Simscape™ Release Notes

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Summary by Version

This table provides quick access to what's new in each version. For clarification, see "Using Release Notes" on page 1.

Version (Release)	New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Latest Version V2.1 (R2008a)	Yes Details	No	Bug Reports	Printable Release Notes: PDF Current product documentation
V2.0 (R2007b)	Yes Details	No	Bug Reports	No
V1.0 (R2007a)	Yes Details	Yes Summary	Bug Reports	No

Using Release Notes

Use release notes when upgrading to a newer version to learn about:

- New features

- Changes

- Potential impact on your existing files and practices

Review the release notes for other MathWorks™ products required for this product (for example, MATLAB® or Simulink®) for enhancements, bugs, and compatibility considerations that also might impact you.

If you are upgrading from a software version other than the most recent one, review the 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 release notes for V1.1 and V1.2.

What's in the Release Notes

New Features and Changes

- New functionality

- Changes to existing functionality

Version Compatibility Considerations

When a new feature or change introduces a reported incompatibility between versions, the **Compatibility Considerations** subsection explains the impact.

Compatibility issues reported after the product is released appear under Bug Reports at the MathWorks Web site. Bug fixes can sometimes result in incompatibilities, so you should also review the fixed bugs in Bug Reports for any compatibility impact.

Fixed Bugs and Known Problems

The MathWorks offers a user-searchable Bug Reports database so you can view Bug Reports. The development team updates this database at release time and as more information becomes available. This includes provisions for any known workarounds or file replacements. Information is available for bugs existing in or fixed in Release 14SP2 or later. Information is not available for all bugs in earlier releases.

Access Bug Reports using your MathWorks Account.

Version 2.1 (R2008a) Simscape™ Software

This table summarizes what's new in Version 2.1 (R2008a):

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

New features and changes introduced in this version are

- "Trimming Now Available for Simscape™ Models" on page 3
- "Thermal Unit Conversions Now Supported" on page 3
- "Enhancement to Specifying Units" on page 4
- "New Blocks" on page 5
- "Enhancements to Simulation Algorithms" on page 5
- ""What's This?" Context-Sensitive Help Available for Simulink® Configuration Parameters Dialog" on page 5
- "New Simscape™ Demo" on page 6

Trimming Now Available for Simscape™ Models

Finding and managing operating points by trimming has been implemented for models that include Simscape™ and SimHydraulics® blocks. Simulink® Control Design™ product is required for using this functionality. For more information, see Trimming Simscape Models in the Simscape documentation.

Thermal Unit Conversions Now Supported

You can now specify temperature for your thermal models in a variety of units, including degrees Celsius, Fahrenheit, and Rankine. The unit manager automatically handles conversions between thermal units.

Thermal units sometimes require an affine conversion, that is, a conversion that performs both multiplication and addition. In situations when you deal with a relative, rather than absolute, temperature, you need to convert using just the linear term. Thermodynamic variables in block dialogs are automatically tagged as appropriate and handled by the unit manager. However, when an input or output signal is related to thermodynamic variables and contains units of temperature, you must decide whether affine conversion needs to be applied. The Simulink-PS Converter and PS-Simulink Converter block dialogs now contain the **Apply affine conversion** checkbox. If you select it, the unit manager uses the affine conversion, otherwise it applies the default linear conversion.

For more information, see "Thermal Unit Conversions" in the Simscape documentation, as well as the Simulink-PS Converter and PS-Simulink Converter block reference pages.

The pm_addunit command has also been modified to support affine conversions. Its second argument, conversion, may now be either a positive real scalar or a 1x2 array. If this argument has two elements, then it is specifying an affine conversion, with the first element (a positive real number) being the linear conversion coefficient, and the second being the offset.

Enhancement to Specifying Units

Simscape block dialogs have drop-down combo boxes for units next to a parameter value. You can either select a unit from the drop-down list, or type a commensurate unit name (or a mathematical expression with unit names) directly into the units combo box of the block dialog. For more information, see "Specifying Units in Block Dialogs" in the Simscape documentation.

Similarly, the Simulink-PS Converter and PS-Simulink Converter block dialogs now contain a drop-down list, which is prepopulated with some common input or output units. You can either select a unit from the list or type a unit name, or a mathematical expression with unit names. Note that you must still match the unit type:

• For a PS-Simulink Converter block, these units must be commensurate with the units of the input physical signal coming into the block.

- Signal units that you specify in a Simulink-PS Converter block must match the input type expected by the Simscape block connected to it.

New Blocks

Version 2.1 contains two new blocks:

- Gyrator block in the Electrical Elements library simulates an ideal gyrator, which can be used to implement an inductor with a capacitor.

- PS Abs block in the Physical Signals library returns absolute value of input signal.

Enhancements to Simulation Algorithms

Version 2.1 contains multiple enhancements to simulation algorithms, resulting in improved robustness and reliability.

"What's This?" Context-Sensitive Help Available for Simulink® Configuration Parameters Dialog

R2008a introduces "What's This?" context-sensitive help for parameters that appear in the Simulink® Configuration Parameters dialog, including those on the **Simscape** pane. This feature provides quick access to a detailed description of the parameters, saving you the time it would take to find the information in the Help Browser.

To use the "What's This?" help, do the following:

1 Place your cursor over the label of a parameter.

2 Right-click. A **What's This?** context menu appears.

For example, the following figure shows the **What's This?** context menu appearing after a right-click on the **Start time** parameter in the **Solver** pane.

3 Click **What's This?**. A context-sensitive help window appears showing a description of the parameter.

New Simscape™ Demo

The following demo has been added in Version 2.1:

Demo Name	Description
House Heating System (`ssc_house_heating_system`)	The demo represents a simple house heating system consisting of a heater, thermostat, and a house structure with four thermally distinguishable parts: inside air, house walls, windows, and roof. You can investigate system behavior with the heating system turned on or off, and plot the heat cost and indoor versus outdoor temperatures.

Version 2.0 (R2007b) Simscape™ Software

This table summarizes what's new in Version 2.0 (R2007b):

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

New features and changes introduced in this version are

- "Code Generation Now Available for Simscape™ Models" on page 7
- "New Thermal Block Libraries " on page 7
- "Additional Physical Signal Blocks" on page 8
- "Improved Simulation Performance " on page 8
- "New Simscape™ Demos" on page 9

Code Generation Now Available for Simscape™ Models

Code generation has been implemented for models that include Simscape™ and SimHydraulics® blocks. For more information, see "Generating Code" in the Simscape documentation.

New Thermal Block Libraries

Version 2.0 contains new block libraries of fundamental thermal elements, sensors, and sources:

- Conductive Heat Transfer
- Convective Heat Transfer
- Radiative Heat Transfer

- Thermal Mass
- Thermal Reference
- Ideal Heat Flow Source
- Ideal Heat Flow Sensor
- Ideal Temperature Source
- Ideal Temperature Sensor

Additional Physical Signal Blocks

The new Physical Signal blocks introduced in Version 2.0 are listed below:

- PS Constant
- PS Math Function
- PS Max
- PS Min
- PS Sign

Improved Simulation Performance

In Version 2.0, various solver improvements have led to improved simulation performance:

- Enhanced handling of dependent dynamic states (higher-index DAEs)

  Simscape can now handle dependencies among the dynamic states as long as they are linear in the states and independent of time and inputs. This allows you, for example, to connect capacitors in parallel (even with their parasitic series resistances set to 0), inductors in series, and so on.

- Significant reduction of the number of equations, which substantially increased simulation speed

  The typical speedup of your models is between 5 and 10 times. There are some models that are below and above this range. Also, the number of states and equations changed between releases. This means that you will have to reset any calculations that relied on the states (such as initial state setting).

The changes to the simulation technology are significant. You may find that some of your models may require different or tighter tolerances to converge, while others will require no change. Refer to the troubleshooting section in the User's Guide for help in finding the cause of a problem if simulation failed.

New Simscape™ Demos

The following demos have been added in Version 2.0:

Demo Name	Description
DC Motor Thermal Circuit (ssc_dc_motor_thermal_circuit)	The demo illustrates how the thermal behavior of a motor can be simulated in lumped parameters.
Round Rod Heat Conduction (ssc_round_rod_heat_conduction)	The demo illustrates the usage of thermal blocks for developing a model of a long iron rod that is heated with a heat source through its left face. The right face and the outer cylindrical surface are open to atmosphere, with a force heat convection.

Version 1.0 (R2007a) Simscape™ Software

This table summarizes what's new in Version 1.0 (R2007a):

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

New features introduced in this version are described here.

Product Introduction

Simscape™ software extends the Simulink® product line with tools for modeling and simulating multidomain physical systems. It enables you to describe multidomain physical systems containing mechanical, hydraulic, and electrical components as physical networks.

Simscape key features are:

- Single modeling environment for modeling and simulating physical systems, such as mechanical, electrical, and hydraulic systems

- Foundation library of physical modeling building blocks and fundamental mathematical elements

- Connection blocks to bridge modeling domains

- Full simulation and limited editing capabilities for models built with SimMechanics™, SimDriveline™, or SimHydraulics® blocks (no license for these products required as long as the products are installed)

- Ability to specify units of parameters and variables, with all unit conversion handled automatically

Simscape software can be used for a variety of automotive, aerospace, defense, and industrial equipment applications. Together with

SimMechanics, SimDriveline, SimHydraulics, and SimPowerSystems™ (all available separately), Simscape lets you model complex interactions in electromechanical and hydromechanical systems.

Block Libraries Moved from SimHydraulics® to Simscape™

The Foundation and Utilities block libraries that used to be included in SimHydraulics (V1.0 and V1.1) are now part of Simscape product.

Compatibility Considerations

Several blocks that used to be in SimHydraulics V1.1 and are now part of Simscape software have undergone changes that have compatibility impact. These blocks are:

- Fluid Inertia
- Inertia
- Mass
- PS Integrator
- Rotational Spring
- Translational Spring

Each of these blocks has a parameter that specifies the initial condition for use in computing the block's initial state at the beginning of a simulation run. In this version, there is a difference in the way these initial conditions are computed, and as a result, the blocks work differently than they used to in the previous version. For details, see the block reference pages.

Compatibility Summary for Simscape™ Software

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 **V2.1 (R2008a)**	None
V2.0 (R2007b)	None
V1.0 (R2007a)	See the **Compatibility Considerations** subheading for this new feature or change: • "Block Libraries Moved from SimHydraulics® to Simscape™" on page 11