VI-Aircraft 19.0 Release Notes

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1 Release Notes

Welcome to the release notes of VI-Aircraft 19.0. The chapter contains information regarding new features, known issues and update history.

Note: All instruction in this guide applies to all supported Adams versions, see Platform Support for further info.

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

1.1 What's new

This is a major release of VI-Aircraft.

New Features:

- Support of Variant Assemblies. Instead of creating separate assemblies for variants of a model you can create one assembly containing several variants. See Building Models --> Overview for general information about variant assemblies. See Using Variant Assemblies in Analyses for information on how to use variant assemblies in VI-Aircraft Analyses.
- Support of Adams Explore. This provide the option also for people being no Adams users to run VI-Aircraft analyses by means of spread sheets and web browsers, also an machines without an Adams installation. See Support of Adams Explore plug-in for details.
  It has been developed and tested with the following combination of operating systems and programs:

Server OS	Client OS	Browser	Spreadsheet Program	Remarks
Windows 7/64	Windows 7/64	Firefox 62 (64 bit)	Open Office 4	Can only read but not write `.xlsx` files, so no editing.
			Libre Office 6.1.2.1 (x64)	

Enhancements:

- User Force elements are now correctly saved in the templates.
- Issues with displaying Force Graphics in VI-Aircraft 18 have been fixed.
- Improvements in the documentation:

- Description of the linear and non-linear aerodynamic force element property file format.
- Corrections in the Table Lookup Oil Damper Element Documentation: Example property file was out-dated.
- Improvements and corrections in the VI-Aircraft Customization Tutorial.

For a complete list of the other bug-fixing and enhancement refer to the Revision History section

1.2 Licenses

VI-Aircraft 19.0 requires following set of license keys:

- `VI_Aircraft_ADAMS_IFace`
- `FEATURE VI_Aircraft_Core`
- `VI_Road_Core`
- `VI_Road_Toolkit`
- `VI_Tire_Core`
- `VI_Tire_Toolkit`

As prerequisite an Adams Full simulation Package license is required, which includes the following keys:

- `ADAMS_View`
- `ADAMS_Solver`

Additional keys are needed for using flexible bodies, and for other functions.

This product is in part 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 2013b to 2017b	from 2013b to 2016b	from 2013b to 2017b*	from 2015b to 2016b	
Veristand™ (***)	2015sp1	2015sp1			
dSPACE® RCP & HIL	2014b-2017a	2014b,2017a		2015b-2017a	
SimWorkBench®	2018.2	2018.2	2018.2		
xPC®	2012b				
Dymola®	2015				2015
MapleSim™	2015				
CarSim™	8.1.1, 9.0				
Virtual Test Drive®	1.4				
Prescan®	7.3				
SCANeR®	1.7r37, 1.8r15		1.7r37, 1.8r15		
ETAS LABCAR-OPERATOR IP®	5.4.0				
SolidThinking Activate	2017.1				
TameTire	5.1		5.1		
CDTire	4.2		4.2		
adheRide thermoRide	1.2/1.4				

(*): please refer to SimulationWorkBench documentation for Matlab version compatible with MLToolkit module.

3rd Party Software included in VI-grade products:

	VI-CarRealTime	VI-BikeRealTime	VI-DriveSim	VI-Driver/VI-Rider for Matlab	VI-Driver for FMI
FTire	2018-4		2018-4		
MF-Tyre/MF-Swift	6.2.0.3 7.1	6.2.0.3 7.1	6.2.0.3 7.1		

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™	2018.0	2018.0	2018.0	2018.0	2015.1, 2016, 2017, 2017.1, 2017.2	2015.1, 2016, 2017, 2017.1, 2017.2
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 **4.8.7** both for Server and for Client.

1.4 Updating Your Files

Updating to 19.0

1.4.1 Platform Support

VI-Aircraft 19.0 is available for the following Adams versions:

Adams version	Platform	Installer Name
Adams 2018	windows x64	`VI_Aircraft_2018_19_0_x64_Setup.exe`

1.4.2 Updating to 19.0

Conversion from v18.0 to v19.0 is performed automatically.

1.5 Known Issues

- A test model with a nose landing gear using the Adams View spring UDE works well with the Fortran Solver, but not with the C++ Solver .
- The **Trimmer Feature** in the Landing without Balance Simulation does not work well with the Linear Point Aircraft Aerodynamics entity. Use the Nonlinear Point Aircraft Aerodynamics entity instead for more reliable results. Also, asymmetric trimming has not been tested with the current release.
- There are some limitations in the Support of the Adams Explore plug-in.

1.6 Revision History

Version	TP ID	Change
2018.19.0	4985	Porting to Adams 2018
	4984	Missing documentation on aerodynamics property files.
	4983	Test variant assembly feature

	4982	Error in Landing without Balance simulation when pitch is negative
	4981	Display Updated Road for an Analysis works for taxis analyses only with `.rcf` files.
	4821	Errors in VI-Aircraft Customization Tutorial
	4815	Change to user force elements not saved to template
	4814	Error in Table Lookup Oil Damper Element Documentation
	4800	Force Graphics Animation does not work with Aircraft 18.
	3577	Adams Explore support
Version	**FDB**	**Change**
2017.18.0	5643	Broken links in Release Notes main page
	5629	Correct documentation on ground wind for Landing Analysis without Balance
	5603	Implausible results with equation based oil damper
	5500	Wrong description of Normal Force calculation for NASA TTR64 Tire Model
	5421	Aircraft contact marked as obsolete. Now relying on Adams/View contact
	5409	Improved Aerodynamics tutorial
	5405	Improved VI-Aircraft + Adams/Controls tutorial
	5403	Improved customization tutorial
	5401	Errors in VI-Aircraft + Adams/Flex tutorial
	5308	Loading Create macro not working
	5259	Missing link & documentation curve Manager New File dialog box.
	5258	Missing link & documentation curve Manager Open File dialog box.
	5257	Landing Without Balance not using brake parameters
	5245	tire documentation refactoring
	5220	vitools failure at simulation end, due to license release
	5201	Option to provide tire type and lateral spring constant parameter τ_A in tire property file
	5200	Option to use full eqn. 64 from T-TR 64 for relaxation length
	5023	Add the SRP reference as input for the nonlinear aero forces UDE
	5022	Option to provide stiffness exponent in tie forces for Tiedown Analysis
	5021	Improved balance description about forces and tires
	4731	Left/right error check logic failure
	3917	ADAMS/View spring UDE does not work in VI-Aircraft
	3805	Errors at analysing termination status of failed simulations
2015r1.17.0	5030	Fixed error in dynamic landing gear insert loadcase button
	5002	Embed TireTestrig in VI-Aircraft
	4989	Allow throttle ID force setting from standard interface
	4978	Error in subsystem open for user defined force elements
	4979	Updated variable torque steering actuator to support state_variable input
	4978	Added example model and tutorial for flight controller
	4976	Enhanced Double Stage air-spring formulation
	4969	Updated control tutorial
	4943	Implemented full vehicle landing on moving platform
	4942	Implemented landing gear drop test on moving platform
	4915	Enhanced integratin with Adams/Control
	4340	fixed tutorial pdf links in documentation
	3936	Full Vehicle Balance analysis may fail (CON1500) for some models.
	3926	Enabled capability to save ude activity in subsystems

	3101	VI-Aircraft crashes when `.rcf` file has line with blanks at the end.
	3039	Enhanced license protection to aircraft solver
	1789	Updated customization tutorial to include plugin and demand-loaded subroutine (using routine argument)
2014.16.0	1366	improve tutorial pdf file names
	1426	tutorial enhancements
	1820	allow taxi to accept rdf input
	2367	give user more control over solver options
	2486	added function-based user defined forces
	2513	setting left-right-single build defaults in gui
	2566	subsystem file cannot hold non-default flex body damping properly
	2902	applicationc crash when no license is found
	3102	Error reading result file from model with bearings
	3466	option to pair load and cases for Full Aircraft simulations
	3467	Add optional pre-sim user macro
	3645	Linear point aerodynamics graphical problem
	3755	Modify general part - ground reference error
2013.15.0	640	New method to place modeling elements on runway
	642	implement flex-flex contact in vi-air contact dbox
	1801	change dmp1500 to ramp off damping for flex bodies
	1819	controls tutorial must be updated for new method
	2065	allow lgs simulations to work when tires are present in model
	2394	angular units of revolutions does not work
	2434	add parameter variables to log files
	2465	make gravity changes occur in small increments
	2480	support import/export of MSC 3d shell road
	2490	restore turnover calculation option
2010r1.13.0 / MD2010.13.0		You can now trim the Full-Aircraft assembly: from the Landing without Balance Simulation the trimming procedure can be activated/deactivated. A trimming tutorial is available to learn how to use this new feature; and a new assembly, that can be trimmed in all the 6 DOF, is available in the shared database.
		You can now add chosen rigid parts to a list in VI-Aircraft that prevents the parts from being considered as part of the aggregate mass for full-aircraft simulations. You might use this feature if, for example, you have a part attached to the ground rather than the aircraft in one of your templates, and you do not want it to be used to determine the aircraft weight and center of gravity location.
		Added a new check box to the template-save-as dialog box. If checked, the template is saved, then the gui switches to the standard interface with the subsystem-create dialog box open with fields filled in with suggested entries. This makes it much easier to create a subsystem after saving a template.
		The Contact Template Builder dialog box was updated to include options for creating MSC.Adams flexible-body contact forces. Notes: Flex contacts require use of the C++ Solver, which is considered experimental for VI-Aircraft 13.0. Also, a bug in MSC.Adams prevents the Solver from finding the correct path to flexible body files for use in Contacts. To work around this problem, the *.adm file must be manually edited to state the exact path to the modal neutral file (e.g. C:/working/fuselage.mnf).
		Added a new automated request to report the tiedown force components at the aircraft and platform ends of the ties.

		The simulation type, Full-Aircraft Tiedown, Spline-Based Platform Motion Analyses, is based on ADAMS/Solver Motion entities defined by time-histories of displacement, velocity or acceleration that are stored in splines. Defining motions using splines is not an exact approach, as discussed in the MSC.Adams/Solver Online Help, but there are ways to minimize the errors: use the cubic spline function (CUBSPL) instead of the Akima spline function (AKISPL) and use velocity-based motions. For this reason the motion definitions in VI-Aircraft now use the CUBSPL function and the example motion files in the shared database are now of type, velocity. (Note that these inaccuracies are not an issue for the sine-based motions of the simulation, Full-Aircraft Tiedown, Sine-Based Platform Displacement Motion Analyses.)
		Added an option to the tiedown analysis that, when selected, keeps the external balance damper active for the entire simulation rather than having it ramp down to zero during the tensioning phase. This is useful if a steady state application of gravity forces is used to assess tiedown characteristics.
		Merged the functionality for external-files input, applicable to the Static Attitude and Tipback Simulation types, into the primary dialog boxes for those simulations. Removed the separate dialog box that was used exclusively for external-files input for those simulation types.
		You can now add chosen markers to a list in VI-Aircraft that causes those markers to move to the runway surface in a subsequent simulation. This might be useful if your model depends on the runway location, because the road location in an analysis is generally unknown when building a template.
		Added button to single-stage and double-stage airspring dialog boxes to allow generation of a plot of the spring force versus stroke.
		Added an option under the Standard Interface View menu: Rotate View by Screen-Based Angles. This allows fine rotation of the model view, which can be otherwise difficult for assemblies with large, detailed roads.
		Added check boxes for automated linear analyses to taxi, attitude and tipback simulation dialog boxes. This has previously existed for other simulation types, such as landing.
		Updated the oleo-pneumatic shock strut force element so it issues a warning if the user accidentally defines a metering pin larger than the strut damper orifice.
		The flexible bearing element formerly had a force exponent hard-coded to 1.1. It can now be set by the user. For best Solver performance it is recommended that the exponent be greater than 1.0.
		The Landing Without Balance Simulation has slightly changed input values. Even though a balance simulation is not conducted as part of this type of landing analysis, a Balance Duration Time greater than zero must be defined because a number of the VI-Aircraft force elements ramp their values on during an interval defined by the balance duration variable. This interval can be brief. The formerly hard-coded value of 0.001 seconds is now user-defined. Also, the hard-coded Balance Number of Steps has been changed from 1 to 0 to reflect the lack of a balance simulation, but this has no effect on the simulation. Note, if the optional trimmer is selected, then the input Balance Duration Time is ignored and zero is used to ensure all forces are fully active for the static trim simulations.
		Added environment variable, MDI_ACAR_WRITE_GRA, to the standard installation configuration file, aircraft.cfg. You can also add this variable to your private configuration file, .acar.cfg, which resides in your home directory. The default setting is “yes”, which causes printing of graphics (*.gra) files and is the long-running behavior of VI-Aircraft. Setting the variable to “no” causes the graphics files to not be printed.

		Added environment variable, MDI_ACAR_WRITE_OUT, to the standard installation configuration file, aircraft.cfg. You can also add this variable to your private configuration file, .acar.cfg, which resides in your home directory. The default setting is “no”, which prevents printing of request tables to output (*.out) files and is the long-running behavior of VI-Aircraft. Setting the variable to “yes” causes the request tables to be printed.
		Improved the solver performance of the equation-based oil damper entity by reducing the number of interdependent variables. The changes produce small differences in simulation results.
		The atmosphere routines now have a speed of sound calculation based on the aircraft altitude and the standard atmosphere model. You can access this value in your templates by referencing an output communicator, cos_speed_of_sound, in the VI-Aircraft testrigs. In your template create an input communicator that has matching name = speed_of_sound, symmetry-type = single, and type = solver_variable.
		If your user-subroutines require the simulation output file name (without the file extension) you can reference a new variable, analysis_name, in the testrigs. You can access this value in your templates by referencing an output communicator in the aircraft testrigs, cos_analysisName. In your template create an input communicator that has matching name = analysisName, symmetry-type = single, and type = array. The array holds the adams_id of the analysis_name string variable.
		Five new variables and communicators were added to the testrigs, macros, and modeling element entities to pass information required for static-equilibrium simulations. (The updated entities are the equation-based oil damper, single-stage airspring, double-stage airspring, oleo-pneumatic element, aerodynamics states, nonlinear aircraft aerodynamics, and linear aircraft aerodynamics.) All simulations in VI-Aircraft are currently dynamic simulations, but static simulations are being considered for future development. The new communicators: ○ cos_balance_ramping – toggles ramping-on of forces during the balance simulation by VI-Aircraft entities ○ cos_staticFlag – flag for VI-Aircraft entities to perform static analysis calculations. Currently used to transmit information to linear point aerodynamics entity. ○ cos_ic_vx, cos_ic_vy, cos_ic_vz – for static analyses, where true entity velocities are zero by definition, this passes the user-input initial aircraft velocity as a simple variable. VI-Aircraft entities use this in static analyses in place of actual aircraft velocities calculated using the MSC.Adams VX, VY and VZ functions.
		Added button to bottom toolbar that opens a Command Window in VI-Aircraft’s current working directory.
		Modified VI-Aircraft control subroutine, con1555, which adjusts tire forces, to allow up to 5 user variables to be passed into tires. Previously the consub over-wrote user-inputs to the tire, though there were no known impacts to users.
		Fixed some help pages, error messages , dialog boxes.
	1304	Rework tutorial projects, in order to better understand the chapter subdivision in the tutorials.
	1299	A fix for the MSC problem about the private library aircraft_solver.dll not found, has been implemented both for private and site solver libraries.
	1246	Reworked the content of the aircraft solver in a way that only source code is distributed: in this way the final user can build using a compiler different from the one used to build the release. A prerequisite for this approach is that all our subroutines are accessed using the routine statement.
	1215	Building a site or private version of VI-Aircraft solver now works without overriding the comopts.inc
	1175	Fixed a problem when using the Cxx solver, that caused looping after balance when running a landing analysis with hold rotations on.

	1147	Shared database files now are correctly visualized when edited in Notepad
	943	Fixed the problem about VI_Road_Core double license checkout
2008r1.12.0 / MDr3.12.0		VI-Aircraft 12.0 is built upon Adams 2008r1 and Adams MDr3. Previous versions of VI-Aircraft were built on Adams 2005r2.
		Road Updates
		The ARM road format, introduced in VI-Aircraft 10.0, has been replaced by the new, more useful VI-Road road types. (In VI-Aircraft VI-Road is also known as VI-Runway.) The ARM roads are still supported, but will no longer be developed. The ARM road files (*.rdf) in the VI-Aircraft shared database have been replaced by VI-Road format road files. It is recommended that you no longer generate new roads using the ARM method. To support this, the VI-Road Plugin has replaced the Road Builder Plugin accessible from the Tools Menu in the Standard Interface.
		New formats for road input files (*.rdf) are now supported. These VI-Road road types are "EXTRUSION", "SURFMESH", "MEASURED", AND "ANALYTIC" roads. These formats offer more options for creating complex road shapes. Examples are included in the VI-Aircraft shared database, where the Russian and San Francisco runway examples have been converted from ARM to VI-Road format.
		VI-Aircraft has maintained support for the MSC 3D Road, with its 3D contact method that was updated after the release of Adams 2005r2. The 3D contact method, as contrasted to the point-follower method, is activated by choice of the MSC 3d Road file (*.rdf) format. Examples of the MSC 3D Contact Road format are contained in the VI-Aircraft shared database in the roads.tbl directory. Look for files with *_msc* in the file name. These files contain the line "METHOD ='3D'". For example, sf28r_mod_msc.rdf makes use of the MSC 3D contact method and sf28r_mod.rdf is a VI-Road file and causes the tires to use the point-follower contact method. The 3D contact method is recommended for shorter, more abrupt runway features.
		Behavior of MSC Tire's 3D contact method can be improved by installing patch, APN-MD R3-472, applicable to both MDr3 and 2008r1 of Adams. The patch must be separately obtained from and licensed by MSC. The license key is "ADAMS_TireHandling".
		The automatic generation of road profiles using roadcase input files (*.rcf) has been improved. Step, Crown, and Ramp road types can now be automatically created in addition to the previously-available flat and 1-cosine bump roads. Other options, such as shifting a bump to the left or yawing a road bump, have also been added. In order to accommodate the new road profile options, the formats for roadcase files have been changed, as have the examples in the shared database roadcases.tbl directory. When you read one of your older roadcase files into a taxi simulation, it is automatically updated to the new format and this version is saved to your default writable database with the string "_v20" appended to the file name. Roadcase files (*.rcf) are used in taxi simulations to automatically generate road files (*.rdf). In VI-Aircraft 11.0, these road files were in ARM format. In VI-Aircraft 19.0 these road files are in one of the new VI-Road formats, SURFMESH or EXTRUSION.
		Updates Other than Road Updates
		The C++ Solver is now supported by all VI-Aircraft simulation types. This is made possible by the addition of a new environment variable, MDI_SOLVER_SELECT, and updates to the simulation submission macros. The C++ Solver is still considered experimental, but it is now available for testing. For some models, the C++ Solver has been found to be faster. Valid options for the environment variable are 'CXX' and 'F77'.
		Updated simulation type: The existing Landing simulation was updated to optionally include yaw, pitch, and roll prevention to allow simulation of 2-point and 1-point landings. Works well for rigid bodies. Works less well for flexible bodies since the rotational "locks" grab the flexible fuselage at the assembly center of gravity.

	New simulation type: Tiedown with platform motion based on time-histories of displacements, velocities, accelerations. Compliments the existing tiedown simulation based on user-defined sine waves of platform motion.
	New simulation type: Landing simulation that does not require a leading balance simulation to set up the primary simulation. This Landing without Balance Simulation uses MSC.Adams part initial conditions to bring the aircraft to the chosen initial velocity without a ramping up to that initial velocity. This can be helpful to avoid exciting a flexible aircraft in the absence of distributed aerodynamics; it can also eliminate the long balance simulations associated with complex flexible bodies.
	New request type: A version of the Measurement Request entity has been added that includes an optional input for a moving reference frame marker.
	New material choices were added to the Nonlinear Beam dialog box. (See Build > Parts > Nonlinear Beam.) These new materials are magnesium, stainless, titanium, tungsten and lead.
	An option to create the MSC.ADAMS Universal Joint was added to the joint creation dialog box.
	Added a test and a warning to the equation based oil damper that alerts users when they choose a metering pin larger than the damper orifice.
	Added tensioning parameters to the tiedown analysis log file.
	Updated documentation.
	Output of the name file (*.nam) is now optional. This is controlled by environment variable, MDI_ACAR_WRITE_NAM, which can be set to 'yes' or 'no'.
	The Actuator Table and Actuator Wizard dialog boxes are now available from the Adjust Menu of the Standard Interface. These give you more control over Adams Car-type actuators in your models, and they are modified to make them suitable for use in VI-Aircraft.
	Improved handling of multi-line comment strings for both subsystem files and template files.
	Fixed Issues
	The roads generated in VI-Aircraft extended infinitely in all directions, beyond the onscreen image. This is no longer true, since the ARM road has been replaced with VI-Road roads.
	On the main menu in the Standard Interface, under Tools, there were unused menu picks. This is not an issue since the menu choices were removed.
	The measurement request entity does not include the fourth marker as an input option for velocity and acceleration requests. For example, the X acceleration measurement request is based on the MSC.ADAMS ACCX function, which is written ACCX(i,j,k,l). In VI-Aircraft the "l" marker defaults to the global origin on the ground. This fourth marker is required for determining relative velocities and accelerations between two moving parts. This was often not needed. Issue resolved. A new version of the Measurement Request entity now includes the fourth marker.
	There were several rarely-used constants embedded in analysis macros that did not convert properly to other time unit systems. They were fixed as in this example: "100" was replaced with "(100(seconds))".
	Repaired minor error in gear-retraction simulation. This did not affect simulation results but did generate an error message.
	A bug prevented running more than one sine-wave-based tie-down analysis at a time. Another bug prevented display of the tiedown balance simulation. Fixed.
	Existing measurement request entity used a hardpoint to define orientation. This is incorrect but did not affect results except in the new landing simulation variant. Fixed.
	An error was reported for some dynamic simulations, such as Landing, that use consub 1501. The error was reported as an "end-of-line" problem and occurred for

	simulations with fewer than 10 output steps. There was a work-around, but this is no longer necessary. This Fortran format statement error is repaired.
	The prepend-file button in the taxi simulation dialog box was broken in release 11.0. Repaired.
	The create tie-point button in the Create Ties in Model dialog box did not property delete existing tiedown elements. There was a work-around that is no longer required. The problem is fixed.
2005r2.11.0	The 1976 U.S. Standard Atmosphere model has been added to VI-Aircraft. The atmosphere model is used to calculate the local densities, pressures, and temperatures during simulations. VI-Aircraft entities automatically make use of atmosphere variables. Testrig communicators are provided for you to make use of atmospheric conditions in your own functions. User inputs text boxes defining atmospheric conditions have been added to all the following full-aircraft simulation types: Landing, Taxi, Flight, Braking, and Tiedown. The inputs include the initial geometric altitude, a flag to control whether the altitude varies with DZ during the simulation, and constant wind velocities in the global X, Y, Z directions. Other simulation types are hard-wired to sea level conditions.
	Added an aircraft tiedown simulation and assembly type to VI-Aircraft. Using this simulation, you can tie and aircraft to a platform using force elements representing ties (cables, straps, etc.). Then you can apply gravity vectors and ground wind and also move the platform to test the tie configuration.
	Added a straight-ahead braking simulation in which you can control braking, thrust and other parameters as your aircraft travels down a runway. This complimented the braking capability already in the existing taxi simulation, where braking commands are controlled by the pilot inputs file.
	A Rebound Landing simulation has been added for landing gear dynamics assemblies. You can test the sudden un-stroking of your compressed landing gear models. This can be used to simulation a landing gear compressed in a hard landing and then suddenly unloaded when the tire leaves the ground.
	The simulation input data tables were previously manipulated by Prepend Row, Append Row, Insert Row After, and Remove Row buttons, which either operated on one row in the table or required you to type in row numbers for the buttons to act on. This could be a cumbersome process. These buttons have been replaced by Insert, Apply, and Delete buttons that act on table rows. Instead of typing in row numbers for the buttons to act on, you can simply click on rows (using the Ctrl key to select multiple rows) for the buttons to act on. A Clear Table button has also been added to remove all rows except for one cleared row. The taxi simulation dialog box has new inputs: Initial X Location, Initial Y Location, and Gravity Load in g's. Previously the taxi simulation only had an input for Initial X Velocity.
	An accelerometer request entity has been added to the Build menu in template builder mode. This entity reports local g-load factors, accelerations and rotation rates at the locations where accelerometer entities are added to the model. These values are available in the post-processor and in the form of variables for incorporation in user functions. An accelerometer has also been added to the aircraft testrig so that g-load factors, accelerations, and rotation rates at the aircraft assembly center of gravity are reported.
	A tiedown marker element has been added to the template builder. You can use these elements to define the location of tiedown attachment points on your aircraft.
	Added several Russian runway profiles to the shared database. These include forward, reversed, VI-Road formatted, and MSC-formatted roads.
	Added a helicopter model and its property files to the shared database. The model is suitable for full-aircraft and full-aircraft moving-platform analyses.

	Changed the minor role of the testrig steering command communicator from “front” to “any” so that steerable tail gears will accept user steering commands. Automatically connects to VI-Aircraft steering elements.
	Taxi, attitude, and tipback balance simulations rely on a test to determine whether they were successful. The criteria was loosened so that balance simulations that reach 0.999*balance_duration are considered successful. Previously, simulations had to reach 0.999999*balance_duration, and that tight criteria was sometimes not fulfilled, causing the primary simulation to be aborted.
	The tire property files were updated with comments noting that tire splines can now have 100 points. The previous limit on tire splines was 25 points.
	All the simulation types except for taxi, attitude and tipback make use of a subroutine that optionally allows printing of balance simulation output to the results files. The subroutine that controls this option contained a statement to generate an artificial output at time=0 so all output had a uniform start point. This was a purely cosmetic feature and caused problems for the C++ solver. This statement was removed to achieve a better current partial compatibility with the C++ solver. It is also necessary for our planned future full compatibility. The end result now is that your balance simulation start time will vary and be nonzero.
	All simulation dialog boxes have been reduced in height so they can be used at screen resolutions as low as 1024x768.
2005r2.10.1	Reintroduced support for legacy MSC 3D Contact Road (This requires legacy MSC 3D Contact Road license only available in version 2005r2 sold before June 30th, 2006.)
	Added support for the new MSC 3D Contact Road. This is available in patch, apn_2005r2_434, which must be separately obtained from MSC. (This patch does not apply to VI-Aircraft 19.0 or later.)
2005r2.10.0	Changeover of all menus, dialog boxes, documentation, etc. to VI-grade
	VI-grade Licensing system
	Added several Russian runway profiles to the shared database
	A new communicator, cos_simulation_duration has been added to the VI-Aircraft test rigs to make the simulation duration variable available for user functions.
	Changed the default template format in the template builder “Save As” dialog box to ASCII from Binary. The dialog box now also retains the user’s choice.
	VI-Road Utility to manage road files (and new road file format)
	New tire contact method.
	Repackaged the Handling Tire for installation and licensing. This tire, which includes the Enhanced and TR-R64 tire models, is now part of VI-Aircraft and no longer requires a separate license.
	An intermittent bug in the flexible strut bearing force entity that caused a solver failure with an error message about an incorrect STEP function has been corrected.
	Several standard tire requests, tire_kinematics,tire_contact_patch, and tire_miscellaneous, which were inconsistently defined, have been corrected.
2005.2.0	New linear point aerodynamics entity
	New capability to change runway orientation for landing simulations
	Pressure relief valve added to equation-based damper
	Added gear-taxi simulation type
	Documentation enhancements, including 3 new tutorials
	Default output changed from .req to .res files
	Tire improvements at low speed
	Tire rim model added
	Tire stick-slip feature added

	Tire simulation speed improved
	Support added for other ADAMS tires
	Enhanced many of the shared database models
	The nonlinear point aerodynamics entity's alpha and beta calculations now valid for all values of Vx, Vy, and Vz great than v_zero_ref
	Improved support for road files with long directory paths and long file names
	The measurement request entity now reports displacements in the body-231 sequence in addition to the body-321 sequence; also discontinuities in reported angles have been reduced
	Large number of minor enhancements and bug fixes
2005.0	New taxi simulation input option allows increased control over simulations
	Assembly aggregate mass communicator added to aircraft test rig
	A road file viewer is added
	New term added to tire model for improved sideforce calculation
	Flexible-body swap
	Documentation improvements, including 2 new tutorials
	Tires associated with wheel parts in ADAMS/Aircraft changed to better handle differential equations associated with tires.
	Added subsystem-manage and assembly-manage options to the Standard Interface menu
	A sensor was added to the reverse braking simulation to improve the reliability of the braking force
	Added external-files option to landing gear drop and retract simulations
	The shared database example flexible airframe template, _AA_airframe_flexcivil.tpl, referenced a modal neutral file which had a misplaced center of gravity (CG), which caused the aircraft to tip over backwards. The CG has been moved forward of the main landing gear.
	Drop test rig changed to allow landing gears with multiple fuselage attachment points to be attached to the test fixture
	A significant number of enhancements and bug fixes
2003.1	Improved balance simulation aircraft positioning
	Background and files_only options added to simulation dialog boxes
	Table look-up mu-slip curve added to all tires
	Additional tire requests
	New measurement request entity
	Lift force added to gear drop simulation
	Products of inertia added to aircraft configuration files
	Total mass option added to aircraft configuration files
	The hydraulic retract actuators now report volume flow rate
	Force/torque magnitudes are now included in the joint and bushing request entities
	Enhanced aggregate mass calculation
	Center of gravity communicators added to test rig
	Landing gear and aircraft aerodynamics entities no

	longer required to be aligned to global x-axis at build time
	New FRICTION_MODE parameter added to tire property files
	Failure of a single simulation no longer stops the entire sweep of runs
	Simulation dialog boxes changed to retain user input information even after the dialog boxes are closed
	Numerous minor enhancements and bug fixes
12.0	Base Product

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