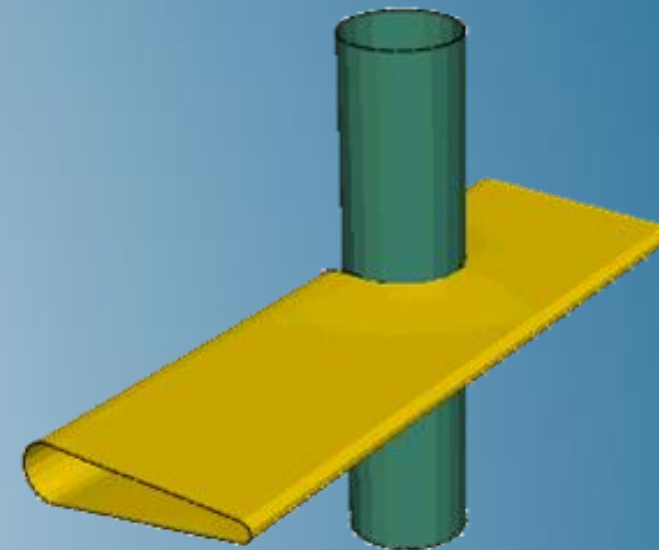


CZone for Abaqus

Abaqus 2020



3DEXPERIENCE®



About this Course

Course objectives

Upon completion of this course you will be able to:

- ▶ Include crushable composite structures in your impact simulations
- ▶ Understand guidelines for defining crushable composite materials based on composite coupon and component testing
- ▶ Incorporate crushable composite structures into your models and how to postprocess CZA analysis results

Targeted audience

Engineers with experience using Abaqus/Explicit

Prerequisites

The *Abaqus/Explicit: Advanced Topics* and *Analysis of Composite Materials with Abaqus* courses are recommended as prerequisites



4 hours

Day 1

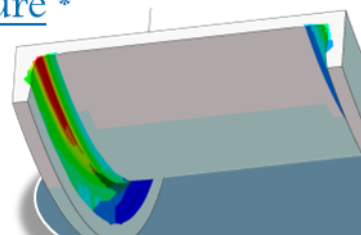
- ▶ Lesson 1 Modeling Crushable Composite Materials
- ▶ Lesson 2 Creating a CZA Model
 - Workshop 1 Race car wing impact: Model Setup
- ▶ Lesson 3 Postprocessing
 - Workshop 2 Race car wing impact: Postprocessing

SIMULIA

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

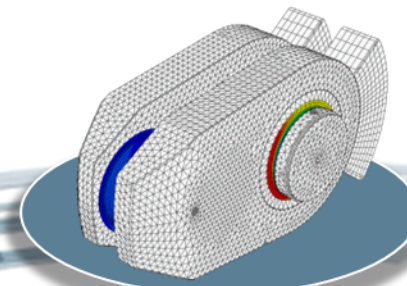
Design Optimization: Tosca Structure *

Simulation-driven design refinement to improve performance



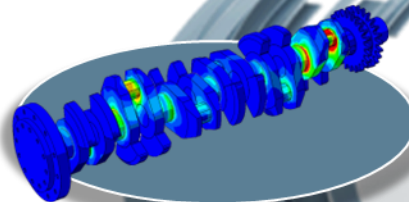
Durability Assessment: fe-safe *

Accurate life estimation to achieve certification



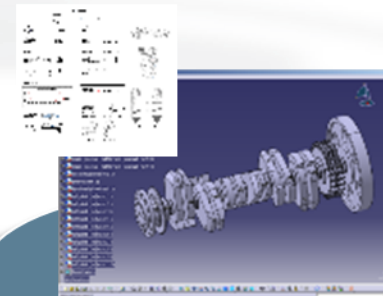
FEA Stress Analysis: Abaqus *

Detailed stress analysis using extracted load history from MBS



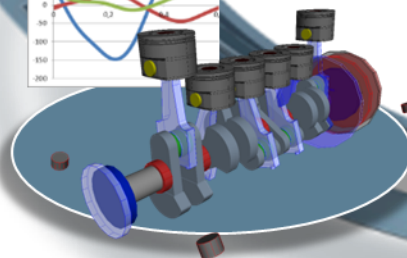
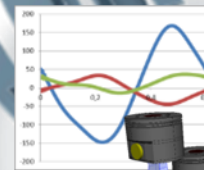
CAD Geometry: CATIA

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



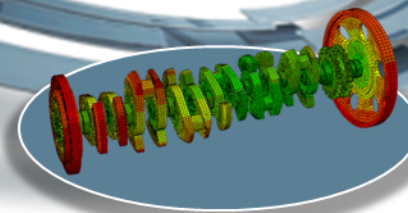
Multibody Simulation: Simpack

System analysis to extract virtual load history of complete working cycle



Mesh Calibration: Isight *

Automated mesh calibration; sufficient mesh quality for accurate results

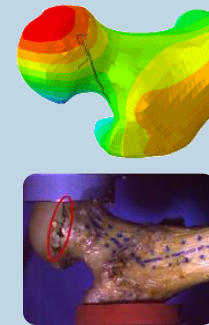


* Included in extended licensing pool

SIMULIA's Power of the Portfolio

Abaqus

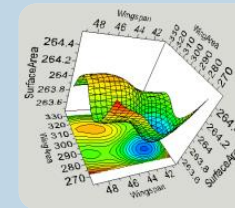
- Routine and Advanced Simulation
- Linear and Nonlinear, Static and Dynamic
- Thermal, Electrical, Acoustics
- Extended Physics through Co-simulation
- Model Preparation and Visualization



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

Isight

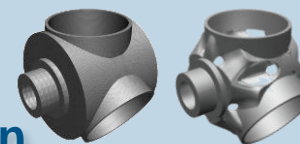
- Process Integration
- Design Optimization
- Parametric Optimization
- Six Sigma and Design of Experiments



**Material Calibration
Workflow Automation
Design Exploration**

Tosca

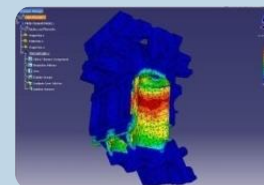
- Non-Parametric Optimization
- Structural and Fluid Flow Optimization
- Topology, Sizing, Shape, Bead Optimization



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

fe-safe

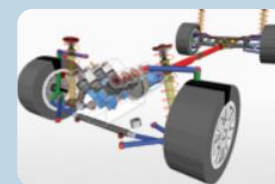
- Durability Simulation
- Low Cycle and High Cycle Fatigue
- Weld, High Temperature, Non-metallics



**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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- > By Location
- > By Course

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- > Full Schedule

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Revision Status

Lesson 1	11/19	Updated for Abaqus 2020
Lesson 2	11/19	Updated for Abaqus 2020
Lesson 3	11/19	Updated for Abaqus 2020
Workshop 1	11/19	Updated for Abaqus 2020
Workshop 2	11/19	Updated for Abaqus 2020

Lesson 1: Modeling Crushable Composite Materials

Lesson content:

- ▶ What is CZone?
- ▶ Why do we need CZone?
- ▶ CZone applications and examples
- ▶ CZone crush stress
- ▶ Other CZA material properties
- ▶ More on Damping and Viscoelasticity
- ▶ Summary



1.5 hours

Lesson 2: Creating a CZA Model

Lesson content:

- ▶ Modeling crushable structures
- ▶ Composite layups
- ▶ CZone contact
- ▶ Output
- ▶ CZA plug-in for Abaqus/CAE
- ▶ CZA modeling checklist
- ▶ Workshop Preliminaries
- ▶ Workshop 1: Race car wing impact: Model Setup



2 hours

Lesson 3: CZA Postprocessing

Lesson content:

- ▶ Introduction
- ▶ Identifying failure
- ▶ Viewing a composite layup
- ▶ X-Y plots
- ▶ Workshop 2: Race car wing impact: Postprocessing



1 hour