ISIGHT 5.9

OVERVIEW

Isight is an open desktop solution for creating flexible simulation process flows, consisting of a variety of applications, to automate the exploration of design alternatives, identify optimal performance parameters and integrate added-value systems.

INTERFACES

Isight has been designed with ease-of-use in mind. Highly visual and intuitive interfaces, wizards, and drag-and-drop capabilities allow you to work quickly and efficiently.

Design Gateway

Leverage this intuitive graphical user interface to quickly create integrated simulation process flows that couple simulation programs regardless of discipline, programming language, or format. It provides drag-and-drop process flow creation, parameter mapping, and problem formulation. This feature-rich process editor supports powerful file parameters that can represent simulation models as variables as well as dynamically sizable arrays for both inputs and outputs. It also provides branching, looping, conditional statements of arbitrary complexity with any parameter, and other execution logic. At any point in the automated process flow, a break can be

inserted to allow user intervention. This flexibility, combined with Jython/Python scripts to alter the runtime behavior of the model as a function of changing parameter values, allows the creation of highly reusable processes. If an authoring error is made, the user can easily restore to a previously auto-saved version. Once the process flow is defined, the user interface enables easy import of externally defined parameter values and problem formulations. Utilities such as model search, model content overview, parameter search, and parameter grouping are also supported.

Runtime Gateway

Execute engineering process flows and create graphs and tables to visualize results. The user can choose between two execution engines: a desktop execution engine, or a distributed execution engine based on embedded SEE technology. All job results are saved automatically to a locally managed

database. The pack-and-go utility makes it easy for users to share models and results. The user interface supports the creation of visual tools for real-time postprocessing of data such as tables, 2D and 3D plots, correlation maps and tables, self organizing maps, and statistical analysis. Run data can be filtered and graded with a flexible set of criteria. All scatter plots allow easy one-click visualization of the virtual prototype by dedicated simulation results viewers. It provides interactive tools for visualizing parameter relationships and performance attribute trade-offs with interactive approximations. Users can share these approximations with non-Isight users by exporting them to Excel.

Component Development Environment

An easy-to-use component development environment based on Eclipse™ supports the creation of application components that communicate with one another in the Isight environment. Add custom techniques, including DOE, approximation, approximation error analysis, optimization and Monte Carlo sampling methods, and random variable distributions. Leverage the APIs of the existing techniques in order to create custom hybrid search methods.

Localization

Interfaces, components, and messages have been localized for Japanese language support.

PROCESS INTEGRATION

Isight includes a number of valuable application components that are included with all package levels. These components are most commonly used for building simulation process flows and exchanging data with external sources.

Abaqus

Quickly and automatically exchange data with Abaqus input, .cae, .odb, and .dat files. Support desktop solver execution, remote solver execution, and results extraction on an LSF cluster.

Dymola

Quickly and automatically exchange data with Dymola input dsin.txt files and output with .mat files. Support for dynosim. exe desktop and remote execution in the SEE environment.

CATIA V5

Exchange data with CATIA V5 models, update a CATIA V5 model, and export native and neutral file formats. Additionally, different instances of the component in a single workflow can use different CATIA environments.

Microsoft Office Components: Word™ and Excel™

Send Isight parameter values and results directly to a pre-formatted Microsoft Word document—an excellent way to quickly share results with others in the organization. Integrate Excel spreadsheets with Isight to allow parameters to be read from or written to cells and automatically execute Excel macros.

Email

Send Isight parameter values and results directly to a pre-formatted email message that will be automatically sent at a predetermined point in a process flow.

MATLAB®

Integrate MATLAB® files with Isight to allow parameters to be read from or written to MATLAB® scripts.

Mathcad

Extract Mathcad parameters and to execute a Mathcad worksheet

COM (Microsoft Component Object Model)

Directly communicate with COM objects.

Data Exchanger, OS Command, and Simcode

Data Exchanger enables easy data exchange between ASCII-based files. The XML component enables easy data exchange between XML formatted files. OS Command automatically executes operating system commands, scripts, and operating system commands on a grid controlled by Platform LSF or using SSH. Simcode combines the functionality of the Data Exchanger and the OS Command components.

Calculator

Perform calculations, unit conversions, data transformations and vector and matrix operations as part of the process flow for all parameter types including strings. The component editor supports syntax-sensitive color coding and has tool tips for hints and error messages.

Script

Execute a script of Java commands to manipulate parameters, interact with files, or invoke other programs.

Database

Interface with a SQL-compliant relational database (Oracle, DB2, Access, or MySQL Server 2000) to support retrieval and storage of input and output data.

Grid Support

Enable parallel submission of optimization, Monte Carlo, and DOE jobs on multiprocessor machines. In addition to the in-the-box distributed execution engine, based on SEE, we also support Platform LSF or PBS/Torque batch submissions on Windows and Linux clusters.

In addition to the above application components that are available with all package levels, SIMULIA offers add-on components for popular engineering software applications such as Solidworks, Pro/ENGINEER, Unigraphics, ENOVIA, ANSYS, LS-DYNA, MADYMO, STAR-CCM+, AVL, Adams, and Nastran. Please visit http://components.simulia.com/ for more information.

DESIGN OPTIMIZATION

Isight also offers several packages that are used to optimize the simulated behavior characteristics in terms of performance, performance variance, and reliability. The design optimization techniques can be used individually or nested in the sim-flow. Most techniques leverage parallel execution and support options for the handling of failed runs.

Design of Experiments (DOE)

Access a full suite of methods including Central Composite, Data File, Full Factorial, Fractional-Factorial, Box-Behnken, Latin Hypercube, Optimal Latin Hypercube, Orthogonal Array, Dependent Variable Sampling and Parameter Study with appropriate postprocessing options. Achieve a user-defined approximation cross-validation error with automatic sequential sampling.

Optimization and Target Solver

Define your optimization problem in terms of variables and multiple weighted and scaled objectives and constraints using

the following algorithms: Gradient: NLPQL, MMFD, LSGRG2; Pattern: Hooke-Jeeves, Downhill Simplex, Adaptive Simulated Annealing; Mixed Integer/Real: MISQP, MOST; Genetic Algorithms: Evolution, Multi-Island GA; Multi-Objective: AMGA, NSGA II, NCGA, Particle Swarm; Other: Stress-Ratio Method, Pointer I & II Automatic Optimizer, Multi-objective Approximation Loop. Specify target values for the output parameters of the process flow and deploy the target solver to modify the input values to achieve those goals. Visualize optimization results using several available tools including the Engineering Data Mining Interface for the viewing of multivariable / multi-response plots.

Data Matching

Calibrate simulation models by minimizing any variety of different error measures using optimization techniques. Target data can be either imported experimental results or simulation results generated by a higher-fidelity code.

Approximations

Create an approximation model for any task, any application component, or from a data file. Response surface modeling (RSM) is available with four-term selection techniques, as well as orthogonal polynomial models. The software also includes Radial or Ellliptic Basis Function methods with user selectable shape functions and smoothing, as well as a Kriging method with Exponential, Gaussian and Matern correlation functions. All methods support automatic cross-validation with easy-to-understand visual error analysis. The Visual Design Driver (VDD) interface allows users to visualize approximation surfaces in 2D or 3D with overlaid constraints, and to make real-time changes or launch a design improvement strategy. The VDD calculates both the global and local effects of the design variables on an output.

Monte Carlo Analysis

Leverage simple random sampling, descriptive sampling, eight standard distributions, and distribution truncation. This component is easily extendable to other sampling methods through the plug-in framework. The distributions supported are: normal, skewed normal, log-normal, Weibull, Gumbel, uniform, Discrete-Uniform and exponential. A component for Stochastic Design Improvement (SDI), an iterative Monte Carlo procedure for improving a design, is also included.
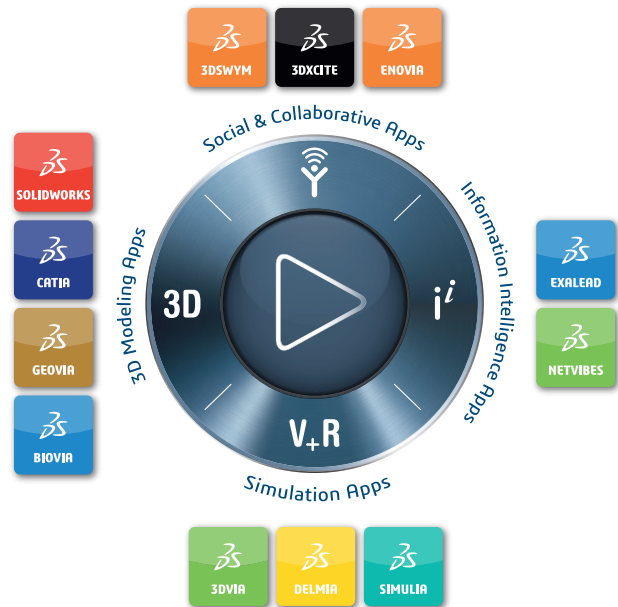
Six Sigma

Use probabilistic analysis to measure the quality of a design given uncertainty or randomness of a product or process. Perform reliability analysis with the mean value method, FORM and SORM reliability method, importance sampling, sobol sampling, DOE sample, or Monte Carlo Analysis. This component can be used in combination with optimization and approximation techniques to perform fast Six Sigma optimization.

Taguchi Method

Improve the quality of a product or process by striving to achieve performance targets and minimizing performance variation. This component supports Taguchi analysis for static, dynamic, and dynamic-standardized system types.

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