Desining & 3D Printing Custom Overland Gear

Expo 2024

Designing & 3D Printing Custom Overland Gear

“Have an idea? You can make it!”

About Me

Who is Adam Zolyak?

- Overlanding 10 years with my wife Val and often friends
- Camping, hiking, padding, and exploring 25+ years
- Long time maker - software, 3D printing, teaching, photography, videography, …
- Home base near Denver, CO but often somewhere in the west


Tripod Adapter
for Newest Starlink (Gen 3)


Tripod Adapter
for Older Starlink (Gen 2)

Agenda

What are we learning today?

- How does 3D printing work?
- Workflow
    1. Modeling
    2. Slicing
    3. Printing
    4. Finishing
- Tips along the way: materials, strength, fasteners, etc
- Q&A

3D Printing Resource Guide

These slides + my recommendations

https://journey-labs.ck.page/expo3d

What can you make with 3D printing?


AMMABLE LIQUID
T BE STORED OR TRANS-
ORTED INSIDE VEHICLE.
XPLOSION MAY OCCUR.

This session will help you get started 3D printing; expertise comes with practice

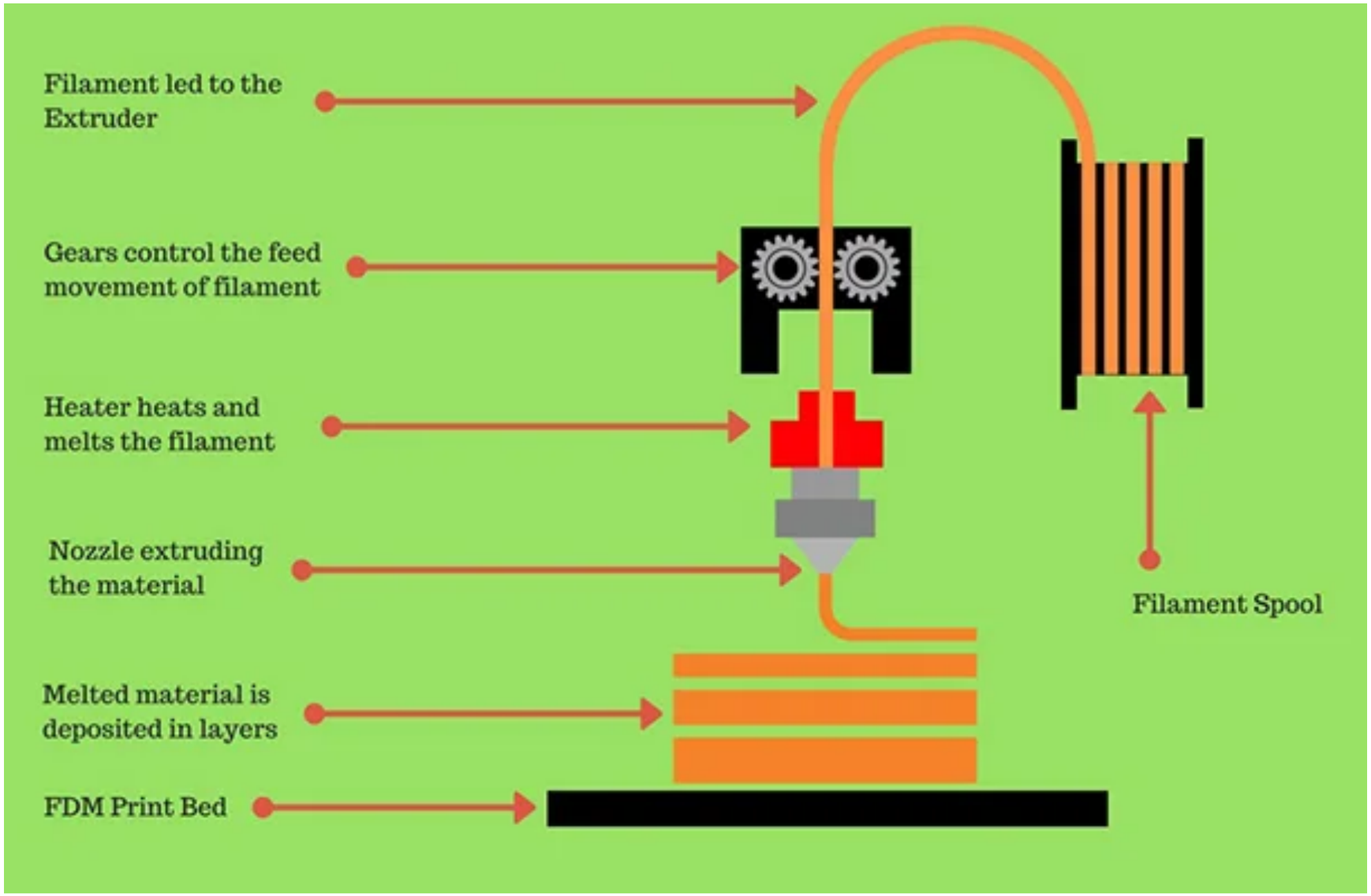
How does 3D printing work?

The Basic of 3D Printing

It’s Like A Glue Gun

The Basic of 3D Printing

FDM (Fused Deposition Modeling)



https://twotrees3d.com/fdm-3d-printer-how-do-fdm-3d-printers-work/

Bambu A1 Mini

My Favorite Printer

3D Printing Workflow

How to make a thing!

1. Modeling
2. Slicing
3. Printing
4. Finishing

Step 1
Modeling

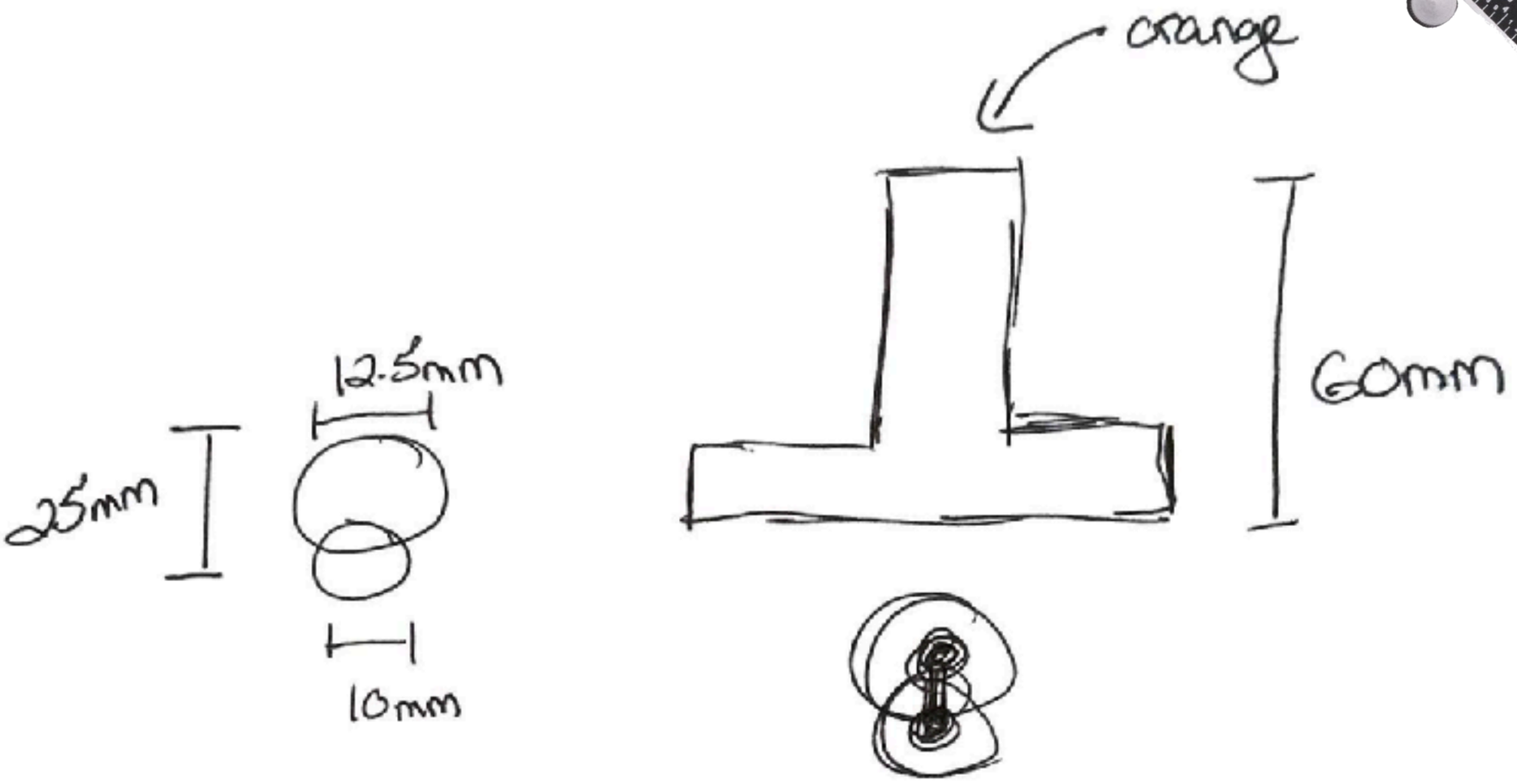
Creating or finding a 3D model

Creating A 3D Model

Solving a problem

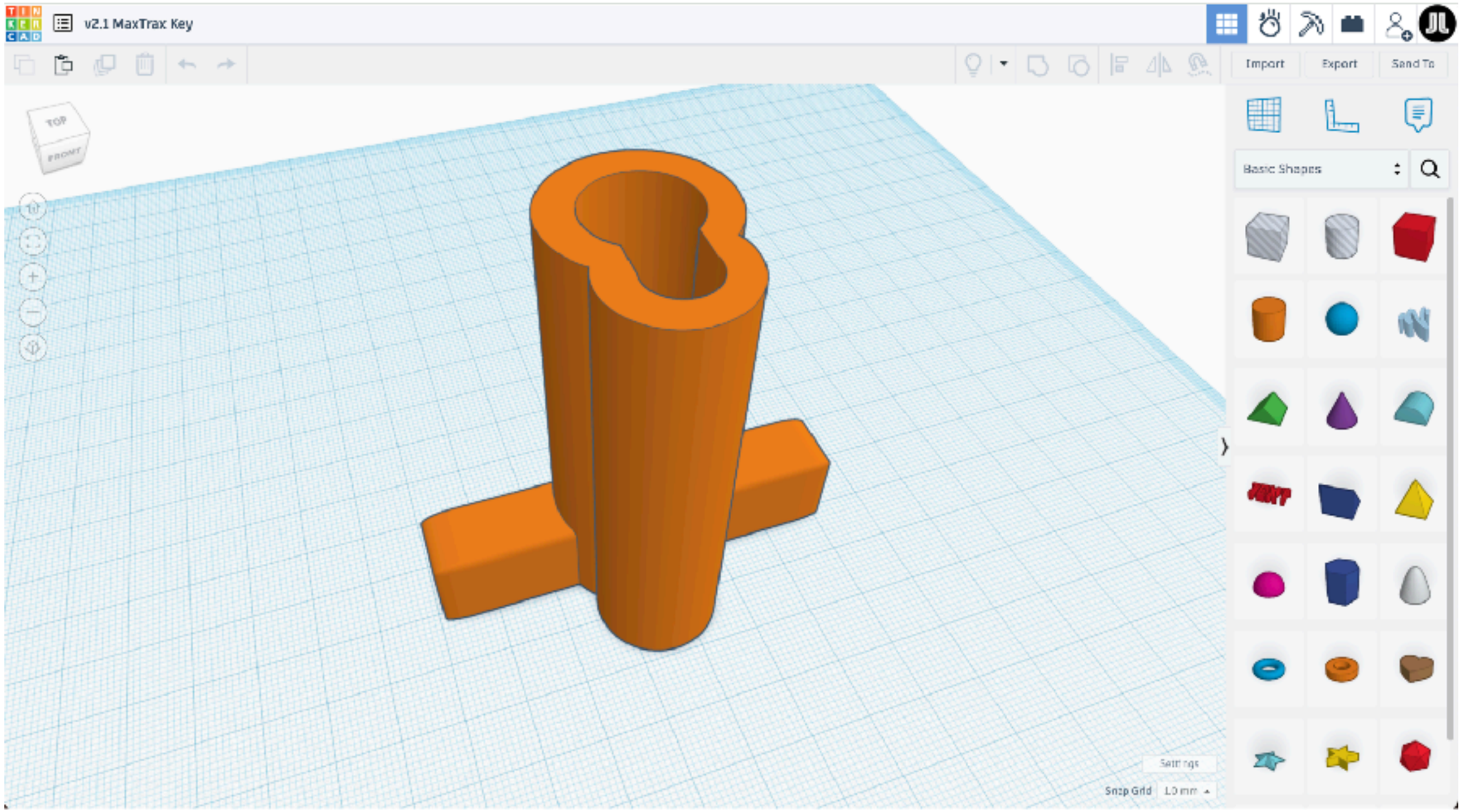
Creating A 3D Model

Sketching & Measuring



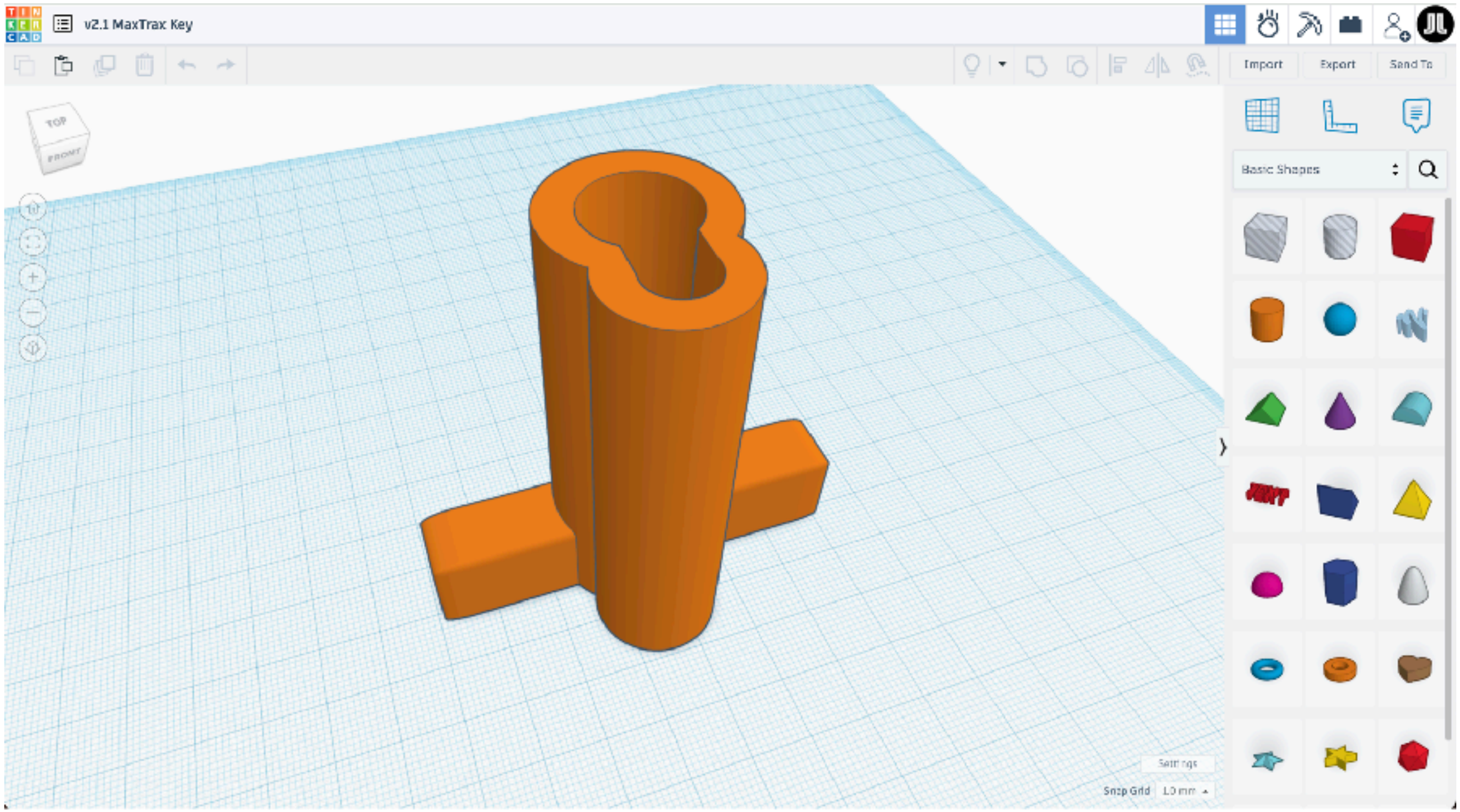
Creating A 3D Model

What shapes do you see?



Creating A 3D Model

Live Demo



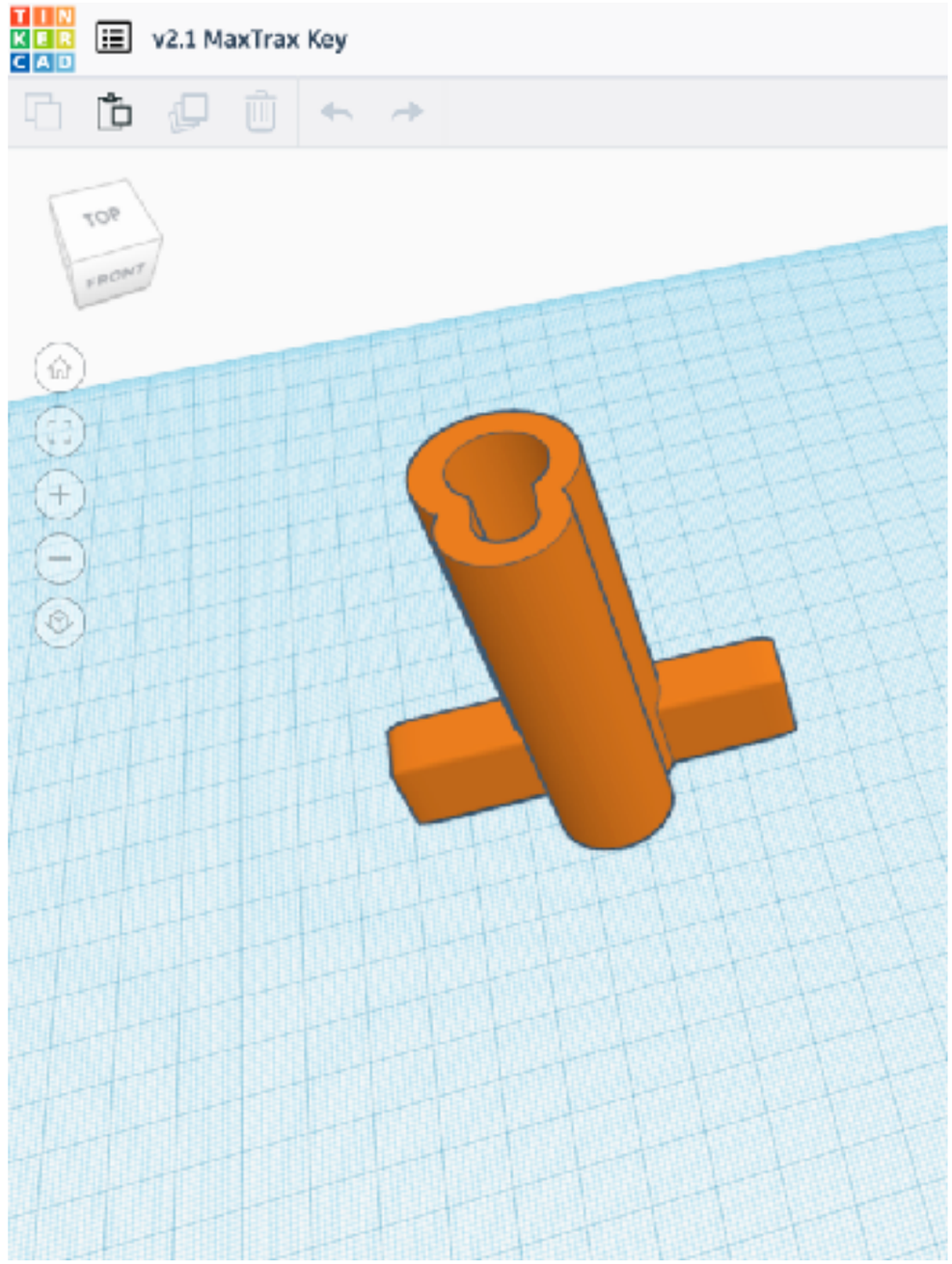
3D Modeling

Creating A 3D Model

The Basics of 3D Modeling

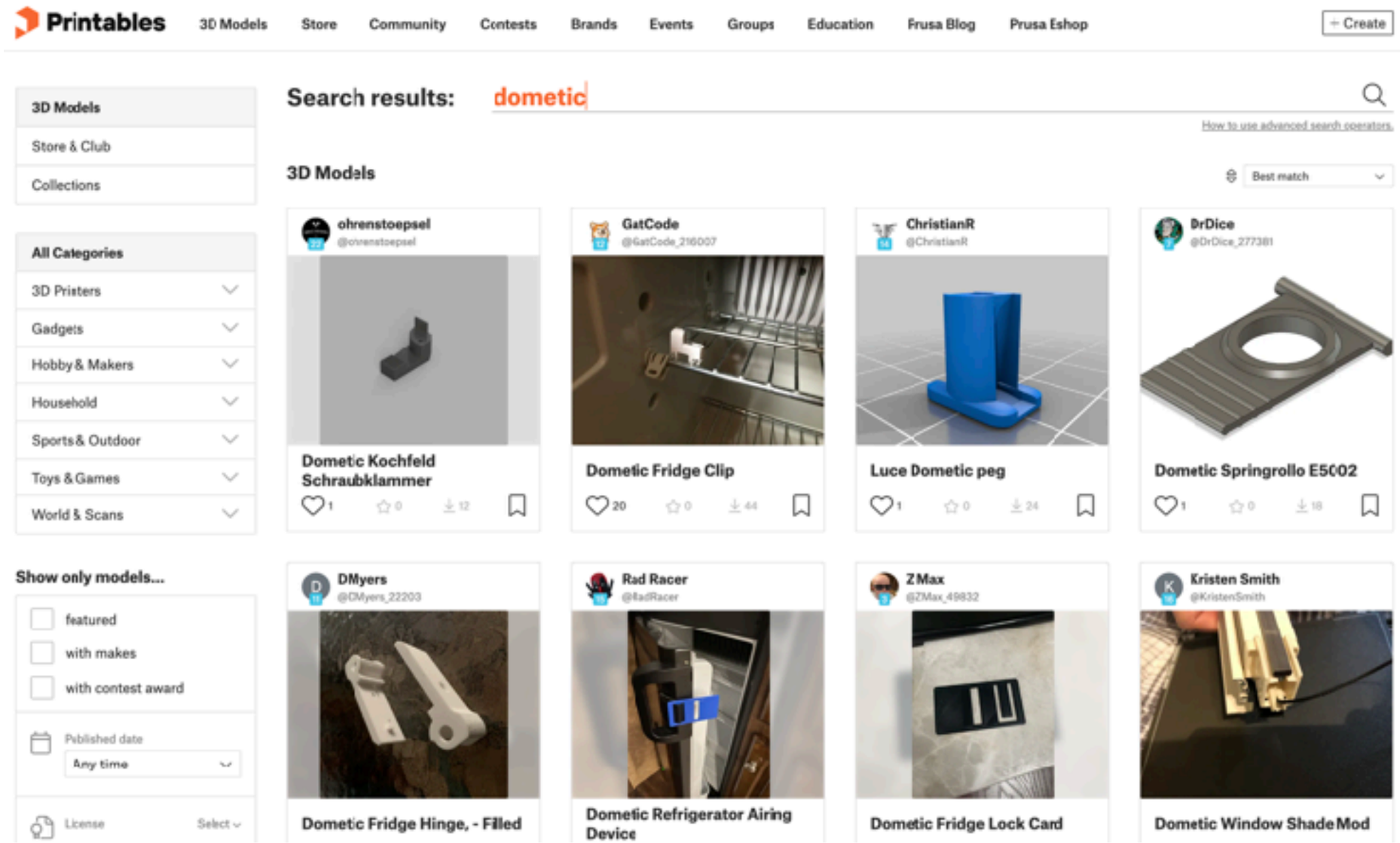
AUTODESK® TINKERCAD®

- Basic Shapes
- Solid or Hole (empty)
- Resizing
- Aligning
- Combining
- Export as STL file



Finding 3D Models

Find free or paid models



https://www.printables.com/

Step 2

Slicing

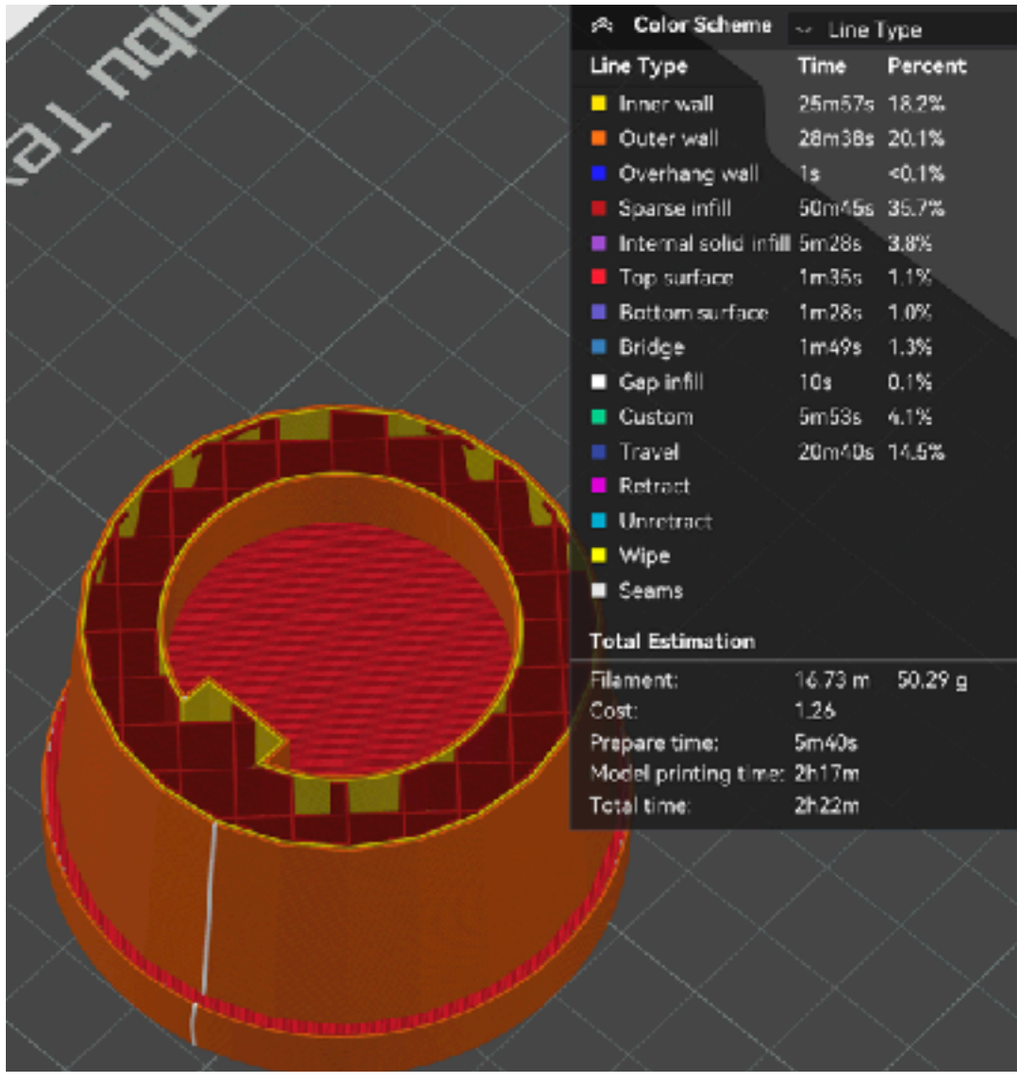
Slicing A 3D Model

Preparing to Print

- Slicing software translates a 3D model file (STL) into a print ready file (GCode)

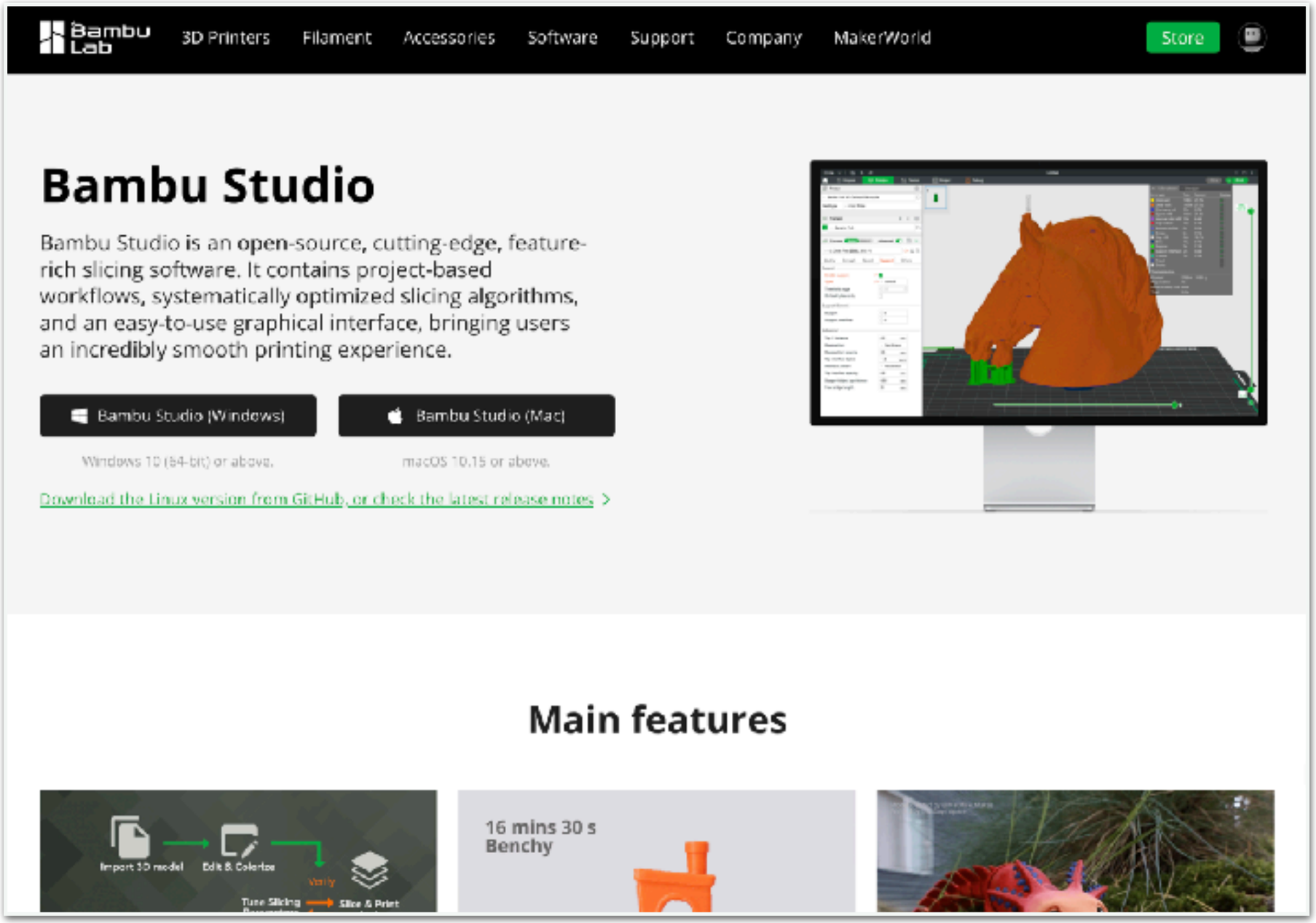
- GCode is a series of 1000s of instructions for the printer - heat to x, move to y, …

- Slicing factors in the specific settings for the printer, filament, infill, supports, etc



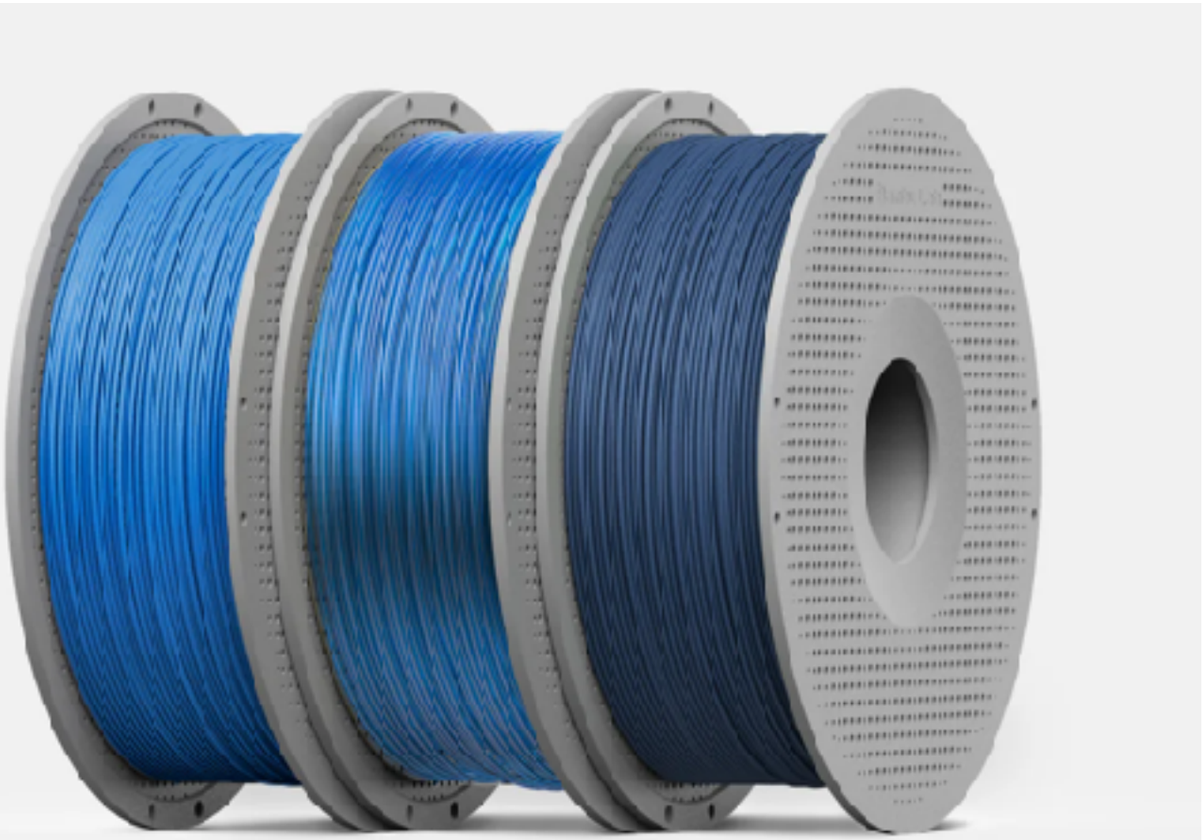
Slicing A 3D Model

Slicing software

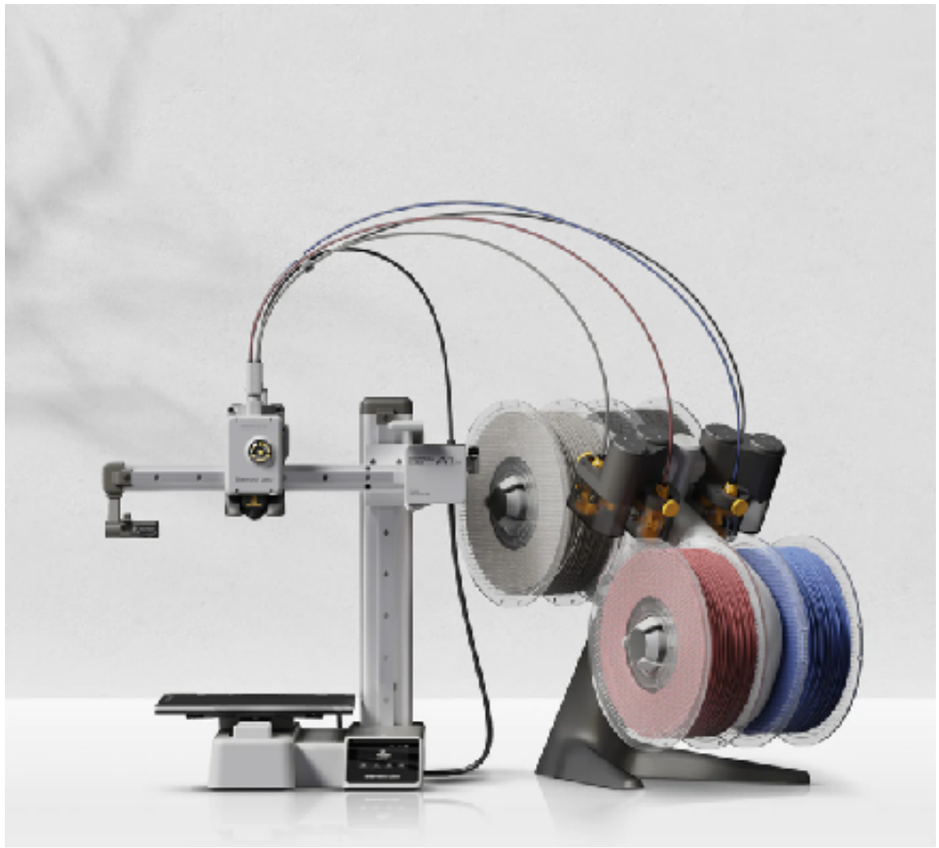


Filament

A continuous thread of plastic for printing



PETG Basic * 1kg | PETG Translucent * 1kg | PETG-CF * 1kg



Selecting A Filament

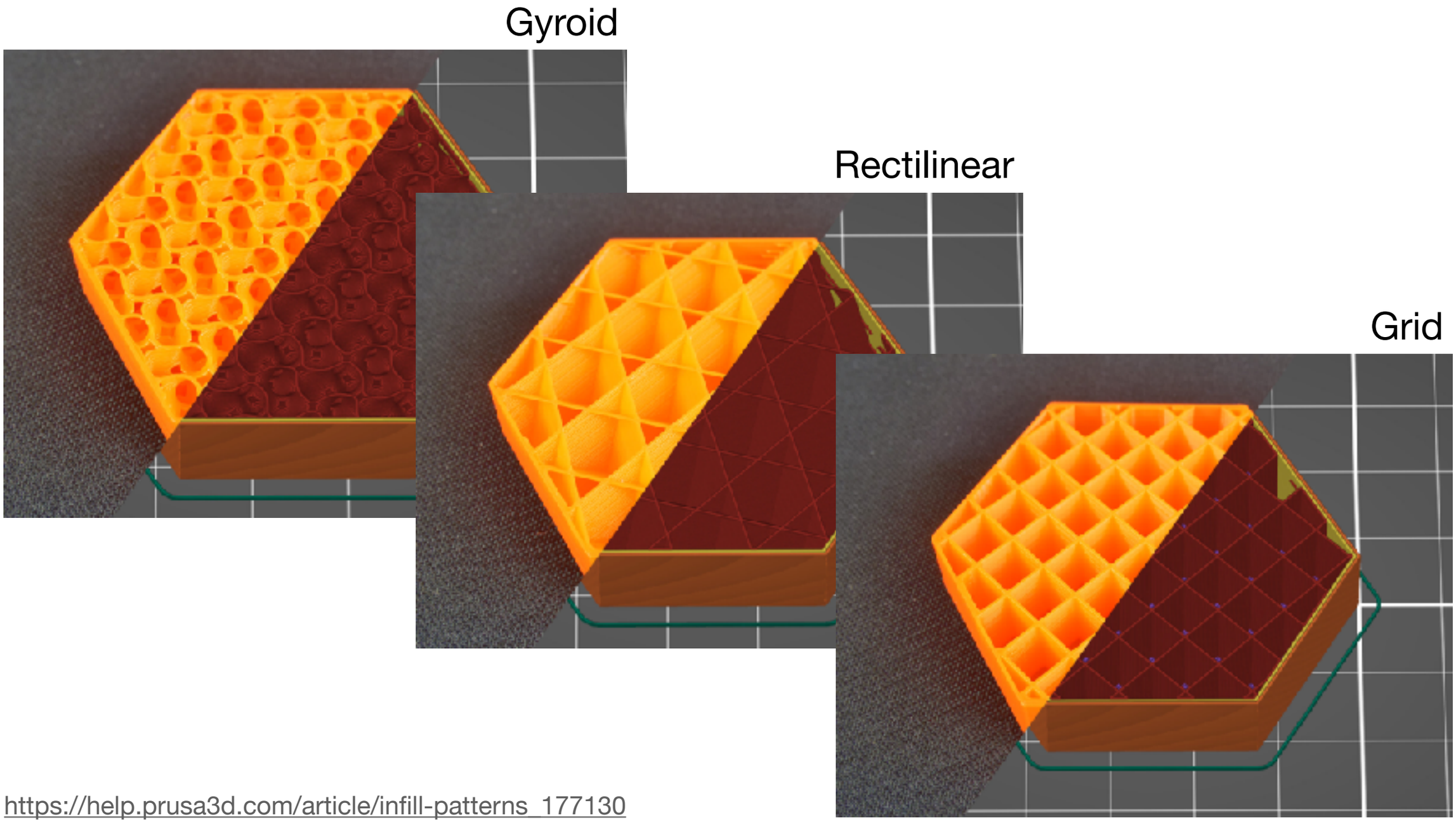
The right material for the job

	PLA Shop now >	PETG Shop now >	ABS Shop now >
Toughness Impact Strength - XY	26.6 kJ/m²	52.7 kJ/m²	39.3 kJ/m²
Strength Bending Strength - XY	76 MPa	65 MPa	62 MPa
Stiffness Bending Modulus - XY	2750 MPa	1670 MPa	1880 MPa
Layer Adhesion Impact Strength - Z	13.8 kJ/m²	13.6 kJ/m²	7.4 kJ/m²
Heat Resistance HDT, 0.45 MPa	57 °C	69 °C	87 °C
Saturated Water Absorption Rate 25 °C, 55% RH	0.43%	0.32%	0.65%

https://bambulab.com/en/filament-guide

Selecting An Infill

The right pattern and density for the job



https://help.prusa3d.com/article/infill-patterns_177130

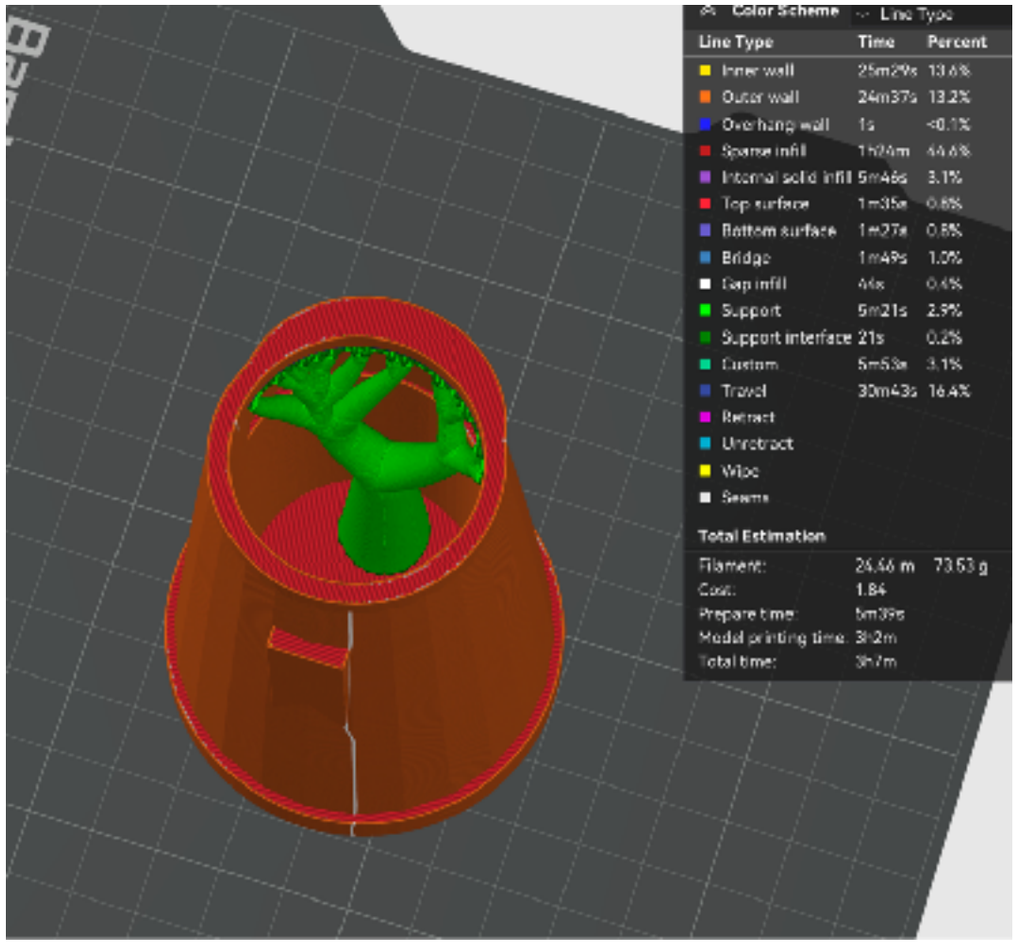
Supports

To support or not to support?

- Supports are temporary structure to support overhangs > ~45 degrees

- Supports are removed after printing

- I like to try printing without supports at first if I think it might be ok without them - less time, material, complexity

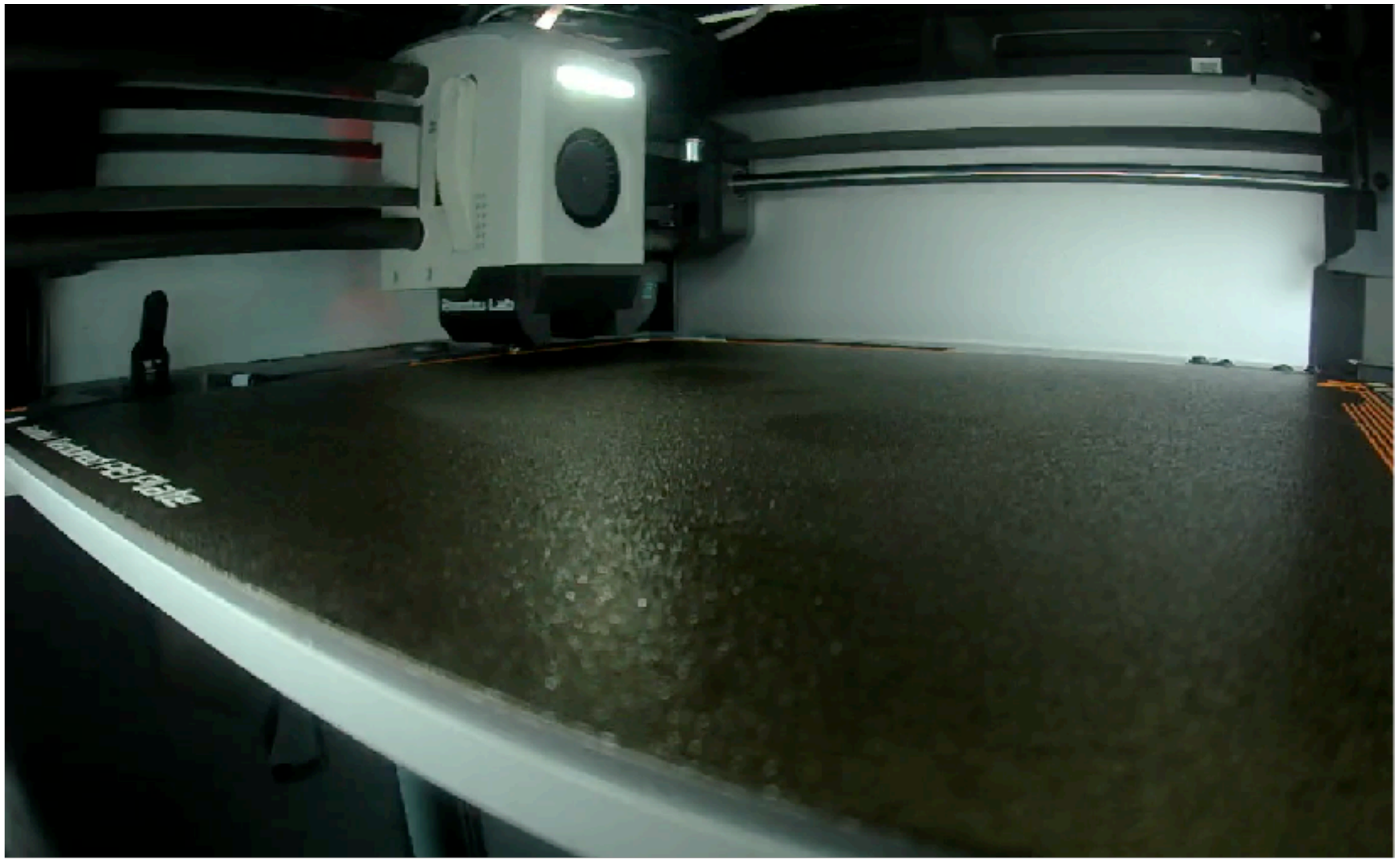


3D Slicing

Step 3
Printing

Timelapse

Because 3D printing can take a long time...



Printer Considerations

What to look for in a 3D printer

- Print size
- Print speed
- Heated chamber
- Auto calibration
- Support - documentation, community

Refining

Iterate, iterate, iterate

- Often takes 2-3 times to get things dialed in, refining the design between prints
- Printing sub-sections can be helpful to tune fit while reducing time and waste

Problems

The internet is your friend

- Sometimes things just don’t work - supports, fastener sizing (ex screw holes), etc
- Adjust settings and try again
- Search for the problem - someone has probably already had it and solved it - YouTube, forums, etc

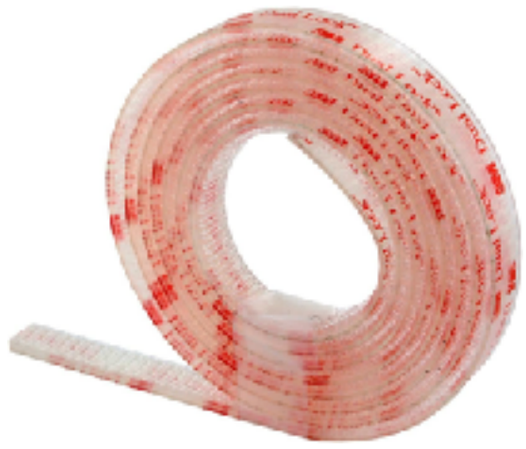
Step 4

Finishing

Finishing Fasteners

Connecting parts

- Screw holes
- Nuts, bolts, …
- Threaded heat inserts
- 3M VHB or Dual Lock tape
- Glue



Finishing Tools

Helpful to remove supports or improve finish

- Needle nose pliers
- Tweezers
- Heat Gun
- Deburring Tool

3D Printing Workflow

How to make a thing!

1. Modeling
2. Slicing
3. Printing
4. Finishing

How to get started?

My recommendation: Bambu A1 Mini

3D Printing Resource Guide

A free guide with my recommendations

Get a copy of these slides and links to my recommendations:

- Free 3D modeling and slicing tools tools
- Free 3D model sources
- Printer and filament recommendations
- My favorite finishing tools

https://journey-labs.ck.page/expo3d

Questions?