Adams 2021

Release Guide

HEXAGON | MSC Software

Corporate
MSC Software Corporation
4675 MacArthur Court, Suite 900
Newport Beach, CA 92660
Telephone: (714) 540-8900
Toll Free Number: 1 855 672 7638
Email: americas.contact@mscsoftware.com

Europe, Middle East, Africa
MSC Software GmbH
Am Moosfeld 13
81829 Munich, Germany
Telephone: (49) 89 431 98 70
Email: europe@mscsoftware.com

Japan
MSC Software Japan Ltd.
Shinjuku First West 8F
23-7 Nishi Shinjuku
1-Chome, Shinjuku-Ku
Tokyo 160-0023, JAPAN
Telephone: (81) (3)-6911-1200
Email: MSCJ.Market@mscsoftware.com

Asia-Pacific
MSC Software (S) Pte. Ltd.
100 Beach Road
#16-05 Shaw Tower
Singapore 189702
Telephone: 65-6272-0082
Email: APAC.Contact@mscsoftware.com

Worldwide Web
www.mscsoftware.com

Support
http://www.mscsoftware.com/Contents/Services/Technical-Support/Contact-Technical-Support.aspx

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- Document name
- Release/Version number
- Chapter/Section name
- Topic title (for Online Help)
- Brief description of the content (for example, incomplete/incorrect information, grammatical errors, information that requires clarification or more details and so on).
- Your suggestions for correcting/improving documentation

You may also provide your feedback about MSC Software documentation by taking a short 5-minute survey at: http://msc-documentation.questionpro.com.

Note:	The above mentioned e-mail address is only for providing documentation specific feedback. If you have any technical problems, issues, or queries, please contact Technical Support.

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Preface

- Welcome to Adams 2021
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Welcome to Adams 2021

Thank you for purchasing Adams 2021. Adams is motion simulation software for analyzing the complex behavior of mechanical assemblies. With it, you can test virtual prototypes and optimize designs for performance, safety, and comfort, without having to build and test numerous physical prototypes.

About MSC Software

Overview

MSC Software Corporation is the leading global provider of virtual product development (VPD) tools, including simulation software and professional services. MSC Software helps companies make money, save time, and reduce costs associated with designing, testing, producing, and supporting manufactured products.

MSC Software works with thousands of companies worldwide, in hundreds of industries, to develop better products faster by using information technology, software, and services to enhance and automate the product design and manufacturing process. Simulating your product performance reduces development costs, time to market, and warranty costs.

About Virtual Product Development and Adams

You've heard it before: manufacturing companies today face intense global competition, demanding customers, fragmented markets, increasing product complexity, compressed product cycles, price and profit pressures, strict regulatory and liability environments, systems integration and supply chain issues, skyrocketing costs of testing and physical prototyping, and on and on…

What you don't often hear, though, is a strategy for enabling your company to improve your new product development process to meet these challenges.

Whether you are delivering airplanes, automobiles, ships, biomedical devices, golf clubs or children's toys to your customers, MSC Software's goal is to help you improve your new product development process, allowing you to be significantly better at your concept development, design, testing, and production activities through the application of VPD.

VPD is an environment that uses an integrated combination of both simulation software technology and traditional techniques to design, test, manufacture, and support products. The result is that cost-effective designs that meet all performance, safety, durability, and reliability requirements can be brought to market in less time and for less cost.

Adams, as part of VPD, is focused on enhancing your ability to make better product development decisions, explore innovative design alternatives, and consistently get the product right. It is the world's most widely used mechanical system simulation software. It enables you to produce virtual prototypes, realistically simulating the full-motion behavior of complex mechanical systems on your computers and quickly analyzing multiple design variations until an optimal design is achieved. This reduces the number of costly physical prototypes, improves design quality, and dramatically reduces product development time.

Technical Support

For help with installing or using an MSC Software product, contact MSC technical support. Our technical support provides technical assistance on questions related to installation and use of the software. For further details please see the Technical Support Usage Guide, which is accessible via our support web site.

You can reach MSC technical support on the web, by telephone, or e-mail.

Web

Go to the MSC Software web site at **www.mscsoftware.com,** and click on **Services -> Technical Support**. Here, you can find a wide variety of support resources including Product Updates, Discussions, Technical Articles, and Documentation updates.

In addition, we provide several excellent sources of online information:

- **SimCompanion** - Find solutions to problems in this repository of troubleshooting tips, examples, and frequently asked questions. To access the SimCompanion, go to:

  http://simcompanion.mscsoftware.com

- **VPD Community** - The VPD community is where to go when you are looking for peer support, as well as technical expertise. Many of our consultants, developers, and technical support staff monitor the forums. To sign up for the forums, go to:

  http://forums.mscsoftware.com

  Then:

  - To view the Adams discussions, select Adams.
  - To view product alerts and company news and events, select MSC News.

Phone and Email

For a current list of phone numbers and language based email addresses please visit our support web site and click on **Contact Technical Support**.

Training

MSC Software training provides comprehensive training in Virtual Product Development. We offer standard and customized training courses in the application of CAE tools to solve from basic to complex problems within any industry. We offer over 100 courses in our state-of-the-art classroom facilities and individual computer graphics laboratories at training centers throughout the world. All of our courses emphasize hands-on computer laboratory work to facilitate skills development. We are uniquely positioned to optimize your investment in design and simulation software tools.

Our industry experienced expert staff is available to customize our course offerings to meet your unique training requirements. For the most effective training, we also offer many of our courses at our customer's facilities.

We specialize in customized training based on our evaluation of your design and simulation processes, which yields courses that are geared to your business. In addition to traditional instructor-led classes, we also offer video courses, interactive multimedia training, web-based training, and a specialized instructor's program.

Course Information and Registration

For detailed course descriptions, schedule information, and registration call the Training Specialist at (800) 732-7211 or visit www.mscsoftware.com.

Internet Resources

MSC Software (www.mscsoftware.com)

MSC Software corporate site with information on the latest events, products and services for the CAD/CAE/CAM marketplace.

MSC Software Store (store.mscsoftware.com)

store.mscsoftware.com is a virtual marketplace where clients can find engineering expertise, and engineers can find the goods and services they need to do their job.

1 What's New

What's New

The following are highlights of additions to existing products. Subsequent updates to the Known and Resolved Issues lists may be found in the MSC SimCompanion articles linked above.

General

Only Version 12 SP4 for SUSE Linux

The SUSE Linux installer in this Adams 2021.0.0 release does not support SUSE Linux 12 SP2 contrary to MSC's official platform support for 2021 product releases. The SUSE installer for this release will function only on SUSE Linux 12 SP4. Within a month or two there will be an updated release, Adams 2020.0.1, that will include a SUSE Linux installer supporting SUSE Linux 12 SP2.

Updated Help System Look and Feel

As part of resolving some browser compatibility issues, see the Issues Resolved list below, the Adams Help system has a slightly different look and feel beginning in this release. The table of contents organization remains the same. Dialog box help (F1 Help) will continue to function the same way. The keyword search launch point has been moved to the top of the page. See the Getting Help section of this release guide for updated diagrams of key Help system features.

Python 3.8 Syntax

This release of Adams uses Python 3.8 (versus 3.6 from the prior few releases). Users writing their own Python scripts to work with Adams should be advised there are some syntax changes which may be of interest/relevance depending on your scripts. For details see: https://docs.python.org/3/whatsnew/3.8.html#bpo-36085-whatsnew

Required Upgrade to MSC Licensing Helium as of Adams 2020.0

Users who wish to use Adams 2020.0 or later versions must update their license servers to use MSC Licensing Helium (this version uses Flexera FlexNET v11.16.3.0). The previous release of MSC Licensing FLEXlm is version 11.13 and is what users working on Adams 2018.0 and more recent prior versions have been running. Those and other older versions of Adams will be supported on MSC Licensing Helium as well.

Note:	It is possible to have multiple versions of MSC Licensing co-existing for those organizations unable to redirect older versions of Adams to MSC Licensing Helium for some reason.

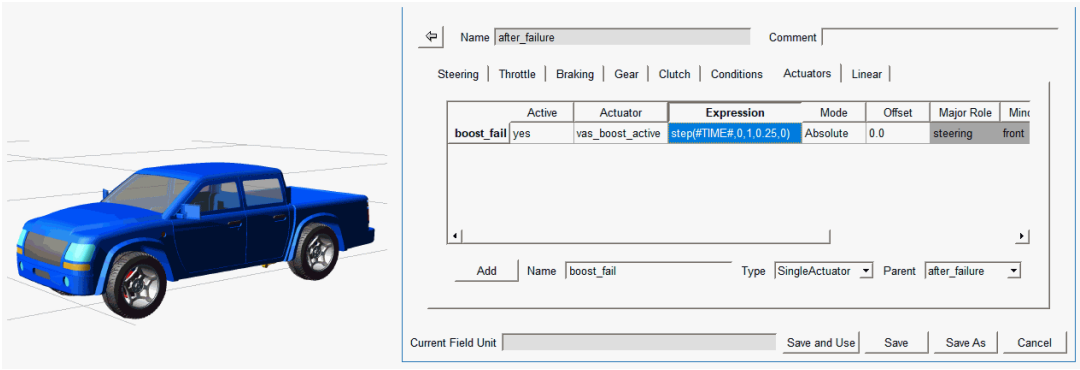
Issues Resolved

ADMS-66204	Adams online help does not open with Microsoft Edge and Chrome browser
ADMS-57756	Adams help does not open on Firefox
ADMS-66336	Customer request documentation for MDI_ADAMS_RETRY env variable
ADMS-66282	Installation path setting update in online help needed

Adams Car

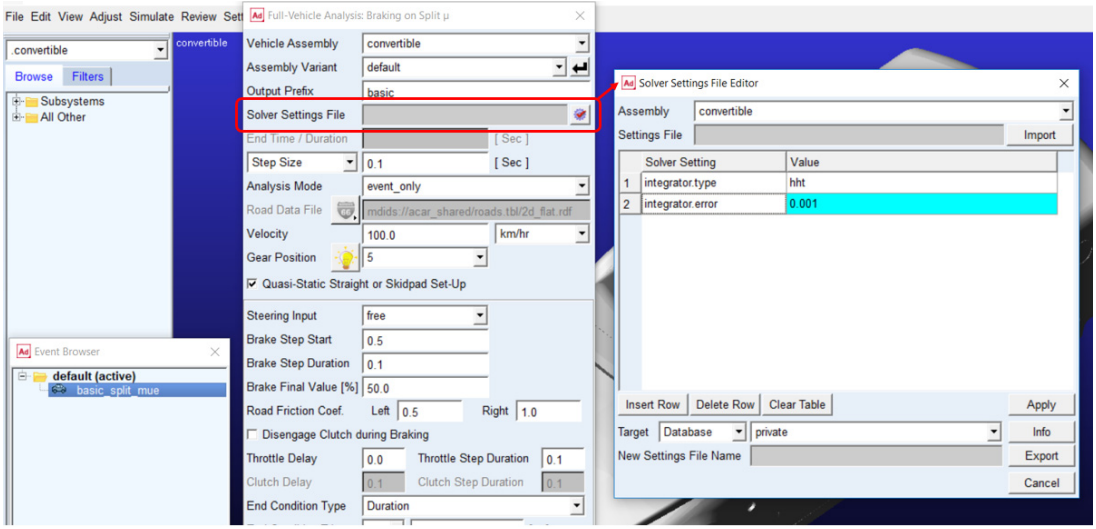
Generic SDI Actuator Support

In this release of Adams Car users can now add any actuator to the Standard Driver Interface (SDI) event definition (with the exception of the Driving Machine demand actuators). The event can change actuator expressions as function of time, mini-maneuver time, or references to condition sensors, in each mini-maneuver. It is also possible to apply relative/absolute to the output of the actuator (similar to the driver demands), and to activate or deactivate the actuator per mini-maneuver.



Solver Settings in Event

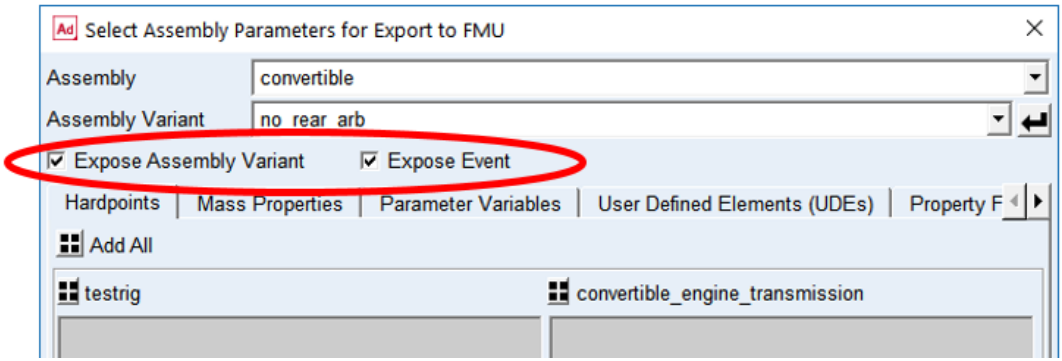
Beginning with this release of Adams, Adams Car users can associate a specific set of Adams Solver settings with one or more events. The dialogs for the full vehicle, suspension and generic actuation events all now support the optional selection or creation of an Adams Solver Settings File (.ssf) with a specific dialog from which Adams Solver Settings can be browsed and specified. Any settings in the specified .ssf will get applied to the given event when it's run. They will override the current Adams Car session's Solver settings. Any applied .ssf will be listed in the Adams Solver message file (.msg) and the Adams Solver dataset (.adm). Also, a new database table, "solver_settings.tbl", has been added to store solver settings files within a cdb.



Event and Variant in FMU

In previous versions of Adams, functional mockup units (FMU) exported from Adams Car could be imported into another Adams instance acting as the FMI master, or a real-time operating system (RTOS) environment such as SIMulation Workbench (SimWB) acting as the FMI master. Model parameters could be exposed in the FMU and set by the FMI master prior to analysis. Now in this release, Adams Car can also expose assembly variants and events so that they can be changed by the consumer of the FMU, for example a user running models on an RTOS.

To achieve this the "Expose Parameters" has been extended to support selection of events and assembly variants.



Custom Events in the Event Browser

With previous releases of Adams Car it is difficult to modify custom events to support the Adams Car event, event set and event browser functionality. Adams Car 2021 introduces a new feature to make this easier. A series of commands allow users to convert a custom macro into an Adams Car event from which one can modify/update inputs and take advantage of all the other Adams Car event browser capabilities.

The following steps make this happen.

1. Generate python class for a custom event (once):

   ```
   acar toolkit event convert macro=<macro_object>
   output_suffix=<output_suffix parameter>
   ```

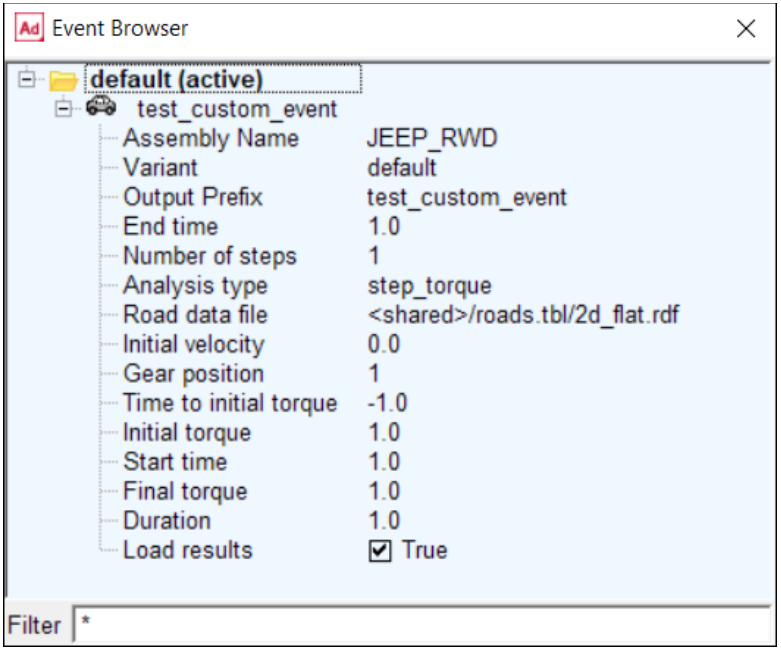
2. Register python class for a custom event (each time Adams Car is started):

   ```
   acar toolkit event register macro=<macro_object>
   python_file=<python file created in step 1> plugin=<plugin name
   if applicable>
   ```

3. Then the macro or dialog box execution commands should create the event instance:

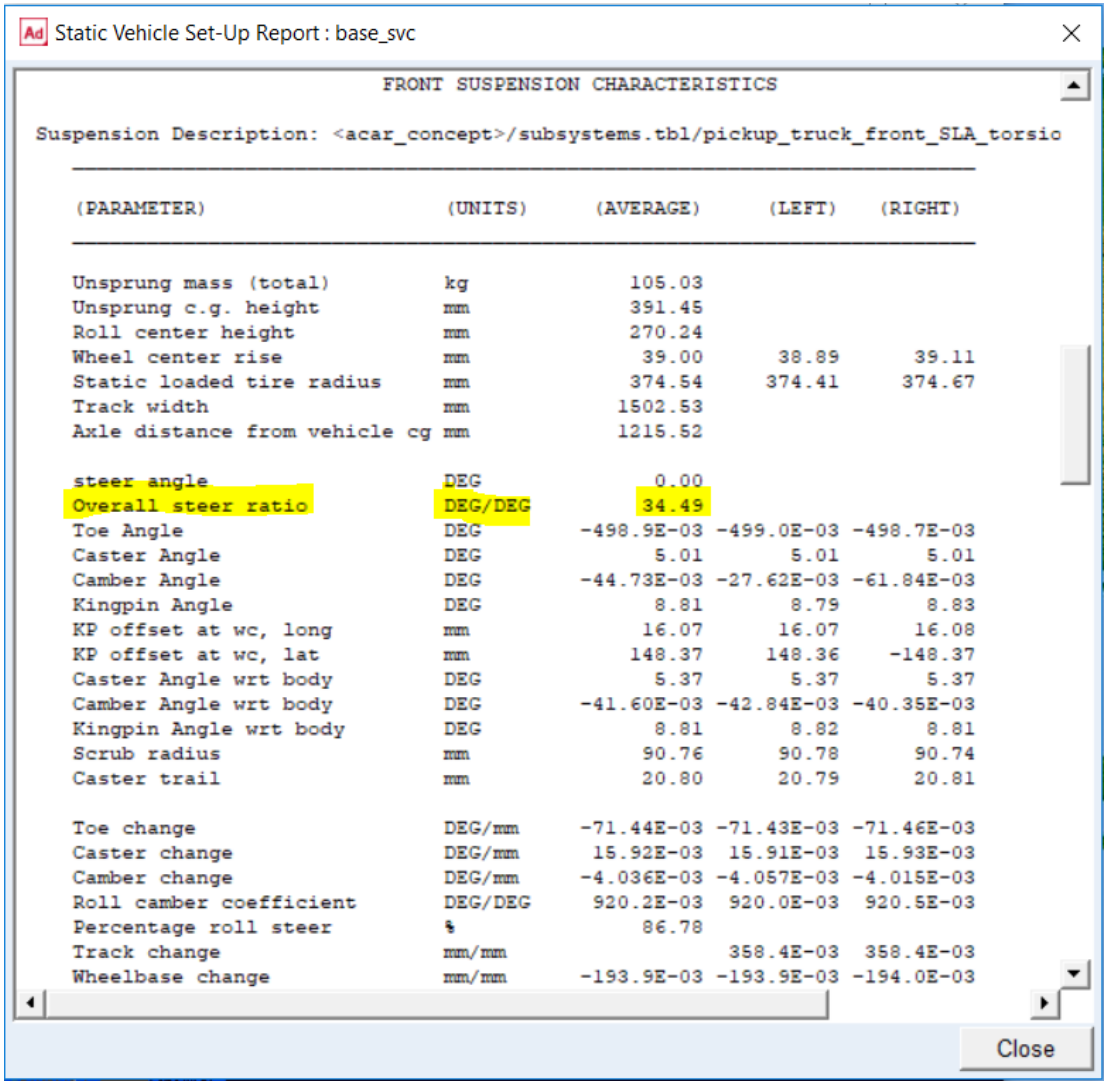
   ```
   acar analysis event create name=<output_prefix>_<output_suffix>
   class=<macro_reference> model=<model name>
   ```

For more details, see the New Feature Example accompanying the release - "A21_004_ACar_Custom_Events_in_Event_Browser".



Overall Steer Ratio in SVC Report

In this release of Adams Car the Static Vehicle Characteristics (SVC) event's report now includes output of the vehicle's overall steer ratio.



Change in Behavior: Perpendicular Joint Primitive Orientation in Template Builder Macro

There is a change in behavior with regards to the orientation of the I and J markers defining perpendicular joint primitives as created by the Adams Car Template Builder automation macro. Specifically,

I-marker was previously:

```
orientation=(ori_relative_to({0,90d,0},eval($joint_name.j)))
```

and is now:

```
orientation=(ori_in_plane(eval($joint_name.i), $axis_1,$axis_2,"Z_ZX"))
```

J-marker was previously:

```
orientation=(ori_in_plane(eval($joint_name.j),$axis_2,$axis_1,"X_XZ"))
```

and is now:

```
orientation=(ori_in_plane(eval($joint_name.j),$axis_2,$axis_1,"Z_ZX"))
```

This will not affect users modeling perpendicular joint primitives interactively, but could influence those who use this macro in modeling automation customizations to create/modify the perpendicular joint primitive.

Issues Resolved

ADMS-68697	Adams Crashing while visualizing road
ADMS-68349	Road Builder Crash
ADMS-67950	when using the road builder for creating road as per ADM 740 workshop 9 crash occurs without any warning
ADMS-67616	Durability Dynamic Loadcase Event set generator not working
ADMS-69081	Adams Car hangs when opening 2020.2.1 cdb in 2020 FP2
ADMS-66266	For external bumpstop clearance results are different in 2019.2 and 2020
ADMS-64798	Weird messages appear while loading Revo type Assembly model
ADMS-67391	error when opening power/velocity plot
ADMS-64264	Spmm Report (.dat one) not generated properly for background analysis (Matlab one works)
ADMS-67946	There are no details available on setting controller gain values for dynamic loadcase durability event
ADMS-65897	Leaf Spring Editor - Save adds an extra suffix to file
ADMS-66493	KnC Dynamic and SPMM events Output Request file some lines that are not aligned as the others
ADMS-66162	Chassis to Car migration plugin_list incomplete

ADMS-63990	Rerun of static loadcase event produces many errors
ADMS-66151	Communicator Error when Open in Modify Dialog Box
ADMS-65485	ACar SVC report for F77 solver Underscores are added into the unit columns display as 'N_'
ADMS-66575	Dynamic Loadcase - need option for steering input (length/angle)
ADMS-67121	new variable subsystem_index is created in output communicator but not included in the template converter
ADMS-64999	Strut bending Complex simulation output Displacement Request issue
ADMS-66136	Full vehicle with ARLMBD event simulations, requirements to add WFT requests and Tire/Rim Ground force requests from custom adm
ADMS-66453	A/Car: Differences in results with and without switch parts + Flexible body
ADMS-67270	Obsolete model tmpmodel is created
ADMS-67065	Beam-based ARB misbehaving with variants
ADMS-66935	issues when reading in subsystem, database corruption and model incomplete
ADMS-66545	Difference in the results when car assembly is created with rigid to flex switch.
ADMS-66258	Orientation issues of perpendicular jprim in template builder
ADMS-65894	No option to browse *.ste new property file in 'Modify General Spline' dbox
ADMS-65753	Dynamic TASA Suspension analysis for 'Aft Axle' as RPC input does not work
ADMS-65752	Error message appears when modified Dynamic TASA suspension analysis event from Event Browser
ADMS-65569	Non-hardpoint stabar profile nodes won't retain after saving subsystem and opening again
ADMS-64053	Suspension Anlysis Compliance GUI is missing Ride Height Specification
ADMS-63703	Front Spring Scale Factor does not change wheel load
ADMS-54809	Graphical Difference Feature Required as in Chassis
ADMS-66801	Documentation update for rack ratio in set full vehicle parameters Dbox
ADMS-35815	Error message appears when try to create the FE part by using the harpoint and construction frame created at same location

Known Issues

ADMS-21716	Adams Car bushing geometry disappears during animation when animating a second time after first running the animation successfully and then clicking the reset button
ADMS-16820	Name of the Filter is also added to Group if user creates a Group by using 'Add to Group' option (Template Builder Mode)

Adams Car-Ride

Issues Resolved

ADMS-67784	Table Functions in Road Profile is not applied at first analysis performing
ADMS-67979	IPIT Help Image of GUI don't contain G and H Tab
ADMS-67816	GUI of Getting Started: Adams Car Ride document is old in Online Help
ADMS-65572	Issues when fitting isolator parameter in rotational az direction with IPIT (general_bushing)
ADMS-58482	Documentation about some options missing in Component Analysis online help

Adams Chassis

Adams Chassis 2020 FP1 Was its Last Release

Beginning with Adams 2021, Adams Chassis is no longer developed and included in Adams releases. The Adams Chassis functionality has been consolidated into Adams Car. Adams Car 2019 and onward, contain the key capabilities (and templates) previously unique to Adams Chassis. If you have any questions about the transition, please contact your MSC account manager.

Adams Controls

Issues Resolved

ADMS-59683	Error message about PINPUT/0
ADMS-59061	Coupling Adams 2019.2 and scSTREAM2020 through FMI does not work. It does work in Adams 2018.
ADMS-38535	Add listing of fixed parameters when pressing the FMU inspect button
ADMS-63418	Error appears when exporting Adams controls plant, depending on state variable name.

Adams Co-simulation Interface

Supported Versions of Software for Co-simulation

An updated table of the Adams co-simulation Interface supported versions of Marc and EDEM is shown below:

Marc/EDEM version	ACSI supported version
Marc 2013.0	ACSI 2014.0, 2014.0.1
Marc 2013.1	ACSI 2014.0, 2014.0.1
Marc 2014.0	No support for ACSI
Marc 2014.1	No support for ACSI
Marc 2014.2*	ACSI 2015-2015.1, ACSI 2016*-2019.0*
Marc 2015*	ACSI 2015-2015.1, ACSI 2016*-2019.0*
Marc 2016 - 2020	ACSI 2015-2021
EDEM 2.7.1 (or later)	ACSI 2016-2021

* The ACSI 2016 and later versions require a workaround for the case of Adams models co-simulating with Marc versions 2014.2 and 2015. Marc 2016 does not require this workaround. For details see the “Special requirements to run Marc” section of the Adams product documentation (Online Help) under “Adams Co-simulation Interface.”

Adams Driveline

Issues Resolved

ADMS-55543	Adams Driveline: Set Testrig demand option does not work as expected
ADMS-65902	Bench test issues with road height for some models

Adams Durability

Issues Resolved

ADMS-67590	Adams PPT ->Adams Durability plugin - FE Part Output name need to be localized (Japanese)
ADMS-67591	Durability plugin ->FE part Output - 'Compute FE Part Stress and Strain' dbox Node name string need to be updated for Japanese localization
ADMS-66592	Solver crash at end of simulation with FEMDATA output and large amount of results
ADMS-67100	Data in RPC file looks broken if the file size is greater than 2GB
ADMS-51555	Automatic deletion of rcf file

Adams Explore

Issues Resolved

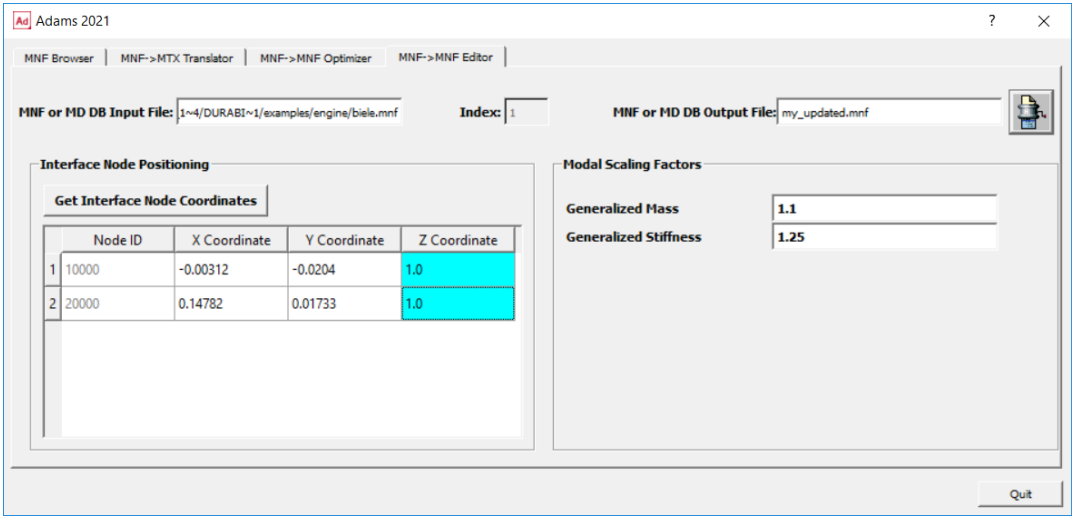
ADMS-67884	Incorrect class name in Aexplore python
ADMS-67061	Charts are lost upon resubmitting xlsx file.

Adams Flex

Direct Modification of MNF Attachments and Generalized Mass and Stiffness

In this release of Adams Flex users can directly modify some content of a modal neutral file (MNF) in the Adams Flex Toolkit. Locations of attachments points ("ASET" in FEA parlance) can be queried and modified. Also, modal scaling factors can be applied to the generalized mass and generalized stiffness.

These modifications can be made through the MNF Toolkit GUI's new "MNF → MNF Editor" tab (shown below) or through the MNF Toolkit's command line interface. See the Adams Flex documentation for details of the new command line options.



Issues Resolved

ADMS-66946	'part create flexible_body initial_velocity' docs has wrong info
ADMS-66913	Provide definition of each INVARIANT in the docs for FLEX_BODY statement
ADMS-67641	MNF Information display is not localized into Japanese
ADMS-65744	Bad/old image on Setting Symmetry of Flexible Bodies

Adams Insight

Issues Resolved

ADMS-58887	Adams crashing while opening model in insight.
ADMS-66601	Adams Insight- Editing the workspace values does not retain the changed quantity but a copied one strangely does.
ADMS-65207	Load results in Insight always loads all results, even for "Selected" option.

Known Issues

ADMS-33805	Exported HTML Report from Insight is not working with MS Edge Browser on Windows10; may work in later versions of Edge; In the meantime use another browser like IE or Firefox.

Adams Machinery

Licensing Organization Change as of 2019.0

If you run Adams Machinery with seat licenses (that is, not with either the Master Key or MSC One token systems), then, as of Adams 2019.0 and later releases (including this 2021 release), you must contact your MSC account manager to get a new license file.

This is because MSC has modified the license features for Adams Machinery such that there are independent license features for interface (GUI) usage and solver usage.

Issues Resolved

ADMS-67719	Bearing life value is different from the value calculated by the bearing manufacturer.
ADMS-47224	Detailed explanation of Adams/Machinery Gear requests such as tangential, radial forces etc are required
ADMS-39532	Advanced 3D Contact online help.
ADMS-60587	Inconsistent Profile Shift Coefficient in 'Detailed' and 'Advanced 3D Contact'
ADMS-59756	Cannot name a worm gear element "worm"
ADMS-57137	Interference has happened in worm gear set on Adams2019
ADMS-53006	Machinery Planetary gear mass property is not taken over from material based input to user input
ADMS-53005	Machinery gear mass property is not taken over from material based input to user input
ADMS-50369	profile shift coefficient for planetary gear isn't considered well.
ADMS-42454	Calculation of Tip Radius of Helical Gear.
ADMS-42072	Detailed type spur gears penetrates within each other.
ADMS-39822	Rule for definitions about 'Axis of Rotation' in 'Worm' Gear
ADMS-66947	Cannot select the NSK Bearing
ADMS-58160	Machinery Gear - Problems with the Worm gear input wizard.

Known Issues

ADMS-30608	If users run the motor with the exact rated condition of voltage and fluency and the external load (load on motor) is within the motor torque limit, then the AC motor is showing abnormal behavior since current is remaining constant but torque is changing as per load applied. Workaround is for the user to specify slightly lower supply voltage and frequency than is rated.
ADMS-31900	Span requests do not persist when modifying chain (open and closed) and belt
ADMS-22387	A broken translational joint on the tensioner in a belt systems is observed when reading bin file created on 2013.1 in later versions. Use .cmd as workaround
ADMS-31886	Chain system guide tensioner's piston & housing mass properties are uneditable.
ADMS-31994	Contact parameter definition for Guide - Chain contact is missing
ADMS-31937	When copying a cam system its follower motion will not be copied. Both cam systems will reference the same follower motion object.
ADMS-31992	Duty cycle bearing life does not support analyses run via external Adams/Solver launched from Adams/View or via standalone Adams/Solver.
ADMS-31960	Unable to chage direction of motor in runtime with curve based method for motor.
ADMS-31988	Some instances of bin file corruption observed which result in inability to open them in Adams 2013.2 and later without error. Workaround is to export .cmd files.
ADMS-32055	An error message appears if the user deletes the design variables created for Detailed bearing geometry parameters
ADMS-32067	Bearing disappears when selecting "reset to start" in animation control dialog.

Adams MaxFlex

Issues Resolved

ADMS-62369	MaxFlex run fails when Windows regional format is set to English (Germany)
ADMS-59767	Solver fails when nthreads>1 for model with nonlinear flexbody

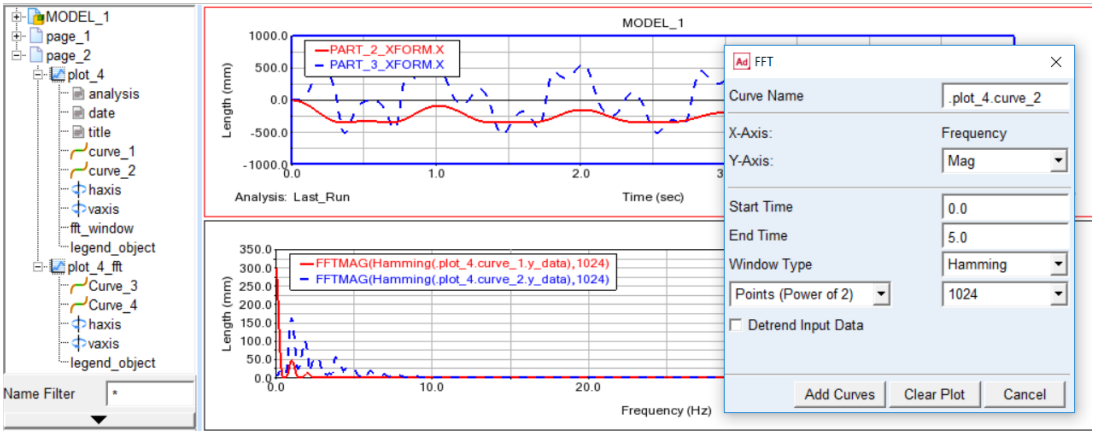
Known Issues

ADMS-68000	Remote solving of MaxFlex bodies does not function on Red Hat Enterprise Linux 7.7
ADMS-65607	Distribution of multiple MaxFlex parts in a given model to solve across multiple remote machines is not functioning. All of the MaxFlex parts will be solved on just one of the remote machines.
ADMS-25798	Object measures unsupported by nonlinear flexible bodies
ADMS-20258	Outline graphics generated for nonlinear flexible bodies do not respond to hide/show toggle

Adams PostProcessor

Multiple FFT Curves on One Plot

Starting with this release of Adams PostProcessor users can create multiple Fast Fourier Transform (FFT) curves on a single plot. Previously, only one FFT curve per plot was allowed. The Plot-FFT dialog now accepts multiple input curves at once and has new buttons for managing the addition of several curves and for clearing the FFT pane of the plot.



Issues Resolved

ADMS-67070	Animation and plot showing different time stamps
ADMS-56842	creating 3D plot makes Adams to crash
ADMS-40367	Adams crashing while modelling and post processing
ADMS-66327	Error when importing some certain plot configuration files in Adams 2020 FP1
ADMS-65973	Error when clicking on Plot Axis

ADMS-51176	translational_displacement result set of a point motion seems reversed per documentation
ADMS-19904	Measures not shown in PostProcessor
ADMS-66617	Exporting of Numeric data from an .res file in linux environment cause a crash if the filename is long.
ADMS-43678	Very slow filtering of requests with large model result files
ADMS-43642	Slow post processor session loading with large model result files

Known Issues

ADMS-55010	The coloring of 3D surface plots, especially when the data values are close to Z=0 relative to the extent (height) of the z-axis can be noticeably offset from what the legend indicates.
ADMS-20717	Fit View is unsupported for the standalone OGL animation view in Adams PostProcessor
ADMS-16835	Error in PPT Appearance Rules if we delete analyses on which rules were created and reload a new animation
ADMS-16834	PPT Appearance Rules cannot be created with request files only
ADMS-5552	No warning that velocity plots of CM in object measures when displacements are disabled in .res are actually Part Xform results

Adams Real Time

Event and Variant in FMU

In previous versions of Adams, functional mockup units (FMU) exported from Adams Car could be imported into another Adams instance acting as the FMI master, or a real-time operating system (RTOS) environment such as SIMulation Workbench (SimWB) acting as the FMI master. Model parameters could be exposed in the FMU and set by the FMI master prior to analysis. Now in this release, Adams Car can also expose assembly variants and events so that they can be changed by the consumer of the FMU, for example a user running models on an RTOS.

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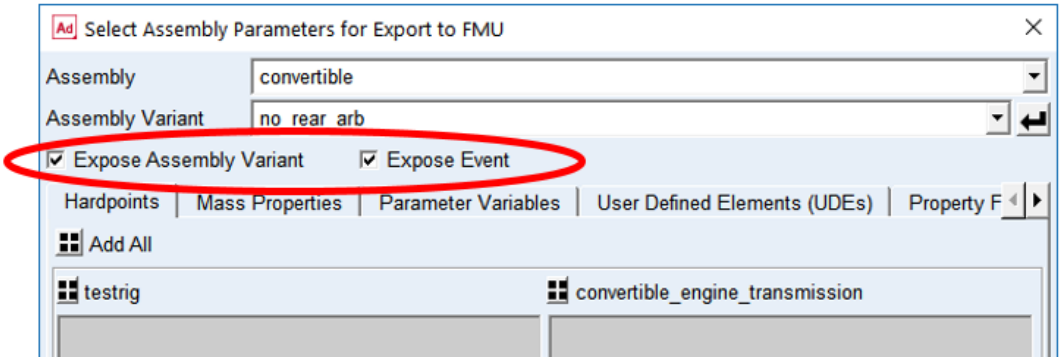


Issues Resolved

ADMS-64204	Adams RT thread affinity set0 parameter help documentation need to be added information about 'NUMA node(s)'
ADMS-67303	Adams Control Plant Export dbox FMI Master - SCALEXIO option need to be removed or hide

ADMS-64189	Parameterized FMU generated through FMI Interface menu is not functioning
ADMS-66507	Adams RealTime Animation documentation disappeared
ADMS-65699	Getting Started: Adams Real Time -'Evaluate the Fixed step Integrator' help example some of Adams Car event dbox images need to be updated

Known Issues

ADMS-64812	When using the real time integrators, the fixed number of iterations may not be enough for convergence of algebraic states (force, friction, variables).

Adams Solver

Runtime Kinetic Energy and Momentum via Subroutines

With this release of Adams Solver two runtime functions have been added that can be called from the CBKSUB, REQSUB, SENSUB, SEVSUB, or CONSUB subroutines. These new functions are:

- SYSTEM_KINETIC_ENERGY (KE) where KE is an output argument returning the total kinetic energy of the model.
- SYSTEM_MOMENTUM (RM, P, I) where RM specifies the reference frame in which either linear (P) or angular (I) momentum is returned.

Note that at this time these functions can only be called through the aforementioned subroutines. They cannot yet be referenced directly from Adams Solver statements.

Issues Resolved

ADMS-67600	Contact model runs well in 2019.2 but not in 2020 or 2020.1
ADMS-68488	Typo in SENSOR statement docs
ADMS-67528	PART velocity IC docs need help
ADMS-67299	Bending Reaction Arm definition is strange.
ADMS-66445	INTEGRATOR statement docs need improvement
ADMS-65484	Need to document information regarding SUSE12 SP2 platform OS scheduler limitation to run Adams SMP job on all CPUs
ADMS-68301	FRICTION_FUNCTION=USER argument of the CONTACT statement refers to CNFSUB
ADMS-67002	Help for solver statement request is incomplete
ADMS-67720	Adams 2020Fp1 crashes when using a runtime clearance between FE_Part and any other geometry
ADMS-61851	Adams crashes upon starting simulation
ADMS-67541	Sphere-to-Sphere contact error message appears when modified contact
ADMS-67385	some images are not displayed in Solver online help
ADMS-66259	wrong results with HHT and small HMAX for some models

ADMS-66135	Adams solver results in 2020FP1 are reversed due to singularity
ADMS-64980	Debug/eprint is clipping adams ids
ADMS-56572	Warning Messages needed about duplicate Contacts for all duplicates

Known Issues

ADMS-67876	Different results when model is run with more than one thread compared to results when run with a single thread.
ADMS-46710	On Red Hat Linux machines when a standalone Adams Solver job is terminated purposely by the user, the message in the terminal gives the impression that Adams Solver stopped unexpectedly. ========== ***Error: Error executing Adams Solver An error occurred while trying to run ...solver.exe Please examine any error message above and report it to Adams Technical Support if necessary. ==========
ADMS-19401	Running numerous initial conditions analyses at different velocities in sequence can lead to incorrect results in C++ Solver. Workaround is to use the FORTRAN solver.
ADMS-16306	Different results observed in Adams/Solver C++ between versions Linux 2012 and 2008r1 for certain model content
ADMS-14816	The linear fortran solver should issue a warning about using varval expressions
ADMS-5440	The C++ solver has a looser error control when dealing with small models. If your model is small (few DOF), use a tighter error control.
ADMS-5641	Performance issues with BEAM elements used in C++ Solver observed in Adams/Chassis models

Adams Tire

FTire No Longer Included with Adams Release

Beginning with the 2020 release (and including this 2021 release), FTire is no longer included with Adams. FTire users will need to acquire FTire directly from its manufacturer, cosin scientific software. https://www.cosin.eu/

Issues Resolved

ADMS-68016	TDFT Documentation for some Plots is Incomplete
ADMS-67945	Help for TDFT states to select Motorcycle Tyre However actually Plots are for Car
ADMS-57865	Documentation does not detail on anything about contact between tire and tilt table testrig
ADMS-67592	Adams closed down while visualizing the road
ADMS-67004	FTire documentation needs to be updated
ADMS-67570	Line charts does not created in TDFT
ADMS-67170	TDFT tool conversion to PAC2002tire belt mass calculation is incorrect
ADMS-57786	Sand bed event doesn't run when the working directory has a blank in the path
ADMS-57767	Sand bed event needs the Ftire license even though the PAC tire and rigid roadad.
ADMS-66510	CON901 Documentation update needed
ADMS-65799	Environment variable to keep road level on 3D spline and CRG road does not work

Known Issues

ADMS-52624	On SUSE Linux 11, the Cosin utility converting road files for the full vehicle embankment event crashes after having successfully completed the conversion task. The "invalid pointer" error and resulting backtrace and memory map diagnostics in the acar.log are benign and can be ignored. This issue does not occur if Cosin licensing is used for FTire.

Adams Vibration

Issues Resolved

ADMS-67858	Documentation does not detail on calculation formula of Gain of Bode plot
ADMS-64885	The Vibration analysis container name is misspelled in Model Browser.
ADMS-61805	Normalized coordinates Mag and Phase values don't match between Solver and View.

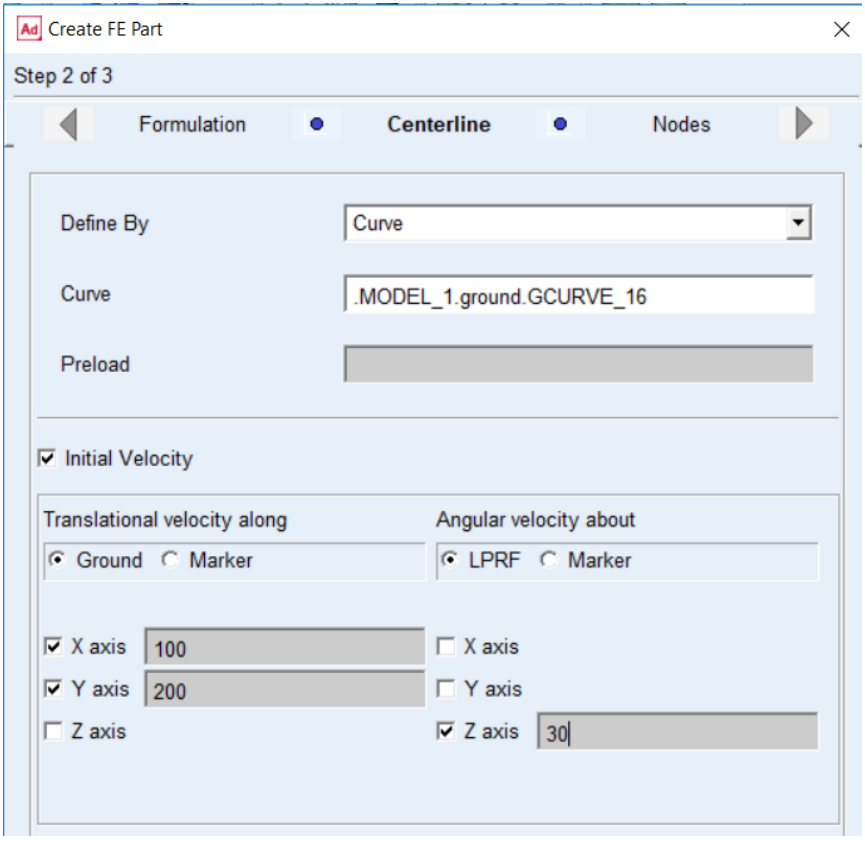
Known Issues

ADMS-22060	Vibration analysis won't launch after a dynamic analysis has been run first and animated in Adams PostProcessor.

Adams View

FE Part Initial Velocity GUI Support

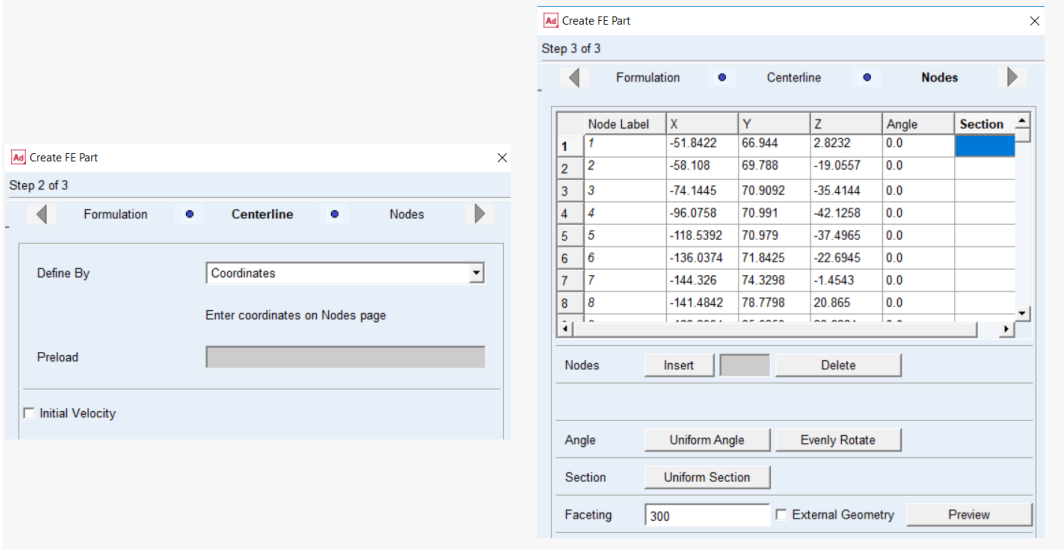
In previous releases, the initial velocity of the Adams FE Part could be set through the Adams View command language. In this release, users can spicy an FE Part's initial velocity directly through the FE Part wizard in the Adams View interface. This will set the same initial velocity for all nodes of the FE Part at once. To specify different initial velocities per node, the command language must still be used.



FE Part Coordinates Method Centerline

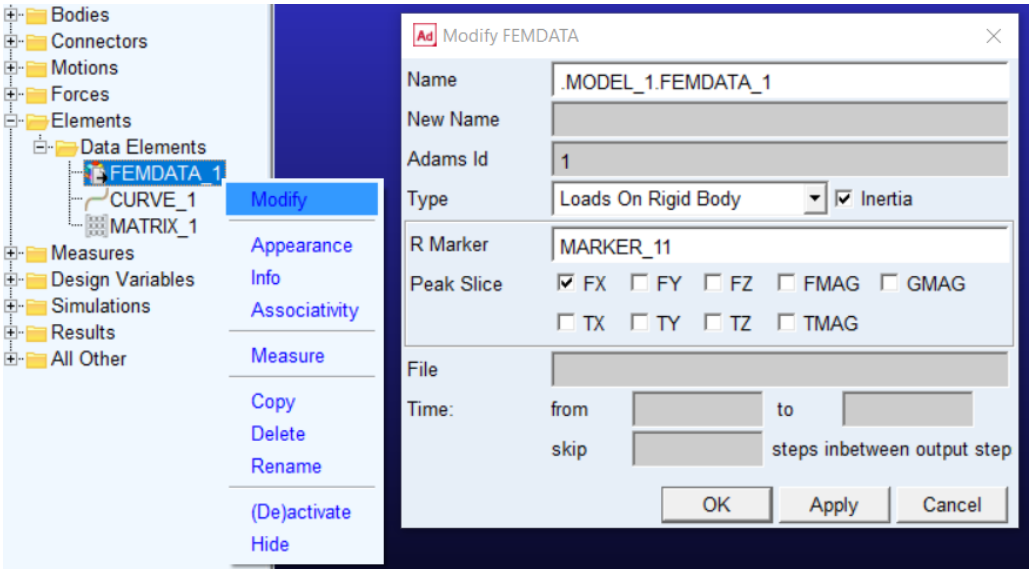
In previous versions of Adams, either a curve or two end markers were prerequisites for creating an FE Part. Hence, if the user had a centerline data in terms of Cartesian coordinates, they had to create a reference curve with those coordinates and refer to it for a FE Part. In addition, the shape of FE Part was fixed by the reference curve. Users could only add or remove nodes on the predefined centerline. If the shape had to be modified then the reference curve had to be modified.

With this new feature, users can now specify an FE Part's nodal locations directly by entering XYZ coordinates. There is no need for a reference curve or marker pair.



Modify Dialog for FEMDATA

In previous releases, Adams View lacked a dialog for modification of a FEMDATA objet. With this release of Adams View such a dialog had been added.



CAD Interoperability Version Support

The following table lists the versions of the supported CAD formats that can be imported and exported in Adams 2021. This release features support for CATIA V6 (.3dxml) files.

Format	Import Version	Export Version
IGES (.igs)	3 & 5	5.3
STEP (.stp)	203/214/242	214
ACIS (.sat)	All → R27	Not Supported
CATIA V4 (.model, .dlv, .exp, session)	All 4.xx	Not Supported
CATIA V5 (.CATPart, .CATProduct)	R10 → R29	Not Supported
CATIA V6 (.3dxml)	All	Not Supported
Pro/Engineer part files (.prt, .asm)	13 → Creo 4.0 M020, Creo 6.0	Not Supported
Inventor (.ipt, .iam)	All → 2019	Not Supported

Format	Import Version	Export Version
Solidworks (.sldprt, .sldasm)	99 → 2019	Not Supported
Unigraphics (.prt)	11 → NX12	Not Supported
JT : JtOpen (.jt)	7.0 → 10.2	Not Supported

Issues Resolved

ADMS-67785	Ribbon is not updated in Adams online help
ADMS-59912	Help missing documentation on "part create equation general_state_equation"
ADMS-41063	Missing documentation on "error" parameter is undocumented and left empty
ADMS-62895	Some geometry command options missing information
ADMS-67763	Error Message appears while selecting marker in 'Compute FE Part Stress and Strain' dbox without specifying Analysis and FE part name
ADMS-60928	AMD fails to report RM Marker does not exist when processing FE_LOAD
ADMS-37706	Option dialog-box does not appear while creating the FE part, where tessellation is not possible for loft parasolid.
ADMS-48320	Parasolid import does not create separate parts
ADMS-67730	Different geometry location when importing STEP file w/o Consolidate to shells.
ADMS-39899	[Japanese localization issue]: AView Flex, AMachinery Gear and view cscript on 2017.1
ADMS-67786	[Japanese localization] popup guide in the ribbon interface is not translated
ADMS-67818	Adamspy command can be executed even though option set to 'CMD' in CMD command window
ADMS-67096	Adamspy FlexBody implementation is missing a properties
ADMS-49826	when using "Radian" for angle unit, the mode animation doesn't work.
ADMS-45933	"Tab" key function not working properly on Adams view Simulation control dbox.
ADMS-68726	Angular Momentum measure not working correctly
ADMS-68252	P708 model with trailer - Adams Car session crashed when trying to run Aggregate Mass option

ADMS-67943	Getting error when try to clear "Increment for dynamic rotation" field value on aview ribbon interface
ADMS-67653	wrong tsf file reference and data in adm header
ADMS-67098	Temporary Settings Solver Settings tab is incomplete and produces errors
ADMS-51573	ADAMS/View run clears Clipboard
ADMS-51454	off diagonal terms doesn't work for inertia definition.
ADMS-50664	Dump file when computer wakes up
ADMS-46491	Adams Car fails to start follow-up
ADMS-38946	model verify produces incorrect error message in valid_i_and_j()
ADMS-67077	Need traceback information when working with macros
ADMS-64918	Command highlight marker_name.
ADMS-56711	'defaults command_file update_screen = off' does not work on larger model
ADMS-25187	Joint motion measure not working as expected
ADMS-66958	Misleading help on output control create request
ADMS-65963	"Adams.switchToCmd" nor "language switch_to python" not listed in help
ADMS-64986	"Modify FEMDATA" opened from command navigator does not work for Fe Part
ADMS-49350	FE Part move action is undone upon .adm export
ADMS-26980	models having FE Parts, created from adm files cannot be exported as cmd files correctly.
ADMS-25804	Centerline ID in FE Part
ADMS-25783	Animation of FE Parts (only in Adams/Car?): Deformed shape of the FE Part are still shown after closing animation controls dialog box
ADMS-21578	FE Part result name suffix confusing
ADMS-21525	Is it possible to Interactively change the Orientation of the Offset Marker from node locations using 'Location: Using Node Label'
ADMS-46644	Modify any mount part and then observe that mount part visibility automatically displayed in GUI
ADMS-66261	Requests and Material of an UDE displayed in Model Browser
ADMS-36046	Momentum measure gets deactivated.
ADMS-21560	motion's measure is deactivate in model browse
ADMS-66121	Reading a macro with mixed language corrupts the python section
ADMS-66137	Adams crashes if python code in macro contains exit()

ADMS-66119	Using Adams.execute_cmd in mixed language macro does not work
ADMS-67088	Cannot set font size in Database Navigator
ADMS-67162	The online help execution from Adams/View does not honor the S_MDI_ONLINE_DIR setting
ADMS-66952	View crash in python_exec when using temp solver settings with Car assembly
ADMS-66620	Temporary settings UI shows different behavior between View and Car
ADMS-66602	When create joint motion measure, I / J marker of joint cannot be obtained
ADMS-66533	ADAMS crashing if TMPDIR path length exceeds 217 characters
ADMS-62635	Translation Kinetic Energy measure appears to be deactivated after creation
ADMS-60172	Adams View closes with a crash after computer sleep or hibernation
ADMS-58580	Entity is hidden in GUI if Imported from Partial Binary
ADMS-59475	Function value is 0 when putting the value power of negative value into Function Builder
ADMS-40044	Integer math confusion in expressions

Known Issues

ADMS-69180	The Adams View command "geometry create shape picture" is not functional on SUSE Linux SP4.
ADMS-68616	Failure to import SolidWorks 2017 and 2019 models on Linux platforms (Red Hat and SUSE). Import works fine on Windows platform.
ADMS-61517	For some object types, one is unable to set properties through the Temporary Settings Property Browser that are object references (e.g., a marker name that defines upon which part and where a given constraint type operates). For such object types the Temporary Settings Property Browser will simply not show the properties that would take object references as values.
ADMS-61425	Temporary settings files (.tsf) cannot be used to switch objects' properties between Adams Solver function based definitions and Adams Solver user subroutine based definitions. Any such switches fail to revert after the .tsf is applied.

ADMS-55600	When launching Adams View or Adams Car on any Linux platform one may notice the message "failed to connect to DS server." This error can be safely ignored for situations that do not involve remoting. Note: the cause is sensitivity to /etc/hosts being incorrectly configured. This file should correctly resolve IP addresses for both the fully-qualified hostname and the short (alias) name.
ADMS-38510	Flexible body creation through ViewFlex fails on Linux when working directory has spaces in the path/name.
ADMS-37795	When exporting .adm files from Adams View, "Roundoff Values" has no influence on the number of digits in the .adm files. Unchecking it should cause AView to ignore the "Significant Digits" setting, but this is not the case.
ADMS-35885	On Red Hat Linux systems when Adams View is busy with a large task (e.g., importing a large file) if one minimizes and then maximizes the Adams View window an "Adams is not responding" or "DOM Bookmarks" is not responding message gets displayed.
ADMS-34194	On Windows 10 virtual machines when VMware tools are installed to make a full screen virtual machine, then some of the Adams-View-based product sessions might terminate unexpectedly (Adams View, Adams Car, Adams Driveline). Uninstalling the Vmware tools alleviates the issue.
ADMS-24977	Window header text is garbled on the Function Builder's Assist dialog
ADMS-24007	The font sizes in Adams View based products in version 2014 and later are not very clear. Menus do not take the system settings "system font size".
ADMS-23976	On machines with multiple graphics hardware options, use of the "CPU integrated" graphics hardware (for example, "Intel HD Graphics") may cause problems with display of flexible bodies and FE parts in wireframe mode. The workaround is to use the other graphics hardware option (for example, the "NVIDIA Processor").
ADMS-23940	If you export an Adams model to CEI Ensight via the co-animation export capability and that model contains a flexible body, and the flexible body doesn't use the same length units as the model itself, the resulting bodies in Ensight will not be scaled or located properly. A workaround is to scale the flex body in Ensight.

ADMS-23899	Some labels in the dialog box builder are obscured under Attributes: Value when Windows font size set to 125%
ADMS-23849	Error "An empty body was encountered when converting the parasolid to a shell" when importing a parasolid geometry
ADMS-23790	View-Reset GUI Dimensions only resets the graphics window (plot/animation) size but not the others (treeview and dashboard)
ADMS-23496	Error messages repeat 2-4 times when trying to apply an orthotropic or anisotropic material in ViewFlex (which accepts only Isotropic materials)
ADMS-23245	Auto-generated object measures for markers on FE Parts give incorrect results for translational velocity and traslational acceleration. Workaround is to use result set data or requests.
ADMS-22236	Defects of exporting/importing polylines and splines as IGES when deviating from default setting and using CAD Interoperability environment variable. Workaround is to use the default setting
ADMS-22088	Location Parameterization on Markers Created on Flexible Bodies Lost after CMD Export-Import
ADMS-22004	Zero volume of cylinders with 1 or 2 segments, with angle extension less than 360 degrees
ADMS-21941	Torsional springs missing when merge two models (each containing one) via "Model assemble" command. Workaround is to use a rotational sforce instead.
ADMS-21230	Usage of MBFolderName in UDEs does not work if one tries to add items to a pre-defined named entry in the model browser. One must select a new, unique folder name.
ADMS-20196	Force Display ON/OFF option is not working for the FE Load
ADMS-19599	Hitting a menu button or any other action in the .main window does not make the main window view the active one
ADMS-17344	If one uses the Database navigator to look at Associativity and then close it and try to modify something using the Edit ? Modify menu, one can see the Database navigator stuck in "Associativity" mode. The way to recover is to go to the Database Navigator and switch to Browse mode and close it and then go back to the Edit ? Modify menu.
ADMS-17094	Some items in parentheses not selected properly in Information Window
ADMS-16818	Some extraneous messages are printed out during ViewFlex solution

ADMS-16288	Some options on the View Management Orient command not working correctly. Workaround is to rotate the View via the tools available in the graphics window and toolbar.
ADMS-16221	OUTPUT variables referencing deactivated BUSHING forces cause analysis failure. Workaround is to comment out or otherwise deactivate the OUTPUT variables.
ADMS-16207	Adams session terminates while creating flexible bodies via ViewFlex and the working directory does not have sufficient space for the generated files.
ADMS-13363	Commands related to modifying internal views of the following form (found, e.g., in the A/Durability sample model) will cause a grey background in the main graphical window: int view mod view=.gui.main.front loc=0.0,0.0 height=0.5 width=1 The work-around to this issue is to click on the view layout icon on the status bar and select the relevant layout.
ADMS-12740	Error in Mass property calculated for copied part with the original part being a parasolid for some (not all) externally imported parasolid files
ADMS-5419	Change search-order for plugin binaries

2 Running Adams Products

Starting Adams Products

This sections described how you can start your Adams products on LINUX and on Windows.

Starting Adams Products on LINUX

The Adams Toolbar is a starting point to using Adams products on LINUX. The toolbar is shown below.

Adams Toolbar tool - Right click to set up Toolbar, manage memory models, access online help and Technical Support resources and more

Product tools - Click to run product or right-click to configure products and create user libraries.

Hold the cursor over a tool to see the name of the associated product.

You can also use the Adams Toolbar to:

- Customize, keep track of, and organize multiple libraries of standard Adams products
- Create binaries
- Manage custom memory models and product preferences

For more information on these or other Adams Toolbar operations, see the Running and Configuring online help (from the **Help** menu in any product, select **Adams Help**, on the left pane, select **Configuring Adams**).

To start a product on LINUX:

1. To display the Adams Toolbar, at the command prompt, enter the command **adams*x*** where ***x*** is the version number, for example **adams2021**.
2. Click on the tool representing the product you want to start.

Note:	We recommend that you use the Adams Toolbar to start your Adams products, but if you want to automate certain operations, use the text-based Program Menu. For more information, see the Running and Configuring online help.

Starting Adams Products on Windows

You start any Adams product from the Start menu. You can also use the Start menu to:

- Change your license type
- Generate problem reports
- Set Adams preferences

For more information on these or other operations, see the Running and Configuring online help.

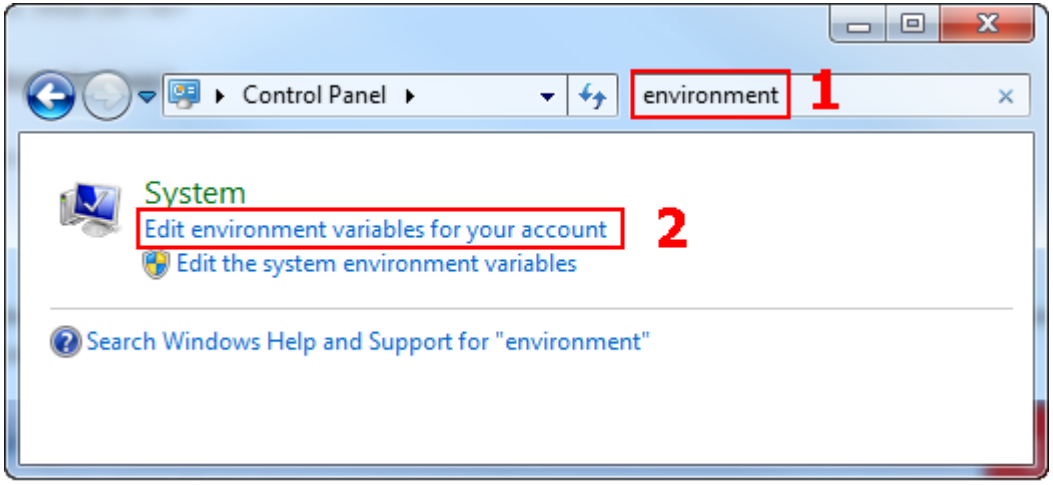
To start a product on Windows:

- From the **Start** menu, point to **Programs**, point to **Adams 2021**, point to the name of the product you want to start.

Tip:	Select the corresponding desktop icon for the product, if you installed it on your desktop.

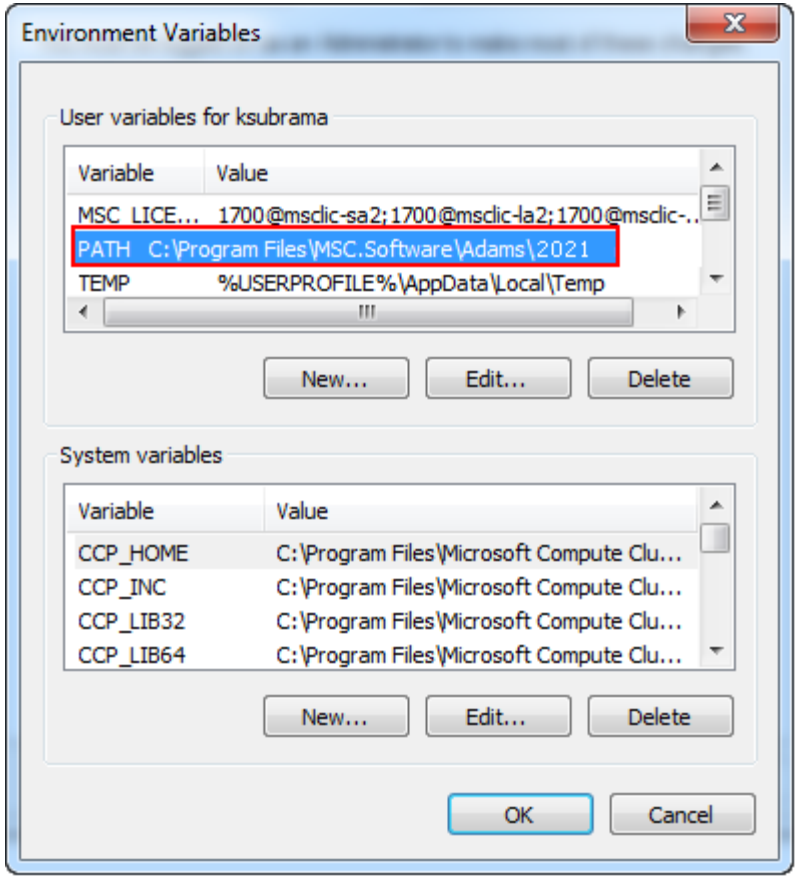
To start a product from DOS shell in Windows:

- **Start → Programs → Adams 2021 → Command Prompt.**
- An alternative is to add the **/bin** directory under the Adams installation directory to your user PATH environment variable. You can do this via the Control Panel:
  a. Type **environment** in the Control Panel search box.
  b. Select the **Edit environment variables for your account** pick.



- Check to see if you already have a PATH variable defined under "**User variables**". If it exists then edit it, add a semicolon ";" to the end of the existing value, and then add the "bin" directory under the Adams installation directory. Otherwise select **New...**, use PATH for the variable name and add the "bin" directory under the Adams installation directory as the value. The default location of this directory is:

  ```
  Windows Adams:
  C:\Program Files\MSC.Software\Adams\2021\bin
  ```



- Once you are done click **OK**.

Note:	Windows appends your User PATH to the System PATH environment variable, so there is no need to copy the existing System PATH variable to your user PATH variable. This behavior is unique to the User PATH variable. For all other environment variables, a User variables definition overrides a System Variables definition.

Setting Preferences

This section describes how you can set preferences, such as your working directory, graphics setting, and memory model size.

Setting Preferences on LINUX

You use the Registry Editor from the Adams Toolbar to set a variety of preferences. For information on the preferences you can set, see the Running and Configuring online help.

To display the Registry Editor:

- From the **Adams Toolbar**, right-click any product tool, and then select **Change <Product Name> Settings**.

Setting Preferences on Windows

You use the Settings menu to modify:

- Graphics settings
- Memory model size

To display the Settings dialog box:

- From the **Start** menu, point to **Programs**, point to **Adams 2021**, and then select **Settings & License**.

Setting Your Working Directory

During a session in a default or custom product, you can select the directory where you want to place your model and output files.

For Adams View, you can set the working directory from the Welcome dialog box.

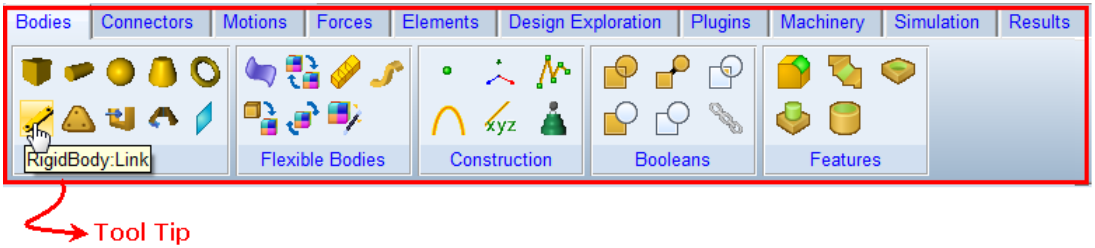
To set your working directory:

1. From the **File** menu, select **Select Directory**.
2. In the dialog box that appears, select the working directory.

3 Getting Help

Tool Tips

Tool tips display information about the item the cursor is currently over in an Adams product. The following shows the tool tip that appears when you place the cursor over the link geometry tool.



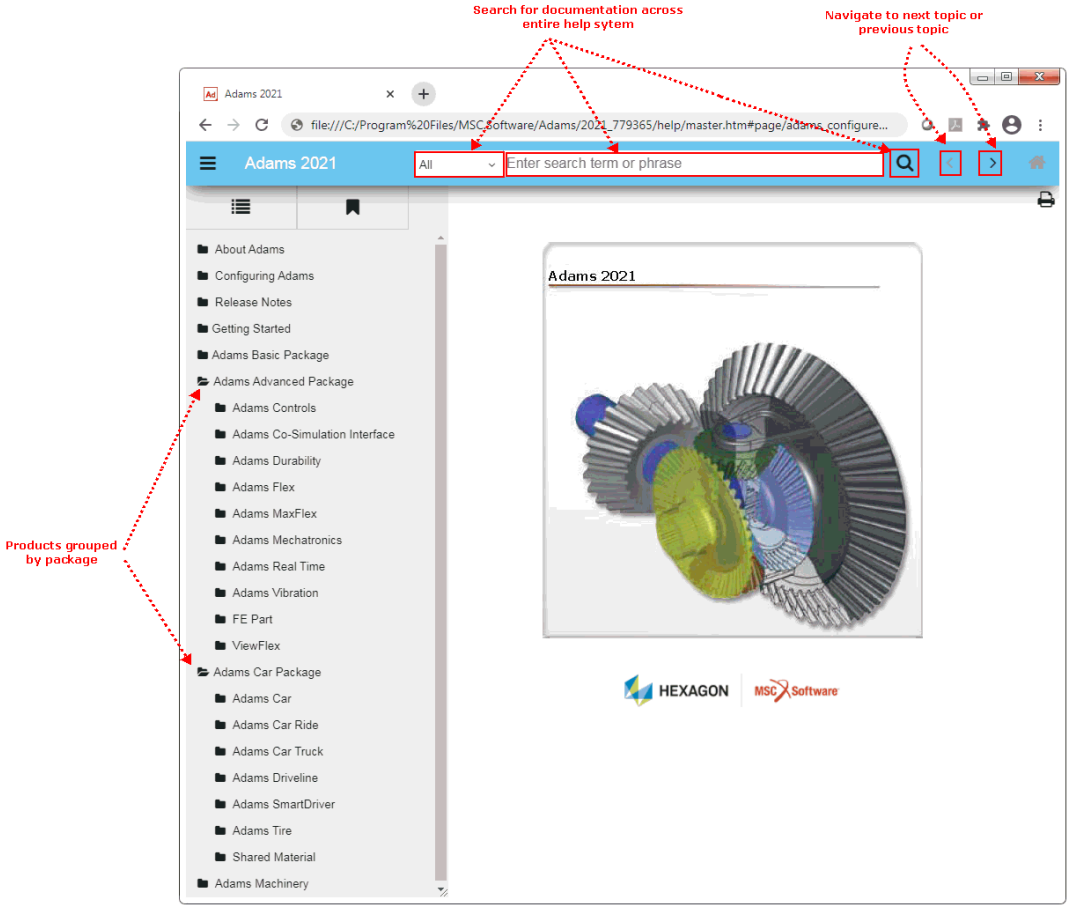
To display tool tips:

- Move the cursor over the item in the interface on which you'd like information.

  A brief description of the item appears.

Online Help

To help you use the Adams products, MSC Software provides online help (HTML format). To view the online help and tutorials, you can use your default Web browser. An example of online help is shown below.



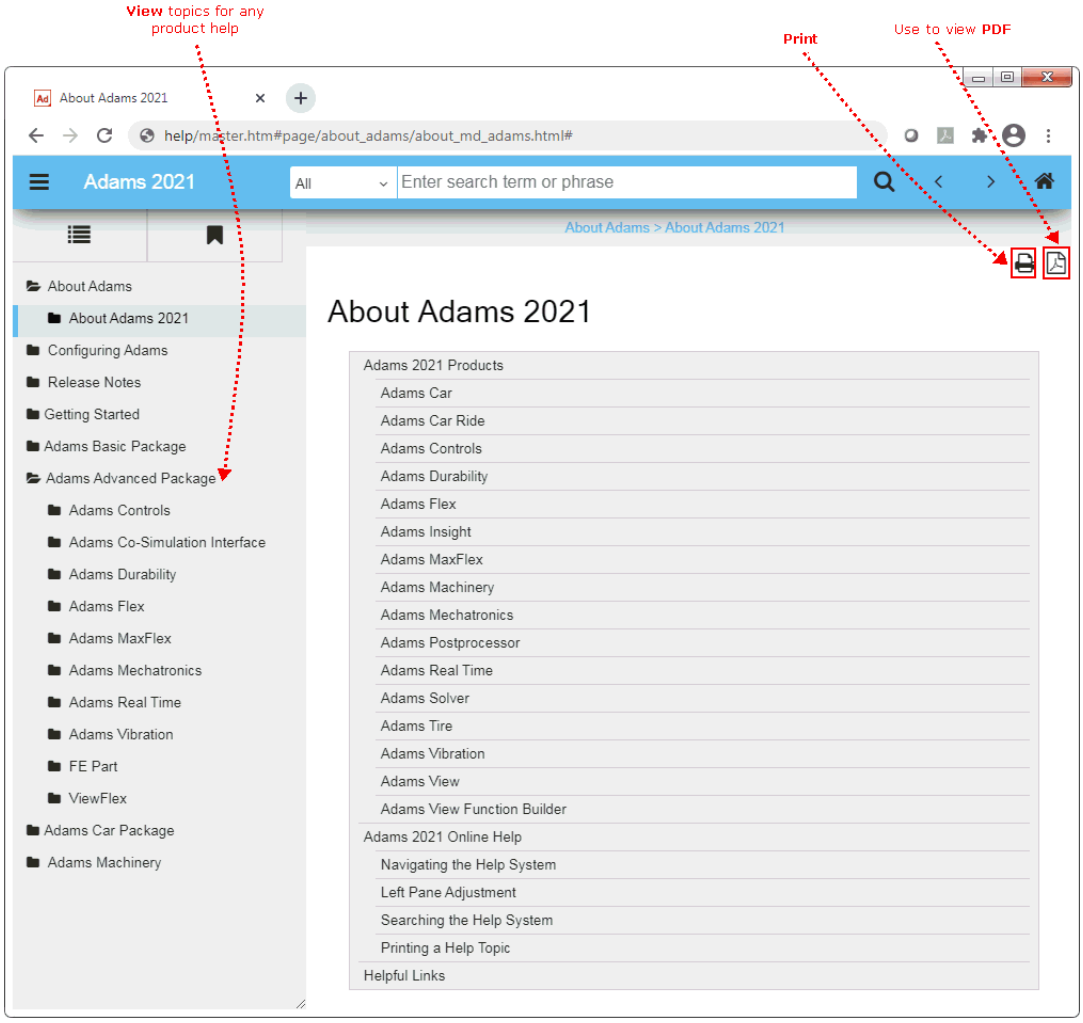
Versions of Web Browsers

For the Adams Help system, all you need is a Windows, Macintosh, or LINUX computer running a fairly new browser with JavaScript enabled. If JavaScript is not enabled, then the Help set will not display in its entirety. You also need to have appropriate Acrobat reader to view PDF files from online help system.

Accessing the Online Help

You can view help for a dialog box, a product, or for all Adams products. The figure below shows the help for all Adams products, called the integrated master site. You can use this site to view any product's help and

search across all product help. You can also access release notes for all products, and view the documents in Adobe Reader.



To get help on a dialog box:

1. Click in the dialog box for which you need help.
2. Press **F1**.

   Adams launches a browser window that contains information about the dialog box.

To get general help on your product:

- From your product's **Help** menu, select ***Product Name Help*** (where ***Product Name*** is the name of your Adams product).

Adams launches a browser window that contains the starting point for your product's online help.

To open the Adams online help from the Adams Toolbar:

- Right-click the Adams Toolbar tool, and then select **Online Help**.

  Your default browser starts and displays the master site for Adams online help.

To open the Adams online help from the Start Menu:

- From the **Start** menu, point to **Programs**, point to **Adams 2021**, and then select **Online Help**.

  Your default browser starts and displays the master site for Adams online help.

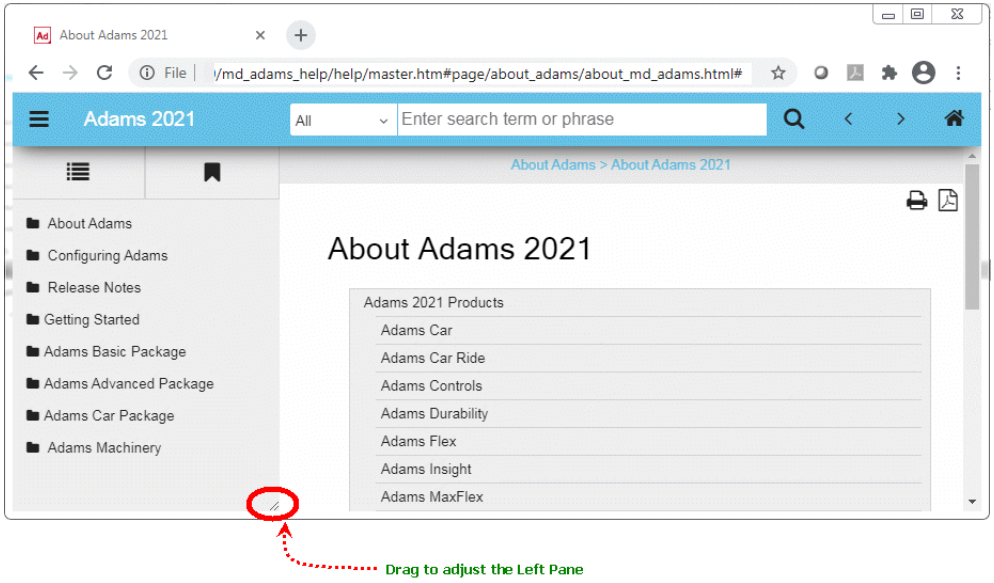
Navigating through the Help

You navigate through the Adams help system as you do through any help system, selecting topics in the pane on the left. In addition, we've provided:

- Navigation arrows < > at the top of the pane to let you scroll through topics one at a time.

Left Pane Adjustment

To adjust the left pane size, drag the icon in the separator as shown below.

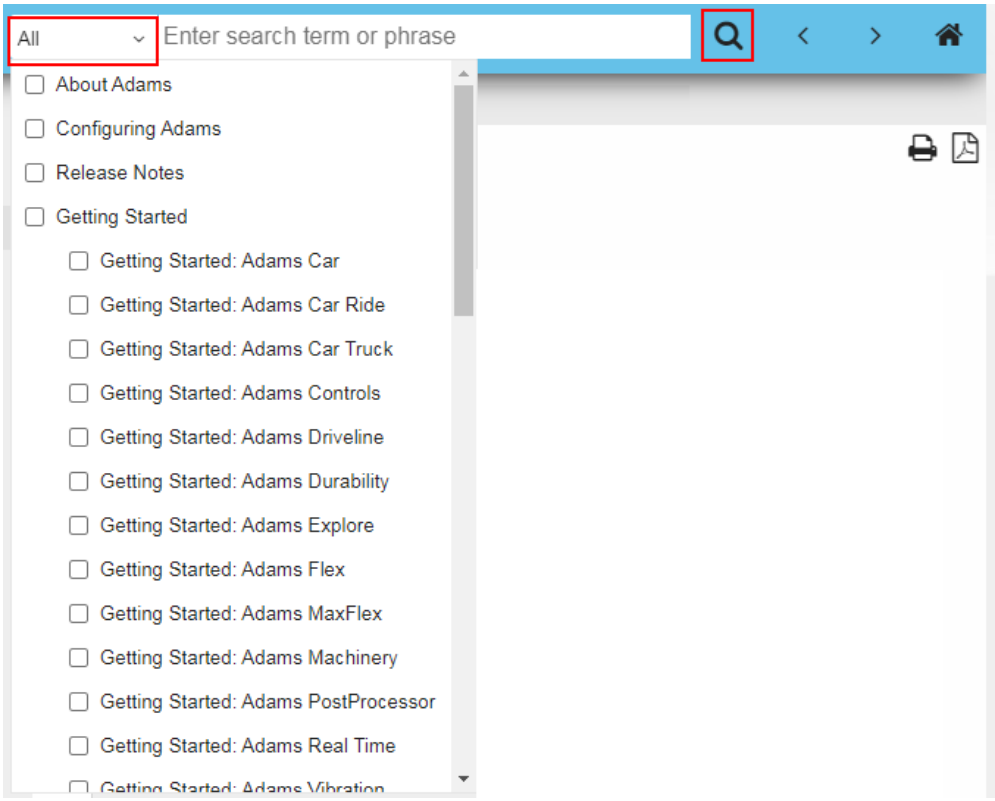


Note: The adjustment of the Left Pane is not available in Internet Explorer.

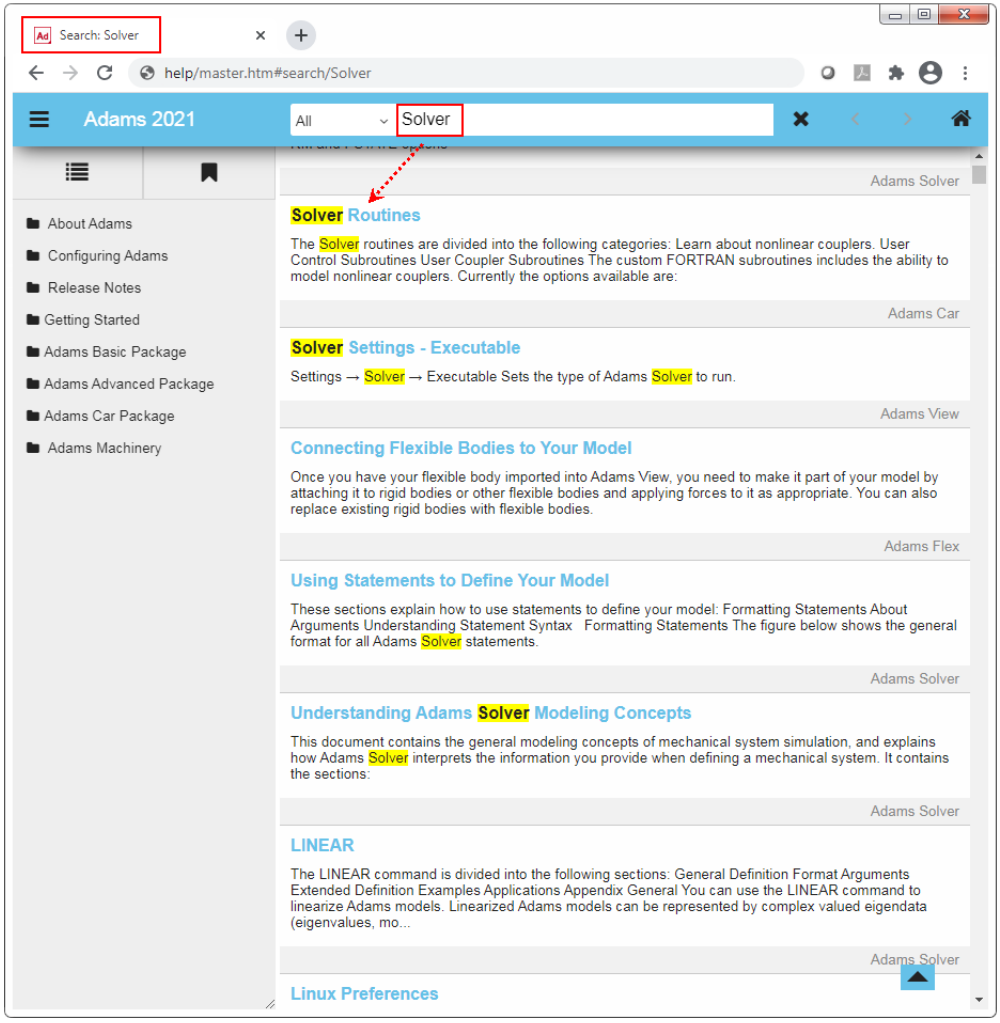
Searching

You can search all the help files in HTML format for a particular product or all Adams products.

1. Select your product from the list.
2. Enter the search term or phrase, and then press enter.



The results are shown on the same page below.



3. Click the topic you want to view.

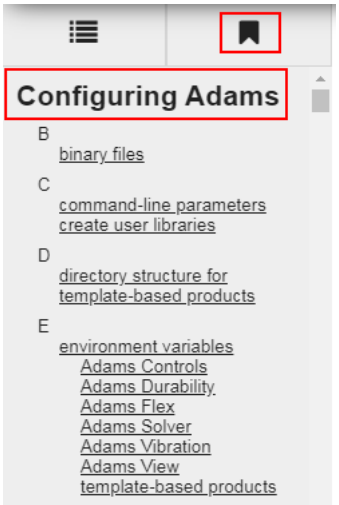
Printing

To print a file:

- In the help system you can select the Print button . to print the topic that you are viewing
- You can select the PDF button . to see the entire PDF file pertaining to the topic and print the file like a regular PDF file. Notice that some of the images in PDF file may be cropped.

Index

The Index tab displays product specific help in alphabetical list of keywords associated with help topics. To view index entries, you can select a letter group to display the entries for that group. When you click on an index entry, the related topic will display in the topic frame.



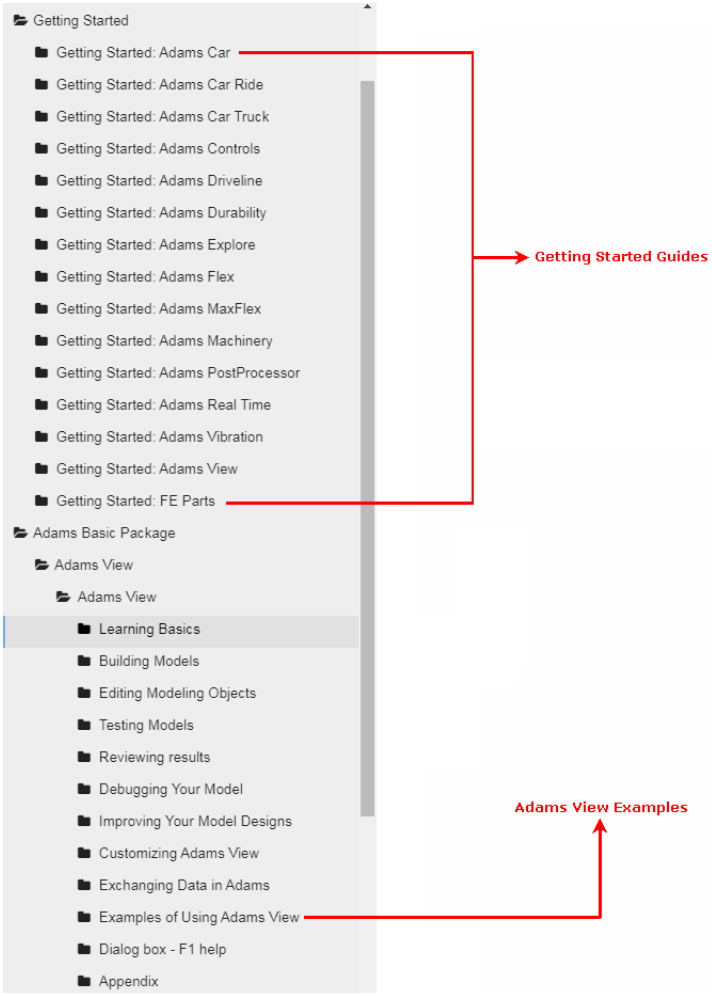
Tutorials and Examples

Adams products have a set of tutorials or getting started guides that step you through examples of using the product's features, as well as introduce the basic concepts of the product. The getting started guides are online. In addition, many of the products have examples of its features that are stored in Knowledge Base Articles.

You will find links to all the tutorials and examples for a product under its Examples tab.

To access the tutorials and examples:

- From the online help, from the left pane, select **Getting Started** and select the product that you are interested in.
- From the online help for a product, from the pane on the left, select **Examples**.



4 Supported Versions of Integration Products

Support for Easy5 and MATLAB

Easy5

This release of Adams Controls is certified to run with Easy5 2018.0.2, 2018, 2017.1, 2017, 2015, 2013, 2010, 2010.1.2, 2010.1.3 and 2010.1.4. Easy5 version support is subject to change. For the latest information, see updates to the Release Guide here:
http://simcompanion.mscsoftware.com/.

MATLAB

The supported versions of MATLAB on Windows and on all Linux except SUSE12sp1 are 2018b and 2019a. On SUSE12sp1 supported MATLAB versions are 2016b and 2017a.

For more information on MATLAB platforms and compatibility, see:

http://www.mathworks.com/support

Note:	If you want to co-simulate with Easy5 or MATLAB and you are running Adams Controls on one of the platforms that Easy5 or MATLAB does not support, you should consider using TCP/IP communication. This allows Adams Controls to communicate with Easy5 or MATLAB even though the codes are running on different platforms.

Supported Environments for Adams Real Time

Concurrent SIMulation Workbench

Adams Solver supports Concurrent's SIMulation Workbench® (SimWB) real time modeling environment on the RedHawk™ Linux® operating system. In addition to participating in real time co-simulations facilitated by SimWB, standalone Adams can be run on the RedHawk Linux operating system. For this release of Adams, MSC has certified Adams Solver in the following environment:

- iHawk® running RedHawk Linux 7.0.2 or 7.3.2, with SIMulation Workbench Control Center 2018.1-0
- The Adams Red Hat Linux 7.1/7.3 installer should be deployed on the RedHawk machine.

dSPACE SCALEXIO

This version of Adams Real Time does not support dSPACE® SCALEXIO®. To use Adams Real Time with dSPACE® SCALEXIO® please use Adams 2019.2. We expect to support dSPACE® SCALEXIO® again in a near-future version of Adams Real Time.

Supported Versions of Integration Products

Company	Product Name	Product Version	Adams Product	Platform
The Math Works, Inc.	**MATLAB*** (The minimum features of MATLAB required for interfacing with Adams are MATLAB, Simulink, MATLAB Coder and Simulink Coder)	2018b, 2019a	Adams Controls	Windows 7 x64 Windows 10 x64
The Math Works, Inc.	**MATLAB*** (The minimum features of MATLAB required for interfacing with Adams are MATLAB, Simulink, MATLAB Coder and Simulink Coder)	2018b, 2019a	Adams Controls	Red Hat Enterprise Linux 7.3 x64 Red Hat Enterprise Linux 7.5 x64 SUSE 12 SP2 x64
The Math Works, Inc.	**MATLAB*** (The minimum features of MATLAB required for interfacing with Adams are MATLAB, Simulink, MATLAB Coder and Simulink Coder)	2016b, 2017a	Adams Controls	SUSE 12 SP1 x64
MSC Software Corporation	Easy5**	2018.0.2, 2018, 2017.1, 2017, 2015, 2013, 2010, 2010.1.2, 2010.1.3 and 2010.1.4	Adams Controls	Red Hat Enterprise Linux 7.1 x64 Red Hat Enterprise Linux 7.3 x64 SuSe 11 SP4 x64 SuSe 12 SP1 x64 Windows 7 x64 Windows 10 x64

Company	Product Name	Product Version	Adams Product	Platform
Functional Mock-up Interface (FMI)[#]	FMU Export Co-Simulation FMU Import Co-Simulation FMU Import Model Exchange	1.0, 2.0	Adams Controls	Red Hat Enterprise Linux 7.1 x64 Red Hat Enterprise Linux 7.3 x64 SuSe 11 SP4 x64 SuSe 12 SP1 x64 Windows 7 x64 Windows 10 x64
MSC Software Corporation	MD Nastran	R1 and above	Adams Car Ride Adams Vibration	LINUX and Windows
MSC Software Corporation	MSC.Nastran	V69.X and above	Adams Durability Adams Flex	LINUX and Windows
MSC Software Corporation	Marc	2005 and above 2003 and above	Adams Durability Adams Flex	LINUX and Windows
MSC Software Corporation	Fatigue	2001 and above	Adams Durability	LINUX and Windows
nCode	FE-Fatigue	Version 5.2 and above	Adams Durability	LINUX and Windows
ANSYS, Inc.	ANSYS	V6.0 and above V5.4 and above	Adams Durability Adams Flex	LINUX and Windows
Dassault Systemes, SIMULIA division	ABAQUS/ADAMS	Version 6.3 and above Version 6.1-1 and above	Adams Durability Adams Flex	LINUX and Windows
Siemens Digital Manufacturing Solutions division	I-DEAS Mechanism Design	I-DEAS NX 10 and above I-DEAS 8, 9, NX 10 and above	Adams Durability Adams Flex	LINUX and Windows
ANSYS, Inc.	EnSight	10.1.1b (but later than 8.2.1f may likely function	Adams PostProcessor	LINUX and Windows
cosin scientific software AG	FTire	Version 2020-3 22743	Adams Tire	LINUX and Windows

Notes:	With regards to compilers, Adams 2021 officially supports the Professional Edition of Microsoft Visual Studio 2017, but the Community Edition 2017 has been found to function in the following scenarios (for more details on compiler support see Hardware and Software Specifications section of the Adams Installation and Operations Guide): *Function Evaluation and co-simulation mode for Adams and MATLAB/Simulink; External System Library (ESL) import of MATLAB/Simulink models into Adams. **Function Evaluation and co-simulation mode for Adams and Easy5; External System Library (ESL) import of Easy5 2018, 2018.0.2 models into Adams. #FMI co-simulation and model exchange FMUs generated with Easy5 2018, 2018.0.2. FMI co-simulation FMUs generated with Adams 2021 and imported into Easy5 2018, 2018.0.2, MATLAB R2018a, R2018b.