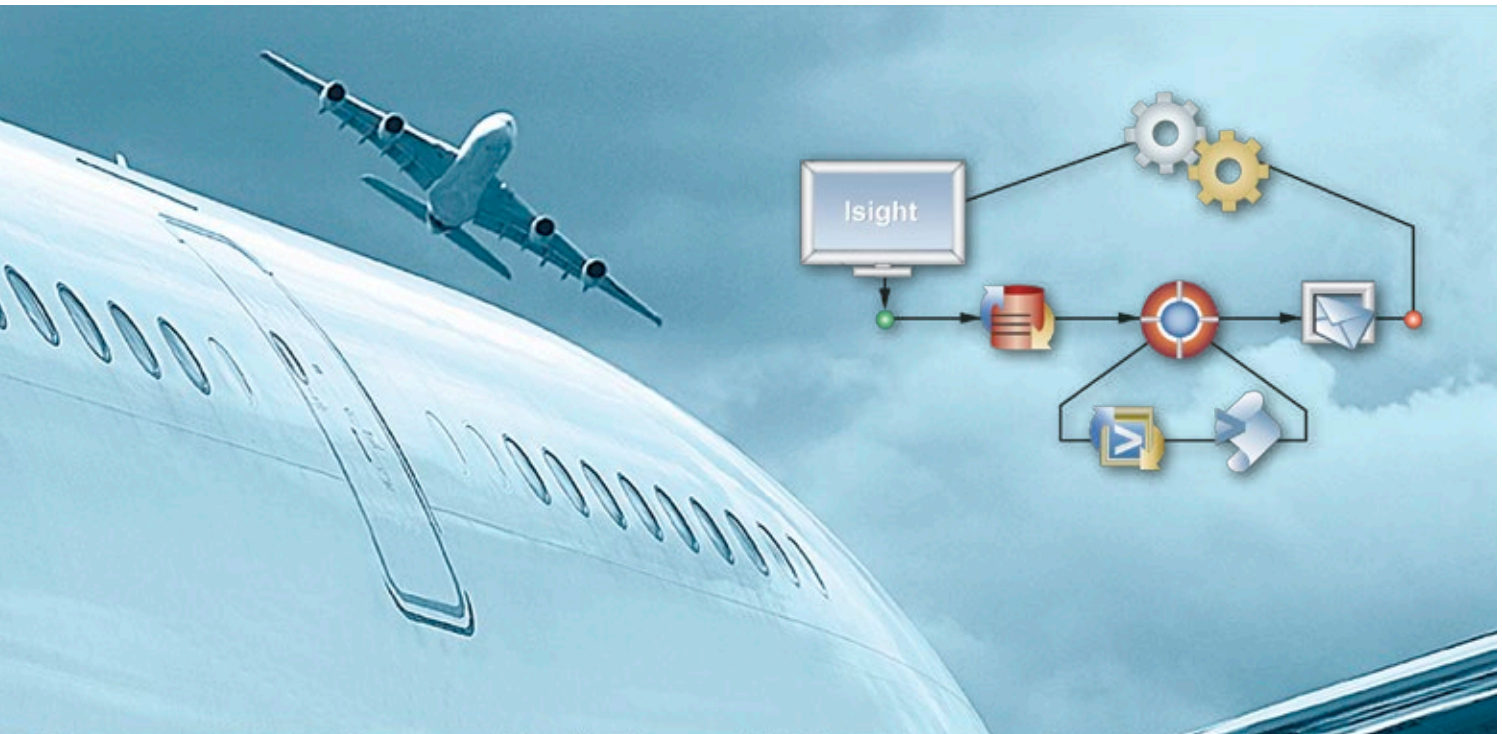3DEXPERIENCE®

ISIGHT
AUTOMATE DESIGN EXPLORATION AND OPTIMIZATION
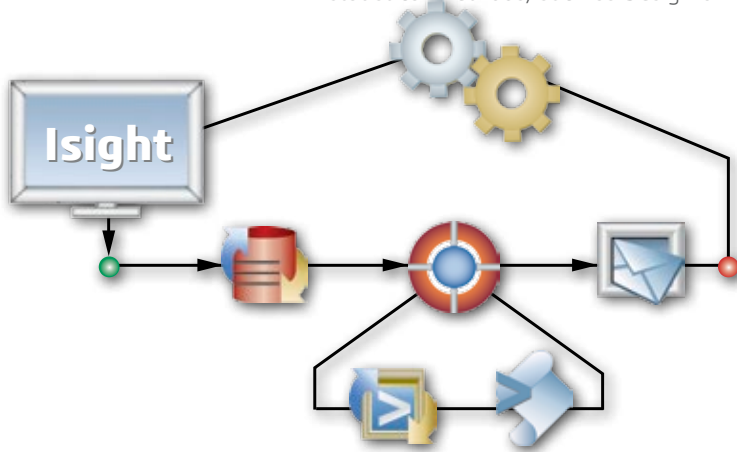
ISIGHT

INDUSTRY CHALLENGES

In today's computer-aided product development and manufacturing environment, designers and engineers are using a wide range of software tools to design and simulate their products. Often, the parameters and results from one software package are required as inputs to another package, and the manual process of entering the required data can reduce efficiency, slow product development, and introduce errors in modeling and simulation assumptions.

SIMULIA's Isight Solution

Isight provides designers, engineers, and researchers with an open system for integrating design and simulation models—created with various CAD, CAE, and other software applications—to automate the execution of hundreds or thousands of simulations. Isight allows users to save time and improve their products by optimizing them against performance or cost metrics through statistical methods, such as Design of Experiments (DOE) or Design for Six Sigma.

Isight combines cross-disciplinary models and applications together in a simulation process flow, automates their execution, explores the resulting design space, and identifies the optimal design parameters based on required constraints.

Isight's ability to manipulate and map parametric data between process steps and automate multiple simulations greatly improves efficiency, reduces manual errors, and accelerates the evaluation of product design alternatives.
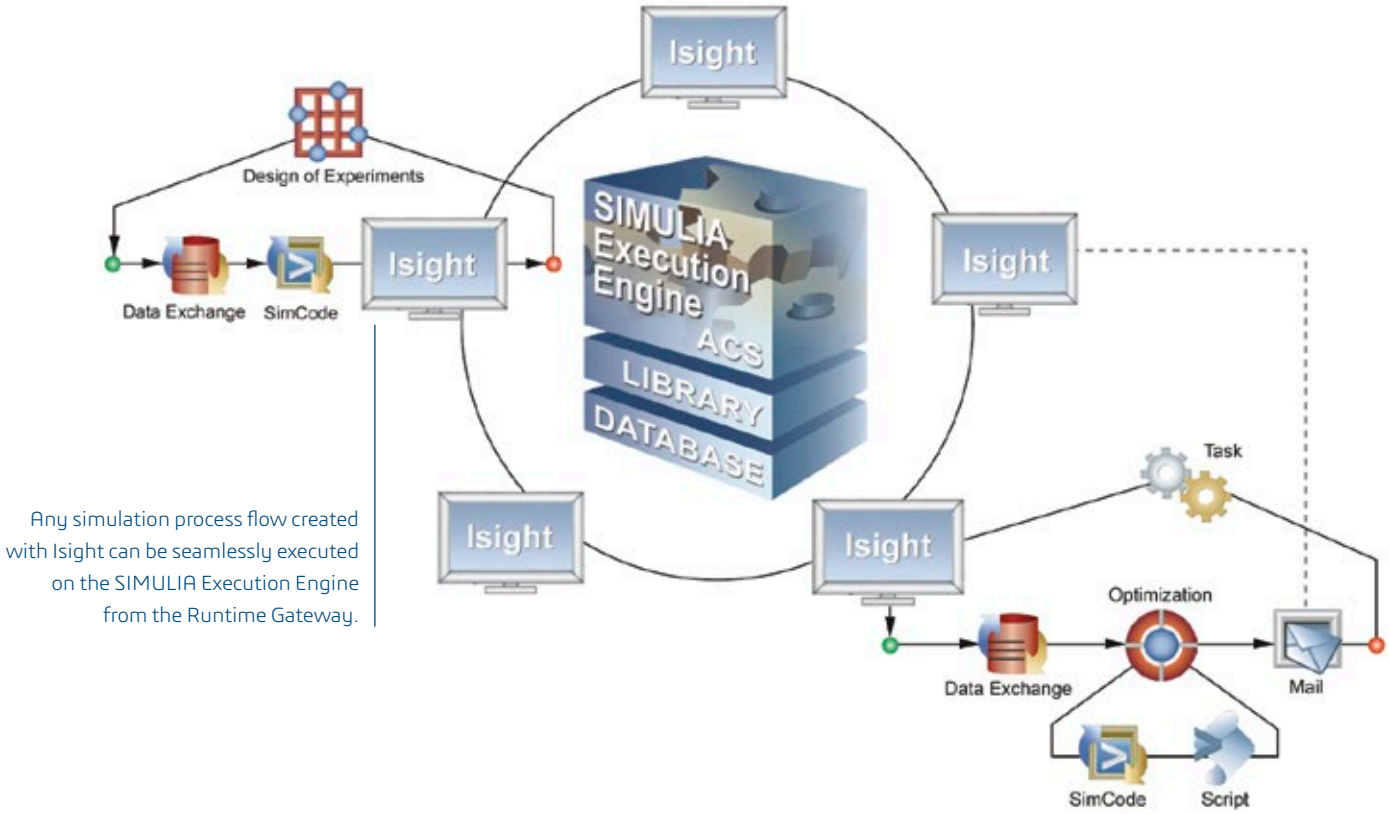
Open Component Framework

Isight provides a standard library of components—including Excel™, Word™, CATIA V5™, Dymola™, MATLAB®, COM, Text I/O applications, Java and Python Scripting, and databases—for integrating and running a model or simulation. These components form the building blocks of simulation process flows.

The direct link between Isight and the components allows for easy modification of a reference input deck, execution of the component, and the extraction of the output information.

A full-featured development environment, based on EclipseTM, supports the development of components, whereas the open API extends additional Isight capabilities. This open architecture allows SIMULIA and its partners to offer a wide range of application components that provide a tighter integration with models developed in popular engineering software applications.

A component based approach makes it easier to create process flows, reduce maintenance costs, and provides timely access to new components or updates through an independent release process.

Simulation Process Flows

The intuitive Design Gateway graphical user interface enables users to quickly create integrated simulation process flows, which couple simulation programs regardless of discipline, programming language, or format.

Isight provides drag-and-drop process flow creation, parameter mapping, and problem formulation.

In addition, Isight delivers branching, looping, conditional, and other execution logic. This flexibility, combined with scripts to alter the runtime behavior of the model as a function of changing parameter values, allows the creation of highly reusable processes.

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 viewer, parameter search, and parameter grouping are also available.

From the Runtime Gateway, any simulation process flow created with Isight can be seamlessly executed on distributed hardware by the Isight Execution engine or the SIMULIA Execution Engine (SEE).

Execution, Results Visualization, and Postprocessing

The Runtime Gateway enables desktop and distributed execution of engineering process flows. It also enables the creation of graphs and tables to visualize results. All job results
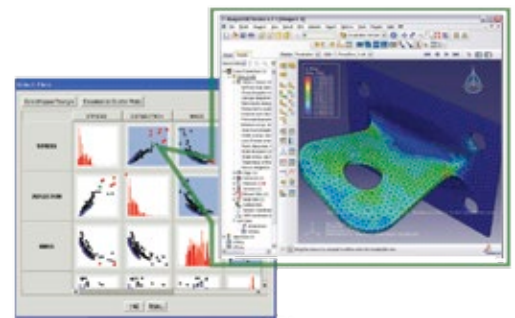

Point cloud scatter plots of simulation results with run grading. Abstract data, like a stress field computed with Abaqus, can be visualized with one click in its native viewer.

are saved automatically to a locally managed database. The user interface supports the creation of visual tools for real-time postprocessing of data such as tables, 2D and 3D plots, and statistical analysis.

Isight provides interactive tools for visualizing parameter relationships as well as performance attribute tradeoffs with interactive approximations. Users can share these approximations with non-Isight users by exporting them to Excel.


In the visual design driver you can trade off dozens of objectives with overlaid constraints in real time.
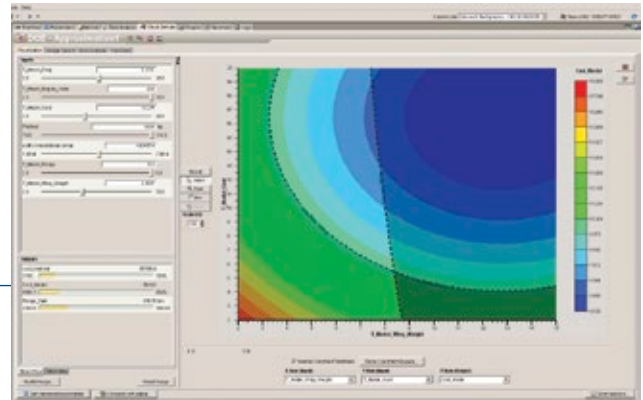
ISIGHT OFFERS AN EXTENSIVE LIBRARY OF PARALLEL PROCESS COMPONENTS TO ENABLE ENGINEERS TO THOROUGHLY AND QUICKLY EXPLORE THE DESIGN SPACE

Design of Experiments

The DOE component enables engineers to quickly assess the impact of various design variables based on a set of objectives and identify significant interactions. The design data produced by DOE runs can also be used with approximation models for use with optimization methods.
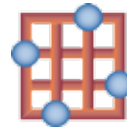
Optimization

Isight provides a comprehensive selection of parallelized optimization techniques that can be applied to a variety of problems. It also includes techniques that can handle multi-objective optimization problems.

Data Matching

This process enables simulation models to be calibrated by minimizing any variety of different error measures using optimization techniques. Target data can be imported as experimental or simulation results.

Approximations and the Visual Design Driver

Isight offers powerful real-time tools to interpolate results of computationally intensive realistic simulations. Approximation models are automatically cross-validated to ensure accurate predictions. The Visual Design Driver allows users to see their approximation models from many different views and "surf" the design space graphically and interactively.
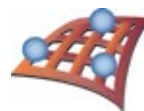
Quality Methods

Isight provides stochastic methods that account for variation in product designs and their operating environment. The Monte Carlo Simulation (MCS) component offers an accurate method to address uncertainty and randomness in the design process. It allows users to sample the design space, assess the impact of known uncertainties in input variables on the system responses, and characterize the statistical nature (mean, variance, range, distribution, etc.) of the responses of interest.

# BAKER HUGHES REDUCES DEVELOPMENT TIME FROM MONTHS TO DAYS

The use of expandable tubulars has emerged as a popular technology for drilling and completing wells. While expandable tubulars vary in type depending upon the application and specific well requirements, the most common approach is to actually form the metals downhole, which presents unprecedented challenges for tool designers. The costs and timelines to achieve a "workable" product can be tremendous. Baker Hughes has effectively leveraged realistic simulation to address these impediments and enhance their understanding of the mechanics and effects of nonlinear/dynamic expansion of metals.

Download the full paper at www.simulia.com/cust_ref

If we hadn't been using the software, the most effective cone geometry would have never been considered.

Jeff Williams,
Project Engineer, Baker Hughes

Images courtesy of Baker Hughes
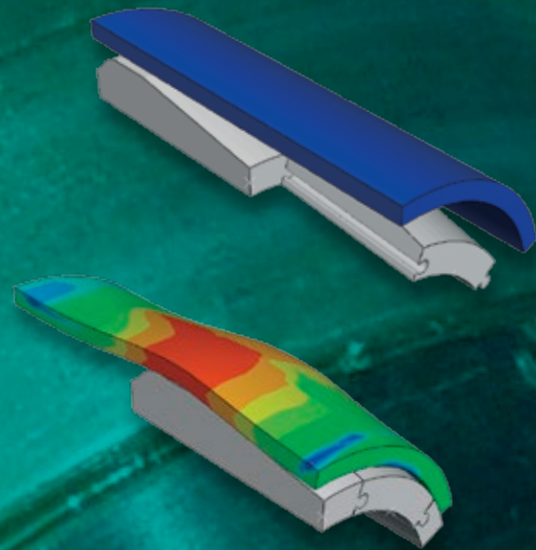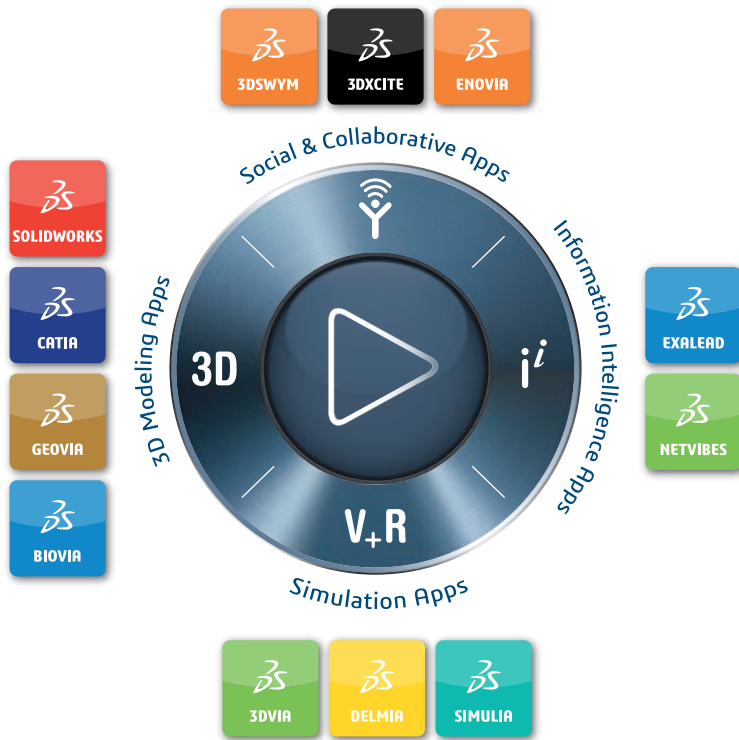
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