



Microsoft® Excel Simulation Interface

User's Guide

Version 2.3

January 1, 2007

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Overview

The acslX Excel Simulation Interface is an add-in utility for Microsoft Excel which allows simulations created in acslXtreme to be controlled and analyzed using Microsoft Excel. This utility works by associating cells in an Excel workbook to specific model variables. In particular, cells associated with model constants can be used to specify the values of those constants prior to a simulation run; model outputs of interest may similarly be collected and inserted into specific cells at the conclusion of the run. Since the model inputs and outputs are simple Excel cells, the complete mathematical, plotting and data import/export facilities available from Excel may be used in the analysis of acslX simulation data.

Installation

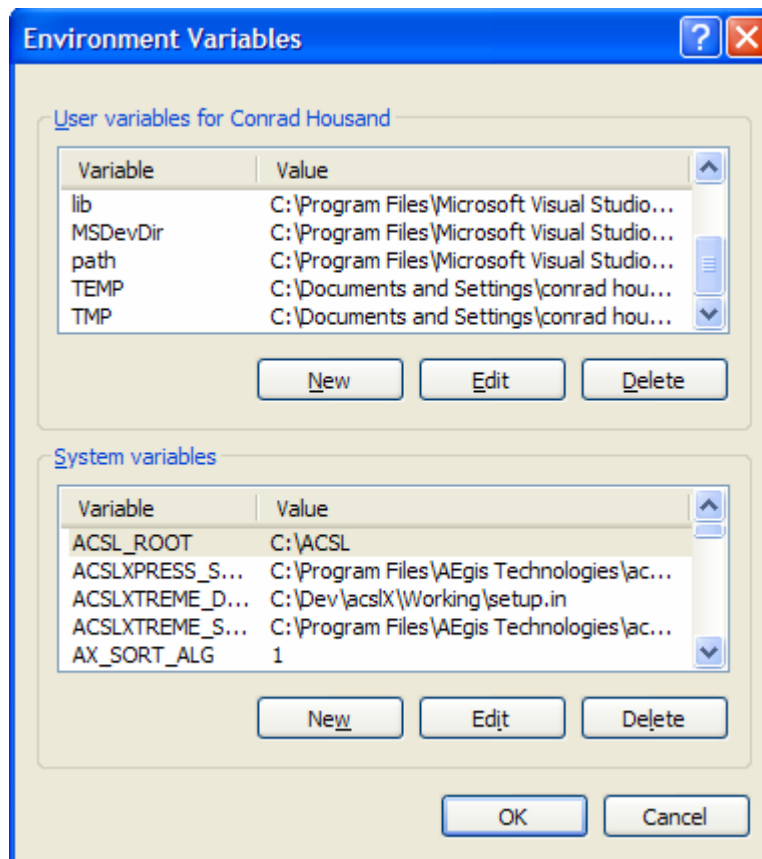
To install the add-in, simply run the Setup.exe program (or, alternatively, the AxExcelAddinSetup.msi file) and follow the instructions provided in the installation wizard. In general, it is best to use an administrative account to install the add-in; when asked whether the utility should be available to everyone using the computer, make sure to select the "Everyone" radio button in the installation wizard if other users on the computer will need to run the program.

After completing the installation, you should have a new start menu item in the AEGis Technologies folder entitled "acslX Excel Simulation Interface." In addition, a new toolbar should be present when you start Microsoft Excel.

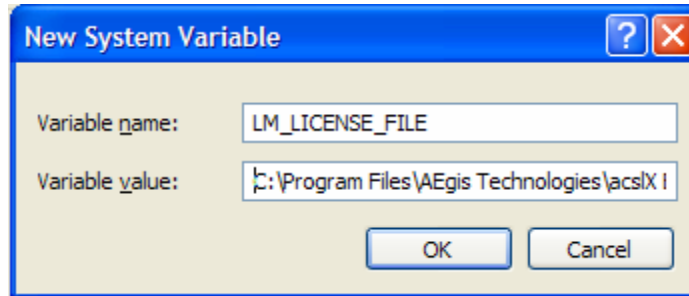
This add-in requires Microsoft .Net framework 1.1 or later to be installed. If a valid version of the Framework is not found by the installer, you will be given an opportunity to download and install it.

Removal of the add-in can be accomplished using the "Add or Remove Programs" applet in the Windows Control Panel. Just double-click the "acslX Excel Simulation Interface" entry in the installed programs list to remove the program.

Use of this add-in requires a license key file which is available from your AEGIS sales representative. If you already have acslXtreme installed, this key file can be placed in the same folder as your acslXtreme license file (typically in the acslXtreme installation folder). If you do not have acslXtreme installed, place this file in the folder in which the add-in was installed (the default location is "C:\Program Files\AEGIS Technologies\acslX Excel Simulation Interface"). You will then need to create an environment variable named LM_LICENSE_FILE which points to this folder. To do this, open the System Settings applet under Windows by selecting the Start Menu -> Control Panel -> System icon. When this dialog opens, select the "Advanced" tab and press the "Environment Variables" button. You should see a dialog similar to the following:



Under the "System Variables" list, select the "New" button and create a new environment variable pointing to the acslX add-in installation folder:







Once the license key is in place, the add-in should be ready for use.

Basic Operation

Use of the simulation interface add-in requires a few fundamental operations which are accomplished using the “acslX” toolbar loaded by the add-in when Excel starts.



The function of the four toolbar buttons is summarized here; detailed instructions are presented in the sections below.

	Specify simulation DLL. Displays a file dialog from which the acslX simulation DLL to be associated with the current workbook is specified.
	Specify simulation inputs/outputs. Displays a dialog box from which the model variables may be associated with cells in the spreadsheet.
	Reset simulation. Reloads the current simulation DLL so that all data is re-initialized to default values.
	Start simulation. Stores the values of selected constants from spreadsheet cells into the simulation, runs the simulation, then displays selected outputs in corresponding cells.

The fundamental work flow for using acslX simulations from within Excel consists of six basic steps:

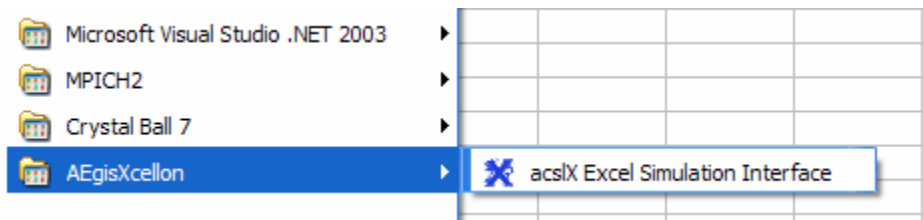
1. Create a new workbook with the necessary sheets for interfacing with acslX.
2. Specify the acslX simulation DLL which with which the workbook will communicate.
3. Specify what model variables will be associated with spreadsheet cells (inputs and outputs).
4. Set any desired input values via the spreadsheet.
5. Run the simulation.

6. Analyze the output values.

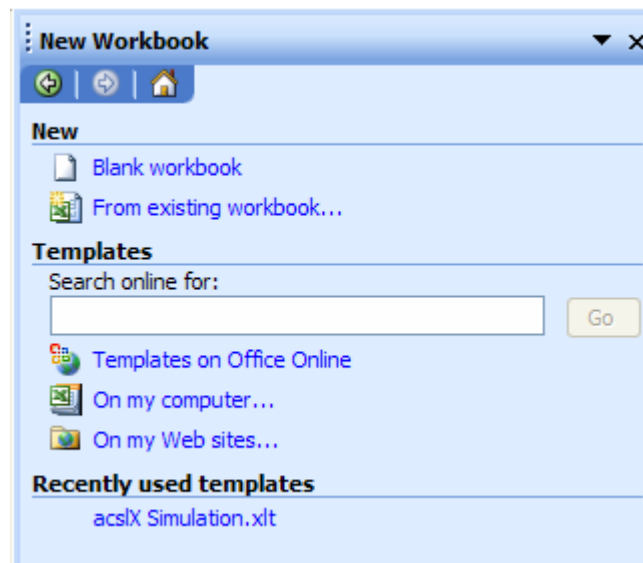
These steps are described in detail in the following sections.

Creating a New Workbook

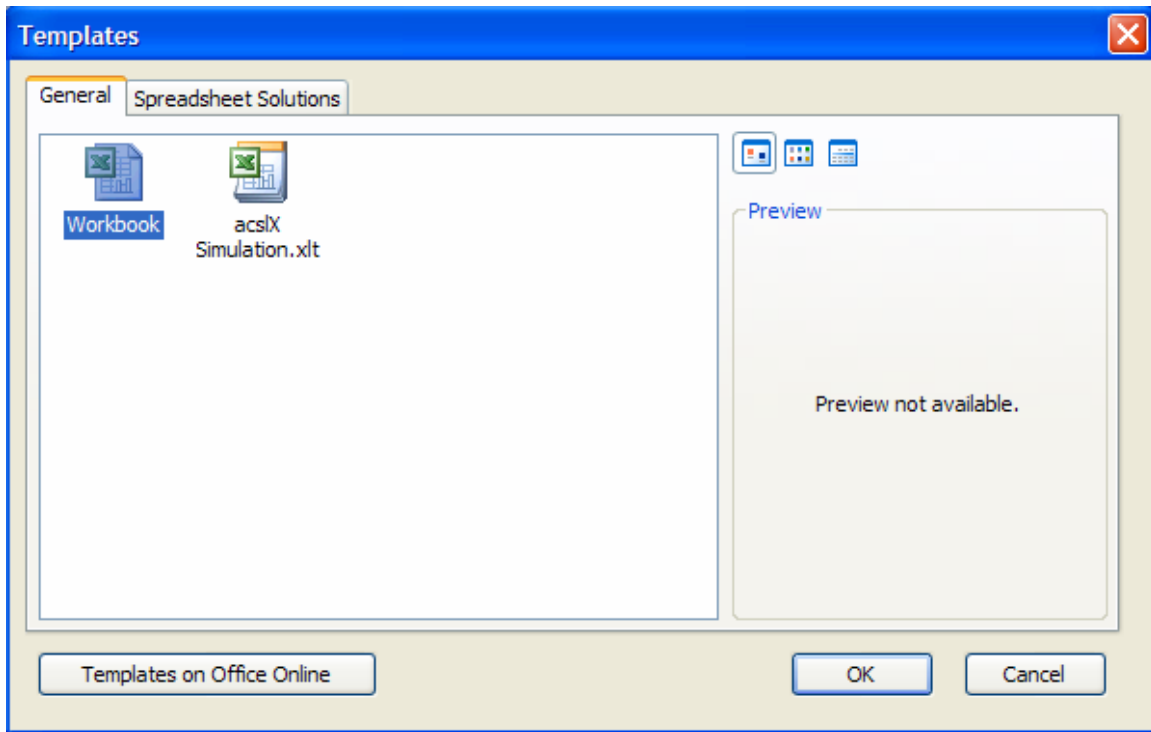
Operation of the acslX add-in requires that the associated workbook has specific sheets present, as the add-in logic depends on the existence of certain sheets to know where to retrieve and store information related to settings and input/output values. As a result, new workbooks are most easily created using a provided template, which is located in the installation folder specified when the add-in was originally installed. This can be done using the “acslX Excel Simulation Interface” shortcut installed in the start menu; this link will open a new Excel document based on this template.



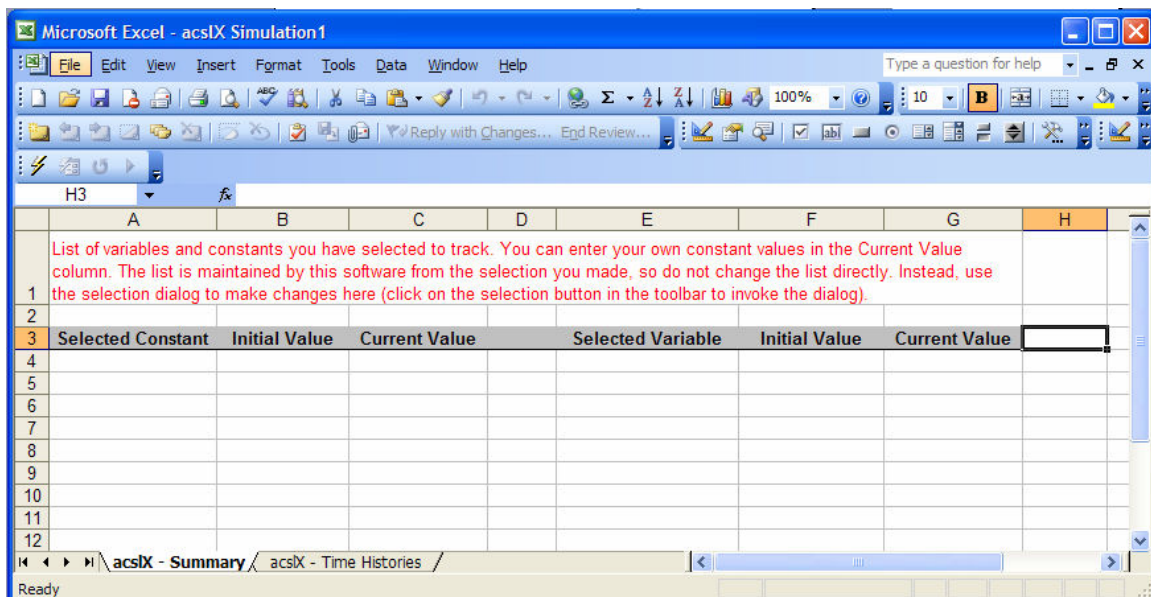
Alternatively, a new acslX-enabled workbook may be created using the File -> New... option from the Excel main menu. A panel will be displayed with a number of options for creating a new workbook; select the option to create a new workbook based on a template on your computer (Templates -> On my computer...).



This will display another dialog containing a list of available templates:



Select the “acsIX simulation.xlt” template. You should then see a workbook which looks like the following:



Description of an acsIX-enabled Workbook

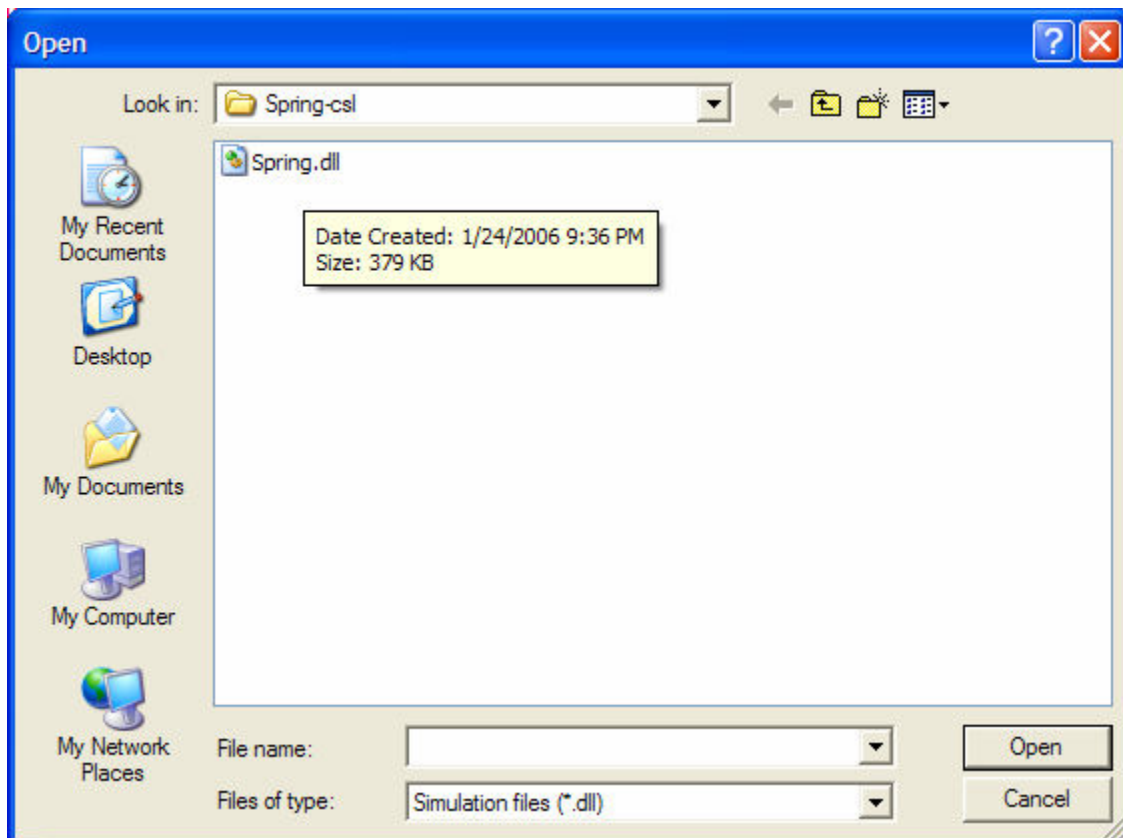
The “Summary” sheet contains cells which are associated with selected input and output model variables. This page is used to set the values of constants prior to a simulation run, and collect the final values of model outputs following a run. “Initial value” columns report the values of those variable when the simulation is loaded – i.e., the default values specified in the DLL. The “current value” column is used to either specify or report the value of the constant or variable before or after the simulation run.

The “Time Histories” page is used to optionally collect the values of output variables at each communication interval during a simulation run; this is useful when plotting the time dependence of a model output over the course of a run.

Note that the sheets present when the workbook is created must be present for operation of the add-in. Removing or renaming these sheets will break the simulation interface for that workbook. Addition of other sheets into the workbook is perfectly acceptable.

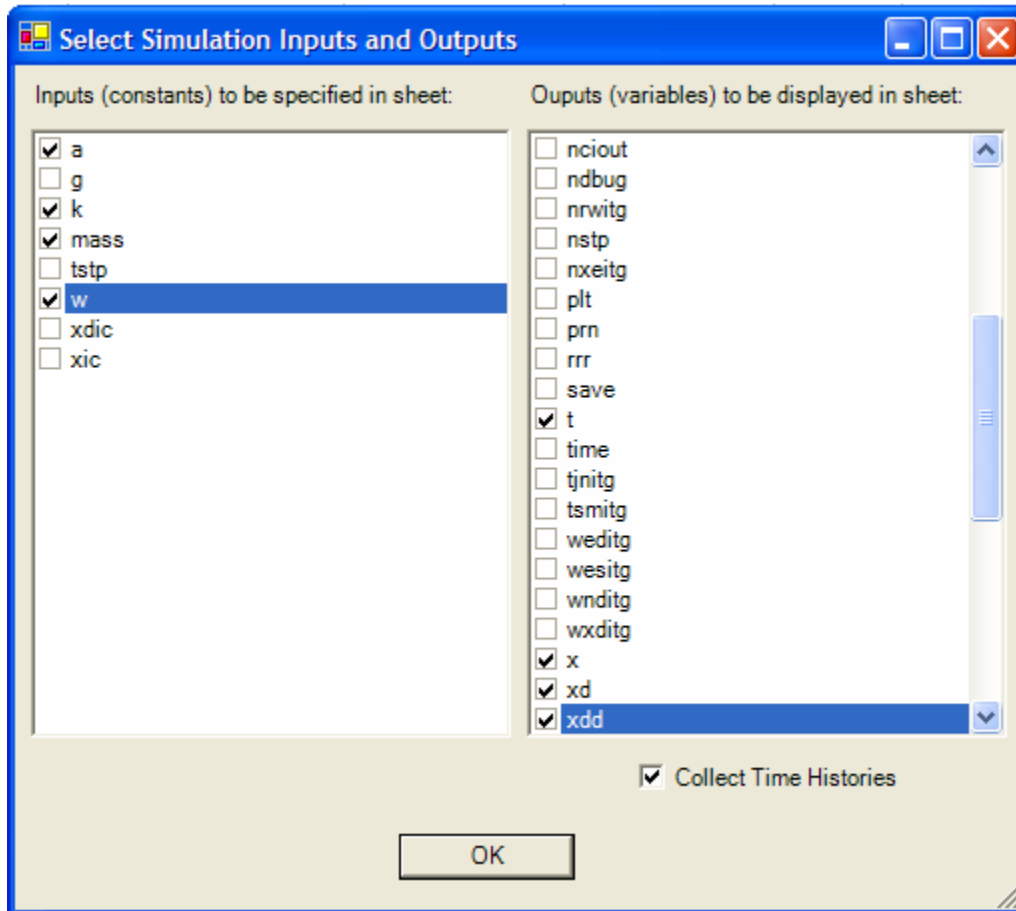
Specifying the acsIX Simulation to Use

In order to associate the new workbook with a particular simulation DLL, select the “Load acsIX Simulation” toolbar button. A file open dialog will be shown from which you should specify the location of a valid acsIXtreme simulation DLL.



Specifying Inputs and Outputs

Once the workbook has been associated with a valid acsIXtreme simulation DLL, cells in the “Summary” sheet can be associated with model inputs and outputs.



The presented list of constants/variables is determined from the simulation DLL selected earlier. Check the boxes next to any desired constants (inputs) or variables (outputs) to be associated with cells in the “Summary” page. If time histories should be collected for any of the output variables, also check the “Collect Time Histories” box under the list of outputs. Note that collecting time history information will introduce a certain amount of communications overhead which will increase the amount of time necessary for each simulation run.

Once the desired inputs and outputs have been selected, press the “OK” button to return to the spreadsheet. Cells should now be populated on the “Summary” page as shown below.

List of variables and constants you have selected to track. You can enter your own constant values in the Current Value column. The list is maintained by this software from the selection you made, so do not change the list directly. Instead, use the selection dialog to make changes here (click on the selection button in the toolbar to invoke the dialog).

	A	B	C	D	E	F	G
1	List of variables and constants you have selected to track. You can enter your own constant values in the Current Value column. The list is maintained by this software from the selection you made, so do not change the list directly. Instead, use the selection dialog to make changes here (click on the selection button in the toolbar to invoke the dialog).						
2							
3	Selected Constant	Initial Value	Current Value		Selected Variable	Initial Value	Current Value
4	a		1		t	0	3.992
5	k		0.12		x	5.5555E+33	0.294380107
6	mass		0.03		xd	5.5555E+33	0.000223484
7	w		1		xdd	5.5555E+33	-0.003564187
8							
9							
10							
11							
12							

Setting Input Values

To set the values of one or more constants (inputs) prior to a run, simply enter the desired value in the corresponding cell under the “Current Value” column. This value will be copied into the simulation prior to the simulation run. The contents of this cell need not be a literal numeric value – in many cases this will contain either a formula or reference to another cell. It may also be the case that the value in this cell is determined by another Excel add-in, or by a macro.

Running the Simulation

Once input values have been specified, the simulation is executed using the “Run acsIX simulation” toolbar button. At conclusion of the run, the “Current Value” cells for any selected outputs will reflect the values of those variables at the end of the run. If time histories are collected, these cells will update during the course of the run, and a column containing the values of the variable at each communication interval will be presented on the “Time Histories” sheet. Either of these cell ranges may be used as inputs to other computations specified elsewhere in the workbook.

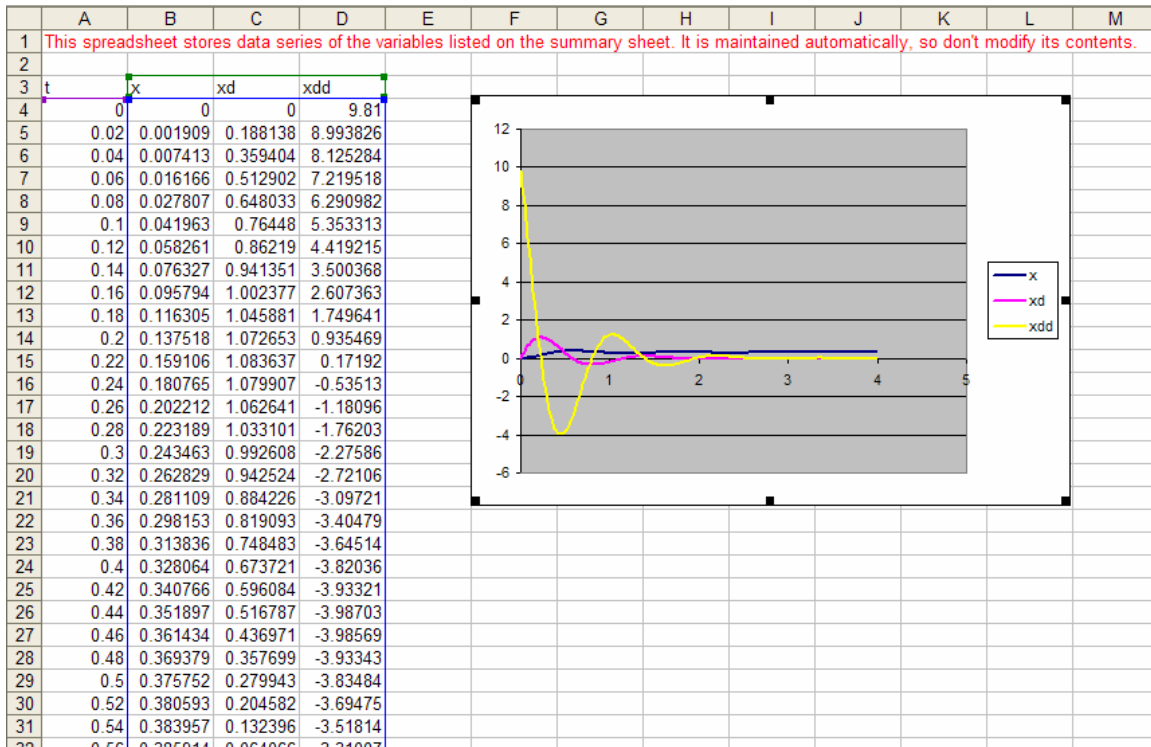
In some cases, it may be required to have the simulation run started programmatically, as opposed to manually via the toolbar button. Refer to the “Advanced Control” section below for instructions on how to do this.

The “Reset simulation” toolbar button is provided in order to restore all simulation variables to their default values as encoded in the simulation DLL. This is done by unloading and reloading the simulation.

Analyzing the Outputs

Analyses on simulation outputs are performed by simply using the output cells on the “Summary” and “Time Histories” spreadsheets as inputs to calculations just as you would any other Excel cells. For example, a plot of the time histories of the outputs can

be created by selecting the columns of data on the time history sheets and using the Excel Main Menu -> Insert -> Chart wizard. See the image below for an example.



Advanced Control via Visual Basic for Applications

In some applications, it may be necessary to programmatically invoke the start of the simulation run (i.e., as opposed to using the "start simulation" toolbar button). In these situations, the toolbar button can effectively be invoked via VBA code as in the following example:

```
Sub StartSimulation()
Application.CommandBars("acslx").Controls("Run acslX simulation").Execute
End Sub
```

This ability is particularly useful when used in coordination with other add-ins (e.g., Monte-Carlo analysis tools such as @Risk and Crystal Ball), in which case the acslX simulation will be run hundreds or thousands of times under the control of another application.

The specific procedure for adding the code to invoke the start of the simulation run will depend on the application which is used to control the execution. In general, however, most techniques will require the creation of a VBA subroutine like that shown above using the Excel Visual Basic Editor (Main Menu -> Tools -> Macro -> Visual Basic

Editor). For specifics regarding how to add the subroutine, refer to the Excel Visual Basic for Applications documentation, and any other application third-party product documentation.

Known Limitations

1. Only scalar (i.e., non-array) variables may be associated with cells in the spreadsheet.
2. Non-numeric (i.e., string) data types are not currently supported.

The following issues have been addressed as of the current release:

1. Multiple acslX worksheets may now be open at one time within Excel.
2. Formulas for model inputs (constants) entered in the “Current Values” column on the Summary sheet are now preserved when changing the list of selected inputs/outputs.
3. Logic related to the way in which the name/location of the acslX simulation DLL associated with the worksheet is persisted has been improved; the add-in now additionally looks for the DLL in the same folder as the .XLS file, making transfer of worksheets between users on different computers easier.
4. A number of issues were fixed which prevented the add-in from working with older versions of Excel (e.g., Excel 2000).

Support

For installation or technical support, please contact AEgis support via email at support@aegistg.com.