

# 3D Design and Printing Basics

Mill Valley Community Center

January 20, 2018, 10:00am – 1:00pm

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## Outline

### 1) Terms:

Additive manufacturing  
Fused Deposition Modeling (FDM)

### 2) Parts of printer:

Frame  
X-Y-Z axes  
Stepper motors/ Belts  
Filament Drive  
Extruder (Bowdin, Direct )  
Build Plate (heated vs non-heated, blue painter's tape, Kapton tape)

### 3) Set up printer:

Clean print bed  
Level print bed  
Set z-gap

### 4) Filament

1.75mm, 3mm  
PLA (180 - 240 C) easier to print  
ABS (260 - 285 C) harder to print, stronger, can use acetone to smooth surface

### 5) Part File

Download or create  
.stl, obj

### 6) Firmware Slice and Control:

Slice settings (speed vs accuracy)  
Extruder temperature (filament profile)  
Retraction (prevent strings)  
Raft, brim, skirt  
Supports

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### Resources

#### Create Your Own Parts - 3D CAD Software:

Tinkercad	<a href="https://www.tinkercad.com/">https://www.tinkercad.com/</a>	Free
SketchUp	<a href="https://www.sketchup.com/">https://www.sketchup.com/</a>	Free
FreeCad	<a href="https://www.freecadweb.org/">https://www.freecadweb.org/</a>	Free
Blender	<a href="https://www.blender.org/">https://www.blender.org/</a>	Free
AutoCad	<a href="https://www.autodesk.com/">https://www.autodesk.com/</a>	Paid
Solidworks	<a href="http://www.solidworks.com/">http://www.solidworks.com/</a>	Paid

#### Download Pre-Designed Files:

Thingiverse	<a href="https://www.thingiverse.com/">https://www.thingiverse.com/</a>
Pinshape	<a href="https://pinshape.com/">https://pinshape.com/</a>
GrabCad	<a href="https://grabcad.com/">https://grabcad.com/</a>
STLFinder	<a href="https://www.stlfinder.com/">https://www.stlfinder.com/</a>
iFind3D	<a href="https://www.ifind3d.com/">https://www.ifind3d.com/</a>

#### 3D Print Guides:

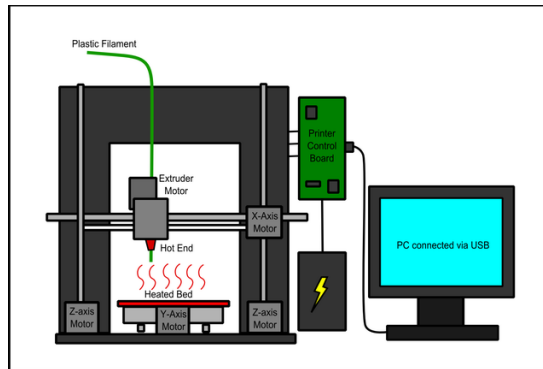
<a href="https://www.makeuseof.com/tag/beginners-guide-3d-printing/">https://www.makeuseof.com/tag/beginners-guide-3d-printing/</a>
<a href="http://3dprintingforbeginners.com/">http://3dprintingforbeginners.com/</a>
<a href="https://www.instructables.com/id/3D-Printing-Basics/">https://www.instructables.com/id/3D-Printing-Basics/</a>
<a href="https://www.3dhubs.com/knowledge-base">https://www.3dhubs.com/knowledge-base</a>

#### Printing Locations:

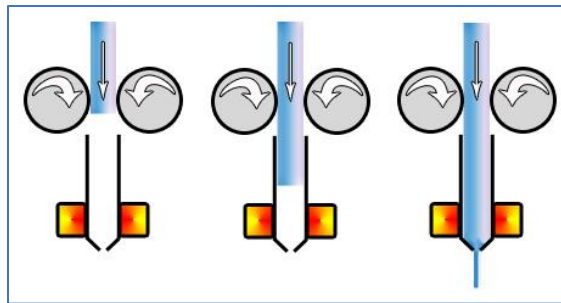
3D Hubs	<a href="https://www.3dhubs.com/">https://www.3dhubs.com/</a>
Marin Library	<a href="http://www.marinlibrary.org/3d-printing/">http://www.marinlibrary.org/3d-printing/</a>

#### DIY 3D Printers:

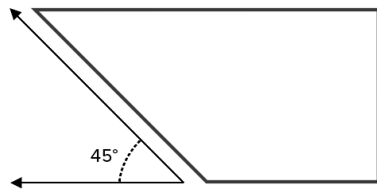
Lulzbot	<a href="https://www.lulzbot.com/">https://www.lulzbot.com/</a>
Prusa	<a href="https://www.prusaprinters.org/">https://www.prusaprinters.org/</a>
Falla	<a href="http://www.falla3d.com/index_en.html">http://www.falla3d.com/index_en.html</a>
RepRap	<a href="http://reprap.org/">http://reprap.org/</a>



**Printer Setup**



**Extruder**



Overhang of less than 45 degrees  
No support is needed



Overhang of more than 45 degrees  
Support is needed

**Support**