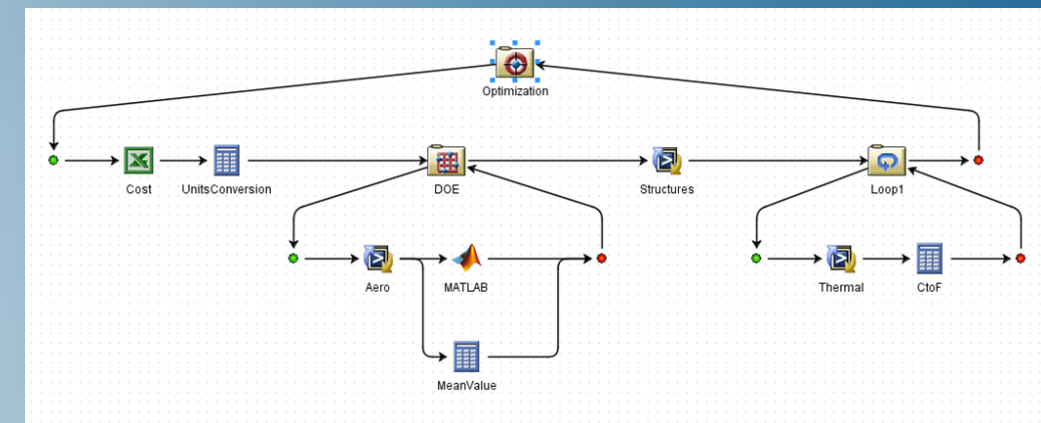# Introduction to Isight

Isight 2018

About this Course

Course objectives

Upon completion of this course you will be able to:

▷ Automate a series of functions to create a Sim-flow

▷ Add components to a Sim-flow

▷ Set up the core component

▷ Configure components to pass data to/from each other

▷ Execute a Sim-flow

▷ Visualize Sim-flow results

▷ Evaluate design alternatives

▷ Create a Sim-flow to capture a process, by integrating various software in the company.

▷ Perform Design Optimization and gain Design Space understanding by using various techniques such as DOE, Optimization, Monte Carlo etc.

Targeted audience

Simulation Analysts

Prerequisites

None

2 days

Day 1

▷ Lecture 1   Introduction
  ◻ Demonstration

▷ Lecture 2   Isight Overview
  ◻ Workshop 1   Exploration of an Isight Model

▷ Lecture 3   Design of Experiments
  ◻ Workshop 2   I-Beam DOE

▷ Lecture 4   Optimization
  ◻ Workshop 3   I-Beam Optimization

▷ Lecture 5   Monte Carlo and Six Sigma
  ◻ Workshop 4   Plate Weld Monte Carlo and Six Sigma

Day 2

▷ Lecture 6   Approximations

▷ Workshop 5   I-Beam Approximations

▷ Lecture 7   Isight Components (Part 1)

     ▢ Workshop 6   SimCode Component – EngSim

     ▢ Workshop 7   Calculator Component

     ▢ Workshop 8   Mapping and Parallel Sim-flows

     ▢ Workshop 9   Excel Component

▷ Lecture 8   File Handling

     ▢ Workshop 10   Advanced Parsing

     ▢ Workshop 11   Loops and Publishing

     ▢ Workshop 12   Combining Models

     ▢ Workshop 13   File Parameters

     ▢ Workshop 14   Data Management

▷ Lecture 9   Isight Components (Part 2)

     ▢ Workshop 15a Data Matching (*for non-Abaqus users*)

     ▢ Workshop 15b Data Matching on Abaqus Results (*for Abaqus users*)

Additional Material
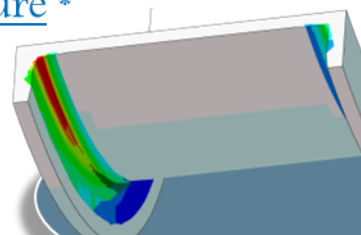
SIMULIA

▷ SIMULIA is the Dassault Systèmes brand for Realistic Simulation solutions

▷ Portfolio of established, best-in-class products
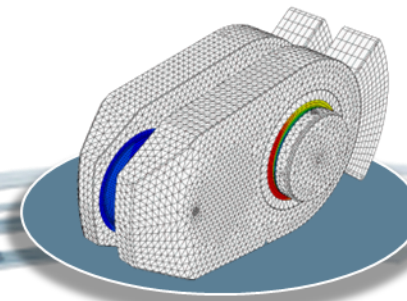- Abaqus, Isight, Tosca, fe-safe, Simpack

Design Optimization: Tosca Structure *

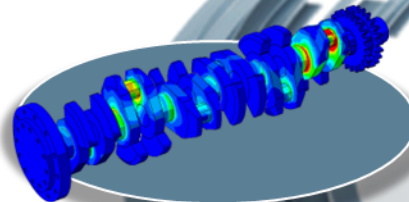Simulation-driven design refinement to improve performance

Durability Assessment: fe-safe *
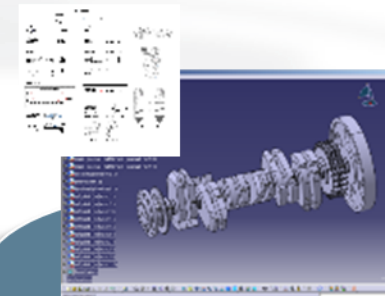
Accurate life estimation to achieve certification

FEA Stress Analysis: Abaqus *

Detailed stress analysis using extracted load history from MBS
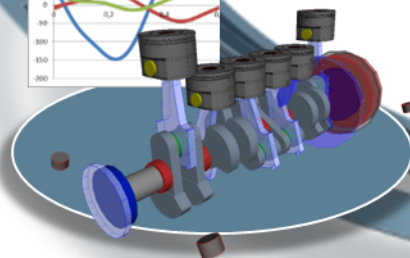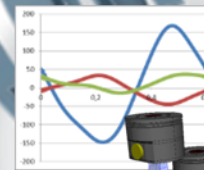
CAD Geometry: CATIA

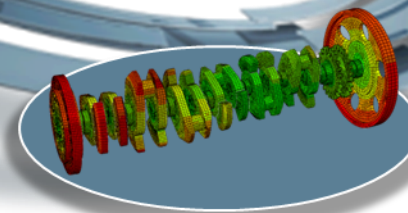Fully parameterized 3D geometry; FEA model generation via associative interface

Multibody Simulation: Simpack

System analysis to extract virtual load history of complete working cycle

Mesh Calibration: Isight *

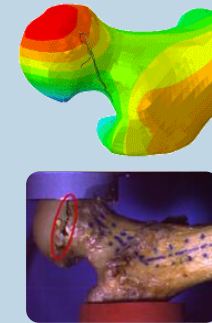Automated mesh calibration: sufficient mesh quality for accurate results

* Included in extended licensing pool

SIMULIA's Power of the Portfolio

Abaqus
- Routine and Advanced Simulation
- Linear and Nonlinear, Static and Dynamic
- Thermal, Electrical, Acoustics
- Extended Physics through Co-simulation
- Model Preparation and Visualization

Realistic Human Simulation
High Speed Crash & Impact
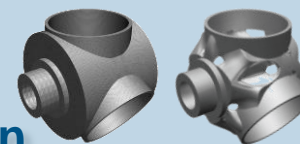**Noise & Vibration**

Isight
- Process Integration
- Design Optimization
- Parametric Optimization
- Six Sigma and Design of Experiments
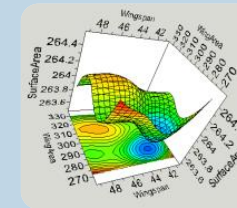
Material Calibration
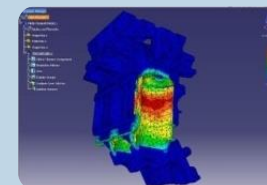**Workflow Automation**
Design Exploration

Tosca
- Non-Parametric Optimization
- Structural and Fluid Flow Optimization
- Topology, Sizing, Shape, Bead Optimization

Conceptual/Detailed Design
Weight, Stiffness, Stress
Pressure Loss Reduction

fe-safe
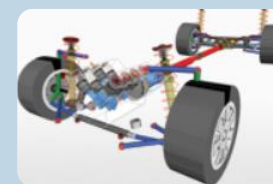- Durability Simulation
- Low Cycle and High Cycle Fatigue
- Weld, High Temperature, Non-metallics

Safety Factors
Creep-Fatigue Interaction
Weld Fatigue

Simpack
- 3D Multibody Dynamics Simulation
- Mechanical or Mechatronic Systems
- Detailed Transient Simulation (Offline and Realtime)

Complete System Analyses
(Quasi-)Static, Dynamics, NVH
Flex Bodies, Advanced Contact

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to log in or join!

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Discover new ways to explore how to leverage realistic simulation to drive product innovation. Join the thousands of Abaqus and Isight users who are already gaining valuable knowledge from the SIMULIA Learning Community.

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Revision Status

Lecture 1	**11/17**	**Updated for Isight 2018**	**Workshop 1**	**11/17**	**Updated for Isight 2018**
Lecture 2	**11/17**	**Updated for Isight 2018**	**Workshop 2**	**11/17**	**Updated for Isight 2018**
Lecture 3	**11/17**	**Updated for Isight 2018**	**Workshop 3**	**11/17**	**Updated for Isight 2018**
Lecture 4	**11/17**	**Updated for Isight 2018**	**Workshop 4**	**11/17**	**Updated for Isight 2018**
Lecture 5	**11/17**	**Updated for Isight 2018**	**Workshop 5**	**11/17**	**Updated for Isight 2018**
Lecture 6	**11/17**	**Updated for Isight 2018**	**Workshop 6**	**11/17**	**Updated for Isight 2018**
Lecture 7	**11/17**	**Updated for Isight 2018**	**Workshop 7**	**11/17**	**Updated for Isight 2018**
Lecture 8	**11/17**	**Updated for Isight 2018**	**Workshop 8**	**11/17**	**Updated for Isight 2018**
Lecture 9	**11/17**	**Updated for Isight 2018**	**Workshop 9**	**11/17**	**Updated for Isight 2018**
Appendix 1	**11/17**	**Updated for Isight 2018**	**Workshop 10**	**11/17**	**Updated for Isight 2018**
			Workshop 11	**11/17**	**Updated for Isight 2018**
			Workshop 12	**11/17**	**Updated for Isight 2018**
			Workshop 13	**11/17**	**Updated for Isight 2018**
			Workshop 14	**11/17**	**Updated for Isight 2018**
			Workshop 15a	**11/17**	**Updated for Isight 2018**
			Workshop 15b	**11/17**	**Updated for Isight 2018**

Lesson 1: Introduction

Lesson content:

- ▷ What is Isight?
- ▷ How does Isight Help Product Development?
- ▷ Automated Design Strategies
- ▷ Isight as the Simulation Flow Integrator
- ▷ Isight Components
- ▷ Isight as a Formalizer of the Engineering Problem
- ▷ Isight as a Driver of Sim-flows
- ▷ Isight Drivers
- ▷ Isight as an Engineering Data Analysis Tool
- ▷ Isight as an Integral Part of SIMULIA's SLM Offering
- ▷ Isight and the SIMULIA Execution Engine
- ▷ Isight Summary

30 minutes

Lesson 2: Isight Overview

Lesson content:

- ▷ Design Gateway
- ▷ Model Assembly
- ▷ Model Execution
- ▷ Runtime Gateway
- ▷ Design Process
- ▷ Example: I-Beam – The Problem
- ▷ 5 Steps for Using Isight
- ▷ Workshop Preliminaries
- ▷ Workshop 1: Exploration of an Isight model

30 minutes

Lesson 3: Design of Experiments

Lesson content:

▷ Motivation

▷ Techniques

▷ Factors, Levels, and Responses

▷ Design Matrix

▷ Execution

▷ Postprocessing

▷ Factor Configuration with Values

▷ Factor Configuration with Ranges

▷ DOE Technique Comparisons

▷ Considerations

▷ Workshop 2: I-Beam DOE

30 minutes

Lesson 4: Optimization

Lesson content:

- Introduction
- Optimization Techniques
- Gradient Methods
- Direct Methods
- Exploratory Methods
- Genetic Algorithms
- Comparing Optimization Techniques
- Pointer
- Pointer2
- Multi-Objective Optimization
- Optimization Analogy: The Big Telescope
- Workshop 3: I-Beam Optimization

1 hour

Lesson 5: Monte Carlo and Six Sigma

Lesson content:

- ▷ Monte Carlo Overview
- ▷ Why use Monte Carlo Simulation?
- ▷ Key Components
- ▷ Terminology
- ▷ Basic Approach
- ▷ Random Variable Distributions
- ▷ Skewed Normal Distribution
- ▷ Sampling Techniques
- ▷ Results
- ▷ Estimating Reliability
- ▷ Probability Table
- ▷ Six Sigma Overview
- ▷ Six Sigma Analysis Types
- ▷ Six Sigma Results Aggregate Parameter
- ▷ Workshop 4: Plate Weld Monte Carlo and Six Sigma

30 minutes

Lesson 6: Approximations

Lesson content:

- Background
- Approximation in Isight
- Response Surface Model (RSM)
- Orthogonal Polynomial (Chebyshev)
- Polynomial Approximations: Summary
- Radial Basis Functions (RBF)
- Elliptical Basis Functions (EBF)
- Radial and Elliptical Basis Functions: Summary
- Kriging
- Effect of Sample Size

- Advantages and Disadvantages of RBF/EBF/Kriging
- Recommendations for Technique Selection
- Approximation
- Approximation Wizard
- Verifying Approximation Accuracy
- Visualization and Design Space Surfing
- Workshop 5: I-Beam Approximations

30 minutes

Lesson 7: Isight Components (Part 1)

Lesson content:

▷ Data Exchanger Component

▷ OS Command Component

▷ Simcode Component

▷ Excel Component

▷ Calculator Component

▷ Workshop 6: SimCode Component – EngSim

▷ Workshop 7: Calculator Component

▷ Workshop 8: Mapping and Parallel Sim-flows

▷ Workshop 9: Excel Component

45 minutes

Lesson 8: File Handling

Lesson content:

- Introduction
- Where Does Isight Execute?
- Overriding Defaults
- Isight File Handling & Execution
- File Parameters
- Component Execution Sequence
- Configuring Input File Parameters
- Configuring Output File Parameters
- File Parameter File Handlers
- "In Model" File Parameters

- Configuring the "Save to DB" option for File Parameters
- Using File Sets
- Isight Database
- The Loop Component
- Workshop 10: Advanced Parsing
- Workshop 11: Loops and Publishing
- Workshop 12: Combining Models
- Workshop 13: File Parameters
- Workshop 14: Data Management (optional)

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45 minutes

Lesson 9: Isight Components (Part 2)

Lesson content:

▷ Abaqus Component

▷ Data Matching Component

▷ Workshop 15a: Data Matching

▷ Workshop 15b: Data Matching on Abaqus Results

See Appendix 1 for
more on Components

30 minutes

Appendix 1: More Components

Appendix content:

▷   MATLAB Component

45 minutes