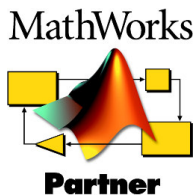# Doc@Source

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Embedding Documentation
In Simulink® Models for
Auto-Generating Reports and Specifications

Product Specification

(For MATLAB R14- R2009b - Report Generator V2 Components)

MathWorks

Partner

Podium Technology

Report Generator Components

Version 2 Report Generator offers a new user interface through the Report Generator Explorer:
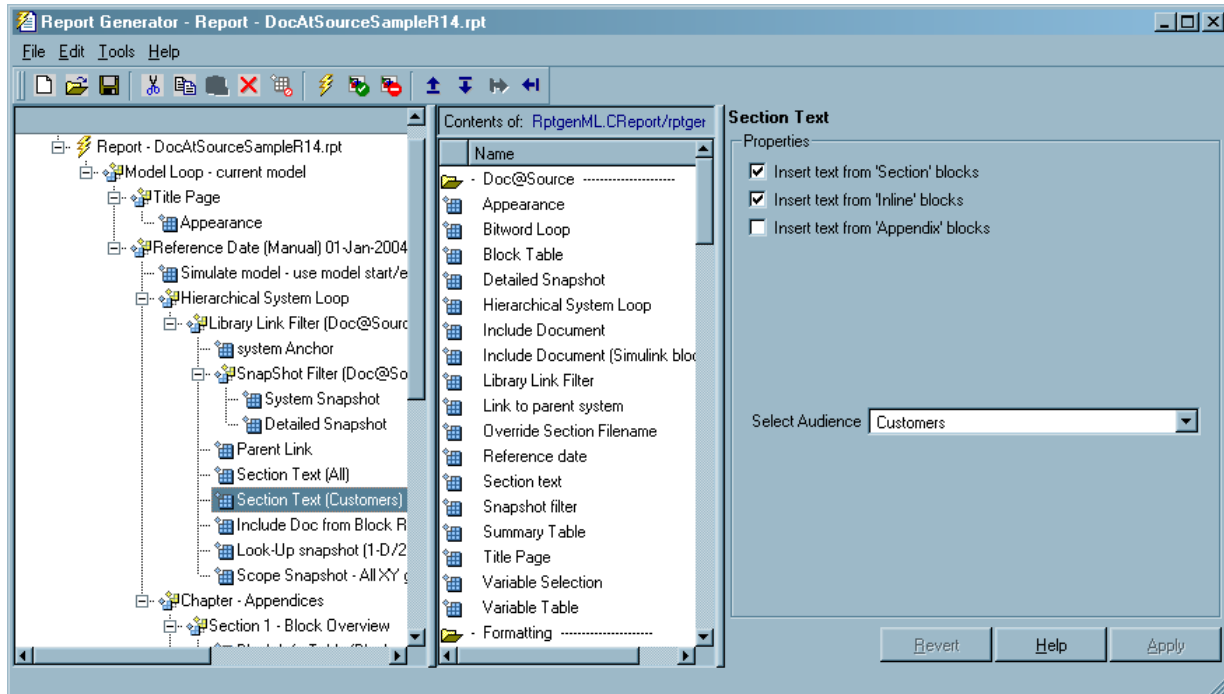
Doc@Source is fully integrated with scheme, allowing its components to be mixed and matched with those from The MathWorks

The Report Generator components that are included with **Doc@Source** are:

- **Hierarchical Model Loop:** Loops the model reflecting the model structure, rather than just a flat system list provided by the standard component from The MathWorks.

- **Document Include:** Two components are provided to enable external documents to be referenced from the generated document. One enables the document to be entered in explorer properties; the other will use a block placed in the Simulink model to get the document name.

- **Scalar Vector Graphic Snapshot (Simulink and Stateflow)**: Produces an SVG snapshot of a system, chart or state. When viewed in a browser, the diagram maintains its hyperlink capabilities as well as being capable of zooming in/out and panning. This is particularly useful for large systems and charts that cannot show all their detail in a single screen.

- **Detailed Snapshot:** When generating an HTML report with bit-map system views, large systems can be *grainy* due to the compression. In this situation a link can be put below the snapshot to a high-definition PDF document that has not lost any of the original detail.

- **Title Page:** Enables the information for the report title page to be taken from a block in the Simulink model, this removes the need to keep a separate template for each model.

- **Appearance:** Enables style sheets to be selected and the information to put in headers, footers and company logos.

- **Section Text:** Formatted text can be saved with and edited from the model through one of the blocks in the block library (see below). As well as the formatted text, these blocks can be a tag for the next section (e.g. 2, 2.1.2 etc.) and have an *audience* attribute so that the text can be selectively included.

- **Library Filter:** When looping through the model, it is possible to specify a list of libraries that should not be looped into (typically you would loop into strategy libraries but not component libraries).

- **Reference Date:** This enables a *last release date* to be established, either determined from the template, model or MATLAB script. The section text and any other blocks can use this date to determine whether they have changed since the last release. The section text will be highlighted to indicate that it has changed since the reference date.

- **Parent Link:** When navigating the (HTML) document, the *Parent Link* enables the model to be navigated up as well as down.

- **Snapshot Filter:** This component can be used to select systems that should not have a picture in the document - established by a *No Snapshot* block being in the system.

- **Block Table:** Produces a summary table of all blocks, detailing all the parameter objects used and any signal objects feeding it or being written by it:

Full Block Path	Inputs	Outputs	Parameters	Modified	Parent Link
DocAtSourceTest/In1		Signal In			DocAtSourceTest
DocAtSourceTest/HTML Documentation				30-Aug-2004 17:02:03	DocAtSourceTest
DocAtSourceTest/Output/In1		Signal Out			Output
DocAtSourceTest/Output/HTML Documentation				22-Jan-2004 16:49:59	Output
DocAtSourceTest/Output/Output Signal	Signal Out				Output
DocAtSourceTest/Processing/Extra Depth/Gain			Gain Description		Extra Depth
DocAtSourceTest/Processing/Extra Depth/Sum	Map Interp Out; Table Lookup Out	Sumation Out			Extra Depth
DocAtSourceTest/Processing/Extra Depth/myMap Lookup		Map Interp Out	2D Map Description; X Axis Description; Y Axis Description		Extra Depth
DocAtSourceTest/Processing/Extra Depth/myTable Look-Up		Table Lookup Out	1D Map Description; X Axis Description		Extra Depth
DocAtSourceTest/Processing/Extra Depth/Out1	Sumation Out				Extra Depth
DocAtSourceTest/Processing/HTML Documentation				22-Jan-2004 16:48:28	Processing
DocAtSourceTest/Test Signals	Signal In				DocAtSourceTest
DocAtSourceTest/Test Signals/HTML Documentation				22-Jan-2004 16:47:20	Test Signals

- **Summary Table:** Produces a table that summarises the properties of a particular block type:

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Table 2.2. DocAtSourceTest - Doc Include Summary

Block Name	Modified	File to include	Link Text
Include Doc		PT-Example.pdf	Link To Another Document
Include Other Doc		PT-Example.pdf	Link To Another Document

- **Variable Table:** Produces a table of various variable (combination of signal and parameter) properties. The table can summarise a number of variables in one table or produce one table per variable:

Table 2.3. DocAtSourceTest/Output/HTML Documentation - Variable Properties

Name	Description	Min/Max	Model Units
Gain Description	Gain Description	[-100 100]	mm/s
2D Map Description	2D Map Description	[-200 200]	s
1D Map Description	1D Map Description	[-Inf Inf]	%
X Axis Description	X Axis Description	[-20 20]	mm
Y Axis Description	Y Axis Description	[-10 10]	mm

Table 2.4. Gain Description - Variable Properties

Property	Value
Name	Gain Description
Description	Gain Description
Value (Display)	2.5
Dimensions	[1 1]
Class	Simulink.Parameter
Value (Model)	2.5
Minimum	-100
Maximum	100

- **Variable Selection:** In order to tabulate the right variables, this component allows you to select them based on some core properties (parameter, signal, scalar, vector etc.)

- **Bitword Loop:** So that bits of a bitword can be brought together, this component collates them in bit order and passes them on to the variable table component:

Table 2.47. CarStatus - Variable Properties

Member	Bit N°	N° Bits	Description	Additional Info	Enum Values
All			Car Status	Car Status *additional information*. *This bitword has:* • *Lots of lovely bits* • *All with colourful additional info*	N/A
ChasStat	01	4	Chassis Status	Chassis summary status of ALL chassis control systems.	0:Good, 1:Not Good, 2:Bad, 3:Very Bad
EngStat	05	4	Engine Status	Engine summary status of ALL engine control systems.	0:Good, 1:Not Good, 2:Bad, 3:Very Bad

- **Section/File Name Override:** In the situation where the contents of a section have to go in a specific file (e.g. because they are being referenced by an external programme), this component allows this to occur.
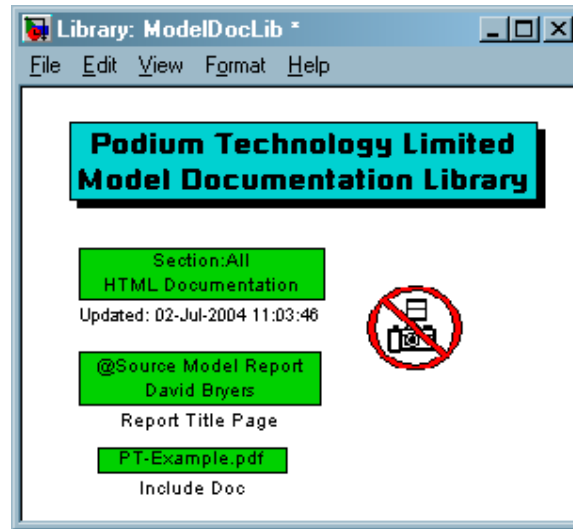
Doc@Source provides four blocks in its block library:

- **Section Text:** This block holds formatted text, double clicking on the block opens up an HTML editor (see below).

- **Report Title Page:** This block can be placed in the model to define details for the title page. This further enables one template to be used with many models.
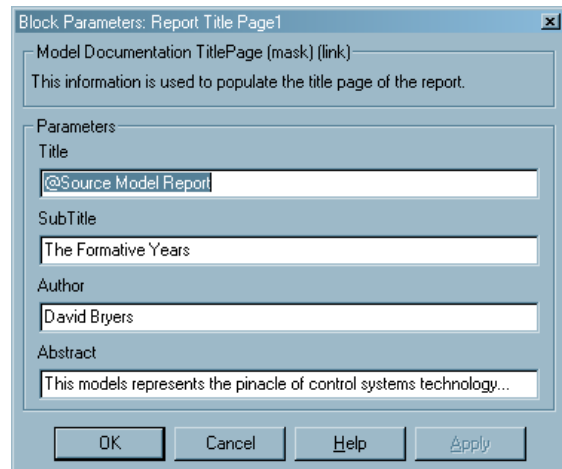
- **Include Doc:** This block enables other documents to be linked in with the automatically generated document. External documents are copied to the report directory to ensure that everything is encapsulated in one place.

- **No Snapshot:** Certain systems may not need their 'picture' in the final document, placing this block in a system ensures it is not.
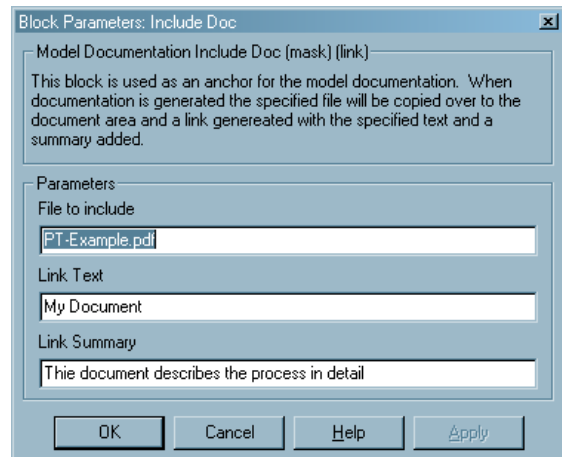
The core of the documentation tool hinges around the *Section Text* block. This block contains a number of properties that are defined in the HTML editor that opens up when the block is clicked on:
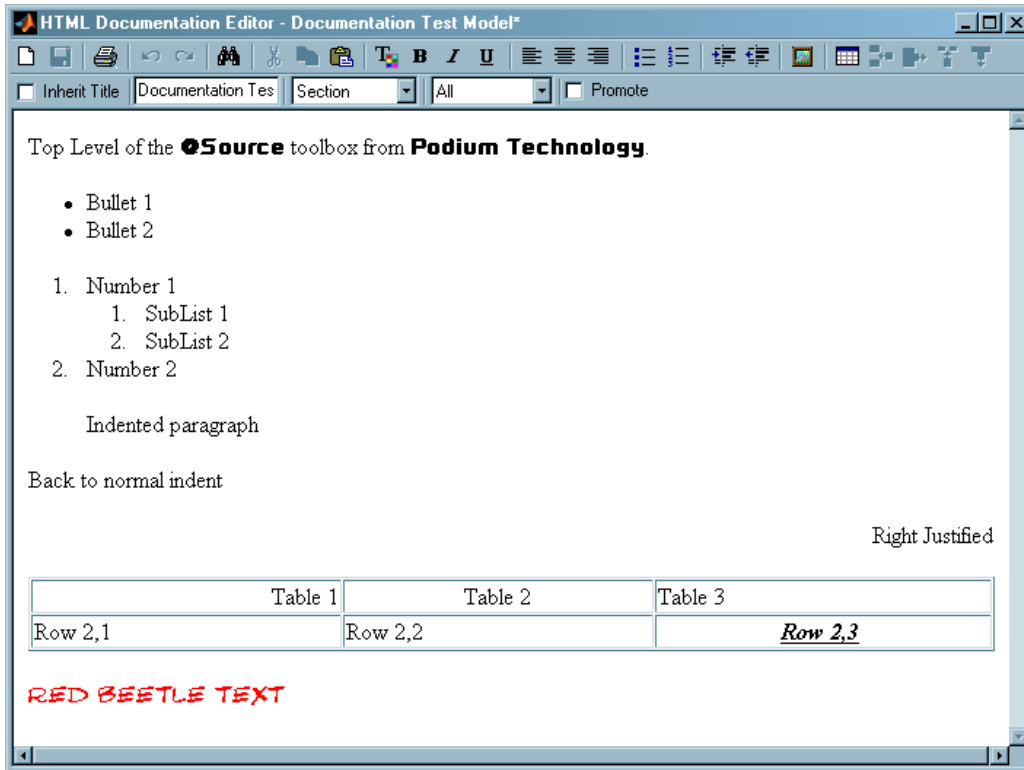
The properties that can be defined in the above window are:

- Location: Where the text should be inserted in the document, this can either be:
  - Section: A new section is made (e.g. section 1.2.5) and the text is placed at the beginning of the section.
  - Inline: The section is placed in the document without adding any new sections.
  - Appendix: The text is saved for insertion in the appendices.
- Audience: Which audiences should see the text. The user can create their own audiences; these may be *All, Developer, Customer* or *Application Engineer*, for example. Typically a different report template would be generated for each audience in order to present the information that is of interest to them.
- Section Title: Where a new section is being tagged, the section title text can be defined.
- Section Text: This is formatted text to be inserted into the generated document.

Examples of Document Output

Some examples of how the report layout can be presented are shown here. All the attributes of font, justification, colours etc. can be defined through your own style sheets, for which examples are provided. The full document can be seen on our web site at:

http://www.podiumtechnology.co.uk/DocWeb/index.html

Below is an example of the title page; the information for the title, sub-title and abstract come from a block in the model, the other information (company related) is defined in the report template. The example shows the report in HTML format and is in a *four-frame* window (no frames and two frames are alternatives). The contents are kept in the left frame for rapid navigation.

The screenshot below has the following notable features:

o The system snapshot has hyperlinked areas, therefore clicking on a block will take you to tables giving information for that block, clicking on sub systems will navigate you to that system.

o The *Parent* link navigates back up the model.

o The *Detailed Snapshot* links to a PDF version of the system to combat any loss of detail in the bitmap image.

o The text comes from the green *Section Text* blocks, the background is yellow to highlight that this text has been modified since the last reference date. A section *1.2 Control System* has been created because the block is tagged as a section node.

Doc@Source has been designed specifically to integrate with your own or third party Simulink library. The interface is achieved through an interface classes, a parent/super-classes are provided for the interface to inherit some or all of its functionality. In fact, the minimum required to integrate libraries with **Doc@Source** is an XML file that informs **Doc@Source** that the library exists and to use the parent class as the interface.

The basic functionality in the parent classes allow you to:

- Use the summary table to summarise blocks of the same (mask) type.

- Tabulate core properties of parameter objects (i.e. those provided in the Simulink.Parameter object)

- Tabulate core properties of signal objects (i.e. those provided in the Simulink.Signal object)

- Tabulate a block summary detail input signals, output signals and parameters.

You would need to write your own interface class when:

- You want to tabulate derived data from blocks.

- Display properties from your own Simulink.Parameter/Signal objects.

- Provide your own methods for deriving the input signals, output signals and block parameters.

An interface class has been used to interface **@Source** (also from Podium Technology). An example of a property table with the additional properties provided by the AtSource.Signal object are provided below (showing 16 of the available 40 properties):

Property	Value
Name[.Member]	Map3D_ModeIn
Description	3D Map Input Mode
Data Type	uint32
Quantity	UserType
Units	
Model Units	
Gain	1
Offset	0
Menu Group	\MapsIn
Init String	1
Value	Map1
Enum Values	1:Map1, 2:Map2
Memory Location	Configurables
Dimensions	1 1
Used By Blocks	MDocTestSimple/AUTO/Rate_Tasks/Maps/Map3D_ModeIn
Used In Systems	MDocTestSimple/AUTO/Rate_Tasks/Maps

An example of an **@Source** message send block being summarised:

Message Command	Help Text	Identifier	Number of Parameters to receive	Parameter Data Type	Response Format String
Dump	Dump application information	99	10	ptfloat	DumpResp %.0f\n\r
Plump	Plump application information	100	2	ptfloat	DumpResp %.0f\n\r

An example report can be seen at: http://www.podiumtechnology.co.uk/AsDocWeb/index.html.

Documentation and examples are provided to make the implementation of these classes as simple as possible.

Can Doc@Source be configured to my specific needs?

Podium Technology has a policy of continually improving its products, should your requirement fall in the bracket of a *general enhancement*, the changes are usually covered under the maintenance agreement and are free of charge.

Should you require some features specific to your needs, **Podium Technology** can quote for this work and deliver, if necessary, a customer specific version of **Doc@Source.**

System Requirements:

Doc@Source has been tested with MATLAB$^{®i}$ R14 onwards; MATLAB Report Generator and Simulink Report Generator are required.

Podium Technology is part of The MathWorks Connections Program to ensure that **Doc@Source** is available when new releases are made by The MathWorks.

Related Products:

Podium Technology produces **@Source** from which **Doc@Source** was derived. **@Source** is the ideal tool for generating a hardware target independent model that can be applied to standard or customer target hardware platforms. Signal and parameter properties are stored in the model so that application tool files can be produced in any format (e.g. ASAM-MCD2) and documentation to be produced with the MATLAB/Simulink Report Generator. See our web site or contact us for further information.

Design Service:

Podium Technology can has experience in a wide range of areas, with particular focus on the MATLAB/Simulink, control and embedded arenas:

- ❑ Rapid generation of Real-Time Workshop targets for customer hardware platforms using **@Source.**
- ❑ Hardware specific block sets for Simulink and Real-Time Workshop.
- ❑ Developing control systems in 'C' or Simulink.
- ❑ MATLAB/Simulink Report Generator component generation.
- ❑ Porting legacy models to **@Source**.

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