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On Your Mark, Get Set, Go with Simulation in Fusion 360

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### Learning Objectives

- Understand the types of simulations that Fusion 360 supports
- Understand how best to use Simulation in the context of your Fusion design
- Understand how to capitalize on the cloud for simulation and collaboration
- Understand the basics for running your first simulation in Fusion 360

### Description

In this class, we will talk about everything you need to know to get started with Simulation in Fusion 360 software. We will look at how to take advantage of simulation in the context of your Fusion 360 design, the benefits of simulation being tied to the cloud for both solving and collaboration, the problems types that can be solved, and the basic steps to get up and running with your first simulation.

### Speaker

Aaron Magnin is a Technical Marketing Manager for Fusion 360 at Autodesk. He attended the University of Nevada, Reno, where he obtained a degree in Mechanical Engineering. In industry he had a focus on safety products, recreational sports equipment, and computer peripherals. He then found his way to application engineering where he focused on simulation products, training, & technical presentations. At Autodesk --and for Fusion 360 specifically-- he creates QUICK TIPS, “What's New Videos”, along with a wide array of other marketing content.

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Types of Simulations in Fusion 360

The Simulation workspace allows you to perform stress (static, nonlinear static, and event simulation), modal, buckling, thermal, thermal stress and shape optimization analyses. Each analysis type can provide you different results, or details related to failure criterion.

Details on each simulation type provided below:

**Static Stress** Analyze how the model responds to structural loads and constraints. From the results, you can investigate displacement, stresses, and safety factor. The results are calculated based on assumptions of small displacement and linear response to the stress.

**Modal Frequencies**: Analyze the natural free-vibration characteristics of designs. With results you can investigate the mode shapes and their mass participation factors.

**Thermal**: Determine the steady-state temperature distribution and the resultant heat flow.

**Thermal Stress**: Simulate temperature-induced stresses. Temperature gradients in the model and varying thermal expansion characteristics of the materials produce stresses due to nonuniform thermal expansion.

**Structural Buckling**: Determine the critical buckling multiplier for a structure subjected to compressive loads.

**Nonlinear Static Stress**: This expands on static stress analysis abilities by adding support for large deformations, changes in contact, changes in loads, nonlinear material behavior.

**Event Simulation**: This expands capabilities beyond nonlinear static stress analysis by adding support for inertial effects for true time-dependent dynamic event simulation (e.g. impact).

**Shape Optimization**: Determine where you can remove material from your design.

For future reference and additional details, make sure to see: [https://goo.gl/mbXPGD](https://goo.gl/mbXPGD)
Best use in the Context of your Fusion Design

In practice, the majority of simulations are run with one of two goals in mind: to validate a design, or to optimize a design.

While both can provide valuable information to designers, more value can be gained from the latter. Why? It takes a highly trained specialist hours to validate real-world conditions, but even the greenest of simulation users can improve a design based on trending information.

Further to that, if you perform a basic analysis early in the design phase, you can substantially improve the overall engineering process. Whereas design changes made to finished or near-finished products (where ‘validations’ often happen), changes are costly, and/or difficult to implement.

Capitalize on the Cloud

Cloud Solve
Fusion 360s connection to the cloud provides many unique benefits over other simulation tools, but as it relates to simulation, we cannot overstress the importance of cloud solving.

Cloud solve overcomes three major hurdles experienced when creating and running simulations:
1. Hardware limitations -- by using the cloud, you’ll have access to high quality, advanced simulation results without losing sleep or requiring expensive hardware.
2. Removes the burden of the local solve -- when you solve a simulation locally, there’s not much else you can do but watch and wait.
3. Simultaneous solve – combine both benefits above, then multiply it. Solve 10’s or 100’s of simulations at the same time.

Sharing Results & Collaboration
Product development typically requires multiple people to take a product to market. This Collaborate section covers how to work with others on your Fusion 360 project.

Share Links -- You can share and make your designs available to anyone for download (even to people without an Autodesk ID). Share a design using a public web link. Right-click, and select Share Public Link.

Mobile Apps – These let you collaborate on 3D designs with anyone inside or outside your company. With the Fusion 360 app, you have the flexibility to view and collaborate on your Fusion 360 CAD models–anytime, anywhere. The app supports more than 100 file formats including DWG, SLDPRPT, IPT, IAM, CATPART, IGES, STEP, STL, making it easy to share designs with your team, clients, partners, and friends.
Team Hub – With a team hub, you can gain administrative rights over team members, projects, and more:

- Users with different levels of permissions or roles (Team Administrator, Team Member, and Project Contributor)
- Different types of projects (Closed, Secret, and Open)
- Roles within a project (Project Administrator, Editor, Viewer)
- Settings to determine the types of users on the hub
- Settings to determine how users are invited