

VisualDOC

LIST OF NEW FEATURES

VERSION 10.0

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VisualDOC 10.0 Summary

Design Module New Features and Enhancements

- Ability to handle failed analysis
- New CMBDOT - discrete optimization method in Gradient Based Optimization and RSA optimization
- Two discrete variable optimizers, DSCDOT and CMBDOT are now available in VisualDOC API
- New Sensitivity Analysis run option
- New tuning parameter in optimization component - Constraint Normalization Default Min (CNDefaultMIN) for Gradient Based Optimization and Non-Gradient Based Optimization

New Analysis Plugins and Enhancements

- New LuaEquation Component
- New Moldex3D Component
- Existing interfaces updates

New Post-processing tools and Enhancements

- New Pie Chart tool for passed/failed design point status
- New Real-time design points table and summary reports feature
- Enhancements in summary reports

Other New Features and Enhancements

- Enhancements in component data generator
- New Quick Start Wizard to automatically create workflows
- Import source code button in Python Equation and Edit Dependency editor
- Syntax Highlight available for PythonEquation, Edit Dependency and Lua Equation
- Fixed name column in component editor
- Drag and drop feature to create workflows

New Examples and Documentation

- Nine new examples using the new and advanced features of VisualDOC have been added with this release
- All the accompanying manuals have been updated for this new release

Design Module Enhancements

Ability to handle failed analysis

All four design modules in VisualDOC i.e. **Optimization, Design of Experiments, Response Surface Based Optimization and Probabilistic Analysis** are now capable of handling failed analyses in the subflow. In case of the failure of analyses in the subflow, VisualDOC will not stop and will try to find the best possible solution depending upon the type of the design module. Failure of analysis components is detected by invalid return code from the analysis component and/or NaN/infinity value of the response. The user can now visualize a design points status summary with the help of a new pie chart tool in the post processing. The details for design points status are also available in the summary reports.

New Discrete Variable Optimization Method - CMBDOT

CMBDOT is a new discrete variable optimizer added to VisualDOC's Optimization and Response Surface based Optimization modules for solving discrete and discrete + continuous variables optimization problems.

Both the existing DSCDOT and the new CMBDOT discrete variable optimizers are also available in the VisualDOC API.

New Run Sensitivity Analysis Option

VisualDOC allows the user to perform sensitivity analysis for each responses i.e. objective and constraints with respect to each design variables at the user defined point. The sensitivities are calculated based on the gradient calculation method selected by the user in optimization module. Detailed sensitivity analysis reports are available in the post-processing.

New Tuning Parameter in Optimization Component - CNDefaultMIN

This parameter defines the threshold value for the scale factor used in normalization of the constraints.

Analysis Plugin Enhancements

LuaEquation Component

The LuaEquation component provides a simple and straightforward method to specify analytical equation between inputs and outputs. The underlying engine used by the LuaEquation component is based on Lua and therefore it follows the Lua syntax.

Moldex3D Component

The new Moldex3D Component enables users to couple their Moldex3D models with all available options in VisualDOC to perform design studies on:

1. Gate location
2. Process parameters (from *.pro file)
3. Combination of both

The component can be setup to run on a local machine or in parallel, where all individual nodes are set as local.

Note: Moldex3D is the world leading CAE product for the plastics injection molding industry. With the best-in-class analysis technology, Moldex3D can help you simulate the widest application range of injection molding processes to optimize product design and manufacturability, shorten time-to-market, and maximize product ROI.

ANSYS Component



The ANSYS Component in VisualDOC is updated to support ANSYS 2019 R2

TAItherm Component



The TAItherm Component in VisualDOC is updated to support TAItherm 12.7.3

MATLAB Component

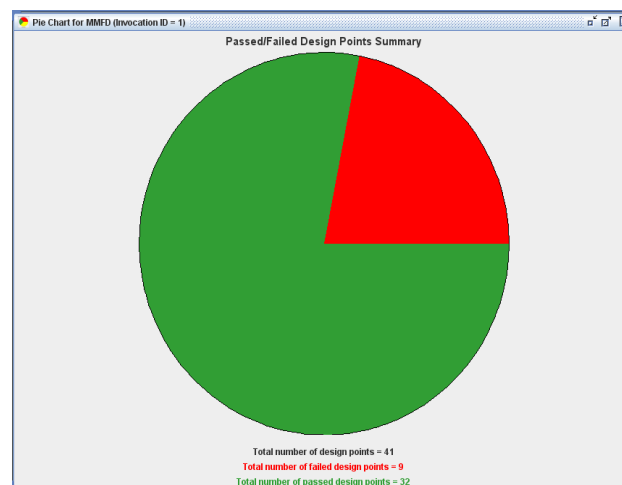


The MATLAB Component in VisualDOC is updated to support MATLAB R2019a

Enhancements in Post-Processing

New Pie Chart tool

The new pie chart tool provides the visualization of the number of failed and successful design points during VisualDOC design module execution.



New Real-time Summary Reports and Design Points Table

VisualDOC can create summary report and the design points table in real-time for the design modules component. The report and design points table will be saved in the VisualDOC_Reports folder which is automatically created in the project directory on the execution of the. Currently, this feature is only available for Design of experiments component and sensitivity analysis.

Enhancements in Summary Reports

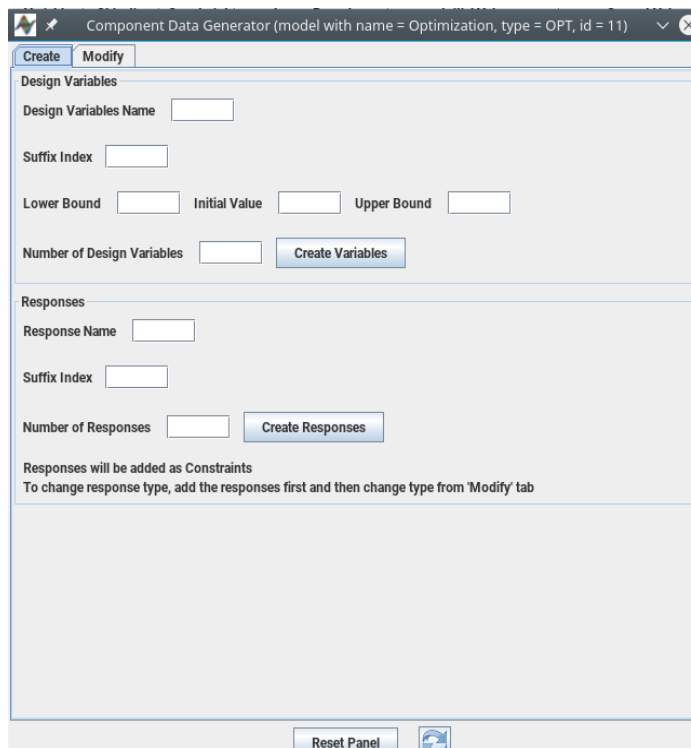
The summary reports for all the design modules have been updated to provide more information to the users.

Other Enhancements

Enhancements in Component Data Generator

Component Data Generator panel is an optional tool that allows the user to add or modify parameters for design variables and responses prior to a run. This panel works with all inner and outer components that allow data addition or data modification.

This panel now has the ability to create one or more new design variables and responses, for inner and outer components. The panel is divided into two tabs: Create and Modify, as shown below:



Component Data Generator (model with name = Optimization, type = OPT, id = 11)

Create Modify

Design Variables

Design Variables Name

Suffix Index

Lower Bound Initial Value Upper Bound

Number of Design Variables


Responses

Response Name

Suffix Index

Number of Responses

Responses will be added as Constraints
To change response type, add the responses first and then change type from 'Modify' tab



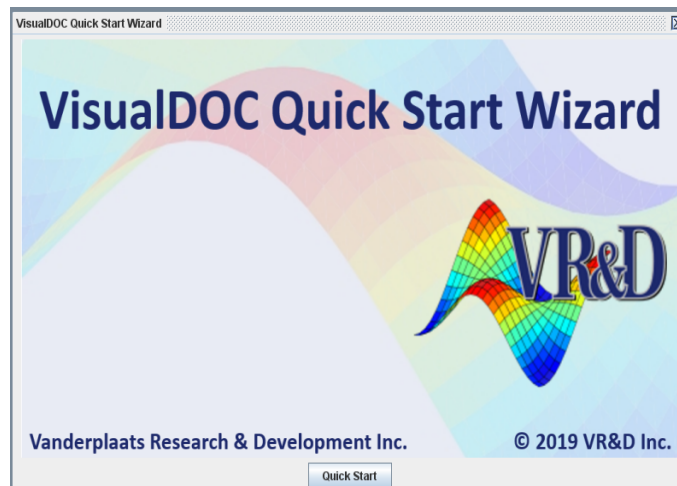
The 'Create' tab allows users to create new design variables or responses.



The 'Modify' tab allows users to edit or modify existing set of design variables or responses. It also allows user to import or export data.

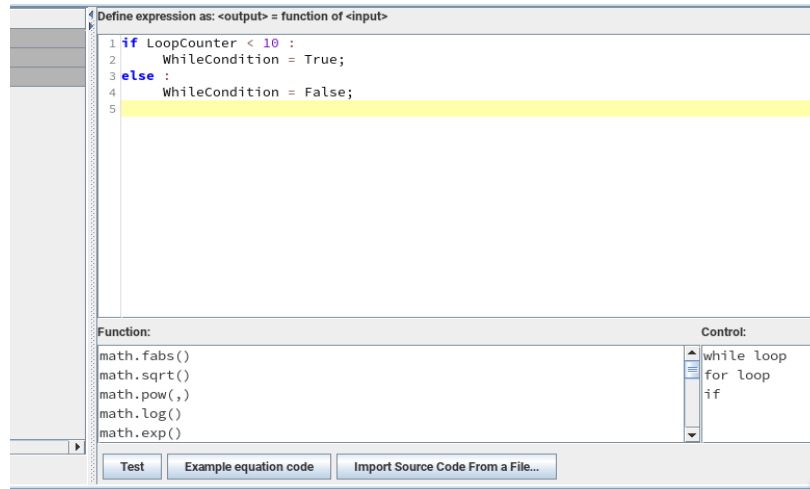
Quick Start Wizard

Quick Start Wizard allows the user to create a new database file with extension *.vdbx* containing pre-defined components. The user needs answer few questions which causes VisualDOC to automatically creates a workflow.



Syntax highlighting text area

Syntax highlighting text area is available for components using Python engine and Lua engine. Python syntax highlighting text area is available in For, If, While, PythonEquation Components and Dependency Equation Editor. Lua syntax highlighting text area is available in Lua Components.



Import source code button in Python Equation and Edit Dependency editor

The user can directly import Python Source code from a text file into the editor with the help of the “Import Source Code From a File...” button.

Fixed name column in component editor

For better visualization of the data and its properties, the ‘Name’ column is now frozen in the component editor panel. So, if a user scrolls the table horizontally, all the columns except the ‘Name’ column will scroll, making it easier to work with the data.

| Name | Value Type | Adv. Attribute | Variable | Response | Lower Bound | Initial Value | Current Value |
|---------------------|------------|----------------|-------------------------------------|-------------------------------------|-------------|---------------|---------------|
| Intrusion | Real | None | <input checked="" type="checkbox"/> | <input type="checkbox"/> | -0.01 | 0.0 | 0.0 |
| Torsional_Stiffness | Real | None | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 21200.0 | 21570.0 | -1.0E3 |
| Frequency7 | Real | None | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 1.0 | 1.0 | 1.0 |
| Mass_Fraction | Real | None | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 0.98 | 1.02 | 1.15 |
| obj | Real | None | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | 0.0 | 0.057584 |
| Cons_violation | Real | None | <input type="checkbox"/> | <input checked="" type="checkbox"/> | | 0.0 | 7.2 |
| Mass | Real | None | <input type="checkbox"/> | <input checked="" type="checkbox"/> | | 0.3190381 | 0.33085 |
| Design_cycle | Real | None | <input type="checkbox"/> | <input checked="" type="checkbox"/> | | 12.0 | 40.0 |

Drag and drop feature to create workflows

New drag and drop functionality is now available to add the components to the workflow.

New Examples and Documentation

Nine new examples using the new and advanced features of VisualDOC have been added with this release. These are as follows.

1. **Equation_Failed_Points:** This new task, added to the Equation example demonstrates how optimization component can handle failed design points during gradient based optimization. In this case analysis failure is due to infinity value for the response.
2. **Approximations with DOE Failed Design Points:** This new task, added to the Beam example, demonstrates how Design of Experiments component can handle failed design points. In this case analysis failure is due to invalid return code.
3. **Reliability Analysis with Failed Design Points:** This new task, added to the spring example, demonstrates how probabilistic analysis component can handle the failed design points.
4. **Ten Bar Truss Sensitivity:** This is a new example that demonstrates how to run sensitivity analysis in VisualDOC.
5. **Design of Experiments with ESLDYNA Optimization:** This is a new example, demonstrates the steps to couple the ESLDYNA software with VisualDOC.
6. **Composite Layer Angle Optimization of a Cantilever plate using Multiple Starting Strategies:** This is a new example, demonstrates the steps to setup different starting strategies using Design of Experiments component in VisualDOC to perform composite layer angle optimization in GENESIS.
7. **Moldex3D Frame Example:** This example demonstrates how to setup a Moldex3D component for gate location optimization.
8. **CMBDOT Example:** This example demonstrates how to call CMBDOT discrete variable optimization method from VisualDOC API.
9. **DSCDOT Example:** This example demonstrates how to call DSCDOT discrete variable optimization method from VisualDOC API.

All the accompanying manuals have been updated for this new release.

