SimDriveline Release Notes

"SimDriveline 1.1 Release Notes" describe the changes in this product since Version 1.0.2. SimDriveline 1.1 is available as a Web release and requires the R14SP2 release of Simulink.

The Release Notes discuss the following topics:

- "New Features" on page 1-2
- "Major Bug Fixes" on page 1-5
- "Upgrading from an Earlier Release" on page 1-6
- "Known Software and Documentation Limitations" on page 1-8

If you are upgrading from an earlier version, you should also see:

- Chapter 2, "SimDriveline 1.0.2 Release Notes"
- Chapter 3, "SimDriveline 1.0.1 Release Notes"
- Chapter 4, "SimDriveline 1.0 Release Notes"

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SimDriveline 1.1 Release Notes

New Features

Several important features have been changed or introduced in SimDriveline for this release.

Changes to the Driveline Environment Block

The Driveline Environment block has been changed for this release.

- The **Simulation mode** pull-down menu has been removed.

  You can linearize a model directly with the `linmod` command and other tools based on MATLAB and Simulink. See "Documentation Improvements" on page 1-4.

- A new option has been added for enabling and specifying a default velocity tolerance for all clutches in the connected driveline. See the block reference page and "Changes to the Controllable Friction Clutch Block".

Changes to the Controllable Friction Clutch Block

The Controllable Friction Clutch block has been changed for this release. A new option has been added to choose between a default velocity tolerance for all clutches and an override velocity tolerance for individual clutches.

See the block reference page and "Changes to the Driveline Environment Block".

Differential Gear Ratio Redefined

The gear ratio of the Differential block has been redefined. Its value now is twice the old value. The differential angular velocity constraint is now

$$\omega_I = (1/2) \cdot g_D(\omega_{O1} + \omega_{O2})$$

where the leading 1/2 is new.

If you load an old model with Differential blocks, SimDriveline warns you of each obsolete block. If you try to run the model without updating, the simulation stops with an error.

See "Updating Differential Gear Blocks" on page 1-6 to update the Differential blocks in your existing models.

Efficiency Block Library and Demos

The demos directory `toolbox/physmod/drive/drivedemos` contains a new block library with driveline efficiency loss blocks and one efficiency demo.

Efficiency Library

The `drive_efficiency` demo model is a block library. It contains three efficiency blocks (masked subsystems) that model these efficiency-power loss phenomena in driveline systems:

- Constant efficiency loss (introduces an algebraic loop)

- Variable efficiency loss (introduces an algebraic loop)

- Power measurement

You can break the induced algebraic loops by inserting Transfer Fcn blocks into the underlying subsystems.

The library also contains two unmasked subsystems that implement the basic load (torque)-based driveline efficiency loss.

Efficiency Demo

The demos directory contains one new demo that implement blocks from the `drive_efficiency` library.

The `drive_sgear_lossy` model illustrates power lost to load-based inefficiency in a simple gear connecting two driveshafts and how total power (including loss) is conserved.

Documentation Improvements

The "Advanced Methods" chapter has been improved and expanded.

- The "Improving Performance" section has been expanded.

- A new section, "Trimming and Linearizing Driveline Models", has been added.

Major Bug Fixes

SimDriveline 1.1 includes these important bug fixes made since Version 1.0.2.

If you are viewing these Release Notes in PDF form, refer to the HTML form of the Release Notes, using either the Help browser or the MathWorks Web site, and use the link provided.

Upgrading from an Earlier Release

SimDriveline 1.1 presents several important issues if you are upgrading from a previous version.

Automatic Updating of Environment and Clutch Blocks

This version of SimDriveline includes updated Controllable Friction Clutch and Driveline Environment blocks. See "Changes to the Driveline Environment Block" on page 1-2 and "Changes to the Controllable Friction Clutch Block" on page 1-2.

These blocks are automatically updated when you open a model created from previous versions of SimDriveline.

- The **Simulation mode** pull-down menu setting from old Driveline Environment blocks is no longer used.

- The new Driveline Environment blocks use the default clutch velocity tolerance configuration. The automatic default is enabled for all non-overriding clutches if you use a variable-step solver.

- For the Controllable Friction Clutch blocks, see the block reference page for new check box details.

  - If the previous **Velocity tolerance** value was the default [], the velocity tolerance value is reset to 1e-3 radians/second. Both new check boxes are selected.

  - If the previous **Velocity tolerance** was a numerical value or expression, that value or expression is preserved. Both new check boxes are unselected.

Updating Differential Gear Blocks

The new Differential block uses a changed definition of the differential gear ratio. See "Differential Gear Ratio Redefined" on page 1-2.

You need to update any old Differential blocks in your model. SimDriveline 1.1 provides an update script. To update your model drive_model,

1 Enter `drive_update('drive_model')` at the command line.

2 The script updates your blocks, then opens a **Save** dialog for you to save the updated model under a new name.

3 The script warns you if you have any Differentials linked to external libraries.

   When you run the script on a model, it does not update any linked libraries. You must update each library separately the same way you would update a model.

Caution   Once you update a model this way, you cannot recover the old version. If you want to keep it, save the old version under a different name, or save the updated version under a new name.

Known Software and Documentation Limitations

The following software bugs, workarounds, and compatibility issues are relevant to SimDriveline 1.1.

Known Software Bugs

This section includes a link to a description of known software problems in SimDriveline 1.1.

If you are viewing these Release Notes in PDF form, refer to the HTML form of the Release Notes, using either the Help browser or the MathWorks Web site, and use the link provided.

SimDriveline 1.0.2 Release Notes

Major Bug Fixes

SimDriveline 1.0.2 includes these important bug fixes made since Version 1.0.1.

If you are viewing these Release Notes in PDF form, refer to the HTML form of the Release Notes, using either the Help browser or the MathWorks Web site, and use the link provided.

Documentation Improvements

The SimDriveline documentation is significantly improved over the Version 1.0.1 documentation. The User's Guide includes a revised set of case studies, up to and including a full car simulation example. It also includes a new chapter on advanced driveline modeling methods.

Upgrading from an Earlier Release

SimDriveline 1.0.2 presents an important issue if you are upgrading from a previous version.

Using SimDriveline and SimMechanics Together

If you open SimMechanics or a model with SimMechanics blocks, then open an old SimDriveline model (built in Version 1.0.1 or earlier) in the new Version 1.0.2, you might cause a memory segmentation violation in MATLAB.

To work around this problem, you must update your old models. Download the necessary file from the MathWorks Web site www.mathworks.com by following the Web link provided. This link is available only in the HTML version of these Release Notes, accessible through the Help browser or the MathWorks Web site.

Once you have downloaded the file fix_opaque.p, place it anywhere on your MATLAB path. Then shut down and restart MATLAB. At the command line, enter

```
rehash toolboxcache
```

Then run the file on your old model by entering

```
fix_opaque('<model_name>')
```

where model_name is the name of the old model.

Note Your file download uses the MathWorks FTP server. To log in to the FTP server, use anonymous as your username and your full e-mail address when you are prompted for a password.

Known Software and Documentation Limitations

The following software bugs, workarounds, and compatibility issues are relevant to SimDriveline 1.0.2.

Known Software Bugs

This section includes a link to a description of known software problems in SimDriveline 1.0.2.

If you are viewing these Release Notes in PDF form, refer to the HTML form of the Release Notes, using either the Help browser or the MathWorks Web site, and use the link provided.

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SimDriveline 1.0.1 Release Notes

Major Bug Fixes

SimDriveline 1.0.1 includes these important bug fixes made since Version 1.0.

If you are viewing these Release Notes in PDF form, refer to the HTML form of the Release Notes, using either the Help browser or the MathWorks Web site, and use the link provided.

Documentation Improvements

The SimDriveline documentation is significantly improved over the Version 1.0 documentation. The User's Guide now includes a complete set of case studies, up to and including a full car simulation example.

SimDriveline 1.0 Release Notes

Introduction to SimDriveline

SimDriveline is a new product in the Physical Modeling family that models and simulates drivetrain systems. With it, you can model bodies rotating around multiple driveline axes, connect them with gears, and create idealized powertrains with clutches, transmissions, and other dynamic elements and subsystems. SimDriveline also lets you actuate and measure rotational motion and torques by interfacing with normal Simulink signal lines and blocks. You can develop controllers with Simulink and connect them to SimDriveline models. With SimDriveline, you can model, simulate, analyze, and control the rotational motions of complex drivetrains.