

SimMechanics Release Notes

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Summary by Version

This table provides quick access to what's new in each version. For clarification, see "About Release Notes" on page 2.

Version (Release)	New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Latest Version V2.7 (R2007b)	Yes Details	No	Bug Reports Includes fixes	Printable Release Notes: PDF Current product documentation
V2.6 (R2007a)	Yes Details	Yes Summary	Bug Reports Includes fixes	No
V2.5 (R2006b)	Yes Details	Yes Summary	Bug Reports Includes fixes	No
V2.4 (R2006a)	Yes Details	No	Bug Reports at Web site	No
V2.3 (R14SP3)	Yes Details	No	Bug Reports at Web site	No
V2.2.2 (R14SP2)	Yes Details	No	Bug Reports at Web site	No
V2.2.1 (R14SP1)	Yes Details	No	Fixed bugs at Web site	No
V2.2 (R14)	Yes Details	Yes Summary	Fixed bugs at Web site	No
V2.1.1 (R13SP1)	No	No	Yes Details	No
V2.1 (R13+)	Yes Details	No	Fixed bugs at Web site	No

Version (Release)	New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
V2.0.1 (R13+)	No	No	Yes Details	No
V2.0 (R13+)	Yes Details	No	Fixed Bugs at Web Site	No

About Release Notes

Use release notes when upgrading to a newer version to learn about new features and changes, and the potential impact on your existing files and practices. Release notes are also beneficial if you use or support multiple versions.

If you are not upgrading from the most recent previous version, review release notes for all interim versions, not just for the version you are installing. For example, when upgrading from V1.0 to V1.2, review the New Features and Changes, Version Compatibility Considerations, and Bug Reports for V1.1 and V1.2.

New Features and Changes

These include

- New functionality
- Changes to existing functionality
- Changes to system requirements (complete system requirements for the current version are at the MathWorks Web site)
- Any version compatibility considerations associated with each new feature or change

Version Compatibility Considerations

When a new feature or change introduces a reported incompatibility between versions, its description includes a **Compatibility Considerations**

subsection that details the impact. For a list of all new features and changes that have reported compatibility impact, see the “Compatibility Summary for SimMechanics” on page 34.

Compatibility issues that are reported after the product has been released are added to Bug Reports at the MathWorks Web site. Because bug fixes can sometimes result in incompatibilities, also review fixed bugs in Bug Reports for any compatibility impact.

Fixed Bugs and Known Problems

MathWorks Bug Reports is a user-searchable database of known problems, workarounds, and fixes. The MathWorks updates the Bug Reports database as new problems and resolutions become known, so check it as needed for the latest information.

Access Bug Reports at the MathWorks Web site using your MathWorks Account. If you are not logged in to your MathWorks Account when you link to Bug Reports, you are prompted to log in or create an account. You then can view bug fixes and known problems for R14SP2 and more recent releases.

The Bug Reports database was introduced for R14SP2 and does not include information for prior releases. You can access a list of bug fixes made in prior versions via the links in the summary table.

Related Documentation at Web Site

Printable Release Notes (PDF). You can print release notes from the PDF version, located at the MathWorks Web site. The PDF version does not support links to other documents or to the Web site, such as to Bug Reports. Use the browser-based version of release notes for access to all information.

Product Documentation. At the MathWorks Web site, you can access complete product documentation for the current version and some previous versions, as noted in the summary table.

Version 2.7 (R2007b) SimMechanics

This table summarizes what's new in Version 2.7 (R2007b):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes	No	Bug Reports at Web site	Printable Release Notes: PDF Current product documentation

New features and changes introduced in this version are

- “Interfacing with One-Dimensional Simscape Domains” on page 4
- “SimMechanics State Names Now Available to Simulink and Real-Time Workshop” on page 5
- “Controlling Redundant Constraint Analysis with New Tolerance Setting” on page 5
- “New Demos” on page 5
- “Code Generation Documentation Consolidated to Simscape User’s Guide” on page 6

Interfacing with One-Dimensional Simscape Domains

The Prismatic-Translational Interface and Revolute-Rotational Interface blocks of the new Interface Elements library allow you to connect a Prismatic or Revolute joint primitive in SimMechanics to a Physical Networks line connected to Simscape blocks. The Prismatic-Translational Interface and Revolute-Rotational Interface blocks transfer mechanical velocities and forces/torques as Physical Networks cross- and through-variables, respectively, without energy loss, along or around axes that you can define.

Several new demos illustrate the use of the Interface Elements blocks. See “New Demos” on page 5.

SimMechanics State Names Now Available to Simulink and Real-Time Workshop

SimMechanics names the mechanical states of your SimMechanics models, and you can access them through the `mech_stateVectorMgr` command. The names of these states and the SimMechanics blocks that define them are now available to Simulink and appear in the outputs of model simulations. They also appear in simulations based on code generated with Real-Time Workshop®.

See the Simulink and Real-Time Workshop documentation for further details about states.

Controlling Redundant Constraint Analysis with New Tolerance Setting

SimMechanics checks for redundant constraints in your mechanical models. You can now adjust the sensitivity of this analysis in the **Constraints** panel of the Machine Environment block, which allows you to choose between automatic constraint redundancy analysis or specifying a constraint redundancy tolerance explicitly.

Certain mechanical configurations are sensitive to the constraint redundancy tolerance and can spuriously lose or gain degrees of freedom if this tolerance is adjusted incorrectly. See “Configuring Methods of Solution”, “How SimMechanics Works”, and “Troubleshooting Simulation Errors” in the SimMechanics User’s Guide.

New Demos

Nine new demos have been added to SimMechanics.

Interface Blocks

These demos illustrate how to use the new Interface Elements blocks. See “Interfacing with One-Dimensional Simscape Domains” on page 4.

- `mech_interface_crate_transfer`
- `mech_interface_dspring_damper`

- mech_interface_hyd_cylinder
- mech_interface_hyd_slidercrank
- mech_interface_rot_spr_damper
- mech_interface_trans_spr_damper

Car Modeling

Three new demos provide examples of sophisticated automotive modeling.

- mech_car_handling
- mech_car_kinematics
- mech_car_suspension

These demos shipped in Version 2.6 (R2007a) SimMechanics.

Code Generation Documentation Consolidated to Simscape User's Guide

Documentation of code generation features common to all vertical Physical Modeling products based on Simscape has been consolidated to the Simscape User's Guide. The SimMechanics User's Guide continues to document code generation features unique to SimMechanics.

Version 2.6 (R2007a) SimMechanics

This table summarizes what's new in Version 2.6 (R2007a):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes	Yes—Details labeled as Compatibility Considerations , below. See also Summary.	Bug Reports at Web site	No

New features and changes introduced in this version are

- “SimMechanics Now Requires Simscape” on page 7
- “Sharing Models Using Simscape Editing Modes” on page 7
- “Block Library Links Must Be Resolved” on page 8
- “Two Blocks Now with Tunable Parameters” on page 8
- “Demos Expanded” on page 9
- “Modeling Constraints with SimMechanics” on page 9

SimMechanics Now Requires Simscape

SimMechanics now depends on and requires Simscape, the foundation for Physical Modeling products. Simscape includes common Physical Modeling utilities and block libraries. See “What Is SimMechanics?” and the Simscape documentation.

Sharing Models Using Simscape Editing Modes

SimMechanics now features a selection of two Simscape editing modes that allow full or restricted editing of models.

- The Restricted mode requires SimMechanics to be installed, but does not require a license. It allows you to change a limited set of model parameters, but not the blocks or connections, in a SimMechanics model.

- The Full mode requires both Simscape and SimMechanics to be installed. It allows you to change anything in a SimMechanics model.

For more details, see “Using the Simscape Editing Mode” in “Running Mechanical Models”.

Block Library Links Must Be Resolved

All SimMechanics blocks in your models must now have resolved block library links. You can neither disable nor break these library links. This is a global requirement of Simscape. Consult the Simscape documentation for further details.

Compatibility Considerations

If you have an existing SimMechanics model with disabled or broken links from SimMechanics blocks to the SimMechanics block library, you must restore all the broken block library links for your model to be valid.

If you have disabled or broken the SimMechanics library link for blocks that you have customized and want to keep these modified blocks in your model, you must move these modified blocks to your own custom library or libraries, then copy the block instances that you need to your model.

You must still restore the block link to its parent library, whether that parent library is SimMechanics or your own.

Two Blocks Now with Tunable Parameters

These SimMechanics parameters are now tunable from their respective block dialogs:

- The **Gravity vector** field of the Machine Environment block.
- All three parameter fields of the Body Spring & Damper block.

See “Limitations” in “Running Mechanical Models” for more about tunable parameters in SimMechanics and the Simulink documentation for tunable parameters in general.

Demos Expanded

Five new demos have been added to SimMechanics.

Angular Motion Equivalence

The `mech_gimbal_transform` demo shows the equivalence of a body's angular motion as measured by Joint Sensors and as measured by Body Sensors.

Joint Limits

Two demos illustrate how to model limits or clearance on joint motion:

- `mech_jointlimit_prismatic`
- `mech_jointlimit_revolute`

The first illustrates limits on translational motion; the second, limits on rotational motion.

Stochastic Oscillator and Controller

Two demos simulate a mixture of deterministic and random forces with a model of a micromechanical damped linear oscillator:

- `mech_brownian_osc`
- `mech_brownian_osc_control`

The first model has no controller; the second, a control force in addition to the damped spring and white noise forces.

Modeling Constraints with SimMechanics

A new MATLAB Digest article explains how to model mechanical constraints with SimMechanics. The article uses a set of four existing SimMechanics demos as illustrations.

Version 2.5 (R2006b) SimMechanics

This table summarizes what's new in Version 2.5 (R2006b):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes	Yes—Details labeled as Compatibility Considerations , below. See also Summary.	Bug Reports at Web site	No

New features and changes introduced in this version are described here.

- “Computer-Aided Design Translator for Pro/ENGINEER Available via the Web” on page 10
- “SolidWorks-to-SimMechanics Translator Now Available Only via the Web” on page 11
- “New Demo” on page 12
- “Modeling Flexible Bodies with SimMechanics” on page 12

Computer-Aided Design Translator for Pro/ENGINEER Available via the Web

A new computer-aided design (CAD) Pro/ENGINEER-to-SimMechanics translator is available. You install and use this translator with Pro/ENGINEER. It is independent of MATLAB.

The translator converts a Pro/ENGINEER CAD machine assembly into an XML file in the Physical Modeling format. The XML file represents the assembly in a form that you can use with SimMechanics to generate a block diagram model dynamically equivalent to the original CAD assembly. To generate models, use the `import_physmod` command.

Installing the Pro/ENGINEER-to-SimMechanicsTranslator

Obtain and use the installer executable by locating and downloading its archive at www.mathworks.com/products/simmechanics/. A README page is provided that describes installation and configuration details.

Translator Documentation

Help files accompany the Pro/ENGINEER-to-SimMechanics translator. They include two HTML pages and a PDF book. These files are independent of the MATLAB help system.

Translator Examples

Some examples of Pro/ENGINEER CAD assemblies are included with the Pro/ENGINEER-to-SimMechanics translator.

One of the examples is a robot arm assembly. The corresponding XML file in Physical Modeling format, `robot.xml`, is located in the `toolbox/physmod/mech/mechdemos/` directory, relative to your MATLAB root.

Compatibility Considerations

The Pro/ENGINEER-to-SimMechanics translator works with Pro/ENGINEER Wildfire Versions 2 and 3 but is available for the Microsoft Windows (32-bit) operating system only.

SolidWorks-to-SimMechanics Translator Now Available Only via the Web

The existing SolidWorks-to-SimMechanics translator for the SolidWorks CAD platform continues to be available via the Web, at www.mathworks.com/products/simmechanics/. However, it no longer ships with SimMechanics.

Compatibility Considerations

The SolidWorks CAD platform and the SolidWorks-to-SimMechanics translator are available only for the Microsoft Windows operating system.

The SolidWorks-to-SimMechanics translator works with SolidWorks 2004, SolidWorks 2005, and SolidWorks 2006. The translator is no longer compatible with earlier versions of SolidWorks.

An older version of this translator is available via the MathWorks Web site. This version supports SolidWorks 2001 Plus and SolidWorks 2003.

New Demo

This version of SimMechanics includes one new demo model, `mec_brownian_osc`, a stochastic linear harmonic oscillator based on micro- and biomechanics.

Modeling Flexible Bodies with SimMechanics

A new MATLAB Digest article and related technical paper explain how to model flexible bodies with SimMechanics and third-party finite element analysis applications. A set of models accompanies the technical paper in a compressed zip archive available from MATLAB Central.

Version 2.4 (R2006a) SimMechanics

This table summarizes what's new in V2.4 (R2006a):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes	Yes—Details labeled as Compatibility Considerations , below. See also Summary.	Bug Reports at Web site	No

New features and changes introduced in this version are described here.

- “New Block Dialogs and the Simulink Model Explorer” on page 13
- “Joint Spring & Damper Adds Extra Simulink State When Connected to a Revolute” on page 13
- “Improved SolidWorks CAD Translation” on page 14

New Block Dialogs and the Simulink Model Explorer

Most of the SimMechanics block dialogs have been upgraded and are now compatible with the Simulink® Model Explorer. See the Simulink documentation for more about Model Explorer.

Block Dialogs Not Rendered in Model Explorer

Model Explorer cannot render the dialogs of these blocks:

- Shared Environment
- Point-Curve Constraint

Joint Spring & Damper Adds Extra Simulink State When Connected to a Revolute

In the new version of SimMechanics, each Joint Spring & Damper block connected to a revolute primitive adds a Simulink state to your model.

These states are in addition to other normal Simulink states, such as those associated with Integrator and Transfer Fcn blocks. See the Simulink documentation for more about Simulink model states.

This new feature does not change the mechanical states of your model, those associated with SimMechanics joint blocks. See the `mech_stateVectorMgr` command reference for more about mechanical states.

Improved SolidWorks CAD Translation

The SolidWorks-to-SimMechanics translator and Physical Modeling XML import command have been improved. See “Modeling with Computer-Aided Design” and the `import_physmod` command reference in the *SimMechanics User’s Guide*.

- Mates in a CAD assembly (restrictions on the free motion of CAD parts) are now translated into Joint blocks that reflect a particular combination of joint primitives, such as Prismatic, Revolute, Spherical, Bushing, etc. Previously, all degrees of freedom in a CAD assembly were translated into appropriately configured Custom Joint blocks. Rigid connections between parts continue to be translated into Welds.
- Blocks in SimMechanics models generated from Physical Modeling XML files are now, by default, labeled with shorter names. You can change the naming convention in the `import_physmod` command options.

Version 2.3 (R14SP3) SimMechanics

This table summarizes what's new in V2.3 (R14SP3):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes	No	Bug Reports at Web site	No

New features and changes introduced in this version are described here.

- “New Shared Environment Block” on page 15
- “Updated Body Spring & Damper Block” on page 15
- “Normalizing Rotations” on page 16
- “New State Vector Commands” on page 16
- “New import_physmod Dialog” on page 16
- “Demos Expanded” on page 16
- “Documentation Enhancements” on page 17

New Shared Environment Block

The new Shared Environment block allows you to link two separate SimMechanics block diagrams with a nonphysical connection. The block enforces the same machine environment settings on both machines but adds no mechanical components (bodies or degrees of freedom) to either. Two machines so connected require exactly one Machine Environment block, rather than two.

See the Shared Environment block reference for further details.

Updated Body Spring & Damper Block

The Body Spring & Damper block no longer contains any degrees of freedom.

Previous versions of the Body Spring & Damper block contained six degrees of freedom (DoFs) represented by a Joint. This Joint had to be taken into account when counting DoFs and loops in your model.

The new Body Spring & Damper block instead uses a Shared Environment block to connect the two sides and contains no DoFs. See their respective block references for more information.

Normalizing Rotations

The Body dialog accepts various rotational forms (Euler angles, rotation matrix, quaternion). SimMechanics now interprets these rotational forms in a slightly different way, so that the standard normalization conditions on rotation matrices and quaternions are consistently enforced. As a result, you might now see slightly different simulation results from earlier versions.

New State Vector Commands

SimMechanics features four new commands that allow you to manipulate the mechanical states of your models. See the command references for more.

- `mech_get_states`
- `mech_runtime_states`
- `mech_set_states`
- `mech_transfer_states`

New `import_physmod` Dialog

The `import_physmod` command generates SimMechanics models from Physical Modeling XML files. In addition to importing Physical Modeling XML through the command line, you can now set up the command through a dialog.

See the `import_physmod` command reference for further information.

Demos Expanded

Two new demos have been added to SimMechanics:

- `mech_flexible_four_bar` models a flexible four bar machine.

- `mech_pole_vault` models a rigid pole vaulter, with a discrete event.

The second demo has an associated MAT-file.

Documentation Enhancements

The SimMechanics User's Guide has been enhanced.

- The review chapter on representing motion has been revised.
- The motion analysis chapter has been revised.
- The computer-aided design (CAD) documentation (also available as a separate book) has been significantly revised. See the CAD chapter.
- A new chapter of case studies, based on the Stewart platform, has been added. The studies apply advanced methods and tasks to this system. SimMechanics includes a related set of demo model and library files.
 - Degrees of freedom, states, closed topology, and constraints
 - Trimming and linearization
 - Designing controllers for the platform
 - Generating code versions of the model
 - Implementing code on dedicated hardware (hardware in the loop)

Version 2.2.2 (R14SP2) SimMechanics

This table summarizes what's new in V2.2.2 (R14SP2):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	No	Bug Reports at Web site	No

New features and changes introduced in this version are described here.

- “Demos Expanded” on page 18
- “Documentation Enhancements” on page 18

Demos Expanded

Two new demos have been added to SimMechanics:

- mech_sticky_box
- mech_sticky_screw

Each demo has an associated MAT-file.

These demos illustrate static friction (stiction) implemented with the Joint Stiction Actuator.

Documentation Enhancements

The online SimMechanics Help has been enhanced with links to four new Web-based AVI animation files (one of them new in this release) that record SimMechanics simulations.

You can access these links most easily by using the Examples index in the Help browser, under **Prerecorded Animations**.

Version 2.2.1 (R14SP1) SimMechanics

This table summarizes what's new in V2.2.1 (R14SP1):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes	No	Fixed bugs at Web site	No

New features and changes introduced in this version are described here.

- “Demos Updated and Expanded” on page 19
- “Documentation Enhancements” on page 19

Demos Updated and Expanded

The demos used in the open-topology Inverse Dynamics case study have been changed:

- mech_dpend_invdyn1
- mech_dpend_invdyn2
- mech_dpend_act (a new demo replacing mech_dpend_stat)

The last, new demo has an associated MAT-file, mech_dpend_act.mat. See “Documentation Enhancements” on page 19.

Two other new SimMechanics demos have been added:

- mech_cambelt models a cam, belt, and pulley system with a Point-Curve Constraint block.
- mech_viscous illustrates how to model a viscous medium with a Joint Spring-Damper block.

Documentation Enhancements

The online SimMechanics Help has been enhanced with additional multimedia support.

- The online Help contains four detailed mechanical drawings for systems modeled in the user's guide: the conveyor, the four bar machine, and the Stewart platform.
- The online Help also contains links to three new Web-based AVI animation files that record SimMechanics simulations.

You can access these features most easily by using the Examples index in the Help browser, under **Mechanical Drawings** and **Prerecorded Animations**, respectively.

The open-topology Inverse Dynamics section of the motion analysis chapter has been enhanced with a new, more complex and more realistic example. The related demos have been changed as well; see “Demos Updated and Expanded” on page 19 previously.

Version 2.2 (R14) SimMechanics

This table summarizes what's new in V2.2 (R14):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes	Yes—Details labeled as Compatibility Considerations , below. See also Summary.	Fixed bugs at Web site	No

New features and changes introduced in this version are described here.

- “Simulation and Visualization Controls Changes” on page 22
- “New Machine Environment Block” on page 22
- “Choosing a Ground Block as Machine Root” on page 23
- “Optional Two-Dimensional Solver” on page 23
- “Optional Gravity Signal” on page 23
- “New SimMechanics Diagnostics Settings” on page 24
- “Restricted Body Coordinate System References” on page 24
- “Minimum Number of Body Coordinate Systems” on page 24
- “Visualization Controls Relocated” on page 25
- “Manual Updating of Body Visualization” on page 25
- “Internal Virtual Reality Visualization No Longer Supported” on page 25
- “Code Generation with Point-Curve Constraint Now Enabled” on page 26
- “Code Generation Improvements” on page 26
- “Additional Simulink Features Now Supported” on page 26
- “SimMechanics Now Supported on HP-UX Platforms” on page 26
- “Demos Updated and Expanded” on page 26

- “Documentation Enhancements” on page 27

Simulation and Visualization Controls Changes

This version of SimMechanics introduces significant changes to how you control simulation, mechanical environment, and visualization in SimMechanics models. These changes, summarized below, include

- “New Machine Environment Block” on page 22
- “Choosing a Ground Block as Machine Root” on page 23
- “Optional Two-Dimensional Solver” on page 23
- “Optional Gravity Signal” on page 23
- “New SimMechanics Diagnostics Settings” on page 24
- “Visualization Controls Relocated” on page 25
- “Manual Updating of Body Visualization” on page 25

The new controls are fully documented in the SimMechanics User’s Guide chapters on running simulations and visualization.

New Machine Environment Block

In the new version of SimMechanics, you configure the mechanical environment for an entire model in the **SimMechanics** node of the **Configuration Parameters** dialog, accessed via the **Simulation** menu. You configure the mechanical environment for each separate machine diagram (one or more per model) via its Machine Environment block. These two dialogs replace the old **Mechanical Environment Settings** dialog.

You must connect exactly one Machine Environment block to each separate machine diagram at one of the machine’s Ground blocks. The new Machine Environment block is located in the Bodies library.

See “Choosing a Ground Block as Machine Root” on page 23.

Compatibility Considerations

Prior to this version, SimMechanics models recorded mechanical environment data in the **Mechanical Environment Settings** dialog. Although you can

no longer access this dialog from the **Simulation** menu, you can continue to run old models as they are. If you want to view these old settings, enter `mech_environment(gcs)` at the command line with your old model open. You cannot change the dialog settings.

If you want to change the settings in old models or build a new SimMechanics model, you must use the new Machine Environment block. Copying this block from the Bodies library into an old model causes the old **Mechanical Environment Settings** data to be copied into the block. You can then reconfigure the new block as you want.

Choosing a Ground Block as Machine Root

The new Ground block has the option of being chosen as the root for a machine's Machine Environment block. In each separate machine diagram (one or more per model), choose one such Ground by selecting **Show Mechanical Environment port** in its dialog. The corresponding port then appears on the Ground. Then connect a Machine Environment block to the Ground at this port.

See “New Machine Environment Block” on page 22.

Optional Two-Dimensional Solver

The new Machine Environment block allows you to choose, through its **Machine dimensionality** pull-down menu, a specialized solver for a machine that moves in only two dimensions. SimMechanics detects the dimensionality and automatically adjusts the solver by default. But you can override the default and require SimMechanics to work in either three or two dimensions.

The two-dimensional solver significantly improves simulation performance in two and one dimensions.

Optional Gravity Signal

The new Machine Environment block allows you to input gravity as an external Simulink® signal. In the block dialog, select **Input gravity as signal**. A Simulink inport appears for connecting the Simulink signal line. The gravity must be a three-component vector signal. You choose the units in the **Gravity vector** units pull-down menu of the block dialog. SimMechanics

interprets the vector gravity signal the same way it interprets the static **Gravity vector** field value in the block dialog.

If you choose gravity as a signal, the **Gravity vector** field is ignored.

New SimMechanics Diagnostics Settings

SimMechanics now lets you control diagnostic messages. In the **SimMechanics** node of the **Configuration Parameters** dialog, accessed via the **Simulation** menu, you can select to enable or disable certain warning messages, and whether to mark closed-loop joints cut automatically by SimMechanics.

Restricted Body Coordinate System References

All coordinate system (CS) references in Body blocks from one CS to another CS must now refer to only

- Other CSs on the same Body
- Adjoining CSs (coordinate systems on Bodies directly connected to the referring body)
- World

All other CS references now cause simulation errors.

Compatibility Considerations

Other types of CS references from one Body to another now lead to simulation errors. If any of your old models contain such references, you must update them.

Minimum Number of Body Coordinate Systems

You can no longer eliminate all the non-center-of-gravity (CG) Body coordinate systems (CSs) on a Body block dialog. Besides the undeletable CG CS entry, at least one non-CG CS must remain.

Visualization Controls Relocated

You now enable SimMechanics visualization and animation for an entire model in the **Visualization** area of the **SimMechanics** node of the **Configuration Parameters** dialog, reached via the **Simulation** menu. You now enable or disable visualization for individual machines within a model via the **Visualization** pane of the Machine Environment block dialog. See “New Machine Environment Block” on page 22.

All SimMechanics visualization controls are now located on the specially configured MATLAB® Graphics visualization window, in the **SimMechanics** menu and toolbar.

Manual Updating of Body Visualization

SimMechanics visualization no longer immediately displays a Body newly added to a model. Instead you must update the model by selecting **Update Diagram** from the **Edit** menu.

Internal Virtual Reality Visualization No Longer Supported

SimMechanics no longer includes internally integrated Virtual Reality Toolbox visualization. Models configured to use virtual reality now default to the MATLAB Graphics visualization/animation tool, which is still supported by SimMechanics.

See the virtual reality section of the visualization chapter in the SimMechanics documentation.

Consult the Web product page for more about Virtual Reality Toolbox.

Compatibility Considerations

You can continue to use Virtual Reality Toolbox with SimMechanics by creating your own virtual world for your machine, incorporating into your model a VR Sink block linked to your virtual world, and feeding Body Sensor signals to the VR Sink.

Code Generation with Point-Curve Constraint Now Enabled

The Point-Curve Constraint no longer creates algebraic loops in Simulink. This improvement means that you can now generate code from models containing Point-Curve Constraints.

Code Generation Improvements

The stand-alone SimMechanics library used for code generation is now precompiled for supported platforms using standard targets. This feature significantly speeds up compilation of generated code.

SimMechanics code generation now supports Real-Time Windows Target.

Additional Simulink Features Now Supported

SimMechanics now supports Model Referencing and S-function target. It also now supports Simulink External mode, but without visualization. See the sections on generating code and SimMechanics limitations in the SimMechanics documentation.

SimMechanics Now Supported on HP-UX Platforms

SimMechanics is now supported on the Hewlett-Packard UNIX (HP-UX) operating system.

Demos Updated and Expanded

All SimMechanics demos have been updated with the new Machine Environment block. New demos have also been added:

- `mech_bouncing_ball` demonstrates how to model impact and collisional forces using a bouncing ball.
- `mech_flyball` models a flyball governor mechanism.
- `mech_rack_pinion` models a driven rack-and-pinion mechanism.
- `mech_rolling_sphere` demonstrates how to model nonholonomic constraints using a sphere rolling on a two-dimensional surface.

- `mech_toroid` illustrates the Point-Curve Constraint with a body sliding on a toroidal curve.

Documentation Enhancements

The SimMechanics User's Guide has been enhanced.

- The review chapter on body motion and coordinate systems is expanded with greater detail and more examples.
- The computer-aided design (CAD) documentation (also available as a separate book) has been significantly revised and expanded. See the CAD chapter.
- The case study sections on trimming and linearization have been revised and expanded, including a new closed-loop linearization example.

You can find a more complex closed-loop linearization example using a Stewart platform model at

www.mathworks.com/company/newsletters/digest/sept02/stewart.html

Version 2.1.1 (R13SP1) SimMechanics

This table summarizes what's new in V2.1.1 (R13SP1):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
No	No	Yes Details below	No

New changes introduced in this version are described here.

Model Reinitialization After Simulation Errors

Restarting a model that had encountered an error during a previous simulation sometimes led SimMechanics to return warnings and zero results. Starting the model a third time reproduced the errors of the first simulation. This bug is now fixed.

Version 2.1 (R13+) SimMechanics

This table summarizes what's new in V2.1 (R13+):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	No	Fixed bugs at Web site	No

New features and changes introduced in this version are described here.

- “Computer-Aided Design Translator for SolidWorks” on page 29
- “import_physmod Command for Generating Models” on page 30
- “Documentation and Examples for SolidWorks-to-SimMechanics Translator” on page 30

Computer-Aided Design Translator for SolidWorks

SimMechanics 2.1 contains a standalone computer-aided design (CAD) translator for the SolidWorks® CAD platform. You install and use this translator with SolidWorks but independently of MATLAB.

The translator converts a SolidWorks CAD machine assembly into an XML file in the Physical Modeling format. The XML file represents the assembly in a form that you can use with SimMechanics to generate a block diagram model dynamically equivalent to the original CAD assembly. To generate models, use the new `import_physmod` command. See “import_physmod Command for Generating Models” on page 30 below.

Installing the SolidWorks-to-SimMechanics Translator

Obtain the self-extracting executable archive

`SimMechanics_Translator_for_SolidWorks.exe` by locating and downloading its archive at www.mathworks.com/products/simmechanics/.

import_physmod Command for Generating Models

Using the CAD-to-SimMechanics translator, you export a CAD assembly into an XML file in the Physical Modeling format. (See “Computer-Aided Design Translator for SolidWorks” on page 29.)

This XML file represents the assembly in a form that you can use to generate a SimMechanics block diagram model dynamically equivalent to the original CAD assembly. You generate the model from the XML file with the `import_physmod` command.

The generated model contains Bodies and Joints that represent the original parts and degrees of freedom of the assembly. You can edit the generated model to add additional SimMechanics and Simulink blocks.

Documentation and Examples for SolidWorks-to-SimMechanics Translator

The SimMechanics User’s Guide has not been updated for this release.

Translator Documentation

Special help files accompany the SolidWorks-to-SimMechanics translator. They include two HTML pages and a PDF book. These files are independent of the MATLAB help system.

Translator Examples

Some examples of SolidWorks CAD assemblies are included with the SolidWorks-to-SimMechanics translator.

One of the examples is a robot arm assembly. The corresponding XML file in Physical Modeling format, `robot.xml`, is located in the `toolbox/physmod/mech/mechdemos` directory, relative to your MATLAB root.

Version 2.0.1 (R13+) SimMechanics

This table summarizes what's new in V2.0.1 (R13+):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
No	No	Yes Details below	No

New changes introduced in this version are described here.

Code Compilation with lcc Compiler

Attempting to compile code generated from SimMechanics models using lcc led to errors in Version 2.0. This bug is now fixed.

Version 2.0 (R13+) SimMechanics

This table summarizes what's new in V2.0 (R13+):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	No	Fixed Bugs at Web Site	No

New features and changes introduced in this version are described here.

- “Code Generation with Real-Time Workshop” on page 32
- “Accelerator Mode and Discrete Events” on page 32
- “Expanded Handle Graphics Visualization Features” on page 33
- “Variable Body Mass and Inertia Tensor” on page 33
- “Vectorized Joint Initial Condition Actuation” on page 33
- “Damped Linear Force Element Blocks” on page 33
- “New Mechanical Branching Bar Block” on page 33

Code Generation with Real-Time Workshop

You can now generate stand-alone C code from SimMechanics models using Real-Time Workshop®. You can also export it to a PC kernel using xPC Target.

SimMechanics 2.0 requires Real-Time Workshop 5.0.1 or later to generate code for the Rapid Simulation (RSIM) target.

Accelerator Mode and Discrete Events

Accelerator mode now supports discrete events associated with the Joint Stiction Actuator and the Point-Curve Constraint.

Expanded Handle Graphics Visualization Features

The MATLAB Graphics visualization tool of SimMechanics has a large number of new features, including recording and playback of simulation animations.

Variable Body Mass and Inertia Tensor

The Sensors & Actuators library features a new Variable Mass & Inertia Actuator block. This block accepts Simulink signals that vary the mass and/or inertia tensor of the Body block to which it is connected. The block only simulates the changes in the body's mass properties and does not simulate the effect of the thrust forces or torques resulting from the accretion or ejection of mass.

Vectorized Joint Initial Condition Actuation

The Joint Initial Condition Actuator block now lists all the primitives in the Joint block to which it is connected. You can set initial positions/angles and initial velocities separately for each prismatic and revolute primitive.

Damped Linear Force Element Blocks

This release introduces a new block library, Force Elements, with two blocks representing damped linear harmonic oscillator forces. The Body Spring-Damper block simulates a damped spring-like force between two bodies. The Joint Spring-Damper block actuates a joint primitive with a damped spring-like force or torque.

New Mechanical Branching Bar Block

The Utilities library features the new Mechanical Branching Bar block. You can use this block to map multiple sensor and actuator lines to one sensor/actuator port on a Joint, Constraint, or Driver or to one Body coordinate system on a Body.

Compatibility Summary for SimMechanics

This table summarizes new features and changes that might cause incompatibilities when you upgrade from an earlier version, or when you use files on multiple versions. Details are provided in the description of the new feature or change.

Version (Release)	New Features and Changes with Version Compatibility Impact
Latest Version V2.7 (R2007b)	No
V2.6 (R2007a)	See the Compatibility Considerations subheading for this new feature: <ul style="list-style-type: none"> • “Block Library Links Must Be Resolved” on page 8
V2.5 (R2006b)	See the Compatibility Considerations subheading for each of these new features: <ul style="list-style-type: none"> • “Computer-Aided Design Translator for Pro/ENGINEER Available via the Web” on page 10 • “SolidWorks-to-SimMechanics Translator Now Available Only via the Web” on page 11
V2.4 (R2006a)	No
V2.3 (R14SP3)	No
V2.2.2 (R14SP2)	No
V2.2.1 (R14SP1)	No

Version (Release)	New Features and Changes with Version Compatibility Impact
V2.2 (R14)	See the Compatibility Considerations subheading for each of these new features or changes: <ul style="list-style-type: none">• “New Machine Environment Block” on page 22• “Restricted Body Coordinate System References” on page 24• “Internal Virtual Reality Visualization No Longer Supported” on page 25
V2.1.1 (R13SP1)	No
V2.1 (R13+)	No
V2.0.1 (R13+)	No
V2.0 (R13+)	No