Simulink® Control Design Release Notes

Contents

Summary by Version

This table provides quick access to what's new in each version. For clarification, see "About 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 (R2007a)	Yes Details	No	Bug Reports Includes fixes	Printable Release Notes: PDF Current product documentation
V2.0.1 (R2006b)	Yes Details	No	Bug Reports Includes fixes	No
V2.0 (R2006a)	Yes Details	No	Bug Reports Includes fixes	No
V1.3 (R14SP3)	Yes Details	No	Bug Reports Includes fixes	No
V1.2 (R14SP2)	Yes Details	No	Bug Reports Includes fixes	No
V1.1 (R14SP1)	No	No	Fixed bugs	No
V1.0 (R14)	Yes Details	No	No bug fixes	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 known 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 compatibility impact, see the "Compatibility Summary for Simulink Control Design" on page 16.

Compatibility issues that become known 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 2.1 (R2007a) Simulink Control Design

This table summarizes what's new in Version 2.1 (R2007a):

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

New features and changes introduced in this version are

- "Ability to Linearize Using an Operating Point Specified Directly in a Simulink Model " on page 4

- "Ability to Capture Linearization Snapshots in GUI" on page 5

- "Ability to Perform Control Design at Snapshots in GUI" on page 5

- "Ability to Retrieve Stored Compensator Designs" on page 5

Ability to Linearize Using an Operating Point Specified Directly in a Simulink Model

You can use Simulink Control Design to linearize around any operating point that you specify directly in a Simulink model. This capability allows you to make changes to a Simulink model and then perform a linearization around the newly specified operating point with the click of a single button. Previously, this same task required two steps: creating a new operating point and then linearizing around this operating point.

There are two ways to linearize around an operating point specified directly in the Simulink model:

- From the Controls and Estimation Tools Manager, as described in "Linearizing at a Simulink Model Operating Point" in the *Simulink Control Design User's Guide*.

- Using `linearize`. For more information, see `linearize` in the reference pages.

Ability to Capture Linearization Snapshots in GUI

You can use the Controls and Estimation Tools Manager to linearize at snapshots of your Simulink model operating point at the following simulation points:

- Specified simulation times, such as when the simulation reaches a steady state solution, as described in "Linearizing at Specified Simulation Times" in the *Simulink Control Design User's Guide*.

- Events during a specified simulation interval, as described in "Linearizing at Simulation Events" in the Simulink Control Design User's Guide.

As in prior releases, you can use `linearize` to perform linearization at snapshots in your model operating point, as described in `linearize` in the reference pages.

Ability to Perform Control Design at Snapshots in GUI

You can use the Controls and Estimation Tools Manager to perform control design at snapshots of your Simulink model operating point at the following simulation points:

- Specified simulation times, such as when the simulation reaches a steady state solution, as described in "Selecting an Operating Point" in *Getting Started with Simulink Control Design*.

- Events during a specified simulation interval, as described in "Selecting an Operating Point" in *Getting Started with Simulink Control Design*.

Ability to Retrieve Stored Compensator Designs

When you design a compensator using the SISO design tool, you can store the current design and then continue making changes to this design. A new button called **Retrieve Design** lets you retrieve the stored design at any time by undoing the design changes you made since you last stored the design. For more information on retrieving stored compensator designs, see "Storing and Retrieving Designs" in *Getting Started with Simulink Control Design*.

Version 2.0.1 (R2006b) Simulink Control Design

This table summarizes what's new in Version 2.0.1 (R2006b):

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

Version 2.0 (R2006a) Simulink Control Design

This table summarizes what's new in Version 2.0 (R2006a):

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

New features and changes introduced in this version are

Compensator Design in Simulink Is Now Supported

This release provides new tools to streamline the workflow for designing Single-Input Single-Output (SISO) control loops directly in Simulink. In previous releases, designing a compensator was a multistep process that involved several tools.

The new tools support any linearizable control architecture, such as single loops, multiple loops, and cascaded loops. With the new tools, you simply select the blocks you want to tune. Then, Simulink Control Design automatically analyzes your model to identify the relevant control loops and opens a preconfigured session of the SISO Design Tool (in the Control System Toolbox). For more information, see "Designing Compensators" in the Simulink Control Design Getting Started Guide.

Supported tunable SISO Simulink blocks include Gain, Transfer Function, Zero-Pole-Gain, State-Space, and PID blocks.

In the SISO Design Tool you can

- Graphically tune multiple SISO loops in a single GUI.

- Gain visual insight into loop interactions and coupling effects.

- Focus the analysis on a specific loop in a multiloop design by removing the effect of other feedback loops.

- Generate first-cut compensator designs using systematic design algorithms, such as Ziegler-Nichols PID tuning, IMC design, or LQG design.

- Optimize linear responses to meet time and frequency-based design constraints (requires Simulink Response Optimization).

- Directly tune Simulink block parameters, such as PID gains, zero-pole-gain representations, and masked blocks.

- Tune continuous or discrete control loops.

- Examine the closed-loop response of any portion of a model.

After a design is completed, you can write the tuned parameter values back to your Simulink model for verification with the full nonlinear system.

Version 1.3 (R14SP3) Simulink Control Design

This table summarizes what's new in Version 1.3 (R14SP3):

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

New features and changes introduced in this version are

- "Control and Estimation Tools Manager Enhanced" on page 9

- "Support for Operating Point Search and Linearization of Models with Model Reference Blocks" on page 9

Control and Estimation Tools Manager Enhanced

You can copy and edit operating points within the Control and Estimation Tools Manager. For more information on this feature, see "Copying Operating Points" in the Simulink Control Design User's Guide.

You can initialize a Simulink model for simulation using operating points from within the Control and Estimation Tools Manager. For more information on this feature, see the example in "Comparing the Linearized and Original Models" in the Simulink Control Design User's Guide.

Support for Operating Point Search and Linearization of Models with Model Reference Blocks

You can linearize and compute operating points for models that reference other models using the Model block. Linearization of model reference models must use the numerical perturbation linearization algorithm. This algorithm accepts state and input perturbation values in the form of an operating point object. For more information on this feature, see the examples in "Example: Command-Line Numerical Perturbation Linearization of a Model Reference Model" and "Example: Using the Graphical Interface for Numerical

Perturbation Linearization of a Model Reference Model" in the Simulink Control Design User's Guide..

Version 1.2 (R14SP2) Simulink Control Design

This table summarizes what's new in Version 1.2 (R14SP2):

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

New features and changes introduced in this version are

- "Context-Sensitive Help Added" on page 11

- "View Linearizations in the Control and Estimation Tools Manager" on page 11

- "Discretization Methods Added" on page 12

- "List of Blocks with Preprogrammed Analytic Jacobians Added" on page 12

- "Block Name Readability Improved" on page 12

Context-Sensitive Help Added

Access context-sensitive help for the Linearization, Operating Point Search, and Linearization State Ordering Options window of the Control and Estimation Tools Manager. To access help on a field within the options window, right-click the option's label and select **What's this?** from the context menu. Help for the option will appear in this window.

View Linearizations in the Control and Estimation Tools Manager

You can view state space, transfer function, and zero-pole gain representations of linearized models within the Control and Estimation Tools Manager without exporting to the workspace. These linearized models appear in the linearization summary pane of the Control and Estimation Tools Manager.

Discretization Methods Added

You can select from three different discretization methods for linearization of multirate and hybrid models.

List of Blocks with Preprogrammed Analytic Jacobians Added

You can view a complete list of Simulink blocks indicating which blocks have preprogrammed analytic Jacobians for use with the block-by-block analytic linearization algorithm. This list is in the "Individual Block Linearization Methods" section of the Simulink Control Design documentation.

Block Name Readability Improved

You can use either truncated block names or full block names in the state space matrices of a linearized model, and within the LTI Viewer, to improve readability.

Version 1.1 (R14SP1) Simulink Control Design

This table summarizes what's new in Version 1.1 (R14SP1):

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

Version 1.0 (R14) Simulink Control Design

This table summarizes what's new in Version 1.0 (R14):

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

New features and changes introduced in this version are

About Simulink Control Design

Simulink Control Design provides tools for the linearization of control systems and physical models in Simulink. A graphical user interface (GUI) simplifies the tasks of specifying operating conditions, linearizing the model, and analyzing the results. Linearized Simulink models often facilitate system analysis and compensator design. This is useful in many industries and applications, including

- Aerospace: flight control, guidance, navigation

- Automotive: cruise control, emissions control, transmission

- Equipment manufacturing: motors, disk drives, servos

Simulink Control Design improves upon previous Simulink linearization tools by providing more options for computing operating conditions, allowing open loop analysis without the removal of feedback loops, and including a linearization inspector and debugger. Linearization projects are easier to manage with the new Control and Estimation Tools Manager. Furthermore, Control System Toolbox features, such as the LTI Viewer, are integrated with the Control Designer to improve control system analysis and design.

Key Features Introduced

Key features of Simulink Control Design include the ability to

- Specify linearization input, output, and open loop analysis points using right-click menus

- Perform open loop analysis without deleting feedback loops

- Extract operating conditions from a simulation

- Compute operating conditions by optimization (trimming)

- Create output constraints for trim analysis

- Linearize individual blocks using context menus

- Inspect and debug results of the linearization

- Identify blocks in a model that contribute to a linearization

- Export results to the MATLAB workspace

- Manage linearization projects, compute operating conditions, and perform linearization with a graphical user interface (GUI)

- Use improved functions at the command line for linearization and trim analysis

Compatibility Summary for Simulink Control Design

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 (R2007a)	None
V2.0.1 (R2006b)	None
V2.0 (R2006a)	None
V1.3 (R14SP3)	None
V1.2 (R14SP2)	None
V1.1 (R14SP1)	None
V1.0 (R14)	None