

3D Modeling & 3D Printing Course (With Fusion 360)

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- **Session 1:** Fusion 360 fundamentals — the original “Getting Started” material and Top Ten Beginner Items. From STL to 3D Printing.
- **Session 2:** 3D Printing Remixing — why Fusion 360 is useful for remixing existing STL models, the remixing workflow, and Bambu Studio → X1C.
- **Session 3:** AI-Assisted 3D Modeling — integrating Tripo AI with Fusion 360 to generate 3D concepts from text prompts and reference images, import AI-generated meshes into Fusion 360, and transform conceptual models into refined, functional, and printable designs.

SESSION 1

Getting Started with Fusion 360

Session Synopsis

This introductory class session provides attendees with a comfortable and practical starting point for working with **Autodesk Fusion 360**. Before moving into advanced 3D modeling and STL remixing techniques, attendees will become familiar with the Fusion 360 interface, navigation, file management, components, sketches, and the basic principles of parametric design.

The emphasis is on developing **good habits from the beginning**. Rather than attempting to memorize every Fusion 360 command, attendees will learn a practical workflow that helps them navigate, organize, save, modify, and ultimately produce their designs.

The goal of this session is to establish the foundation attendees will need for the more advanced work covered in Session 2.

Recommended Video Learning Approach

The videos associated with the Top Ten are intended as **supporting resources rather than ten separate in-class video lessons**.

During class, the instructor will introduce and demonstrate each concept, followed by hands-on practice. The recommended YouTube videos provide attendees with an opportunity to review a technique later at their own pace.

This approach keeps the class focused on **doing**, rather than simply watching.

The core workflow becomes:

Instructor Demonstration → Attendee Practice → Troubleshooting → Independent Review Video

Why Fusion 360 for 3D Printing Remixing?

When working with 3D-printed objects, there is an important distinction between **creating a visually appealing 3D model** and **creating a precise, functional part that actually works in the real world**.

AI-powered 3D generation tools such as Meshy and Tripo AI can be useful for quickly creating artistic, organic, or conceptual models from text and images.

However, when the goal is to create a functional mechanical part, modify an existing design to exact dimensions, maintain tight tolerances, or create components that must physically fit together, a traditional parametric CAD platform such as **Autodesk Fusion 360** provides the precision and control required.

Fusion 360 allows attendees to work with exact numerical dimensions, establish design relationships, and make changes to a model while maintaining its underlying design intent.

Precision and Parametric Control

Exact Measurements

Fusion 360 uses precise numerical dimensions—whether in millimeters or inches—for lines, holes, angles, offsets, and other geometry.

This provides the dimensional control necessary when creating parts that must match existing hardware or fit with other components.

Parametric Timeline

Fusion 360 records design operations in a Parametric Timeline.

An attendee can change an early design dimension, such as the diameter of a screw hole, and subsequent features can update based on that change.

This makes the model substantially easier to revise than a static polygon mesh.

Tight Tolerances

Functional 3D-printed parts often require specific clearances for:

- Snap-fits
- Threads
- Hinges
- Sliding components
- Mechanical assemblies
- Press fits
- Hardware interfaces

Parametric CAD provides the tools necessary to define and maintain these dimensions rather than relying solely on visual approximation.

Engineering and Manufacturing

Fusion 360 extends beyond simply creating shapes. It provides a broader engineering and manufacturing environment in which designs can be evaluated, modified, and prepared for fabrication.

Stress and Thermal Analysis

For appropriate designs and workflows, Fusion 360 provides simulation capabilities that can be used to evaluate how a component responds to loads, stress, and thermal conditions before committing to a physical prototype.

Manufacturing Ready

Fusion 360 supports workflows for manufacturing, including CNC machining, fabrication, and 3D printing.

Designs can be exported into appropriate formats for fabrication while maintaining greater control over the geometry than is typically available from an AI-generated polygon mesh.

Assembly Joints

Multiple components can be connected using mechanical joints such as hinges, sliders, and rigid connections.

This allows attendees to digitally examine movement, positioning, and potential interference before producing the physical parts.

Top Ten Beginner Items

1. Use a 3-Button Mouse

A middle scroll wheel lets attendees **zoom, pan, and orbit** easily. Developing comfortable 3D navigation skills is one of the first steps toward becoming efficient in Fusion 360.

Recommended Video: *How To Change Pan, Zoom, And Orbit Settings*

2. Master the Navigation Cube

Use the **View Cube** in the top-right corner to reset the view or look at flat sides. Attendees will learn how the View Cube provides quick access to standard orientations and helps maintain awareness of how the model is positioned in three-dimensional space.

Recommended Video: *Autodesk Fusion – The Viewcube*

3. Save Immediately

Save the file right when you start to secure the project. This establishes an important habit of protecting work and maintaining an organized project history.

4. Create Components Early

Make a new component for each distinct part you build so you can move or edit them separately.

Attendees will learn that **components are the building blocks of an organized Fusion 360 design**. Creating them early becomes especially important when designing assemblies containing several moving or interconnected parts.

5. Keep Sketches Simple

Draw basic shapes first and add complex details later using tools rather than one massive sketch.

The goal is to teach attendees to create **clean, understandable, and editable sketches**. Simple sketches are easier to troubleshoot, modify, and reuse as a design evolves.

Recommended Video: *Easy Sketching in Fusion 360: Beginner's Tutorial*

6. Fully Define Sketches

Add dimensions and constraints until sketch lines turn black so your model stays predictable.

Attendees will learn why dimensions and geometric constraints are critical to maintaining **design intent**. A properly constrained sketch is less likely to change unexpectedly when other dimensions or features are modified.

Recommended Video: *Fully Constrained Sketches – How to Create them in Autodesk Fusion*

7. Use Keyboard Shortcuts

Press **D** for dimensions and **Q** or **E** for commonly used modeling commands.

Rather than memorizing dozens of shortcuts, attendees will be introduced to the shortcuts they will use most frequently and encouraged to incorporate them naturally into their workflow.

8. Press S for Search

Hit the **S** key to open Fusion 360's quick command search and find tools without hunting through menus.

This is an important beginner productivity skill:

You don't have to know where a tool is to use it.

9. Learn the Parametric Timeline

Use the history bar at the bottom to go back in time and change past steps without breaking the model.

The Parametric Timeline is central to Fusion 360's workflow. Attendees will learn that a model is not simply a collection of shapes—it is a sequence of design decisions that can be revisited and modified.

Recommended Video: *Quick Tip: Parametric Timeline*

10. Manage Cloud Data

Use the **Data Panel** to keep projects and folders organized.

Attendees will learn how to locate, organize, and manage Fusion 360 projects and designs so that files can be retrieved and maintained as the course progresses.

Recommended Video: *Quick Tip: Data Panel Navigation*

Bambu Studio 3D Printing to X1C

From Digital Model to Physical Object

Once an STL model has been created or remixed in Fusion 360, the next step is preparing it for physical production.

Bambu Studio provides the bridge between the finished 3D model and the Bambu Lab X1C 3D printer.

Attendees will learn how to take their finished model, prepare it for slicing, evaluate the print settings, and send it to the printer.

Step-by-Step Quick Guide

1. Import the STL File

- Open **Bambu Studio**.
- Click the **Folder/Plus icon** on the top toolbar or drag and drop the .stl file directly onto the virtual build plate.

2. Select Printer and Material Settings

- Choose the appropriate **Printer model**, such as the **Bambu Lab X1 Carbon (X1C)** or P1S, from the top-left drop-down.
- Select the correct **Nozzle diameter**, typically **0.4 mm**, and the appropriate **Plate type**, such as the Textured PEI Plate.
- Under **Filament**, select the appropriate material and color, such as Bambu PLA Basic.

3. Position and Scale the Model

- Use the top menu tools to **Move, Rotate, or Scale** the model.
- Position the model appropriately on the build plate.
- Consider how orientation affects strength, surface quality, print time, and support requirements.
- Enable **Supports** when the model contains steep overhangs or other geometry that cannot be printed reliably without support.

4. Slice the Plate

- Click the green **Slice Plate** button in the top-right corner.
- Review the **Preview** screen.
- Check estimated print time, layer lines, support structures, and filament usage.
- Examine the sliced model for obvious problems before sending the job to the printer.

Session 1 Takeaway

By the end of Session 1, attendees should understand the basic Fusion 360 interface, navigation, file organization, components, sketching concepts, shortcuts, and Parametric Timeline.

More importantly, attendees will have developed the fundamental habits necessary to approach 3D modeling with an organized and intentional workflow.

These skills provide the foundation for Session 2, where attendees will apply Fusion 360 to **remixing existing 3D printer STL models** and preparing those designs for physical production.
