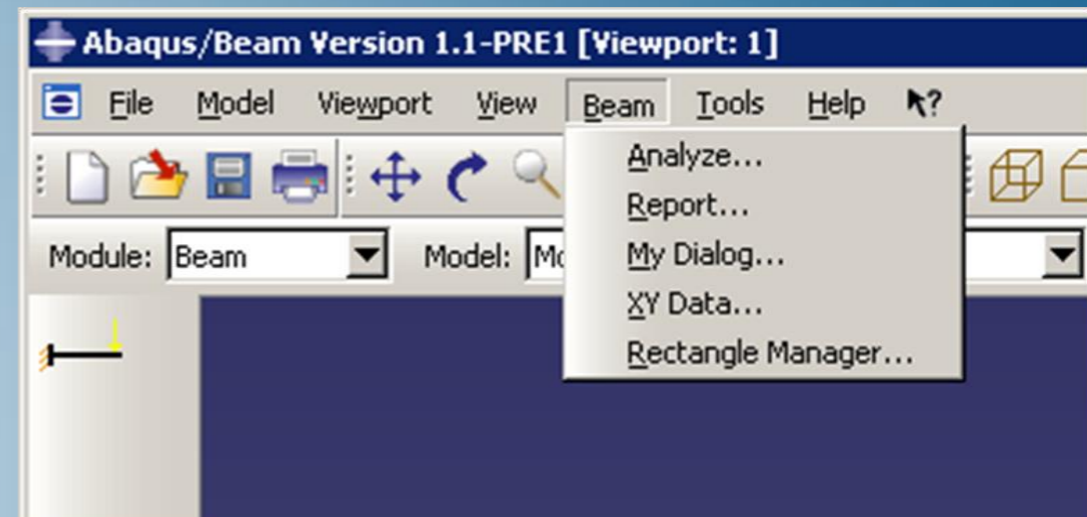


# GUI Customization with Abaqus

Abaqus 2019



**3DEXPERIENCE**<sup>®</sup>



# About this Course

## Course objectives

The goal of this course is to train you to use the Abaqus GUI Toolkit to customize the Abaqus/CAE interface or build your own applications

- ▶ Learn how to build dialogs and issue commands from the GUI
- ▶ Learn how to create and modify GUI modules and toolsets
- ▶ Learn how to create custom applications

## Targeted audience

Users interested in modifying and extending the capabilities of Abaqus by customizing their Abaqus interface

## Prerequisites

This seminar assumes prior knowledge of the Python programming language and the Abaqus kernel commands. Thus, students *must* attend the Introduction to Abaqus Scripting seminar prior to attending this class. Experience with object-oriented programming and GUI toolkits is recommended, but not required.



3 days

# Day 1

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- ▶ Lecture 1      GUI Toolkit Introduction
- ▶ Lecture 2      Widget Library
  - Workshop 1    Creating Widgets
- ▶ Lecture 3      Layout Managers
  - Workshop 2    Using Layout Managers
- ▶ Lecture 4      Dialogs
- ▶ Lecture 5      GUI Messaging
  - Workshop 3    Message Handling
- ▶ Lecture 6      Commands and Keywords (Part 1)
  - Workshop 4    Using GUI Commands and Keywords (Part 1)

## Day 2

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- ▶ Lecture 7            Commands and Keywords (Part 2)
- ▶ Lecture 8            Modes (Part 1)
  - Workshop 5        Using GUI Commands and Keywords (Part 2)
- ▶ Lecture 9            Modes (Part 2)
  - Workshop 6        Modes Processing
  - Workshop 7        Procedures
- ▶ Lecture 10           Modules and Toolsets
- ▶ Lecture 11           Building Applications
  - Workshop 8        Creating an Application
  - Workshop 9        Additional Exercises

## Day 3

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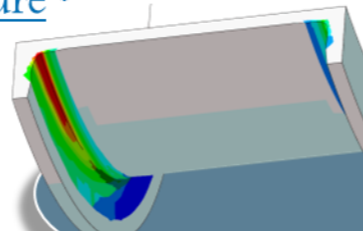
- ▶ Lecture 12      Other Topics
  - Workshop 10    Using customData
  
- ▶ Wrap up      Finish workshops  
                 Consulting for company-specific applications

# SIMULIA

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

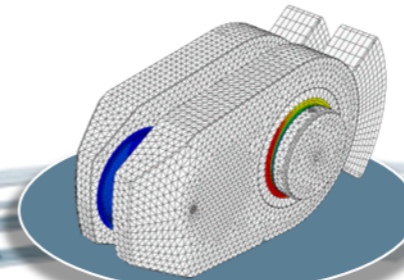
## Design Optimization: Tosca Structure \*

Simulation-driven design refinement to improve performance



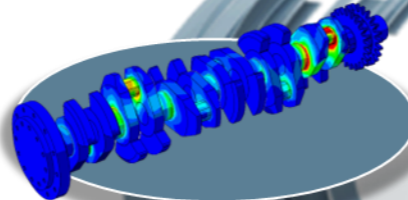
## Durability Assessment: fe-safe \*

Accurate life estimation to achieve certification



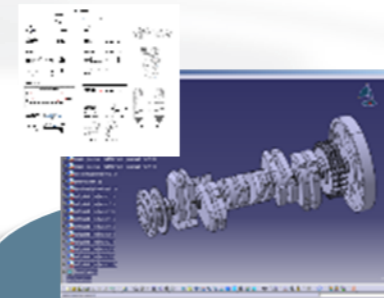
## FEA Stress Analysis: Abaqus \*

Detailed stress analysis using extracted load history from MBS



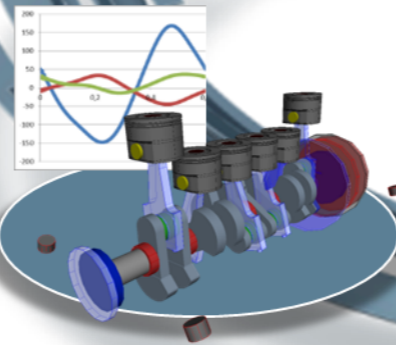
## CAD Geometry: CATIA

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



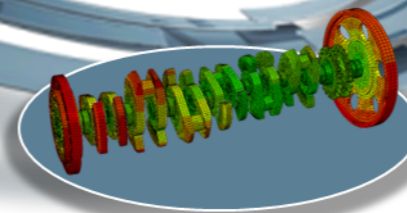
## Multibody Simulation: Simpack

System analysis to extract virtual load history of complete working cycle



## Mesh Calibration: Isight \*

Automated mesh calibration; sufficient mesh quality for accurate results

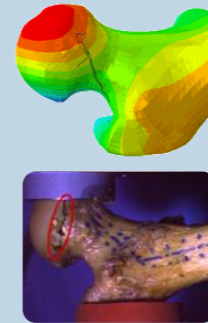


\* Included in extended licensing pool

# SIMULIA's Power of the Portfolio

## Abaqus

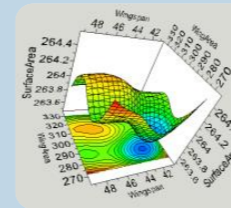
- Routine and Advanced Simulation
- Linear and Nonlinear, Static and Dynamic
- Thermal, Electrical, Acoustics
- Extended Physics through Co-simulation
- Model Preparation and Visualization



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

## Isight

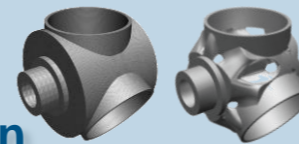
- Process Integration
- Design Optimization
- Parametric Optimization
- Six Sigma and Design of Experiments



**Material Calibration  
Workflow Automation  
Design Exploration**

## Tosca

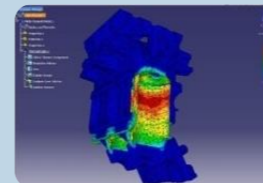
- Non-Parametric Optimization
- Structural and Fluid Flow Optimization
- Topology, Sizing, Shape, Bead Optimization



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

## fe-safe

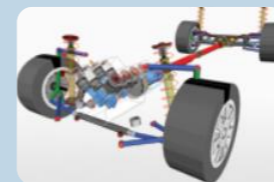
- Durability Simulation
- Low Cycle and High Cycle Fatigue
- Weld, High Temperature, Non-metallics



**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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in f t YouTube

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# Revision Status

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Lecture 1	11/18	Updated for Abaqus 2019
Lecture 2	11/18	Updated for Abaqus 2019
Lecture 3	11/18	Updated for Abaqus 2019
Lecture 4	11/18	Updated for Abaqus 2019
Lecture 5	11/18	Updated for Abaqus 2019
Lecture 6	11/18	Updated for Abaqus 2019
Lecture 7	11/18	Updated for Abaqus 2019
Lecture 8	11/18	Updated for Abaqus 2019
Lecture 9	11/18	Updated for Abaqus 2019
Lecture 10	11/18	Updated for Abaqus 2019
Lecture 11	11/18	Updated for Abaqus 2019
Lecture 12	11/18	Updated for Abaqus 2019

Workshop 1	11/18	Updated for Abaqus 2019
Workshop 2	11/18	Updated for Abaqus 2019
Workshop 3	11/18	Updated for Abaqus 2019
Workshop 4	11/18	Updated for Abaqus 2019
Workshop 5	11/18	Updated for Abaqus 2019
Workshop 6	11/18	Updated for Abaqus 2019
Workshop 7	11/18	Updated for Abaqus 2019
Workshop 8	11/18	Updated for Abaqus 2019
Workshop 9	11/18	Updated for Abaqus 2019
Workshop 10	11/18	Updated for Abaqus 2019

# Lesson 1: GUI Toolkit Introduction

## *Lesson content:*

- ▶ Types of Customization
- ▶ Background
- ▶ Abaqus GUI Toolkit
- ▶ Example
- ▶ Documentation and References
- ▶ Customization Services
- ▶ GUI Application Components



30 minutes

# Lesson 2: Widget Library

## *Lesson content:*

- ▶ GUI Application Overview
- ▶ Introduction
- ▶ Widgets
- ▶ Workshop Preliminaries
- ▶ Workshop 1: Creating Widgets



1.5 hours

# Lesson 3: Layout Managers

## *Lesson content:*

- ▶ GUI Application Overview
- ▶ Layout Managers
- ▶ Layout Hints
- ▶ Example
- ▶ Workshop 2: Using Layout Managers



2 hours

# Lesson 4: Dialogs

## *Lesson content:*

- ▶ GUI Application Overview
- ▶ Dialogs



30 minutes

# Lesson 5: GUI Messaging

## *Lesson content:*

- ▶ Messaging
- ▶ Workshop 3: Message Handling



1.5 hours

# Lesson 6: Commands and Keywords (Part 1)

## *Lesson content:*

- ▶ GUI Application Overview
- ▶ Data Targets
- ▶ GUI Commands and Keywords
- ▶ AFX Targets
- ▶ Using Keywords and Targets with Widgets
- ▶ Workshop 4: Using GUI Commands and Keywords (Part 1)



1.5 hours

# Lesson 7: Commands and Keywords (Part 2)

## *Lesson content:*

- ▶ GUI Application Overview
- ▶ Data Targets
- ▶ Using Keywords and Targets with Widgets



30 minutes

# Lesson 8: Modes (Part 1)

## *Lesson content:*

- ▶ GUI Application Overview
- ▶ Modes
- ▶ Form Example
- ▶ Workshop 5: Using GUI Commands and Keywords (Part 2)



1.5 hours

# Lesson 9: Modes (Part 2)

## *Lesson content:*

- ▶ GUI Application Overview
- ▶ Detailed Mode Execution
- ▶ Procedure Modes
- ▶ Procedure Example
- ▶ Workshop 6: Modes Processing
- ▶ Workshop 7: Procedures



2.5 hours

# Lesson 10: Modules and Toolsets

## *Lesson content:*

- ▶ GUI Application Overview
- ▶ Modules and Toolsets



15 minutes

# Lesson 11: Application Overview

## *Lesson content:*

- ▶ GUI Application Overview
- ▶ Applications
- ▶ The Main Window
- ▶ Customizing Abaqus/CAE
- ▶ Workshop 8: Creating an Application
- ▶ Workshop 9: Additional Exercises



3 hours

# Lesson 12: Other Topics

## *Lesson content:*

- ▶ Plug-ins
- ▶ Custom Data
- ▶ Internationalization
- ▶ Context Sensitive Help
- ▶ Miscellaneous
- ▶ Feedback
- ▶ Workshop 10: Using customData



1.5 hours