

# Introduction to Abaqus for CATIA V5

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## Day 1

- **Lecture 1**      **Abaqus for CATIA V5 Overview**
- **Lecture 2**      **Integration of AFC into CATIA V5**
  - Workshop 1      Introduction to the AFC Interface
- **Lecture 3**      **Analysis Cases and Analysis Steps**
- **Lecture 4**      **Defining Model and Part Properties**
- **Lecture 5**      **Defining Loads, Boundary Conditions, and Fields**
  - Workshop 2      Defining Loads, Boundary Conditions, and Fields
  - Workshop 3      Defining a Parametric Study and an Analysis Template
  - Workshop 4      Analysis Assembly
  - Workshop 5      Optimization of an I-beam

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## Day 2

- **Lecture 6**      **Assembly Properties**
- **Lecture 7**      **Obtaining and Evaluating Results**
- **Lecture 8**      **Best Practices**
  - Workshop 6      Linear vs. Nonlinear - Analysis of a Skew Plate
  - Workshop 7      Structural Analysis of an Automotive Control Arm
  - Workshop 8      Working with Composite Shells Including Spot Welds and Contact
  - Workshop 9      Contact Pair vs. General Contact - Lap Joint Analysis
  - Workshop 10     Understanding Contact using an Analysis of a Syringe
  - Workshop 11     Explicit Dynamics Analysis of a Crushable Tube
  - Workshop 12     Sequential Thermal-Structural Analysis of a Disk Brake
  - Workshop 13     Defining Assembly Constraints and Bolt Tightening Connections



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# Abaqus for CATIA V5 Overview

Lecture 1

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## Overview

- Abaqus FEA and AFC
- Abaqus for CATIA V5 Features
- AFC-GPS Features Comparison
- Licensing

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# Integration of AFC into CATIA V5

## Lecture 2

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### Overview

- **AFC Prerequisites and Co-requisites**
- **CATIA Feature Integration**
  - Units
  - Material Properties
  - Assembly Constraints
  - Knowledgeware
  - Templates and Publications
  - Automation
  - Job Submission
  - Results Visualization
  - Assembly of Analysis
  - Product Engineering Optimizer (PEO)
- **The AFC Specification Tree**

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# Analysis Cases And Analysis Steps

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## Overview

- **Analysis Cases**
  - What is an Analysis Case?
  - Defining an Analysis Case
  - Which features for which Cases?
- **Analysis Steps**
  - What is an Analysis Step?
  - Structural Static Analysis Steps
  - Explicit Dynamics Analysis Step
  - Thermal Analysis Step
- **General Considerations**
  - Step Succession Rules
  - Current Analysis Case and Step

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# Defining Model And Part Properties

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## Overview

- **Properties Overview**
- **Mesh and Model Properties**
  - Mesh Parts
  - Material Properties
  - Mesh Properties
  - Global & Local Element Assignment
  - Modeling Techniques
  - Importing Composite Properties from the Composite Design Workbench
- **Part Properties**
  - Analytical Rigid Surface
  - Rigid Body Constraint
  - Rigid And Smooth Coupling
  - Rigid And Smooth Virtual Parts
  - Masses And Mass Sets

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# Defining Loads, Boundary Conditions, And Fields

Lecture 5

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## Overview

- **General Considerations**
  - Propagation
  - Amplitudes
  - Local Axis Systems
  - User Subroutines
  - Groups
  - Selection Sets
- **Nonlinear Structural Analysis Workbench**
  - Boundary Conditions, Loads, and Fields
- **Thermal Analysis Workbench**
  - Boundary Conditions, Loads, and Fields

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# Assembly Properties

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## Overview

- **Assembly Properties**
  - Assembly Overview
  - Analysis Connections
  - Contact/Fastened Connections
  - Connection Properties
  - Distant Connections
  - Welding Connections
  - Point-based Connections

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# Obtaining and Evaluating Results

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## Overview

- **Analysis Control**
  - Tools Options
  - Abaqus Files
  - Output Requests
- **Integrated Job Management**
  - Job Manager
  - Job Monitor
  - Storage Manager
- **Postprocessing Results**
  - Postprocessing Tools
  - Analysis Tools

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# Best Practices

## Lecture 8

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### Understanding common warning messages

- **NUMERICAL SINGULARITY**
  - Unconstrained rigid body mode
- **ZERO PIVOT**
  - Overconstrained degree of freedom
    - Overconstraint checks can be bypassed by un-toggling **Enable overconstraint checks** (in **Tools**→**Option**) but is NOT recommended.
    - Minor analysis speed up if overconstraint checks are turned off.
    - Overconstraints may produce damaging and unpredictable behavior, hence should be resolved before proceeding to solve the analysis.

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