errors due to the fact that VI-Driver *can't read/load path DRD file* . It happens because DRD file is referenced in the VDF with a relative path: in general DRD file is stored in VI-CarRealTime working directory, while the investigation analyses are run in a specific investigation folder. In general, errors are thrown whenever the investigation uses property files which reference other files with a relative path. Suggested workarounds to overcome the problem:
    - copy all the involved files in the investigation folder;
    - use current VI-CarRealTime directory as investigation folder by simply specifying "." as Output Folder in the Investigation Mode.
- Running a model with the FMI master plugin from a OneDrive directory may lead to failure on the 2nd run. A workaround to prevent the failure is removing the temporary directory in which the FMU files are decompressed.
- If you have Fingerprints created with versions older than VI-CarRealTime 18 and containing Press Maneuver events, you will have to manually update the fields 'Front To Origin Distance' and 'Rear to Origin Distance'. (as an alternative the Fingerprints can be opened in any version between 18.0 and 19.1, and they will be automatically updated).

1.8 Revision History

1.8.1 Release 20.1

Added Capabilities:

Change ID	Module	Description
20668	CarRealTime	Improve smoothing time + offset management for CDI and FTIRE
20634	CarRealTime	Check drd definition before running mxp event to avoid errors
20590	CarRealTime	CarMaker to VI-CarRealTime converter Enhancements
20166	CarRealTime	Certify dspace 2019b
20138	CarRealTime	Improve Documentation on Tire Forces flag
20136	CarRealTime	Expand documentation on report file with rigid bodies
20054	CarRealTime	Review SCALEXIO Tutorial
19731	CarRealTime	Add Warning during suspension initialization when dependent/independent inconsistencies are found
19701	CarRealTime	Electric energy consumption function
19036	CarRealTime	TAMETIRE 6.x enhancements
18971	CarRealTime	Update Documentation on Matlab API resolveSubsystemFromSystem
18928	CarRealTime	Documentation for NEDC cycle
18927	CarRealTime	Remove shared dbs from available targets for converters
18291	CarRealTime	Support dSPACE 2019A
17581	CarRealTime	Integration step parameter for VI-DriveSim events
15254	CarRealTime	Improve editing capabilities in static loadcase editor
14932	CarRealTime	Add user defined std tire reference location as VI-CarRealtime event parameter

Bugs Corrected:

Change ID	Module	Description
20852	Road	Vi-Road initialization issue when using Ftire in MT mode
20667	SuspensionGen	Fz compliance is not null
20626	CarRealTime	MaxPerfomance factor spline not working with Tire Limits enabled
20596	CarRealTime	VI-TireLimits application generates wrong visualization when plots camber dependency
20581	SuspensionGen	Wrong right bushings graphic orientation
20580	CarRealTime	CarSim converter does not recognize coefficient for M_DIFF_VISC
20579	Road	Crash inverting points with empty table
20450	CarRealTime	Tire limits outputs do not take in account road friction
20246	CarRealTime	CarRealTime adams plugin uninstall does not remove all files
20171	CarRealTime	Crossover SevenPostRig fails when body is fixed
20114	CarRealTime	CRT rise an error in case compliance model is not defined
20109	CarRealTime	Numerical issues when activating locked central differential
20079	CarRealTime	Update Side View Angle ouptut sign consistency
20022	CarRealTime	VI CRT 20.0 Silent Install stops on 3rd party installers
19973	CarRealTime	Single table Auxiliary antiroll force is corrupted with asymmetric range of export
19940	SuspensionGen	Wrong right wheel visualization for solid axle types
19912	CarRealTime	Battery SOC resets to 100 when initial velocity is zero
19823	CarRealTime	KnC Wizard - Failing vehicle model creation when adding a database in session
19759	CarRealTime	Add a warning against self exciting springs when using length as independent variable
19690	CarRealTime	Coulomb Friction does not work for Column element
19672	CarRealTime	Component points export from suspension assembly is not supported

19663	CarRealTime	Add Z units to Fz compliances spline defaults
19657	CarRealTime	Auxiliary plugin compile in Linux is missing files
19540	CarRealTime	Rear Compliance not working for Fz with 3d splines
19409	CarRealTime	Fuel running mass field cannot be activated
19377	SuspensionGen	Blade ARB overwrite T ARB element
19301	SuspensionGen	Dependence of blade anti-roll bar from steering is not captured
19173	CarRealTime	ZUnit attribute is missing in Anti-Roll Compression Ratio Spline
19133	SuspensionGen	Single elements have null motion ratio spline when exporting from Suspension Gen without 3rd Spring
19025	CarRealTime	Published system points to ubf files of the original database
18962	CarRealTime	Remove references to missing (unused) property files in subsystem file
18749	CarRealTime	Error in initialization running with only Main Motor
18329	CarRealTime	Plugin Validation checks only for left wheel mass
18230	CarRealTime	Plugin Export calculates negative chassis inertia
17985	CarRealTime	Electric Motor Tau issues
17061	CarRealTime	Adams plugin full vehicle validation hides axis scale
15636	CarRealTime	Suspension testrig does not give warning when statics abort time is reached
14828	CarRealTime	Spin when landing from jumps
13988	CarRealTime	Pickup model longitudinal vibration at full throttle standing start

1.8.2 Release 20.0

Added Capabilities:

Change ID	Module	Description
18481	Driver	Enhance VI-Driver and VI-Road compatibility with MB-SHARC
18389	CarRealTime	Add documentation on Camber/SVA splines handling with dependent suspension
18288	CarRealTime	Tire Model and Road Format Compatibility Matrix
18275	SuspensionGen	Remove steering system from rear SolidAxle5Links
18234	CarRealTime	Add plugin documentation about ARB deactivation
18075	CarRealTime	Remove driver parameters no longer present in the system tree from documentation
17880	CarRealTime	Powertrain Layout Enhancements
17595	CarRealTime	Improve car pictures in body panel
17438	CarRealTime	Add user VDF option for automatic validation
17418	CarRealTime	Add makefile to the pack & go archive
17416	CarRealTime	Steering kinematics from vertical motion with fixed steer loadcase
17381	CarRealTime	3d spline support for Fz compliance
17329	Road	Show material ID on Materials frame
17315	CarRealTime	Add steering torque input channel
16866	CarRealTime	Documenting use_jounce_actuator flag in static loadcase xml
15258	CarRealTime	Support MFTyre 2020.x on NI_PXI
15226	Animator	Update Icon Design
15082	CarRealTime	Add documentation on methods adopted to export antiroll force
15075	Road	Remove initial z offset in crg exported from mesh
14987	CarRealTime	Enhance Preferences Editor

14722	CarRealTime	Support for Adams 2020
14673	CarRealTime	Curve Manager Enhancements
14669	CarRealTime	Make About Dialog consistent with the other products
14552	CarRealTime	Support FTire 2020.2
14356	CarRealTime	Update Bibliografy in xml file
14343	CarRealTime	Improve FTire usability with VI-Road
14243	CarRealTime	Clone models in build mode
14225	CarRealTime	Replace model in entire fingerprint
14059	CarRealTime	Support -m module-name when calling python
14018	CarRealTime	Improve tire low speed stability with no changes to the property file
13983	CarRealTime	Set default values for ServoGear in SharedModels Rack&Pinion steering
13932	CarRealTime	Update documentation advance steering
13812	Road	Background color selection for 3D widget
13350	CarRealTime	Add rotational sensors
13288	CarRealTime	Export rack damping from Adams Car
13079	CarRealTime	Add documentation for missing system parameters
12627	CarRealTime	Add flag to ignore braking phase in Fuel Consumption Calculation
12595	CarRealTime	Add secondary contributes to kingpin moment computation
12511	CarRealTime	Support body lock option for 7post event
11983	CarRealTime	Update CarSim converter
11976	CarRealTime	Certify matlab 2019b
11344	CarRealTime	Create Seven Postrig Tutorial
11264	CarRealTime	Dark Theme
11243	CarRealTime	King Pin Moment from element acting on upright
11102	CarRealTime	MFTyre 2020.1
11101	CarRealTime	Tametire 6.1 (experimental)
10701	CarRealTime	Improve correlation for Automatic model validation
10700	CarRealTime	Investigation mode improvements
10408	CarRealTime	Automatic deactivation of installation stiffness when stiffness value is non positive
10380	CarRealTime	Improve documentation for external driveline with Simulink
10353	CarRealTime	Optimize solver performance
10168	CarRealTime	Built-in battery model
9838	CarRealTime	CarMaker to VI-CarRealTime converter
9704	Road	GridMesh road model
8716	CarRealTime	Remove FTire libraries from distribution
8628	CarRealTime	Simulink Plugin Export - Enhancements
7911	CarRealTime	Increase model fidelity for ride events
6291	CarRealTime	Symmetry control for compliance in K&C Wizard
6092	CarRealTime	Direct interface for CD Tire
5632	CarRealTime	Runtime tunable vehicle properties
4667	CarRealTime	Variable fidelity model
3447	CarRealTime	Support for Adams Car CG point location
1309	SuspensionGen	Export anti-roll bar in dual table format

Bugs Corrected:

Change ID	Module	Description
19046	CarRealTime	Wrong longitudinal force sign in validation plots
18833	CarRealTime	Export for body_parts group with flexible bodies fails in force creation
18736	Road	Unwanted icons on default context menu
18714	CarRealTime	Hardy Disk Affects torsion bar load output
18616	CarRealTime	Press maneuver events terminates in case on equation of motion violation
18573	Road	Colors mismatch between materials frame and graphics
18557	CarRealTime	Path Sensor outputs may contain random data in case of automatic initialization fails.
18411	CarRealTime	No Differentials options does not deactivate all differentials
18382	CarRealTime	Shared models advanced steering inertia too low
18369	CarRealTime	Copy and paste does not work on standard tables
18365	CarRealTime	Incorrect title in several message dialogs
18363	CarRealTime	Wrong pwr map file exported in obfuscated events
18362	CarRealTime	VI-CarRealTime Plugin number of compliance analysis are not correctly assigned
18354	CarRealTime	Kinematic scaling factor should not affect steering dependency
18338	CarRealTime	SpeedGen can't be launched from comand
18328	CarRealTime	Plugin Export only checks wheel subsystem symmetry to write wheels subsystems
18213	CarRealTime	Plugin Export add driveline adds wrong minor role to assembly
18012	CarRealTime	Traceback using maxperf + staticevo when using solver ppt
17875	Road	Crg road exported from mesh road is flat
17791	CarRealTime	Investigation Mode Summary Report for multiple events
17647	CarRealTime	Pickup model event fails to run press maneuver event
17586	Road	Road outside the viewport
17528	CarRealTime	Throttle Scaling in Cosimulation for electric motor not working
17463	CarRealTime	Components kingpin moment mismatch (spline vs. no spline)
17417	CarRealTime	Adams plugin Xdof export does not support variants
17380	Road	Different results in corner cutting from drd file or drd in rdf
17234	CarRealTime	Investigation mode: traceback selecting points as factors
17046	CarRealTime	Wrong units for influence matrix user output
17032	CarRealTime	Plugin validation with adams 2019 uses wrong steering units
16867	CarRealTime	Remove dots ('.') from VI-CRT user output internal name
16029	Driver	Combo box list not fully visible
15267	Road	Wrong parameter value in exported crg file
15247	CarRealTime	Error in mirroring compliance symmetry
15073	Road	Crg rototranslation is not correct
14923	Road	Opencrg generated by mesh is wrong
14918	Road	Continuation line flag lost on save
14870	CarRealTime	Investigation mode candidate and response channel search filters are case sensitive
14858	CarRealTime	Speedgen vertical acceleration is always zero
14235	CarRealTime	Errors when exporting powertrain that doesn't have phs_powertrain_type
14210	CarRealTime	Export errors when phs_kinematic_flag doesn't exist for a subsystem

14167	CarRealTime	CarRealTime output jounce_stop_data.jounce_rear is always 0
14144	CarRealTime	Events table is useless in review mode
14101	Road	No way to open pdf help from VI-Road gui
14100	SuspensionGen	No way to open pdf help from SuspensionGen gui
14083	CarRealTime	User sensor panel is not refreshed in duplicated subsystems
14078	CarRealTime	Incorrect location for user sensor on unsprung mass parts
13894	CarRealTime	Shared database 'Pickup' has wrong upshift RPM map
13870	CarRealTime	Remove compl_parallel_travel simulation from export analyses
13307	CarRealTime	CRT demo automatic transmission spline
13179	CarRealTime	Plugin Validation Wrong CM displacement request
13098	CarRealTime	Steering Rack Force Output Differences
13084	CarRealTime	Sevenpostrig output documentation
13045	CarRealTime	Export error with kinematic_flag
12738	CarRealTime	Ouput map doesn't deactivate Advanced Steering Ouputs
12673	CarRealTime	Transmission efficiency spline documentation
12566	CarRealTime	CRT does not execute more than one custom postprocessing script
12560	CarRealTime	Lap Sensor is triggered before end of DRD path
11902	CarRealTime	Skidplate Output Naming Convention
11596	CarRealTime	Adams ppt command not working if path contains spaces
11252	CarRealTime	FMU failing under OneDrive
10752	CarRealTime	Sedan car steering torque sign inversion around 450 deg
9630	CarRealTime	Adams Crossover shared model does not perform SPMM compliance analyses
9583	CarRealTime	Active runtime log in Solver Executive Control produce an empty log
9552	SuspensionGen	Anti-roll steering component missing sign
8431	CarRealTime	Export ADAMS to CRT - Steering Rack Analysis / Scale Factors
8416	CarRealTime	VI-CRT Plugin: plugin does not recognise steering compliance communicators activity
7905	CarRealTime	Advance Steering variable ratio - Check
4462	CarRealTime	UNC paths cause errors in CRT
3269	CarRealTime	Support export of rear wheel steering models

1.8.3 Release 19.2

Added Capabilities:

Change ID	Module	Description
14889	CarRealTime	Outputs for rigid part documentation
14540	Road	Improve road graphic visualization
14138	CarRealTime	Kinematic mode for steering assist servo gear
13941	CarRealTime	Support Adams Car Bumpstop of type external on export
13936	CarRealTime	Support for license protected obfuscated send files

Bugs Corrected:

Change ID	Module	Description

15274	CarRealTime	Torque scaling parameter does not work for motors when using pwr file
14888	CarRealTime	Wrong speed tracking using electric motors at differential
14843	CarRealTime	Body on Frame 7Post Rig Analysis Errors
14827	CarRealTime	Wrong compliance scaling factor for traction and braking
14556	CarRealTime	Fix wrong formula in frequency bushing documentation
14024	CarRealTime	VI-CarRealTime plugin does not update already open assemblies
13929	CarRealTime	Automatic Gearbox and Standard clutch configuration generates wrong results
13777	CarRealTime	Torque Converter Locking Clutch does not generate constant value (=1) for speed ratio
13720	CarRealTime	Clutch Slip on MaxPerformance w/Dual Clutch
13679	CarRealTime	Roll center height computation during turn
13214	CarRealTime	Potential crash when calling vicrtCreateIOstruct
13201	CarRealTime	Advanced Steering Hardy Disk w/EPS Column

1.8.4 Release 19.1

Added Capabilities:

Change ID	Module	Description
12921	CarRealTime	Vtd event - xod path always include local directory - not working wth local path option
12431	CarRealTime	Add independent integration time step to be used for static analysis only
11139	CarRealTime	Add reverse rotation input for electric motor
11065	CarRealTime	Convert capacity factor to correct units during export
11053	CarRealTime	Support for CDTire 4.2.8
10893	CarRealTime	Customized cones position in Press Maneuvers event
10787	CarRealTime	Rack and pinion steering documentation improvements
10710	CarRealTime	Support dSPACE toolchain 2018b
10699	Driver	Support Adams 2019.0
10629	CarRealTime	Support Adams 2019.0
10622	CarRealTime	Allow engine block as differential shaft inner reaction body
10614	SuspensionGen	Animation support
9867	CarRealTime	Document Adams Car steering template for rack pinion steering
9584	CarRealTime	Optimize solver performance
9033	CarRealTime	Export Bushing Scaling from Adams Car
8988	CarRealTime	EMotorTorqueMapFile has no corresponding object in parameters
8916	CarRealTime	Need an option to remove suspension analyses in full vehicle export panel
8846	CarRealTime	VI-SpeedGen should account for driveline efficiencies
8705	CarRealTime	Remove obsolete trailer.mdl from shipped example models
8513	CarRealTime	Make tir reading case insensitive in CarSim Converter
8497	CarRealTime	Export tire inertia parameters from CarSim
8496	CarRealTime	Export torque converter parameters from CarSim
8322	CarRealTime	Support version 5.4.8 of ETAS LCO
8226	CarRealTime	Generate CMD with export settings when exporting a model from Adams Car
8196	Road	Implement function to invert trajectories driving direction
7940	CarRealTime	Show message at the end of suspension export

7912	CarRealTime	Investigation mode improvements
7877	CarRealTime	Add Heave and Roll Damper Inputs
5370	CarRealTime	Update OpenCRG to version 1.1.2
3507	CarRealTime	Downshifting map with tunable sport/comfort modes
3152	CarRealTime	Remove Sensors (or bushings) from GUI tables
1310	SuspensionGen	Allow hardpoint selection from data row and viceversa
1250	CarRealTime	Improve correlation for Automatic model validation

Bugs Corrected:

Change ID	Module	Description
13047	Driver	Simulation not interrupted by end of path event
12667	CarRealTime	VI-SpeedGen Evo doesn't write all the outputs channels
12628	CarRealTime	VI-CRT Chassis Compliance and Damping in v18.2 versus v19.1
12567	CarRealTime	API publishSystemFileToDb wrong cfg output
12555	CarRealTime	Rigid Part graphic not copied when publishing a system in a new database
12391	CarRealTime	User sensor on body part not working
12012	CarRealTime	Body Rigid Parts are not considered in automatic model validation report
12007	CarRealTime	Full xml paths when exporting model with Use Existing option
11921	CarRealTime	Skidplate point appear and disappear from Skidplate table
11629	CarRealTime	Missing kingpin_moment_computation parameters update
11613	CarRealTime	Investigation Mode Not Working
11531	CarRealTime	Vehicle Wizard Utils generate wrong gear shifting map
11528	Driver	Adams controls simulation with vidriver failure
11506	CarRealTime	Wrong Label in RackFeedback Force panel
11464	CarRealTime	Vicrt_startup.py can't include external libs
11422	CarRealTime	Traceback in compute combinations with groups (1 element)
11365	CarRealTime	Single bumpstop clearance adjustment
11281	CarRealTime	Engine property files obfuscation works only in combination with Overwrite Files
11239	CarRealTime	Incorrect options reported in customization tutorial
10951	SuspensionGen	SuspensionGen closes writing on a folder where the user has no writing access
10922	CarRealTime	VI-TIRE user tire module skipping the differencing computations in single-thread
10726	CarRealTime	Errors when setting ARB rate using MATLAB api
10597	CarRealTime	Wrong offset of steering curves for dependent suspension
10594	CarRealTime	Auxiliary Rebound Bumper causes Simulink crash
10580	CarRealTime	Simplified main motor does not work
10414	CarRealTime	Crossover Torque Converter Slips
10398	Driver	Adams crash submitting VDF
10366	CarRealTime	No drag force in pickup shared model
10327	CarRealTime	Wrong powertrain and graphics file names during validation
10214	Road	Crash creating a centerline with path builder tool
10207	CarRealTime	Body Compliance: torsion compliance not tunable
10186	CarRealTime	CRT Demo external steering model example is out of date

10129	CarRealTime	Automatic Model Validation fails when vicrt_19_defaultPrefs.xml is defined in Adams CWD
10115	CarRealTime	Error exporting powertrain data
10027	CarRealTime	Sport/Comfort Gear shifting mode live tuning is not working on simulator
9983	SuspensionGen	Caster angle not computed by mcpherson elastokinematics analysis
9787	CarRealTime	Sensors appear and disappear from User Sensor table
9785	CarRealTime	Steering Wheel Angle end condition is not triggered when the model use rack travel spline
9726	CarRealTime	Wrong automatic selection of initial gear
9636	CarRealTime	VI-Speedgen computes wrong speed profile when using electric motors
9623	CarRealTime	Matlab may crash running a VI-CarRealtime model including a plugin generated by Simulink
9574	CarRealTime	Crt_pluginSOL not included in installer
9536	CarRealTime	Wrong bushing force computation when spline is not symmetric wrt deformation
9062	CarRealTime	Wrong driving torque reactions
8901	CarRealTime	Help: links to anchors in the same page do not work for Investigation mode topic
8898	CarRealTime	Body on frame feature is not compatible with 7 Post events
8892	CarRealTime	Motor uses property file activation flag even in case of simple model
8857	CarRealTime	Solver crash when using obfuscated top motor map
8855	CarRealTime	Differential efficiency does not change behaviour during throttle release
8803	CarRealTime	Missing units in AntirollBar Compression Ratio value
8782	CarRealTime	Wrong signs in some automatic model validation KnC curves with MBSharc
8773	CarRealTime	Wrong steering torque sign when using rack-pinion steering
8751	CarRealTime	Comfort mode shifting tables not set correctly for vehicles exported from Adams
8739	CarRealTime	Clutch efficiency is not applied correctly for standard clutch
8709	CarRealTime	Fz Compliance macro errors when exporting MBSharc Model
8694	CarRealTime	Simulink cosimulation crashes when using a send file including trailer model
8607	CarRealTime	Traceback when compiling interactively custom solver plug-in
8542	CarRealTime	Carsim converter does not export splines vs Rack
8489	CarRealTime	User defined vehicle location generates a speed gen event not coherent
8451	CarRealTime	Solver crash when using v18 automatic transission
8407	CarRealTime	Wrong documentation on groups required to export engine rods from Adams Car
8370	CarRealTime	Main motor torque imported from v18.2 delivers different results
8338	CarRealTime	Missing dialog boxes in VI-CarRealTime plug-in for Adams Car older than 2017.2
8317	CarRealTime	Export procedure rises errors exporting solid geometry
8281	CarRealTime	Deactivation Runtime input does not work correctly when using dual clutch model
8274	CarRealTime	Remove "variants" stuff from documentation
8262	CarRealTime	Missing export_def.py in VI-CarRealTime installation
8224	CarRealTime	Asymmetry issue with rear Installation Stiffness
8214	CarRealTime	Engine Initial Condition may be incorrect
8210	CarRealTime	Dual motor awd does not update motors and differentials activity
8195	CarRealTime	Matlab plugin export failure using expression in vector
7729	CarRealTime	Driveline layout visualization
4957	CarRealTime	Investigation mode System Mismatch on empty fingerprint
3886	Driver	File -> Import Event menu in VI-EventBuilder doesn't work

1.8.5 Release 19.0

Added Capabilities:

Change ID	Module	Description
7947	CarRealTime	Export Advanced steering data from Adams Car
7515	CarRealTime	Remove need of memory block for simulink interface
7198	CarRealTime	Add compliance threshold to model system tree
6257	CarRealTime	Exposing Custom Logics documentation
6018	Animator	Record movies with full frame rate
5978	CarRealTime	Export models from Adams for v19
5925	CarRealTime	Add angle sign picture to susp setup date editor
5819	CarRealTime	Use communicator matching name to detect steering compliance information
5810	Driver	Add Steering Angle Velocity END Condition in VDF
5793	CarRealTime	Export the right EPS map from Adams
5167	Road	Allow general road interface to work with variable I/O points
5127	CarRealTime	Add roll center output to standard output set
4922	CarRealTime	Improved management of masses and auxiliary vertical force in Adams Car Export
4783	Animator	Dynamic filter files in AdamsDBfileDialog
4782	Road	Enable surf mode on new path selection
4781	Road	Enable smoothing function for oval and analytic roads
4778	Road	Improve continuity of smoothing function for closed tracks
4775	SuspensionGen	Add bushing frame visualization
4774	SuspensionGen	SuspensionGen orthographic view
4770	SuspensionGen	Add tierod at lca option for rear mcpherson
4769	SuspensionGen	Option to move mcpherson arb on lca
4768	SuspensionGen	Support for mcpherson with three links
4767	SuspensionGen	Function to add and remove antiroll bar
4764	SuspensionGen	Reference System not clear
4760	SuspensionGen	Add specific activation flag for each setup function
4533	CarRealTime	Remove un-used parameters from sample TIR files
4515	CarRealTime	New SportCar shared model
4421	CarRealTime	Support TameTire v5.1
4419	CarRealTime	Support FTire 2019-1
4399	CarRealTime	Engine omega channel should be null when internal engine is disconnected
4398	Road	Enable road width field loading a drd as road
4356	CarRealTime	KnC Wizard support dataset containing NaN
3526	CarRealTime	Model efficiencies as dissipation of energy
3257	CarRealTime	Investigation mode
3250	CarRealTime	Expose Scaling factor for suspension elements
3145	CarRealTime	Enable use of multiple auxiliary subsystems
3028	CarRealTime	Performance Scaling maps for MaxPerformance
2737	CarRealTime	Gearbox inertia should be gear dependent

2733	CarRealTime	Gear dependent engine torque maps
2729	CarRealTime	Add option to define maximum engine speed per gear
1402	CarRealTime	Increase model fidelity for ride events
1375	CarRealTime	"Body on frame" chassis architecture
1372	CarRealTime	Solid axle based vehicles
1343	CarRealTime	Startup logic behaviour improvements
905	CarRealTime	Allow csv file generation for each lap in multi-lap mode
756	Driver	Path distance as end condition
751	CarRealTime	Suspension model for VI-SpeedGen

Bugs Corrected:

Change ID	Module	Description
8023	CarRealTime	Error running user tire sample with single contact point enabled
7945	CarRealTime	Opening up-to-date system - marked as modified
7894	CarRealTime	Enabling left / right symmetry makes right data being set on the left side
7813	CarRealTime	Failures with NI Veristand interface
7684	CarRealTime	Error in Matlab Exported plugin compilation
7593	Road	Wrong road mesh colour
7592	Road	Modified material on a mesh road is not visible on 3D after reloading the rdf file
7414	CarRealTime	Inerter elements don't apply force to model
7411	Animator	Default folder when importing analysos is wrong
7399	Driver	Update VDF option chooses wrong shift gear RPM for GSE-based powertrain
6166	CarRealTime	Published model still references old XGR file
5991	CarRealTime	7Post mex function: I/O update generates a res with wrong name
5990	CarRealTime	7Post mex function does not support external plugin
5976	CarRealTime	Problem generating a plugin from with "tunable" parameters
5949	CarRealTime	Matlab crash using 7Post mex
5942	CarRealTime	"7post testrig end of reference signal reached" warning appears when computing first integration time step
5926	SuspensionGen	Multilink elastokinematics failure with arb on lca
5896	CarRealTime	Coast_down.xml event is saved with its full path in fingerprint xml
5829	CarRealTime	Simulink Plugin Export - Makefile Issue
5788	CarRealTime	Speedgen fails when vehicle relocation flag is active
5779	CarRealTime	Optimal gear definition fails during straight setup
5765	CarRealTime	Engine Reaction torques get lost selecting an invalid body
5754	Driver	Gear Mapped Module inhibit clutch idle control
5695	CarRealTime	Engine mount request sign mismatch
5675	CarRealTime	Wrong help labels in powertrain editor

1.8.6 Release 18.2

Version	Change ID	Change
18.2	FDB-6022	Matlab api does not allow appending of aux subsystem to a system instance
	FDB-6020	Document how to return materail id from user tires

	FDB-6016	Cannot run event with obfuscated model
	FDB-6011	SCANeR 1.7r37 certification
	FDB-6010	Wrong contact patch estimation relocating vehicle on external road
	FDB-6004	Obsolete tags are not removed from model
	FDB-6002	Cannot run crg roads on SCALEXiO
	FDB-5986	Rack-Pinion steering - EPS friction parameters are not parsed correctly
	FDB-5978	Vehicle side slip is not properly defined at low speed
	FDB-5973	Cannot initialize simulink model when vfs block is inside a subsystem
	FDB-5969	Steering motor_torque output channel is zero when using User Assist torque
	FDB-5953	Improve export process logging time spent on different stages
	FDB-5947	Human driver fails to drive a maneuver that works with robot driver
	FDB-5946	Throttle dependent gearshifting maps are hard to set
	FDB-5945	Press Maneuvers for MATLAB crash when launched the second time
	FDB-5943	Torque converter splines don't have labels and units
	FDB-5941	Unsupported parts can be selected as bushing attachment in powertran model
	FDB-5929	Hysteretic Damper conflict with J Damper
	FDB-5928	Wrong tooltip in trailer body subsystem
	FDB-5924	Missing source UI file for engine bushings
	FDB-5918	Wrong labels for frequency bushings in powertrain mount
	FDB-5910	Powertrain outputs wrongly computed when using Inactive clutch
	FDB-5909	Print a warning in case of event initial gear greater than maximum gear
	FDB-5908	Can't define initial gear greater than 7 for VI-Driver events
	FDB-5907	Wrong main motor IC when using motor transmission ratio is different from 1
	FDB-5899	Need a Matlab API to refresh kingpin axis
	FDB-5897	Add parameter to skip inertial contribution on kingpin moment computation
	FDB-5894	Missing Payload panel in distributed trailer body subsystems
	FDB-5885	Add two slalom maneuvers with cones spaced 18 and 36 m
	FDB-5883	Missing save & restore procedure for trailer
	FDB-5882	Static results for trailer analysis not stored in output files
	FDB-5877	Speedgen fails when the main motor is activated
	FDB-5873	Engine part with rods connection may produce instability
	FDB-5869	Prevent to simulate models not declaring valid kinematics maps function of Rack Displacement in combination with Rack-Pinion steering
	FDB-5866	Wrong mass distribution in case of unmapped subsystems
	FDB-5863	Incorrect response of LSD differential in example driveline.mdl model
	FDB-5861	Wrong default location for car hitch ball to attach trailer
	FDB-5860	Trailer example fails to simulate with SedanCar
	FDB-5851	Matlab API: error setting rear bumpstop/reboundstop property files
	FDB-5849	Matlab API: writeSystemStruct doesn't update bumpstop/reboundstop property files
	FDB-5844	Adams Car export failure with old style powertrain template
	FDB-5842	Unclear message reported during Adams Car export when one or more brake parameters are not found
	FDB-5841	Adams Car export fails if cil_tierod_joint communicator is not matched
	FDB-5836	Missing documentation for output channel OUTPUT_FV_Steering_System_DriveSim_Steering_Feedback_Torque

	FDB-5649	Long model name leads to export failure with unclear messages
	FDB-4853	Spikes in tire forces with MFTyre running on briges
	FDB-4515	Trailer is unable to retrieve user vehicle location

1.8.7 Release 18.1

Version	Change ID	Change
18.1	FDB-5811	Improve user tire example with non-linear forces implementation
	FDB-5796	Rack and pinion steering may incorrectly partition upper column inertia
	FDB-5768	Main engine ratio is not propagated to VI-SpeedGen
	FDB-5766	Crash writing simulation final statistics with small circular buffer
	FDB-5765	Wrong force at wheel computation using 4 wheel steering models
	FDB-5763	Open differential dialog shows a wrong GUI
	FDB-5760	User tires cannot distinguish between speedgen and crt invocation
	FDB-5756	Torque Map Property File is incorrectly required with Simple Motor Type
	FDB-5754	Cannot run ftire with viroad rdf on linux
	FDB-5753	User event vdf contains a time based end condition
	FDB-5741	Speedgen solver crashes when using MaxPerformance with TireLimits
	FDB-5739	Apply flying car plane computation mode to user sensors
	FDB-5738	Options in Mode of Simulation menu for events vanish
	FDB-5736	GUI: driveline layout broken when no Motor is selected
	FDB-5721	Additional rack displacement and steering deactivation extra input conflicts standard inputs
	FDB-5719	Wrong front and rear unsprung inertia with Adams/Car Plugin
	FDB-5718	Various documentation errors
	FDB-5717	Ride Height map with load - experimental mode
	FDB-5716	Problems running coast down event with dual clutch transmission
	FDB-5709	SpeedGen fails when using wheel motors in powertrain subsystem
	FDB-5703	GUI hangs when a wrong aerodynamic property file path is specified
	FDB-5700	External engine co-simulation failure during 7Post analysis
	FDB-5699	Wrong xform computation for singular conditions
	FDB-5692	Suspension frequency dependent longitudinal DOF
	FDB-5686	FMI: External Driveline tutorial is not aligned with distributed files
	FDB-5685	Multi thread unpredictable behavior
	FDB-5678	Deactivated ARBs are reactivated by plugin during export
	FDB-5677	Reboundstop property file curve are misinterpreted
	FDB-5671	Distributed solverPlugin_template.cpp example doesn't provide all available callbacks
	FDB-5670	Engine torque reaction not updated properly
	FDB-5669	Fz Compliance are calculated in a wrong way
	FDB-5660	Need a command line switch to override output prefix
	FDB-5657	Closing RunWindow using close button(X) may leave the gui locked
	FDB-5655	Support for Adams 2017.2
	FDB-5652	Improve bumpstop management in model export
	FDB-5651	Default tire testrig rt integrator is euler
	FDB-5613	Save As button for Property Files do not update GUI

	FDB-5573	Channels not properly updated in GUI
	FDB-5572	CRT/TireLimits pre-processing error using MFTYRE 6.x
	FDB-5556	Errors occurs loading analysis with animation from CRT in Adams PPT
	FDB-5551	Expose bumper curve in gui as done for damper
	FDB-5470	Impossible to delete a User Sensor or modify sensor type
	FDB-5468	Gearbox image doesn't disappear when the component has been deactivated
	FDB-5451	VI-Road RDF loaded multiple time with FTIRE
	FDB-5428	RH maps computation depends on vehicle user location parameter
	FDB-5406	Expose tire contact patch on-road/out-of-road output
	FDB-5063	Support execution maxpeformance and pressmaneuvers solvers from command line
	FDB-4755	Implement a simulink target to compile Simulink model as VI-Crt plugins
	FDB-4736	VI-CRT batch launcher crashes when short path names are not available
	FDB-4697	Runtime batch for dll creation are not comatible with windows compiler 14.0 (VS2015)
	FDB-4610	Output channel filter for Active Only
	FDB-3818	Implement reload button for output map editor

1.8.8 Release 18.0

Version	Change ID	Change
18.0	FDB-5645	Wrong engine speed initialization with user tire
	FDB-5590	Solver crash during straight setup analyses when integration step is not 1ms
	FDB-5589	setSystemParameterTreeValue doesn't manage multiple parameters types
	FDB-5565	Cannot register auxiliary output from more than 1 plugin
	FDB-5561	Wrong initialisation with external engine and user defined location
	FDB-5558	Speedgen produce wrong engine torque during braking in output channel
	FDB-5527	Wrong CG location in HTML validation report when engine part is active
	FDB-5515	Crash with large RDF on XPC target
	FDB-5509	Assembly/design condition in report file is wrong computed when using external engine
	FDB-5499	Possible static failures with automatic z location
	FDB-5480	Add new output channels reporting the tire to road closest point even when the tire is flying.
	FDB-5465	Wrong torque output from engine mount for large deformation
	FDB-5458	SpeedGen input generator (spg_igen) does not report error messages
	FDB-5455	Output step field disappear after a VI-DriveSim event execution
	FDB-5447	Rear suspension dependency input does not work in simulink
	FDB-5433	Traceback executing events referencing a file from a non registered database
	FDB-5423	Missing aerodynamic forces in simulink events
	FDB-5415	Improve documentation about Side view angle
	FDB-5399	Simulink simulation fails after second consecutive execution
	FDB-5392	Longitudinal suspension DOF misbehavior (16.2 vs. 17.2)
	FDB-5389	MF-Tyre/MF-Swift license not returned when static equilibrium analysis fails
	FDB-5388	license error with MF-Tyre/MF-Swift tire property file and mode 125
	FDB-5387	Output prefix field cannot be a full path
	FDB-5376	Custom events can't be loaded in vicrt GUI
	FDB-5339	Vicrt-plugin: Number Of Analyses parameter in auxiliary roll stiffness setup panel is neglected

	FDB-5338	Create a tutorial for using an external steering system
	FDB-5316	Add low speed threshold to internal abs controller
	FDB-5315	Crt plugin: set vicrt integration step in automatic model validation panel
	FDB-5309	First order compliance improvements
	FDB-5306	Matlab API: error when using frontSuspensionMainSpringFileSetSpline2D function
	FDB-5302	Document output prefix in mxp simulation with Matlab
	FDB-5301	Wrong units in distributed 'aero_advanced.aer' file
	FDB-5300	Wrong Cz values using advanced aerodynamic module
	FDB-5283	Example Databases are no more shipped with vicrt installer
	FDB-5282	Port to adams 2017
	FDB-5281	VI-Drivesim Files Path field is not used as target path for send creation
	FDB-5278	Possible crash when using a plugin dll in Simulink environment
	FDB-5274	Missing documentation for standard aerodynamic
	FDB-5270	Steering compliance lock should be deactivated during steering feedback computation
	FDB-5268	Skidplate Forces computation on 3d road with high height/bank variation
	FDB-5253	VI-Driver feedforward problems using external aerodynamic
	FDB-5251	Possible crashes during 7Post analysis
	FDB-5243	Crt plugin: mismatched powertrain splines when pvs_max_gears differs from model gear number
	FDB-5242	Add license troubleshooting topic in documentation
	FDB-5237	Automatic computation of kingpin location/orientation splines
	FDB-5236	PressManeuvers: wheel/cone base intersection not detected
	FDB-5232	Isolc unable to retrieve tire width with MF-Tyre
	FDB-5231	Vehicle wizard errors when defaultPrefs.xml is not in the working directory
	FDB-5226	TireLimits: Graph scaling for tire ellipse
	FDB-5225	"Setup on flat road" flag not working when PSD or user location are active
	FDB-5221	Error when gear number is less than 4 in Gear Ratio table
	FDB-5208	Incorrect negative engine torque in STL event
	FDB-5207	Engine rpm exceed the MaxRpmLimit during STL event when Lazy=0
	FDB-5202	GUI: changing rdf file doesn't make fingerprint bold
	FDB-5192	Include driveshaft reaction torques to crt model
	FDB-5185	No effects of Initial Gear flag in MaxPerformance & SpeedGen events
	FDB-5184	Manage external inputs with Rk2 solver
	FDB-5179	Documenting external road
	FDB-5176	Speedgen brake bias doesn't match the actual torque bias
	FDB-5170	Database publish doesn't work when model has files that are not directly in a database
	FDB-5160	Rpm limiter doesn't work with lazy shift enabled
	FDB-5155	Models with compliance symmetry management
	FDB-5143	Single damper element doesn't provide force at wheel
	FDB-5131	Missing contribute on kingpin moment computation
	FDB-5128	Max engine brake torque scaled by driveline efficiency
	FDB-5091	Acceleration is greater if the negative engine torque is increased (at big values)
	FDB-5090	Carsim 9.0 models failing export
	FDB-5087	SCANeR interface file does not compute correctly tire radius and steering ratio

	FDB-5075	Problems exporting a model with a compliant Steering
	FDB-5073	Automatically add example vehicle models to the database configuration during installation
	FDB-5069	Error loading cfg file with path containing DATABASE string
	FDB-5067	Vimaxperformance command line doen't match other crt solver one
	FDB-5051	Add output channels for driver demands.
	FDB-5048	Upgrade openCRG lib to version 1.1
	FDB-5043	TNO tires are not compatible with external road
	FDB-4998	Crash using extra input for suspension testrig event
	FDB-4997	Expose road material id among tire output
	FDB-4988	K&C interface: track and wheelbase variation offset
	FDB-4980	Analysis failure when selecting output step > 0.01
	FDB-4966	CRT user sensors should all be defined in vehicle reference frame
	FDB-4940	Speedgen: wrong tire normal force calculation on banked road
	FDB-4930	Independent integration time step for engine part
	FDB-4928	Add driver longitudinal target input
	FDB-4853	MFTyre contact patch computation failure on meshed bridge
	FDB-4792	Add STEERING DAMPING parameter (to run steer release maneuver with the std steering subsystem)
	FDB-4776	SpeedGen 2D ride height maps
	FDB-4763	Rack and pinion steering redesign for consistency with VI-DriveSim
	FDB-4727	Integrate akima spline on vicrt core
	FDB-4677	SpeedGen calculates a negative lap time using a low initial speed (<0.1m/s & >0m/s) in the XSG file
	FDB-4659	Port to dspace scalexio (release 2016)
	FDB-4644	Multi-thread support for USER tires
	FDB-4642	Single-road support for MF-Tyre tire
	FDB-4640	Support for multi-thread pacejka tires
	FDB-4598	VI-CRT K&C Interface revamping
	FDB-4569	Nam file is not updated if already exists
	FDB-4567	Update system output_map xml file
	FDB-4561	Units not shown in differential curve editor
	FDB-4531	MXP and VDD giving different results
	FDB-4507	FTIRE contact patch force output strongly affected by multithread mode
	FDB-4463	Possible lack of concruence between rack travel vs steer wheel angle and steering feedback splines
	FDB-4308	Efficiency map for transmission losses
	FDB-4303	CRT log file is ill formatted
	FDB-4292	Adv stering messages not included in log file
	FDB-4264	Could not submit a new event because gui is locked
	FDB-4240	Generalize compliance data set for k&C import
	FDB-4224	Ride height
	FDB-4074	Add parameters to VI-Driver to control delay between consecutive gearshifting
	FDB-3994	K&C interface compliance loadcases
	FDB-3964	Suspension Compliance - missing or ill defined
	FDB-3837	Missing center differential outputs
	FDB-3681	Efficiency scaling for engine and gearbox

	FDB-2633	Automatic plot generation using tire testrig CRT
	FDB-2576	Improve multiple road initialization in CRT

1.8.9 Release 17.3

Version	Change ID	Change
17.3	FDB-5319	VI-DriveSim event does not produce SCANeR interface file when requested
	FDB-5310	Support for ETAS HIL platform
	FDB-5278	Random crashes using VI-CarRealTime S/function in combination with plugins
	FDB-5010	Matlab API are not compatible with Matlab 2016b

1.8.10 Release 17.2

Version	Change ID	Change
17.2	FDB-5191	Kingpin moment computation includes driving torques reacting on chassis
	FDB-5177	Right side Compliance vs Fx forces not computed during suspension testrig analysis
	FDB-5161	Port Adams Car interface to Adams 2016
	FDB-5159	Matlab API documentation is not fully updated to v17.x data structure
	FDB-5158	Add a matlab API to Get/Set damper 3D spline data
	FDB-5149	Static analysis failure after vehicle relocation
	FDB-5137	Add path_distance channel to lap_sensor outputs
	FDB-5124	Implement possibility to generate and execute fully obfuscated models
	FDB-5112	SpeedGen startup strategy fails in case of non monotonic powertrain map
	FDB-5106	Matlab API: error when using frontTireSetPropertyFile function
	FDB-5078	Fx compliance doesn't switch with external braking model
	FDB-5066	No error flag returned by pressmaneuver executable
	FDB-5062	Binary file encryption error undetected
	FDB-5030	Vehicle relocation api issue
	FDB-5026	"Missing Input Errors" message related tire force graphics with 7Post simulation
	FDB-5025	Missing spring and damper property file causes errors
	FDB-5024	Wrong lower cardan ratio output channel
	FDB-5017	Add an Harware specification page to documentation
	FDB-5005	Report file does not contain design condition
	FDB-5003	Automatic z location option is always active
	FDB-5000	MxP Matlab: license not released after CTRL+C
	FDB-4992	SCANeR interface file inherits the system file name instead of the event name
	FDB-4991	Steer release maneuver in Simulink not supported for base steering system
	FDB-4967	Matlab API performance problem
	FDB-4948	3D damper spline not shown in Curve Editor
	FDB-4927	Add Tire Limits capability to DriveSim Event
	FDB-4839	Rep file misses Assembly Conditions when no setup is performed
	FDB-4809	Wrong contact patch computation in suspension testrig
	FDB-3822	Crash writing files when working dir is wrong
	FDB-3061	Solver Settings GUI fields corrupted at startup

1.8.11 Release 17.1

Version	Change ID	Change
17.1	FDB-4965	MaxPerformance event predicts 0s lap time when initial speed is 0
	FDB-4963	Aero_forces_rear_sideforce output always equals to aero_forces_rear_downforce
	FDB-4953	Add solver status output channel
	FDB-4950	Lsd c1 table not read from 16.2 setup file
	FDB-4941	Error in path compensation output computation during static analysis
	FDB-4938	Publishing operation breaks .obj references on source body subsystem
	FDB-4929	Static equilibrium for models with engine part lasts forever
	FDB-4926	Misaligned lap sensor and lap time triggers
	FDB-4924	Missing example dcd file
	FDB-4922	Matlab API --> error in creating Struct if Auxialiary subsystem block is present
	FDB-4920	Body subsystem is not marked as modified when ride height maps are recomputed
	FDB-4916	VI-CarRealTime export generates fixed analysis names
	FDB-4912	Possible wrong average wheel travel in auxiliary roll force with asymmetric range
	FDB-4908	Possible Vehicle model export failure due to FORTRAN solver incompatibility
	FDB-4905	Missing example file for engine part subsystem
	FDB-4899	Left over file handles in matlab environment may lead to simulation failure
	FDB-4898	Add output channels for road normal
	FDB-4896	Missing user outputs deactivation using output map or env var VI_XFORM_REMOVE=1
	FDB-4887	Tirelimits: spikes in lon/lat margin channels
	FDB-4886	Speedgen: randomic crash
	FDB-4885	GUI widget for vehicle setup is not properly updated for central elements
	FDB-4880	OpenCRG and OpenDRIVE sensor indexing problems
	FDB-4879	Improve documentation for Suspension Compliances
	FDB-4875	Skidplate computation may lead incorrect results when more than one wheel is flying
	FDB-4874	Steering.steer_at_spindle input channels don't work
	FDB-4869	Wind Effect in .aer files for Static Laptime Event neglects vehicle yaw
	FDB-4854	GUI doesn't open if vicrt_17_defaultPrefs.xml has a wrong working dir
	FDB-4852	Support multiple dspace overlays on the same installation
	FDB-4845	Wrong current system focus refreshing a subsystem
	FDB-4843	Servo Gear Differential equation deos not work with internal EPS model
	FDB-4840	Aerodynamic modifiers panel not updated at startup
	FDB-4838	MaxPerformance event may be terminated prematurely when the vehicle is relocated
	FDB-4832	Missing vehicle configuration modified status
	FDB-4829	FTIRE custom installation failure when COSIN_PREFIX includes spaces
	FDB-4825	Speedgen post processing may alter speed profile too much
	FDB-4820	Susbsytem reload doesn't work properly
	FDB-4819	Failure on speedgen initialization due to engine map
	FDB-4816	Speedgen optimal gear is wrong at low rpm
	FDB-4815	Suspension testrig failure using VI-Steering
	FDB-4812	User sensors calc frequency is bound to output rate
	FDB-4810	Driving Machine File Editor not working

	FDB-4808	Save As subsystem replaces the subsystems of all the systems
	FDB-4807	VI-TireLimits GUI shows wrong camber slider range
	FDB-4804	Incorrect default longitudinal slip step for runtime TireLimits computation
	FDB-4803	Event names are case sensitive
	FDB-4800	Can't edit compliance vs fz map with GUI
	FDB-4798	ISO standard typo in GUI
	FDB-4796	PressManeuvers Matlab crashes after stop with CTRL+C
	FDB-4791	Compliance vs fz data are neglected in overall compliance computation
	FDB-4790	Add support for air spring
	FDB-4786	VI-CarRealTime crash using TireLimits from simulink
	FDB-4782	Tierod force computation is skipped when spline rack_displacement_vs_steering_wheel is not defined
	FDB-4781	MaxPerfMatlab ignores the output prefix writing the result file
	FDB-4767	Add support for dSPACE release 2014-B and 2015-B
	FDB-4760	Vehicle center of gravity height depends on design wheel center location
	FDB-4759	Incorrect Traction control computation when wheel center design position doesn't match wheel radius
	FDB-4758	Can't export Adams Car models including linear springs
	FDB-4750	Missing checkin of road core license in speedgen
	FDB-4742	Support for partially obfuscated mesh roads
	FDB-4740	Renaming in tree view is not triggerd by two consecutive clicks
	FDB-4737	Support export from VI-Automotive of skidplate component
	FDB-4735	Update FMI Examples distributed with CRT
	FDB-4734	Missing win32 dll in double wishbone FMI distributed in vicrt
	FDB-4733	Change FMU unzip directory path generation
	FDB-4729	Carsim importer neglects engine inertia and initial toe/camber
	FDB-4728	K&C wizard incorrect definition of toe map for longitudinal compliance
	FDB-4726	Vehicle setup may fail on 3d road with vehicle relocation
	FDB-4725	Longitudinal slip problems on tire testrig using PAC tires
	FDB-4724	LSD preload should not be included in the torque reacting to C1
	FDB-4721	OUTBOUND_SAFE option could not work correctly
	FDB-4695	Incorrect wheel setup (toe/camber) when reference is set to ground
	FDB-4681	Servo Steering Map doesn't is neglected when Steering Feedback Map is active
	FDB-4679	Live animation is interrupted when a MaxPerformance attempt leads to an equation of motion failure
	FDB-4678	Speedgen parameters --> check the correct value to define the MIN VELOCITY in the XSG file
	FDB-4675	SpeedGen crashes using an initial speed = 0.0m/s
	FDB-4674	Could not set initial speed value = 0m/s in SpeedGen simulation
	FDB-4654	Adjustable bumpstop does not support negative clearance
	FDB-4643	OpenCRG roads are loaded multiple times
	FDB-4631	Gravity option for acceleration sensors
	FDB-4630	CRT does not exit immediately after tire initialization error
	FDB-4629	Component property files can't be saved
	FDB-4627	Pressmaneuver event should not use absolute path referencing VDF file
	FDB-4616	Clutch torque is not 0 when gear is neutral
	FDB-4613	Vehicle setup doesn't work with individual roads

	FDB-4607	Certify compatiblity with veristand 2015
	FDB-4606	Update DoubleLaneChange and ObstacleAvoidance according to ISO-3888-1/2
	FDB-4602	Fuel consuption does not allow cutoff conditions
	FDB-4592	User input channels disappear from simulink interface after cancel button
	FDB-4588	Missing end condition in VDF file generated by PressManeuvers for Matlab
	FDB-4587	Linker errors while compiling solver plugin libraries
	FDB-4579	Antirollbar forces imported from K&C data may be wrong when active and inactive antirollbar loadcases are provided
	FDB-4564	Application crash running PressManeuvers with circular buffer
	FDB-4563	Memory leak running PressManeuvers with experimental clutch
	FDB-4551	Add upper speed limit field to PressManeuvers event
	FDB-4550	Allow storage of all feasible run for PressManeuvers event
	FDB-4539	Full vehicle export using "No Suspension and Steering" option fails when subsystems don't exist in target database
	FDB-4536	Vi-driver closed loop event failure when vehicle is moved away from origin
	FDB-4529	Final drive ratio field should not appear in transmission editor
	FDB-4505	Road normal from crg roads with pac2002 is always assumed to be vertical
	FDB-4326	Create a comprehensive library of example models
	FDB-4147	Support import of CarSIM 9.0 models
	FDB-2493	Bumpstop adjustment failure when no additional adjustments are active
	FDB-1682	Advanced aero forces: support for wind effect

1.8.12 Release 17.0

Version	Change ID	Change
17.0	FDB-4519	Throttle demand should be 0 when steering input is applied in J-Turn and Fishhook events
	FDB-4518	Implement ramp steer event
	FDB-4513	Lap sensor does not detect 1st lap when vehicle is started away from the origin
	FDB-4512	Log communicators and flags found in the Adsms Car model affecting the export process.
	FDB-4511	VI-CarRealTime interface fails to start when using "run as administrator" option
	FDB-4503	Report file contains wrong cog position when using external road
	FDB-4486	Internal TCS should not work when vehicle is in null gear or in clutch open conditions
	FDB-4485	Mismatched LSD differential implementation on matlab example models
	FDB-4469	Vehicle dimensions are stored in press maneuvers gui
	FDB-4439	Error reading drd track file from mesh rdf
	FDB-4438	Auxiliary longitudinal dof - not consistent hub acceleration output channels
	FDB-4437	Missing initialization of low wheel omega filter
	FDB-4415	Unrealistic default parameter settings for canned sine steer event
	FDB-4413	Driver steering ratio input is not correct when using vi-steering module
	FDB-4412	Rack and pinion steering should support positive spline for EPS electric motor current
	FDB-4411	Engine rpm not initialized with vi_crt_demo model and settle setup mode
	FDB-4393	Understeer_gradient output channel is noisy for the first few samples
	FDB-4387	Separate max and min saturation for rack and pinion column friction model
	FDB-4358	Extend rack and pinion steering friction model with hyperbolic formulation
	FDB-4357	Inertia of all steering column parts should be editable from the gui

	FDB-4356	Plugin library name definition for rack and pinion steering is not required
	FDB-4355	Add rigid switch in rack and pinion steering to stiffnesses instead of using 0
	FDB-4350	MATLAB/Simulink cosimulation with FTire module fails
	FDB-4330	MaxPerformance files does not support database references
	FDB-4320	Documentation for differential torque in Limited Slip Differential is wrong
	FDB-4316	Support request as output file format
	FDB-4315	Integrate external road
	FDB-4305	K&C Interface - Missing left side toe compliance for single loadcases
	FDB-4301	Model imported from CarSim may miss spring data
	FDB-4297	Clutch model for crt demo should be made active by default
	FDB-4294	Antirollbar activation inputs do not work when ARB is defined as dual table
	FDB-4291	VI-CarRealTime Adams Car plugin exports incorrect names for displacements request
	FDB-4284	Support for Matlab 2014
	FDB-4274	Error in sprung mass CG computation in K&C interface
	FDB-4271	Implement api call to extract current simulation time step
	FDB-4270	Add road friction to std output channels
	FDB-4246	Potential crash when calculation is interrupted pressing CTRL+C
	FDB-4244	Python.exe crash running VI-CarRealTime interface with IST timezone
	FDB-4242	Tire user interface enhancements should support save/restore
	FDB-4239	No output files generated when working dir is not existing
	FDB-4234	Wrong contact patch computation in case of 7Post events
	FDB-4228	Detroit locker toggle button incorrect behaviour
	FDB-4227	VI-CarRealTime live animation channels are fixed
	FDB-4221	VI-Safety events are not compatible with external engine model
	FDB-4218	Could not run custom cosin tools using cosin_prefix envinronment variable
	FDB-4216	SevenPostrig event does not work with advanced steering
	FDB-4215	Advanced steering model with hydraulic eps does not restore all states properly
	FDB-4206	CarSIM importer fails to import model with overall ride+tire stiffness
	FDB-4199	Tire error message unclear
	FDB-4198	VI-Speedgen may retrieve wrong friction value from road file
	FDB-4192	Obstacle avoidance simulates too long
	FDB-4184	Advanced steering may produce wrong results when steer to rack spline has negative slope
	FDB-4178	Could not run FTIRE simulation once custom COSIN_PREFIX is defined
	FDB-4176	Misleading error msg from tno tyre model
	FDB-4174	Add solver input for missing activation modules
	FDB-4171	VI-CarRealTime Suspension testrig analyisis does not support solver plugins
	FDB-4170	VI-CarRealTime Suspension testrig analyisis does not support vehicle setup
	FDB-4169	Static analysis failure with setup and uneven road
	FDB-4146	K&c interface: longitudinal opposing loadcases report
	FDB-4140	Wrong folder is proposed browsing for an auxiliary subsystem
	FDB-4134	Missing documentation for MaxPerformance Tire LImits Predictor flag
	FDB-4125	Support user defined vehicle initial location/orientation
	FDB-4124	Suspension compliance maps are not mirrored in case of left/right symmetry

	FDB-4120	Memory leak in simulink s-function
	FDB-4119	2d auxliary anti roll map exported by v16.2 differs from v16.0
	FDB-4116	Unexpected vehicle response when changing SteeringGearRatioScale
	FDB-4091	Automatic validation: straight acceleration shifting time mismatch vs adams
	FDB-4082	Incorrect VI-Driver response to std_tire_ref marker shift
	FDB-4077	License check failure on PXI platform with multiple network cards
	FDB-4076	VI-Animator launched from utilities menu does not inherit current CRT configuration
	FDB-4072	Spring motion ratio does not depend on steering
	FDB-4067	Steering wheel velocity output returned to simulink is when the rack input is used
	FDB-4061	Missing Matlab api for auxiliary roll maps
	FDB-4060	File Select erroneously returns "None" file when pressing cancel button
	FDB-4056	Update logic to detect existing accessories like VI-Road and VI-Animator allowing manual selection.
	FDB-4029	K&C license is not returned when data import fails
	FDB-4011	Simulnk output for steering torque is wrong when an external steering model is used
	FDB-4004	Road graphic is wrongly positioned in VI-Animator when std_tire_ref is shifted from default location
	FDB-4003	Aerodynamic auxiliary front sensor is connected to rear chassis when body compliance is active
	FDB-4001	Export problems when model contains custom steering displacements request
	FDB-3997	Implement Press Maneuver event for Matlab
	FDB-3995	Images in K&C interface compliance documentation are wrong
	FDB-3991	MaxPerformance events stops complaining about no differences in computed speed profile
	FDB-3990	MaxPerformance analysis log file report incorrect scaling factor
	FDB-3984	Misleading warnings about extrapolation at time=0 with spc file
	FDB-3983	User sensor output for 7Post analysis in simulink is 1 step delayed
	FDB-3975	Road Data file with friction table shorter than road length can produce 0 friction
	FDB-3963	Add external inputs to support manuever based control channel switching
	FDB-3866	Un-installer doesn't remove VI-CarRealTime accessories
	FDB-3829	Integrate matlab resreader tool
	FDB-3792	Upgrade FMI master to version 2.0
	FDB-3741	Wrong VI-SpeedGen limit for braking phase stored in result file
	FDB-3704	Upgrade VI-CarRealTime GUI architecture
	FDB-3700	External suspension support through fmi
	FDB-3698	Minor problems converting XML event to VDF
	FDB-3683	VI-SpeedGen and Road are initialized at each MaxPeformance iteration
	FDB-3682	VI-Road call from utilities menu doesn't set current working dir
	FDB-3674	Support for Adams 2015
	FDB-3669	Improve custom tire documentation
	FDB-3649	Small differences between res file generated by MaxPerformance and FileDriven event
	FDB-3639	Road graphics not udpated after rdf modification
	FDB-3584	CTRL+C does not stop execution gracefully with FTIRE
	FDB-3508	VI-Driver end_condition triggering information are not reported in log file
	FDB-3406	SevenPostrig live animation doesn't work
	FDB-3397	Windows 8.1 start menu: unable to distinguish documentation links
	FDB-3383	VI-CarRealTime execution failure when VICRT_INST_DIR envinroment variable points to a previous installation

	FDB-3293	Could not change output prefix in Maxperformance for Matlab simulation
	FDB-3263	Strong influence of maxlongslip coefficients on VI-SpeedGen predicted max speed
	FDB-3259	VI-CarRealTime preferences file are not version dependent
	FDB-3247	Implement skidplate component
	FDB-3119	Defect of online-help in Kinematics/Steer angle topic
	FDB-2984	Enable definition of custom output channels from solver plugin
	FDB-2906	Support NI-VeriStand 2014
	FDB-2880	Sprung mass in autogenerated suspension assembly is incorrect
	FDB-2536	Rolling resistance returned by tir file marked as 'MF-Tyre' is wrong
	FDB-2464	Support for user defined event chain (Custom events)
	FDB-2158	Send file can be loaded as model
	FDB-2157	File not found error message running solver job
	FDB-2129	Conflicts with startup scripts using multiple vi-carrealtime version
	FDB-2046	VI-CarRealTime --> velocity profile source for output vdf
	FDB-2044	Build mode may become not accessible
	FDB-790	Raise a warning when installation stiffness is smaller than the spring stiffness
	FDB-128	License Expiration Warning

1.8.13 Release 16.2

Version	Change ID	Change
16.2	FDB-3888	Extended search path for vicrt_cdb.cfg to send file folder
	FDB-3886	Wrong scaling factor exporting spline based differentials from VI-Automotive
	FDB-3876	MESH road data file memory reallocation issues
	FDB-3869	Powertrain map interpolation fails
	FDB-3868	Crash with negative motion ratio and setup
	FDB-3859	Error when deactivating ARB subsystem
	FDB-3842	Trailer analysis depends on std tire ref position
	FDB-3836	First 2 loadcases are missing in suspension test-rig res file
	FDB-3834	Hard-coded aligning torque values in steering.lcf
	FDB-3819	Smoothing time not working for SURFMESH when CP mode = 1
	FDB-3817	Python fitting utils does not compute correct polynomial coefficients
	FDB-3814	User VDF file for VIDriveSim event
	FDB-3804	Suspension testrig angles setup
	FDB-3773	Report file inertial attributes depends on std_tire_ref Z definition
	FDB-3772	Wrong aerodynamic sensor position when internal aero is not active
	FDB-3759	Automatic model validation bad curve matching with VI-Automotive models
	FDB-3743	Suspension validation settings
	FDB-3742	Loadcase for auxiliary compliance has wrong limits for pre-analyses
	FDB-3729	Chassis dof offset
	FDB-3726	VI-Automotive models are wrongly exported
	FDB-3725	Errors at the end of VI-Automotive models export procedure
	FDB-3717	Torsion stiffness limit in auxiliary subsystem is not mapped
	FDB-3711	Application remains hanged up randomly

	FDB-3707	User tire tutorial
	FDB-3662	VI-DriveSim Event Wrong VDF path into _send.xml
	FDB-3629	Improving model export capability
	FDB-3585	Multithread computation is not deterministic with curved RGR
	FDB-3264	Export VI-Automotive models keeping adjustements active
	FDB-2813	Random license issue running Maximum Performance event

1.8.14 Release 16.1

Version	Change ID	Change
16.1	-	this version includes upgrades for compatibility with VI-Automotive 16.0

1.8.15 Release 16.0

Version	Change ID	Change
16.0	FDB-3637	Probelms solving static equilibrium using advanded aeromap with sideslip dependency
	FDB-3633	External engine solver is not correctly deallocated when performing simulink analyses
	FDB-3628	Abort time for trailer simulation is hardcoded to 100s
	FDB-3622	Suspension compliance is wrongly computed using external tire input from simulink
	FDB-3614	Center differential does not behave according to the LSD specification
	FDB-3569	Force graphics are wrong when std_tire_ref is modified
	FDB-3539	Incorrect processing of steering data for K&C import in case of redundant input data
	FDB-3528	Rack forces may be inaccurate for high jounce
	FDB-3521	Prevent errors when models does not include body geometry
	FDB-3505	Trailer model 64bit does not run properly
	FDB-3494	Improve stability of external powertrain example subroutine
	FDB-3469	Support for variable ratio in advanced steering EPS
	FDB-3452	Problems running max performance event with external powertrain
	FDB-3443	Some parameters stored in the system tree may not be exported properly from Adams Car
	FDB-3442	Wrong units in steering angle channel in model validation report
	FDB-3426	Improve export process for auxiliary vertical stiffness computation
	FDB-3423	Prompt a warning for circular buffer activation mode
	FDB-3422	Static Load Editor ignores changes
	FDB-3413	Incorrect conversion of pwr_scaling_factor parameter from v14
	FDB-3356	Problems running VI-CarRealTime on Matlab 2013b win64
	FDB-3390	Wrong computed CG with SportsCar models
	FDB-3323	Implementing an import procedure for CarSim models
	FDB-3314	Static on 3d road could fail for models with inactive setup
	FDB-3313	Adams Car export doesn't write system xml
	FDB-3304	MaxPerformance event GUI does not prevent access to initial gear field
	FDB-3302	Export error for cos_ARB_force
	FDB-3295	Speedgen event disregards pwr_scaling_factor parameter
	FDB-3274	New Matlab library for accessing vehicle data
	FDB-3250	Wrong computed tierod forces

	FDB-3226	Misuse event should stop when limit roll is reached
	FDB-3225	Auxiliary subsytem status not properly saved.
	FDB-3217	Simulink interface documentation reports incorrect channel names
	FDB-3204	VDF converter does not map yaw rate controller activation
	FDB-3187	Automatic validation report errors for SportsCar models
	FDB-3182	Automatic model validation errors
	FDB-3165	Automatic model validation fails when results file are disabled
	FDB-3157	VDF parameters definition in VI-DriveSim event
	FDB-3153	Leftover files when uninstalling crt_plugin
	FDB-3135	Could not run VI-driver event with std_tire_ref.psi =0
	FDB-3134	Road graphic is wrongly positioned when std_tire_ref data are changed
	FDB-3124	Roundoff error in two consecutives setup files savings
	FDB-3121	Export errors when RES file is not selected in the model
	FDB-3114	Active flag not working for Static Loadcase editor
	FDB-3104	Edit button not working for Static Loadcase File
	FDB-3098	Wrong model inputs description
	FDB-3089	Road data save & restore before static phase
	FDB-3086	Wrong definition in bushing torque expression
	FDB-3077	Ride height maps not updated
	FDB-3076	TireTestrig does not save results in Matlab format
	FDB-3074	TNO tire initialization fails with overlay 64 bit
	FDB-3072	MaxPerformance USE_TIRELIMITS flag always set to FALSE in mxp file
	FDB-3071	Missing obj files when a system is saved with a different name
	FDB-3059	Updating Vehicle_Understeer_Stability_Factor definition
	FDB-3057	STI user tire example
	FDB-3053	User tire crt tutorial
	FDB-3048	vcredist_x64 not installed
	FDB-3046	Wrong compliance and auxiliary stiffness in Adams Car exported model
	FDB-3038	Missing aerodynamic inputs for MATALB Simulink standard block
	FDB-3036	Plugin changes for MB-SHARC support
	FDB-3035	Add throttle/brake to VI-Animator startup script
	FDB-3034	A/Car plugin export failure
	FDB-3032	7post results file are missing
	FDB-3031	Performance issues on dSPACE
	FDB-3017	Support usage of Adams Ftire license for basic FTire computation mode
	FDB-2991	Support for Adams 2013.2
	FDB-2980	Tire Testrig issue with call to VI-Animator
	FDB-2976	Support for different layout of servo assistance force
	FDB-2975	Implement steering release event
	FDB-2974	Improve fuel consumption capabilities
	FDB-2970	Support cosimulation with FMU component
	FDB-2967	Output as bus on Simulink interface does not work correctly
	FDB-2964	Vi-drivesim file event is always saved on root

	FDB-2962	Phantom load using asymmetric antirollbar
	FDB-2961	Cross weight setup failure on 7Post event
	FDB-2958	Curb sled simulation failure with 64bit overlay installed
	FDB-2948	set SVM_GLOBAL_OUT_XML_FLG to 0.0 seems not work
	FDB-2928	Inconsistent rpm in speedgen
	FDB-2927	vicrt_passive.mdl model incompatibility with MATLAB 2012
	FDB-2908	Improve the definition of the graphic files
	FDB-2907	Support for MF-Tyre 6.2
	FDB-2898	Introducing Skidpad setup
	FDB-2897	Different results if model has adjustements
	FDB-2890	ISOLC tolerance error when using models that required setup
	FDB-2886	Support for FTire 2014-1
	FDB-2861	Adding a simple aux subsystem template for res file estension from simulink
	FDB-2858	Problems with roads DB memory management
	FDB-2827	Straight setup mode fails with external engine body
	FDB-2815	Speedgen is not passing computation and simulation modes to custom aerodynamics
	FDB-2749	Using flyingLap Mxp final maneuver and the same dynamic are different
	FDB-2704	Moving ISOLC under mxp2012 framework - reduce computation time
	FDB-2668	Change working dir path to relative in send file
	FDB-2615	PAC2002 error management
	FDB-2571	Running multiple events may leads to unpredictable results
	FDB-2518	Print a message while performing automatic road graphic generation
	FDB-2312	Add global inertia properties in report file
	FDB-2308	Adding Ride height outputs to Static LapTime event
	FDB-2307	Seven-post event: including free up wheels option
	FDB-2306	Control the significant digits written to xml files
	FDB-2270	Improving error message for StaticLapTime Event
	FDB-2223	Changing the format of the error message when no input file is specified (VDD or DM events)
	FDB-2115	Road Database Cleanup Disabled
	FDB-1199	Unexpected third spring behaviour
	FDB-1132	Could not remove custom plot pages in TireLimits application

www.vi-grade.com
email: info@vi-grade.com