



Simulink S-Function for RT-LAB

Document 2

Integration of an Existing S-Function in a Model for RT-LAB

Version 1.1

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REVISION HISTORY

Version	Date	Responsible	Comment
1.0	2017-02-20	Daniel O'Brien	Initial version
1.1	2017-03-02	Daniel O'Brien	Improved creation of OpConfiguration blocks.

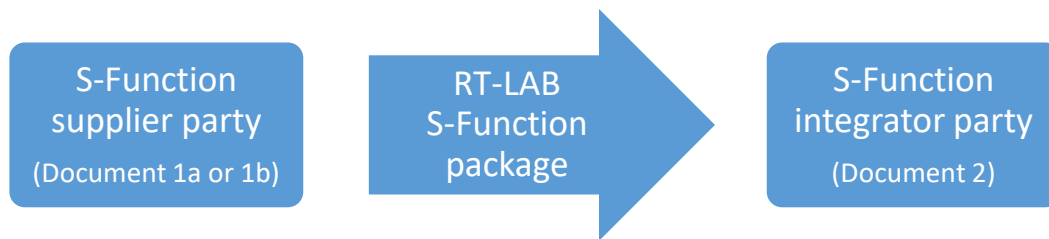
INTRODUCTION

This document presents a procedure to:

- Integrate an existing S-Function in a model for RT-LAB

To apply this procedure, you must have a RT-LAB S-Function package that was supplied by another party. The supplier must have completed the instructions from one of the following document:

- Document 1a – Creation of a S-Function From a Simulink Model and Protection of the Source Code
- Document 1b – Creation of a S-Function From C Code and Protection of the Source Code



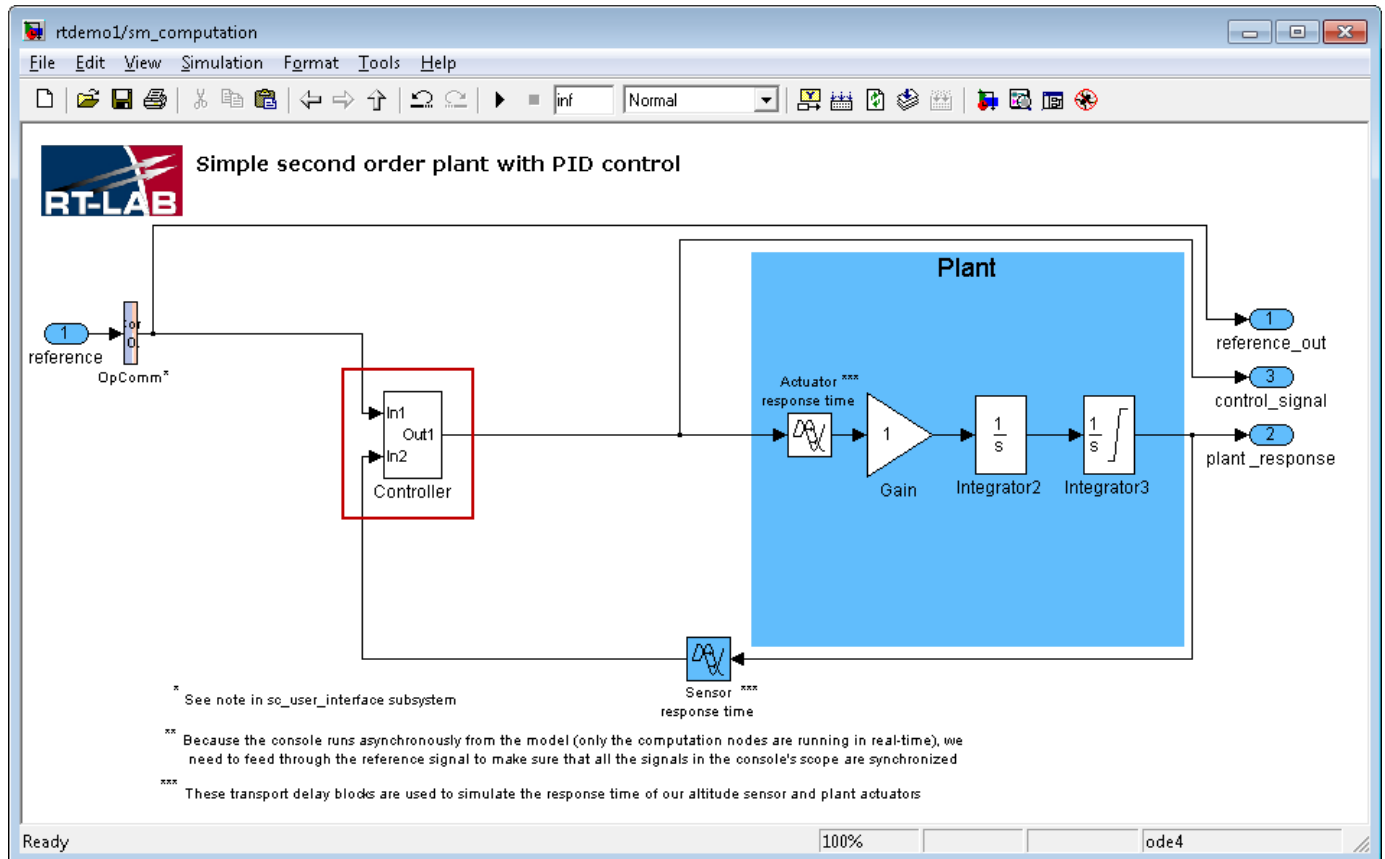
REQUIRED MATERIAL

- Windows host PC with an installation of RT-LAB 10.5+
- Target (OPAL-RT Simulator)
- MATLAB/Simulink
 - The Simulink Coder toolbox is required and any toolbox used in the Simulink model must be compatible with Simulink Coder.
 - The same version (ex: R2013b) and architecture (ex: 64-bit) of MATLAB/Simulink must be used by the supplier and the integrator of the S-Function.

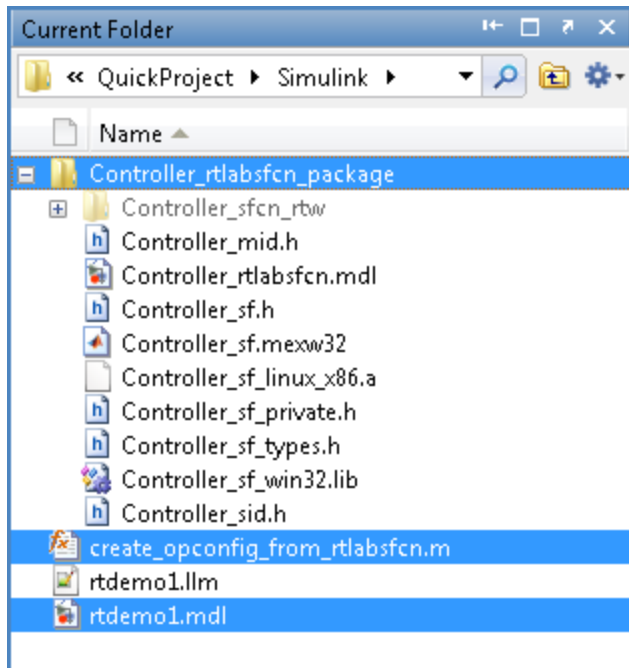
S-FUNCTION INTEGRATION

As an example, a S-Function will be integrated for the Controller part of the Simulink model `rtdemo1.mdl` provided with RT-LAB.

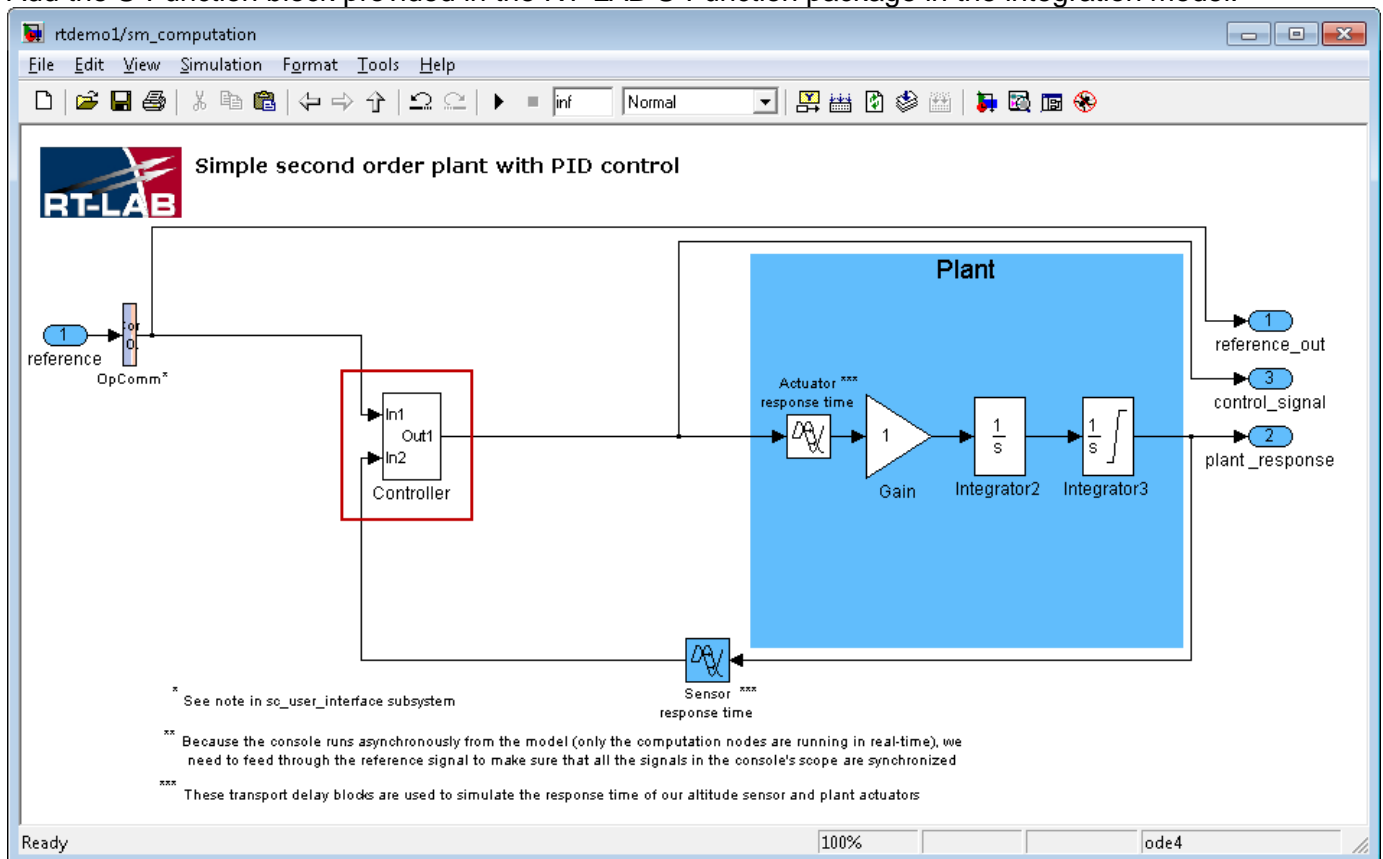
Note: Throughout this section, *Controller* is used as the name of the S-Function. You may replace it by the name of your S-Function.



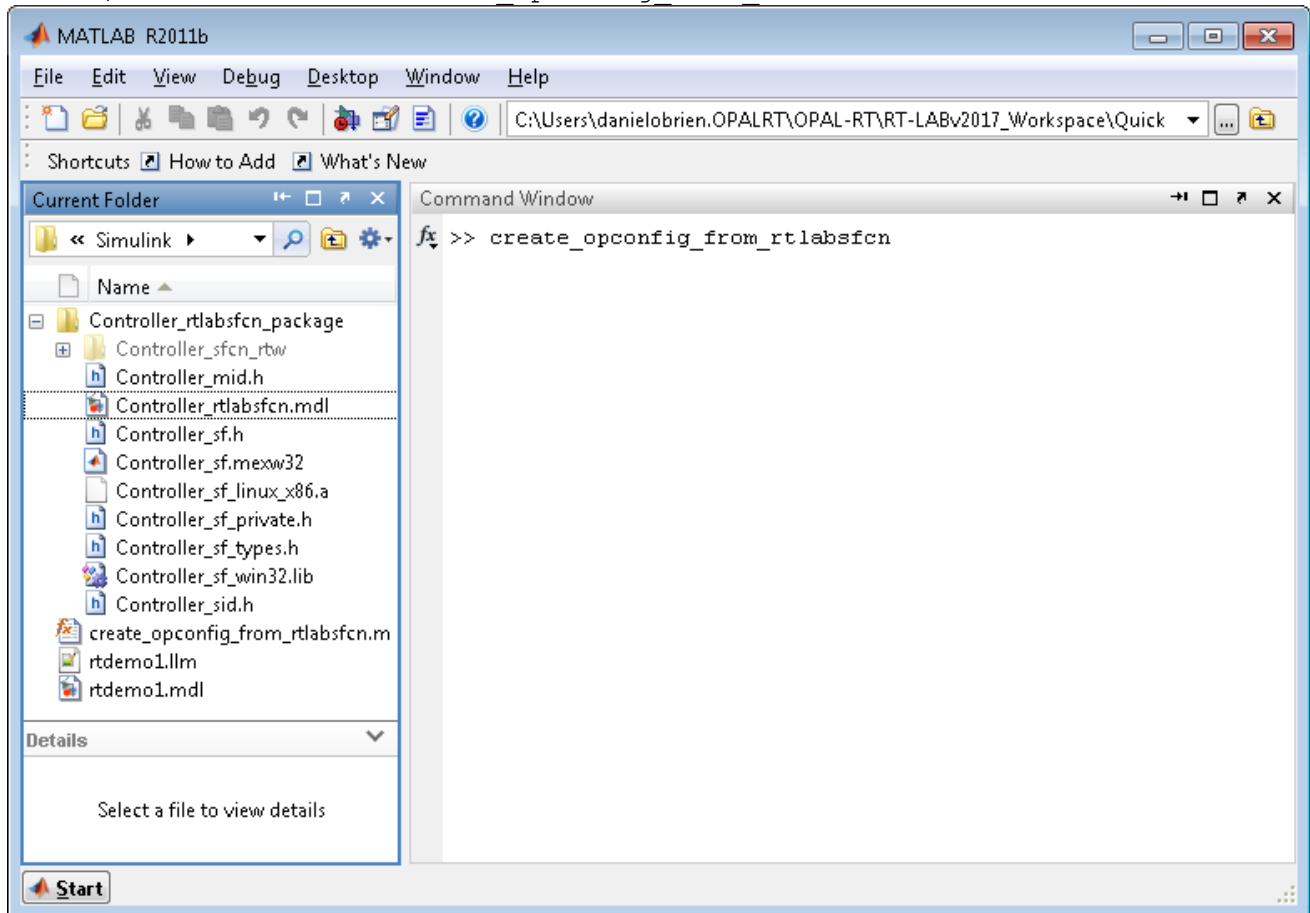
1. Change the current folder in MATLAB to the folder where the integration model is saved.
Note: The integration model is the model which will be used by RT-LAB and that will contain the S-Function supplied by another party.
2. Copy the *Controller_rtlabsfcn_package* folder next to the model.
3. Copy the following file that is provided with the procedure next to the model or in a folder that is a MATLAB path.
 - `create_opconfig_from_rtlabsfcn.m`



4. Open the integration model and make a backup of the Controller source logic as we will replace it by the S-Function block.
5. Add the S-Function block provided in the RT-LAB S-Function package in the integration model.



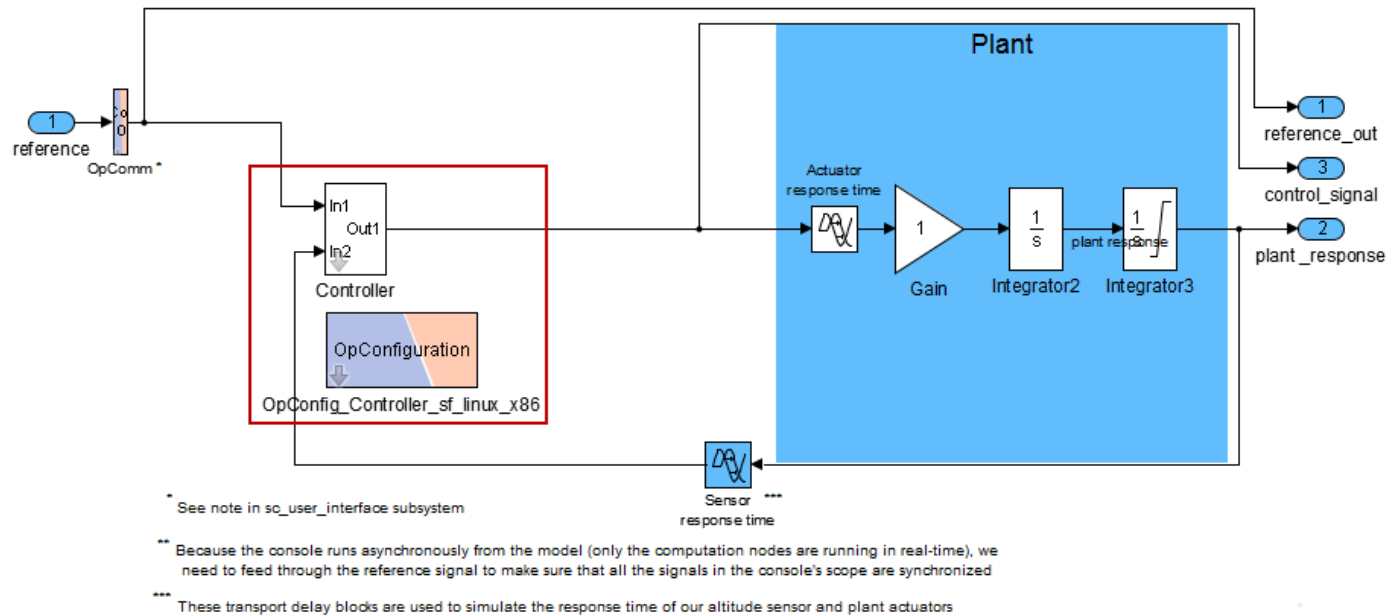
6. Click on the Controller S-Function block in order to have it selected. Then, in the MATLAB command window, enter the command: `create_opconfig_from_rtlabsfcn`



- This will automatically create OpConfiguration blocks for each platform supported by OPAL-RT simulators. Only keep the OpConfiguration block that corresponds to the platform you will be using.



Simple second order plant with PID control



- Make sure that the model runs in Simulink without any problem at this point. In other words, you must be able to press *Start simulation* in Simulink.



- Your model is ready for a real-time simulation in RT-LAB.

Technical Services

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Note:

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This publication is not intended to form the basis of a contract.