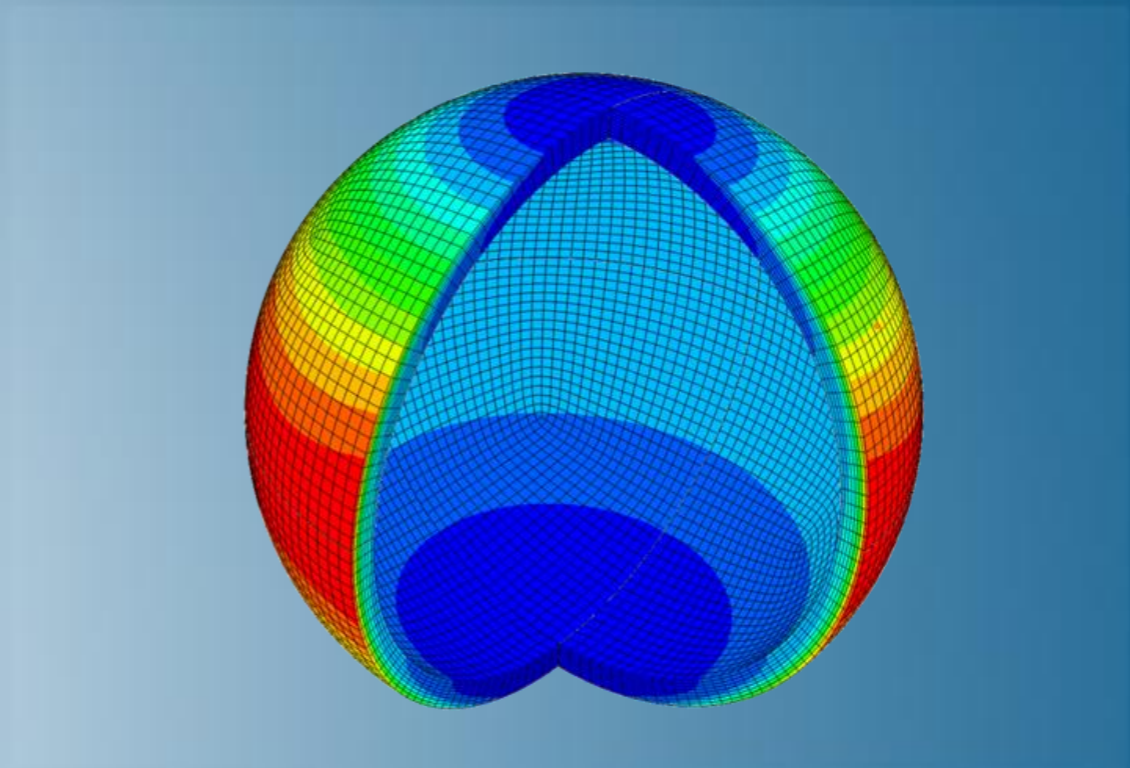


Electromagnetic Analysis with Abaqus

Abaqus 2018



3DEXPERIENCE[®]



About this Course

Course objectives

Upon completion of this course you will be able to:

- ▶ Set up and create electromagnetic models with Abaqus
- ▶ Perform low frequency eddy current analyses with Abaqus
- ▶ Perform transient eddy current analyses with Abaqus
- ▶ Perform magnetostatic analyses with Abaqus

Targeted audience

Simulation Analysts

Prerequisites

This course is recommended for engineers with experience using Abaqus



1 day

Day 1

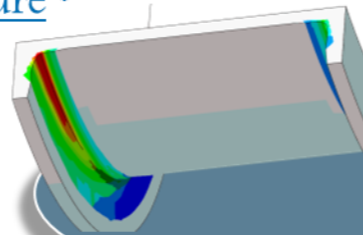
- ▶ Lecture 1 Introduction to Computational Electromagnetics
- ▶ Lecture 2 Geometry, Material Properties, Elements and Meshing
 - Workshop 1 Heating of a Rod: Problem setup
 - Workshop 2 Sphere in a Magnetic Field: Problem setup
- ▶ Lecture 3 Loads and Boundary Conditions
- ▶ Lecture 4 Output and Transfer of Results
 - Workshop 1 (cont'd) Heating of a Rod: Thermal Response
 - Workshop 2 (cont'd) Sphere in a Magnetic Field: Electromagnetic Response
 - Workshop 3 Magnetostatic Analysis of a Solenoid Valve
 - Workshop 4 Magnetic Pulse Forming of a Metallic Tube

SIMULIA

- ▶ SIMULIA is the Dassault Systèmes brand for Realistic Simulation solutions
- ▶ Portfolio of established, best-in-class products
 - Abaqus, Isight, Tosca, fe-safe, Simpack

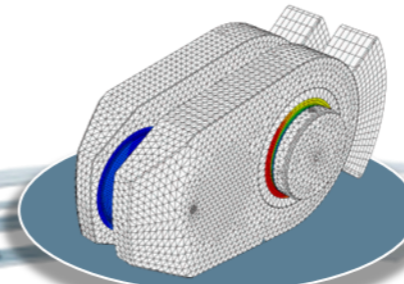
Design Optimization: Tosca Structure *

Simulation-driven design refinement to improve performance



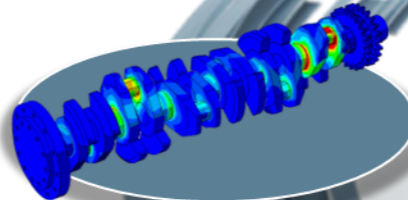
Durability Assessment: fe-safe *

Accurate life estimation to achieve certification



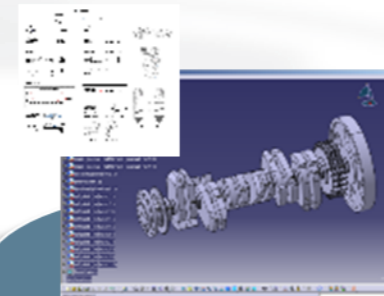
FEA Stress Analysis: Abaqus *

Detailed stress analysis using extracted load history from MBS



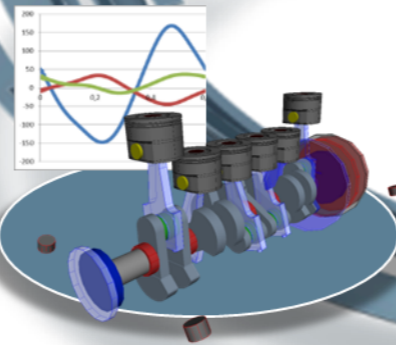
CAD Geometry: CATIA

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



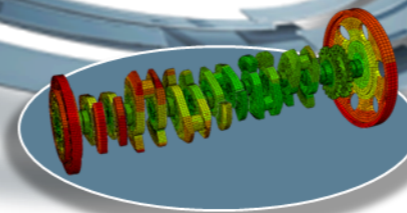
Multibody Simulation: Simpack

System analysis to extract virtual load history of complete working cycle



Mesh Calibration: Isight *

Automated mesh calibration; sufficient mesh quality for accurate results

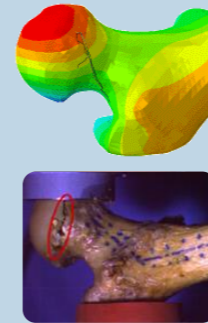


* Included in extended licensing pool

SIMULIA's Power of the Portfolio

Abaqus

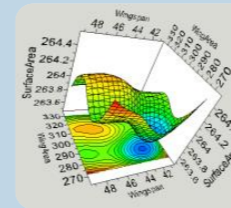
- Routine and Advanced Simulation
- Linear and Nonlinear, Static and Dynamic
- Thermal, Electrical, Acoustics
- Extended Physics through Co-simulation
- Model Preparation and Visualization



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

Isight

- Process Integration
- Design Optimization
- Parametric Optimization
- Six Sigma and Design of Experiments



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Revision Status

Lecture 1	11/17	Updated for Abaqus 2018
Lecture 2	11/17	Updated for Abaqus 2018
Lecture 3	11/17	Updated for Abaqus 2018
Lecture 4	11/17	Updated for Abaqus 2018
Workshop 1	11/17	Updated for Abaqus 2018
Workshop 2	11/17	Updated for Abaqus 2018
Workshop 3	11/17	Updated for Abaqus 2018
Workshop 4	11/17	Updated for Abaqus 2018

Lesson 1: Introduction to Computational Electromagnetics

Lesson content:

- ▶ Motivation
- ▶ Basics of Electromagnetism
- ▶ Computational Electromagnetics in Abaqus
- ▶ Workflow of an Electromagnetic Analysis
- ▶ Examples



45 minutes

Lesson 2: Geometry, Material Properties, Elements and Meshing

Lesson content:

- ▶ Geometry Creation
- ▶ Material Properties
- ▶ Element Technology
- ▶ Meshing
- ▶ Workshop Preliminaries
- ▶ Workshop 1: Heating of a Rod: Problem setup
- ▶ Workshop 2: Sphere in a Magnetic Field: Problem setup



2 hours

Lesson 3: Loads and Boundary Conditions

Lesson content:

- ▶ Introduction
- ▶ Loads
- ▶ Boundary Conditions
- ▶ Symmetry
- ▶ Motion



1 hour

Lesson 4: Output and Transfer of Results

Lesson content:

- ▶ Analysis Procedures
- ▶ Co-simulation
- ▶ Sequential Mapping
- ▶ Output
- ▶ Workshop 1 (cont'd): Heating of a Rod: Thermal Response
- ▶ Workshop 2 (cont'd): Sphere in a Magnetic Field: Electromagnetic Response
- ▶ Workshop 3: Magnetostatic Analysis of a Solenoid Valve
- ▶ Workshop 4: Magnetic Pulse Forming of a Metallic Tube



3 hours