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Fusion 360 Simulation: Working with imported geometry - Instructor Guide

This instructor guide is a comprehensive tool for facilitating this course in the classroom. Prepare to teach this course by thoroughly reviewing this document, as well as all related course materials and resources. You don't need be expert in Autodesk® Fusion 360™ to deliver this course, but you should understand the foundational concepts associated with Finite Element Analysis. If you are new to Fusion 360 and/or new to CAD, we suggest developing a solid foundation in the core concepts of Fusion 360 before presenting this course to your students.

The following learning resources are pre-requisites to help prepare you in supporting your students through this course.

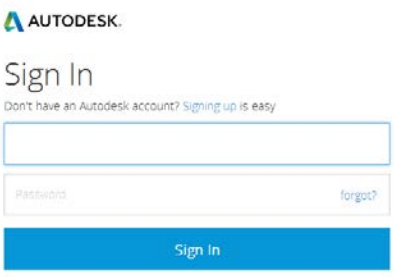
Fusion 360: Foundational Concepts *(academy.autodesk.com)* explores core concepts behind Fusion 360 CAD/CAM through a series of lectures and hands-on exercises. We highly recommend you enroll in this course if you are new to Fusion 360 and/or new to CAD.

We've summarized the core Fusion 360 skills in Fusion Mastery: Working with imported geometry course so you can familiarize yourself with them before delivering this learning content in the classroom. It's always recommended that you work through the course yourself in preparation for each lesson.

- Sketch – Basic Sketch Modeling.
- Sketch – Application of Dimensions and Constraints.
- Feature – Extrude, Revolve, Sweep and Fillet.
- User Interface – Workspace Navigation.

Each lesson is listed below along with suggested time allocations for instruction. The referenced demonstrations are based on the step-by-step instruction included in the course. Review the video tutorials and/or step by step print guides for the detailed instruction in each lesson.

Lesson 1: Getting started

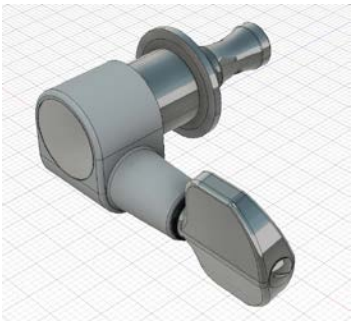


Total Time Required for Lesson: 20 minutes
Discuss Objectives: 3 Minutes
Demonstrate:10 Minutes

- Review course overview and learning objectives
- Download the course resources and software
- Create an Autodesk ID
- Install the software

Hands on Time: 5 Minutes
Review Objective: 2 minutes

Lesson 2: Importing geometry from Autodesk and non-native applications



Total Time Required for Lesson: 15 minutes

Discuss Objectives: 3 Minutes
Demonstrate: 5 Minutes

- Import native and non-native CAD files to Fusion 360.
- Upload data to a project.

Hands on Time: 5 Minutes
Review Objectives: 2 minutes

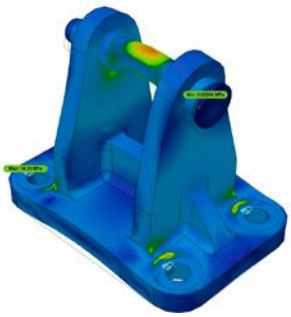
Lesson 3: Editing non-native imported geometry

Total Time Required for Lesson: 15 minutes
Discuss Objectives: 3 Minutes
Demonstration: 5 Minutes

- Edit imported models to form a solid.
- Access the Patch Workspace.
- Use direct modeling tools.

Hands-on Time: 5 Minutes
Review Objectives: 2 minutes

Lesson 4: Contact types for simulation



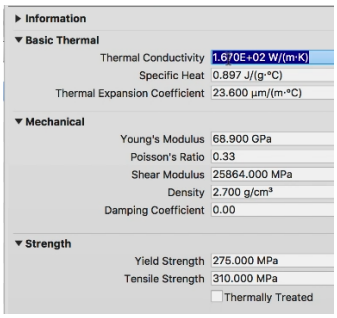
Total Time Required for Lesson: 20 minutes
Discuss Objectives: 3 Minutes
Video Lecture: 3 Minutes
Demonstration: 5 Minutes

- Use Automatic and Manual Contacts.
- Identify types of contacts.

- Articulate the idea of contacts.

Hands-on Time: 5 Minutes
Review Objectives: 2 minutes

Lesson 5: Defining materials and properties

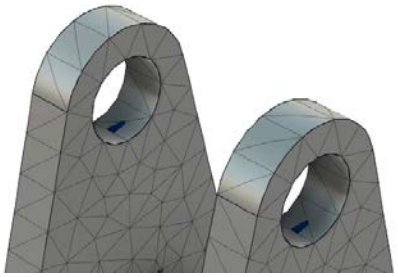


Total Time Required for Lesson: 20 minutes
Discuss Objectives: 3 Minutes
Demonstration: 5 Minutes

- Change the material of the model.
- Duplicate and edit a physical material.
- Set a study material.

Hands-on Time: 10 Minutes
Review Objectives: 2 minutes

Lesson 6: Principles of model meshing for simulation

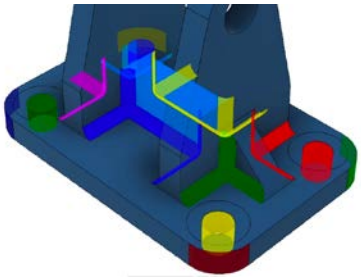


Total Time Required for Lesson: 30 minutes
Discuss Objectives: 3 Minutes
Video Lecture: 6 Minutes
Demonstration: 8 Minutes

- Set mesh properties.
- Use adaptive mesh refinement.
- Apply local mesh control.
- Discuss the principles of meshing.
- Understand the reason for local mesh refinement.

Hands-on Time: 10 Minutes
Review Objectives: 2 minutes

Lesson 7: Model simplification for Finite Element Analysis (FEA)



Total Time Required for Lesson: 20 minutes
Discuss Objectives: 3 Minutes
Demonstration: 5 Minutes

- Use simplification to remove components.
- Remove features from the simulation model.
- Add features to the simulation model.

Hands-on Time: 10 Minutes
Review Objectives: 2 minutes

Next Steps

Total Time Required for Lesson: 10 minutes
Discuss Objectives: 1 Minutes
Demonstration – 1 Minutes

- Launch website *http://academy.autodesk.com* and *http://academy.autodesk.com/portfolios*
- Share designs to Portfolio
  Continue to develop your expertise in Fusion 360 Simulation and enroll in one of the following courses.
  Fusion 360 Simulation: Linear Material Analysis
  Fusion 360 Simulation: Nonlinear material analysis
  Fusion 360 Simulation: Thermal analysis
  Autodesk CFD: Fluid flow
- Review Inspiration menu for real world examples of industry design

Hands-on Time: 5 Minutes
Review Objectives: 3 minutes