VisualDOC

LIST OF NEW FEATURES

VERSION 7.0

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Highlights of the New Release

VisualDOC is a general purpose multidisciplinary design, optimization, and process integration software. VisualDOC's graphical user interface allows the user to easily create a connected workflow of components and configure each of them. Version 7.0 of VisualDOC is a major release which has a new design and a new Graphical User Interface (GUI). The new GUI is shown in **Figure 1**.

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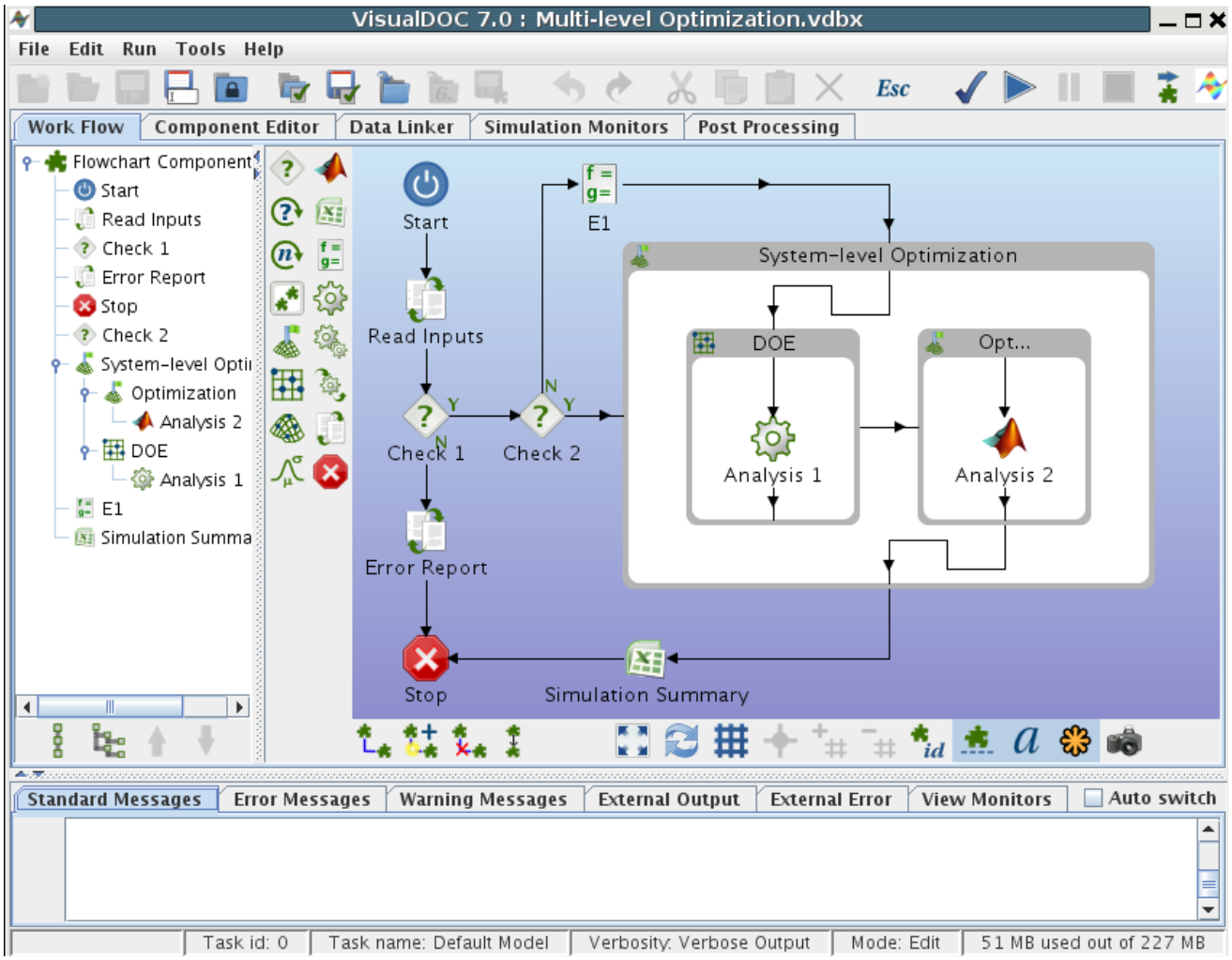

Figure 1 VisualDOC Window

The following is a brief summary of the most important features of the new release.

1. **Workflow**: The new design introduces the concept of canvas on which the user graphically creates a *connected workflow of components* resembling a typical flowchart. The user can add any number of components and connect them to describe virtually any design process. A snapshot of the workflow is shown in **Figure 2**. A large number of Flow-Control, Design, and Analysis components are supported. Note that since VisualDOC model now resembles a flowchart, and hence VisualScript is no longer needed nor supported (An existingVisualScript flowchart from 6.2.2 can be imported in the new version).

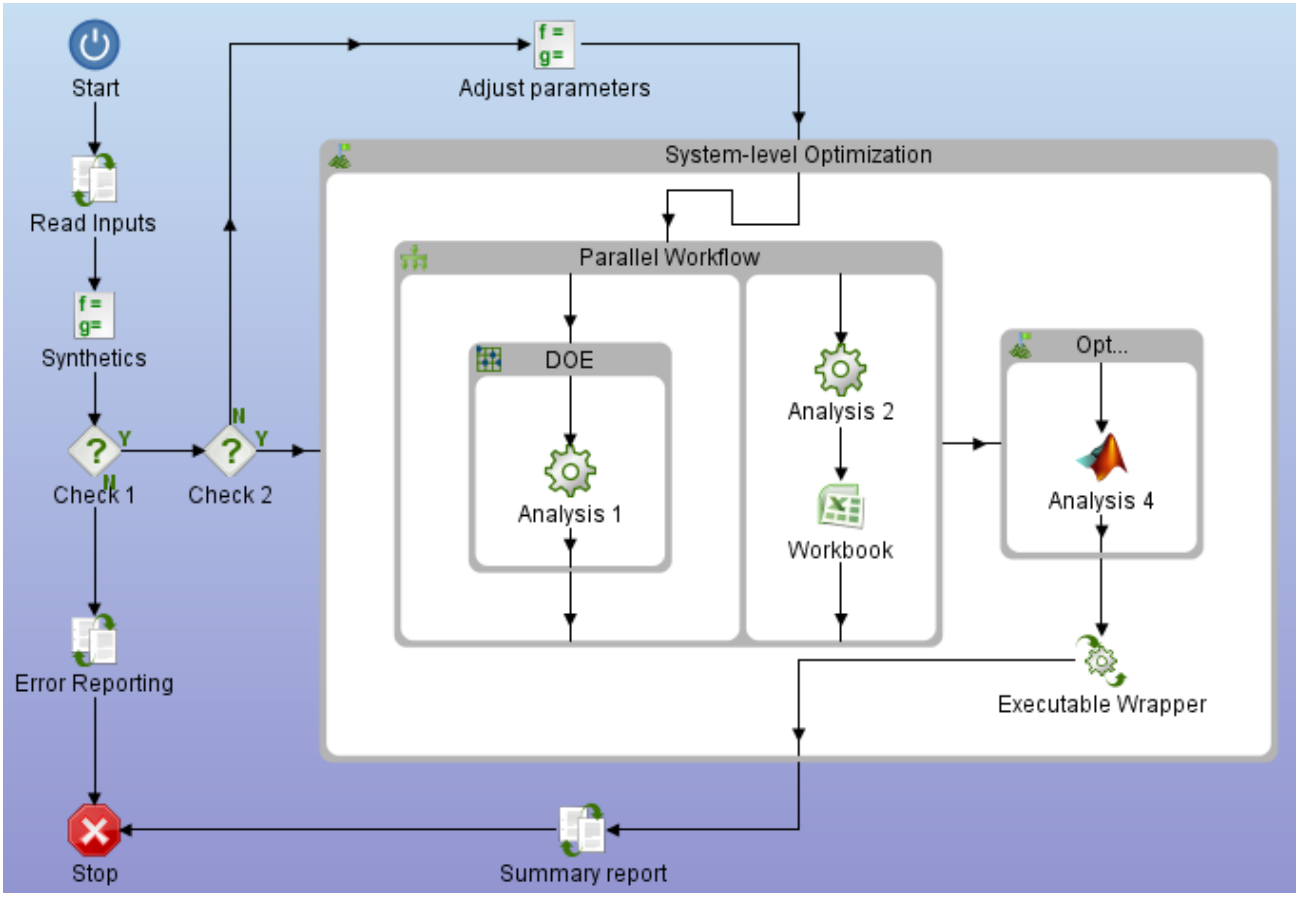

Figure 2 Workflow

2. **Data Editor**: Generic data editors are provided to define simulation data for any component. A snapshot of a data editor is shown in **Figure 3**.

	Basic	Attributes	Scaling	Objective				
Name	Input/Output	Data Type	Value Type	Adv. Attribute	Variable	Objective	Constraint	
x	Input	Vector	Real	None	☑	☐	☐	
z	Input	Vector	Real	None	☑	☐	☐	
area	Input	Vector	Real	None	☑	☐	☐	
area[0]	Input	Scalar	Real	None	☑	☐	☐	
area[1]	Input	Scalar	Real	None	☑	☐	☐	
area[2]	Input	Scalar	Real	None	☑	☐	☐	
area[3]	Input	Scalar	Real	None	☑	☐	☐	
mass	Output	Scalar	Real	None	☐	☑	☐	
stress	Output	Vector	Real	None	☐	☐	☑	
B	Output	Vector	Real	None	☐	☐	☑	
x_i	Input/Output	Vector	Real	None	☐	☐	☐	
z_i	Input/Output	Vector	Real	None	☐	☐	☐	
					☐	☐	☐	

Figure 3 Data Editor

3. **Component-specific Property Editor**: Each component in the workflow performs a specific task. Property editors specific to a component are provided to configure them. The user can add multiple different optimization (or other) components to the workflow and configure each one of them individually. Snapshot of a property editor is shown in **Figure 4**.

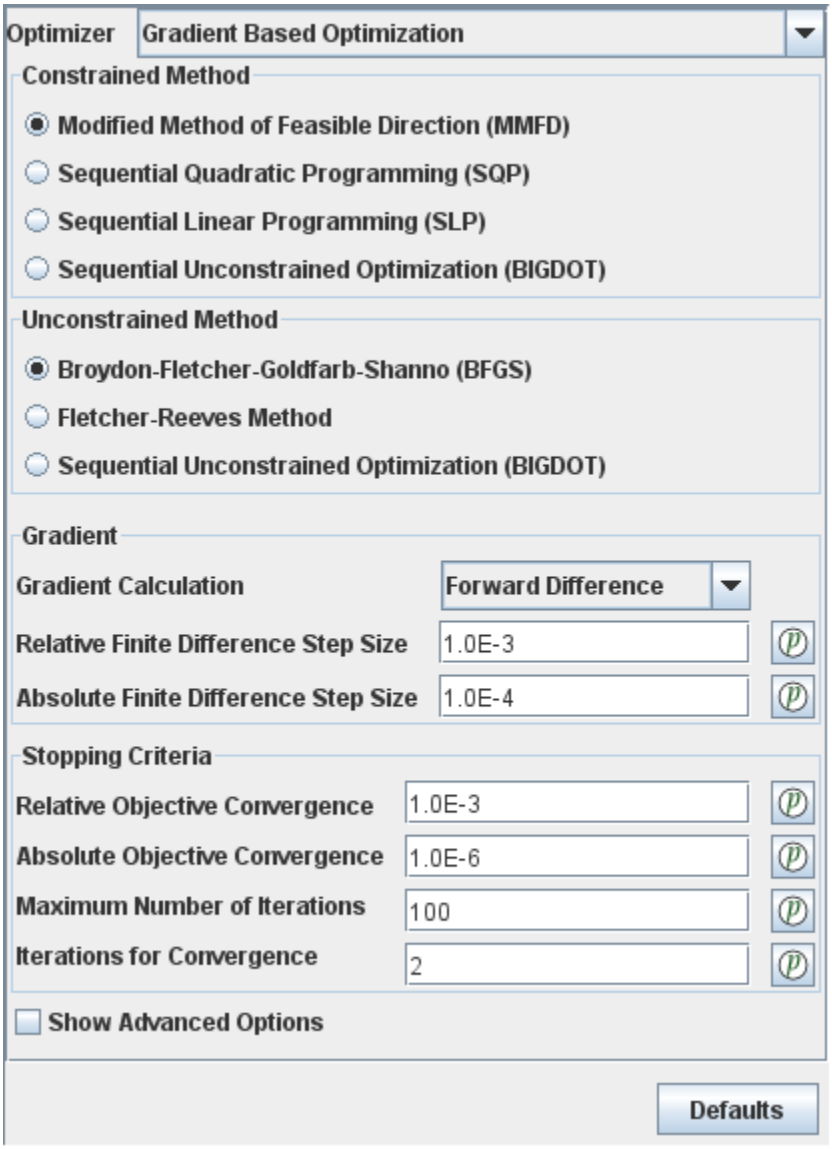

Figure 4 Property Editor for Optimization component

4. **Data Linker**: The concept of links is introduced which allows defining transfer of information from one component to another. The links are created simply by dragging the desired data from one component and dropping onto data from another component. A snapshot of the data linker is shown in **Figure 5**.

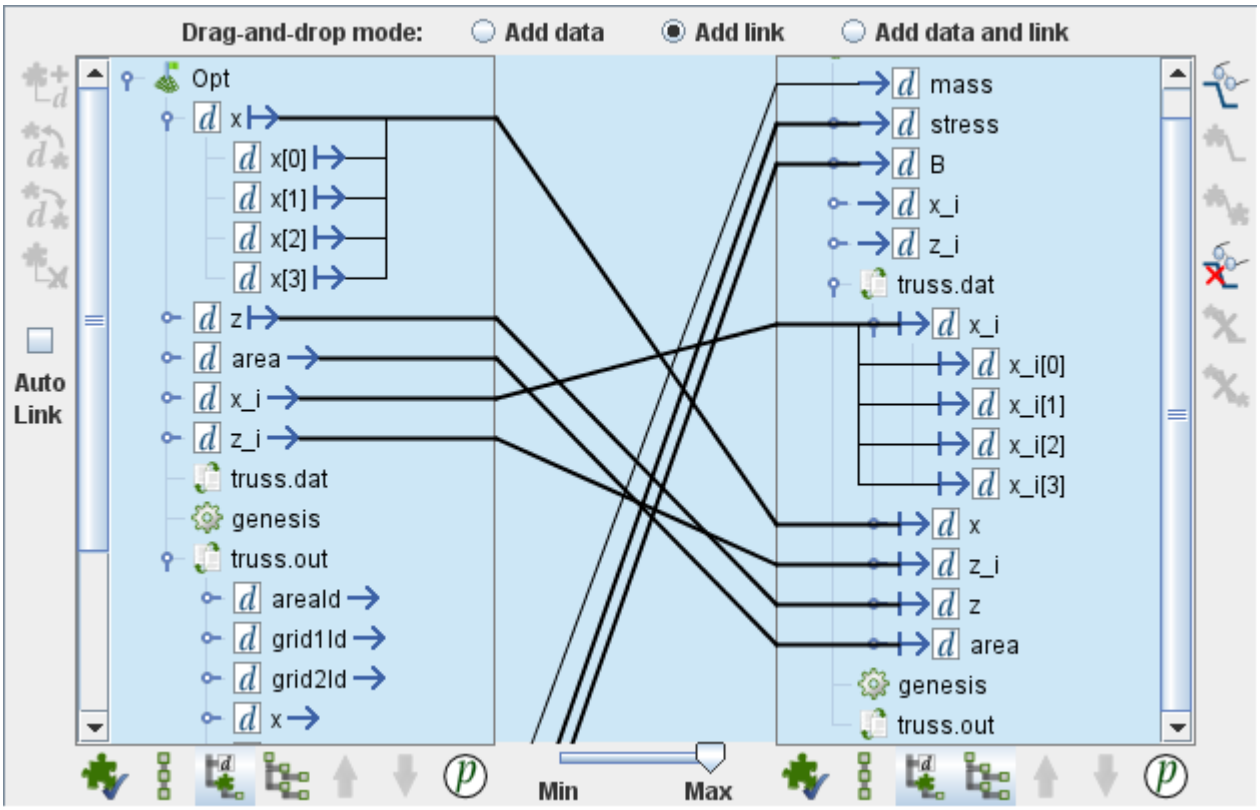

Figure 5 Data Linker

5. **Task Manager**: The new task manager allows the user to clone existing tasks. Using the task manager, the user can work with multiple different versions of the same model. Different versions of a model can be stored as independent tasks each of which can be opened, edited, run, or post-processed. A snapshot of the task manager is shown in **Figure 6**.

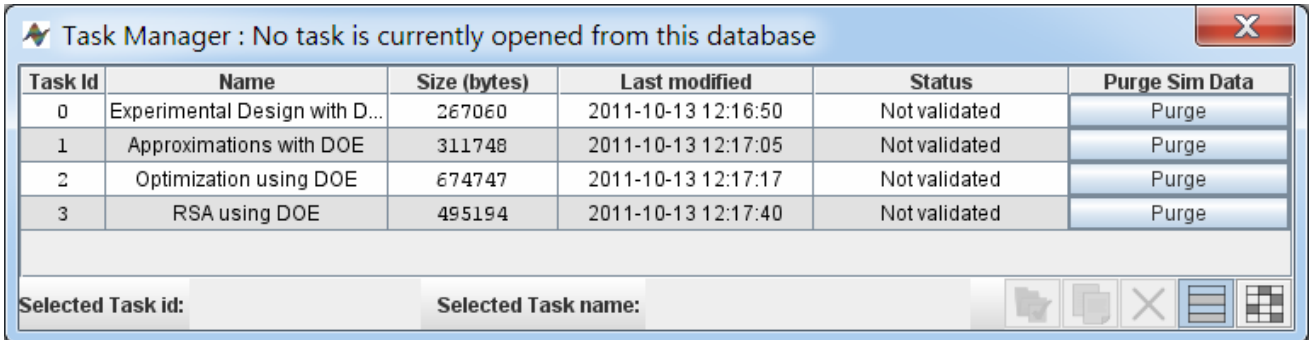

Figure 6 Task Manager

6. **Simulation Monitors**: These consist of visualization plots, data tables, and animations. The user can add any number of simulation monitors that display in real-time the progress of a VisualDOC simulation. With simulation monitors, it is possible to monitor virtually any simulation data shown in VisualDOC. The monitors can be added/edited before, during, or after a simulation has run. A snapshot of some of the simulation monitors is shown in **Figure 7**.

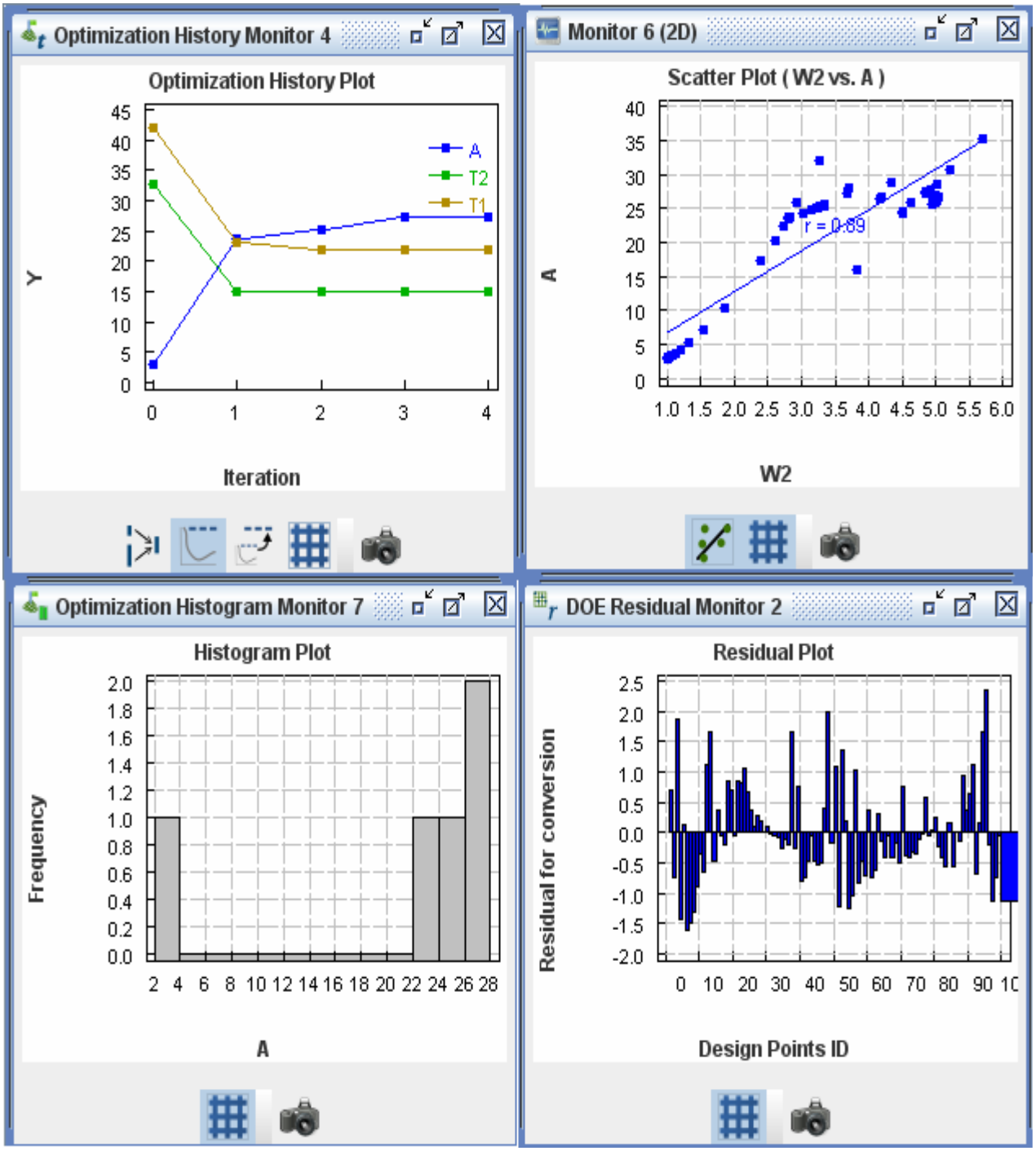

Figure 7 Simulation Monitors

7. **Advanced Post-processing**: All the design components provide specific post-processors to examine, validate, extract, and interact with generated simulation data. A snapshot of a post-processor for the Design of Experiments component is shown in **Figure 8**.

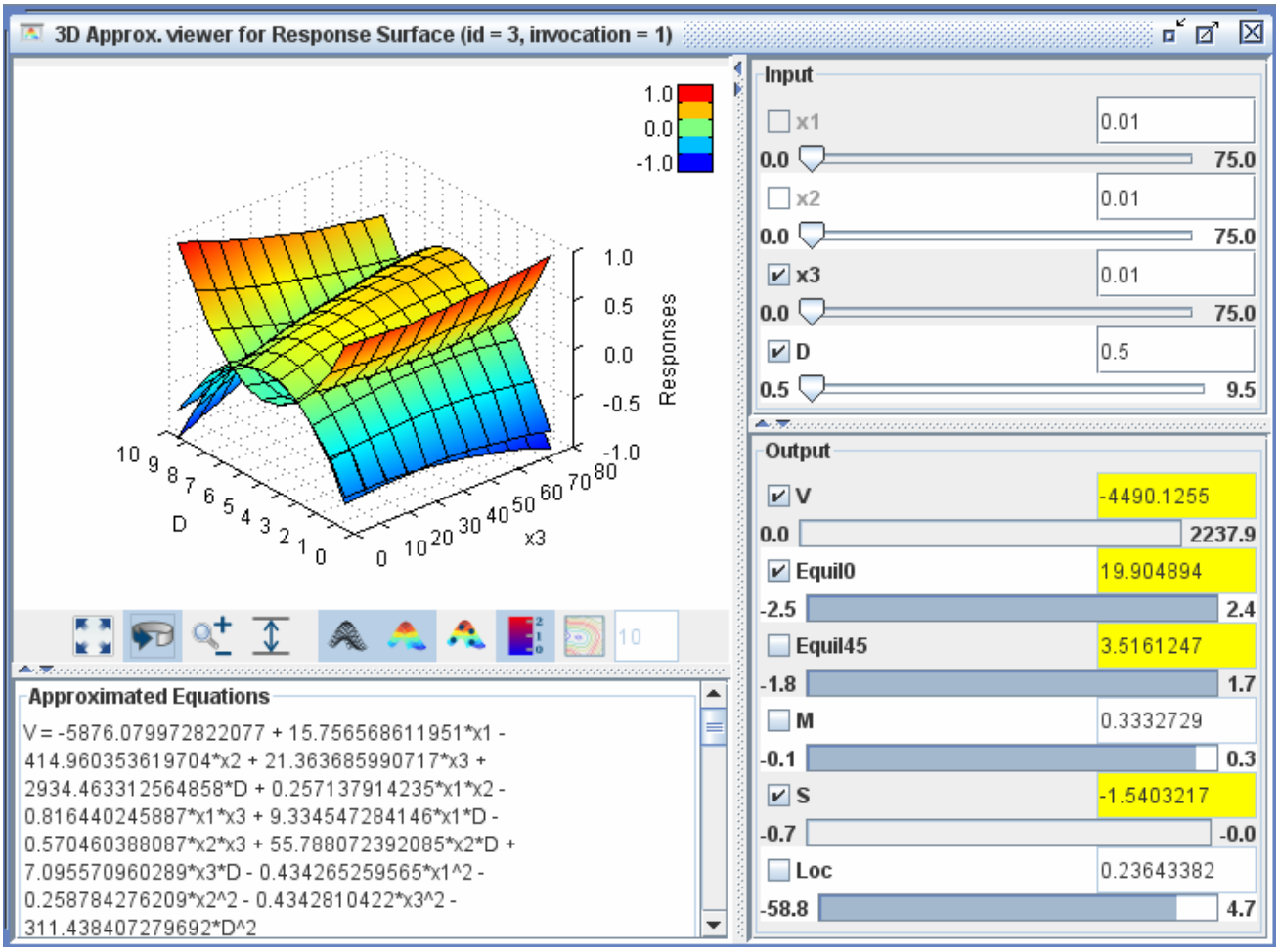

Figure 8 Approximation Viewer Post-processor

Apart from the main GUI elements for model configuration discussed above, the new release includes a large number of new features and enhancements, some of which are outlined below:

1. **Powerful Debugging**: The user can start/stop/pause/continue any simulation in VisualDOC and can add any number of break-points to a model to interactively inspect and monitor a design process.
2. **Full Parameterization**: Virtually any configurable property of a component or a data can be parameterized. Parameterization allows for other components in the workflow to read/write values. For example, the user can update the lower/upper bound or initial value for the optimization component from some other component. Similarly any tunable property (e.g. step size for optimization, error tolerance, etc.) can also be updated using data from other components.
3. **Partial Model Execution**: The new version allows the user to execute only a single component or a part of the subflow. It is useful for validation especially in a large model or components that involve expensive computation.
4. **Powerful and Flexible Auto Completion**: The new version supports powerful and flexible auto-completion. The creation of simulation data, links, connections, etc. can be automatically completed using existing model information as a hint. Auto-completion dramatically reduces the time and effort spent in creating a large VisualDOC model.

5. **Import/Export Components**: The user can save a single component or a subflow which can then be imported into another VisualDOC model. The user can also import an existing task into another task.
6. **Extract/Reuse Simulation Data**: The new version provides a powerful data extractor which enables the user to specify the data sets whose values are to be extracted from the database. The extracted data can be exported to text files for use in other software or can directly be used by other components in VisualDOC.

For a more comprehensive list of new features, the user is referred to the VisualDOC User's Manual.

Differences between versions 7.0 and 6.2.2

The following description is intended for the users of VisualDOC 6.2.2 and earlier. The following are the changes (differences) that a previous VisualDOC user should know about:

1. VisualDOC version 7.0 has a different database structure than version 6.2.2 and earlier. The user can import a version 6.2.2 database into version 7.0. Since the new version includes a large number of additional configuration options, all such information (which is not present in 6.2.2 and earlier versions) is assigned a suitable value based on the imported data. The user may have to occasionally modify such properties to get a fully working VisualDOC 7.0 model.
2. VisualScript has been merged into VisualDOC which now includes all the capability of VisualScript.
3. VisualDOC 7.0 provides the design capabilities as components that can be added to a workflow. Hence, the user can perform multiple or multi-level optimization, design of experiments, etc. in the same model. Any number of design modules (up to any level of depth) may be included in a VisualDOC 7.0 model.
4. Batch-mode execution of VisualDOC 7.0 requires the Java Runtime Environment (JRE). Batch-mode execution of version 6.2.2 and earlier did not rely on JRE.
5. The VisualDOC 7.0 API now includes the DOT API and provides direct access to all the included design modules (Optimization, Design of Experiments, Response Surface Approximation, and Probabilistic Analysis). The user is no longer required to setup a VisualDOC database when using the API.
6. VisualDOC 7.0 is native 64-bit. On Windows 64-bit, both the 32- and 64-bit versions get installed during the installation process. The user can run either version of the software; however, it is recommended to use the 64-bit version on 64-bit Windows.
7. All the manuals have been updated to reflect the changes in version 7.0.
8. All the included examples have been updated to work with the new version.

Features in version 6.2.2 not available in version 7.0

VisualDOC 7.0 does not include certain features of version 6.2.2. These features may be added in a future release. The list of missing/incomplete features is as follows:

1. The parallel container of VisualScript is not available. When a VisualScript model that contains a parallel container is imported into version 7.0, it creates a parallel workflow, but executes it sequentially. All the components in the parallel workflow are executed one by one. Also, the parallel execution feature of version 6.2.2 is not available.
2. The file backup feature present in version 6.2.2 is not available.
3. User-defined gradients for gradient-based optimization (DOT and BIGDOT) are not available.
4. The ability to define Pass/Fail constraints is not available.
5. The What-If post-processing tool for optimization is not available.
6. The Basic-GA based optimization algorithm has been removed.
7. The ability of VisualScript to interact with Morpher (from Detroit Engineering Products) is not available.