

Overview

What the area is for, equipment at a glance and who the Area Champion is.

- [Digital Fabrication Overview](#)
- [Fusion 360 Cheat Sheet](#)

Digital Fabrication Overview

Digital Fabrication covers the machines that turn a computer design into a physical part: **3D printers**, the **laser cutter** and **CNC**. The 3D printers live in the print lab; the laser and CNC are in the laser/CNC shop.

3D printing and laser cutting are **self-serve once you have been trained**.

Equipment at a glance

The current list of equipment, with locations and which machines need training, is in **Atlas**: <https://atlas.waukeshamakers.com>.

The 3D printers with maintenance pages in this book are:

- Original Prusa MK4
- Original Prusa i3 MK3S+
- Bambu Lab X1 Carbon with AMS 2 Pro and AMS
- Anycubic Kobra 2 Max

Pages in this book

- **Digital Fabrication: Fusion 360 Cheat Sheet**: the basics of designing parts in Fusion 360
- **Digital Fabrication: Laser Cutter**
- **Digital Fabrication: Laser-Safe and Prohibited Materials**
- Maintenance checklists for each 3D printer in the **Maintenance** chapter

Before you work here

- **Get trained** on each machine before you use it. See **Training and Certification: How Certification Works**, and check your certifications in Journeyman at <https://journeyman.waukeshamakers.com>.
- **Never leave the laser unattended** while it is running.
- **Only cut approved materials** on the laser. See **Digital Fabrication: Laser-Safe and Prohibited Materials**.

- **Fumes.** See **Shop Safety: Air Quality**.
- **Inspect before use.** See **Training and Certification: Pre-Use Inspection**. If a printer or the laser is not working right, tag it and report it: see **Shop Safety: Tagging a Tool Out of Service and Reporting It**.

To be confirmed: whether members supply their own filament and laser stock or the shop provides some, and how members send jobs to the printers. See also ****Facility Operations: Consumables****.

Learning to design

New to 3D design? The **Fusion 360 Basics** class walks you through your first model. The class outline and handout are in **Classes and Instructors: Fusion 360 Basics**, and the cheat sheet is in this book.

Area Champion

To be confirmed: who the Digital Fabrication Area Champion is and how to reach them. See ****Volunteer Runbooks: Area Champions**** for what Area Champions do.

Fusion 360 Cheat Sheet

A quick reference for designing parts in Autodesk Fusion 360. This is the handout from the **Fusion 360 Basics** class; see **Classes and Instructors: Fusion 360 Basics** for the class itself.

The core workflow

This is the process you will repeat for almost everything you build:

1. **Sketch** a 2D shape on a plane or face.
2. **Extrude** it into 3D (add material).
3. **Sketch** on a face of your 3D object.
4. **Cut** to remove material (extrude inward).
5. **Fillet** to round edges and finish.
6. Repeat steps 3 to 5 to add detail.

Keyboard shortcuts

Shortcut	Action
S	Search bar (find any tool by name)
L	Line
C	Circle
R	Rectangle
D	Sketch Dimension
E	Extrude
F	Fillet
Q	Push/Pull
M	Move/Copy
Ctrl+Z / Cmd+Z	Undo

Tip: press **S** and type the name of any tool. It is the fastest way to find anything.

Mouse navigation

Action	Control
Orbit	Middle mouse button
Pan	Shift + middle mouse button
Zoom	Scroll wheel
Reset view	Click the house icon on the view cube (top right)

Practice project: phone stand

The class project. Dimensions are included so you can rebuild it at home.

Step 1: Base

1. **Create Sketch** on the XZ plane (the floor).
2. Draw a **Rectangle**: 70 mm x 80 mm.
3. **Finish Sketch**.
4. **Extrude** (Symmetric): 10 mm.

Step 2: Back support

1. **Create Sketch** on the back face (the 70 mm x 10 mm face).
2. Draw a **Rectangle** from the top-left corner: 70 mm wide x 60 mm tall.
3. **Finish Sketch**.
4. **Extrude**: 10 mm (away from the base).

Step 3: Phone slot

1. **Create Sketch** on the top face of the base.
2. Draw a **Rectangle**: 50 mm x 4 mm, positioned 5 mm from the back wall.
3. **Finish Sketch**.
4. **Extrude** as **Cut**: -8 mm (leaves a 2 mm floor).

Step 4: Fillet

1. Select **Fillet** (or press **F**).
2. Click the top edges of the back support; radius **5 mm**.
3. Optionally fillet the bottom edges of the base: **3 mm**.

Dimensions reference

Feature	Size
Base	70 x 80 x 10 mm
Back support	70 x 60 x 10 mm
Phone slot	50 x 4 mm, 8 mm deep cut
Fillets	5 mm (top), 3 mm (bottom)

Stuck? Check here first

Problem	Fix
Can't see my sketch	Click the Home icon on the view cube
Extrude is grayed out	Click Finish Sketch first
Extrude didn't cut	Undo, redo the extrude, and change Operation to Cut
Sketch lines are still blue	Add dimensions to fully constrain the sketch (it still works if you don't)
Can't select a face	Zoom in and hover until the <i>face</i> highlights, not an edge
Model disappeared	Check the eye icons in the Browser panel (left side)

What to learn next

1. **Components:** organizing multi-part models.
2. **User Parameters:** named variables for dimensions.
3. **Patterns:** repeating features in circles or grids.
4. **STL Export:** File, Export, STL, so you can 3D print your design.

Resources

- **Product Design Online** (YouTube): beginner-friendly Fusion 360 tutorials.
- **r/Fusion360**: a Reddit community for questions and inspiration.

- **The makerspace:** come in and practice, and ask in #general on Discord if you get stuck.