

# 3D PRINTER PRIMER

## HOW 3D PRINTERS COMPLEMENT THE HAM RADIO HOBBY AND COMMUNICATIONS INDUSTRY

Another helpful tool, because we're all "makers"...



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## **Benefits of 3D Printing for Us Makers...**

- **Create custom brackets, enclosures, project boxes, knobs, antenna parts, stands, mic holders, etc.**
- **Create replacements for hard-to-find parts.**
- **Wonderful addition for those STEM related projects.**
- **Great learning tool for students (young and old).**
- **Obviously, can be used for non-ham projects around the house.**
- **Printed plastic parts are surprisingly strong and durable!**
- **Amazon, Home Depot, etc. sell 3D printers.**

# Just a Teaser...

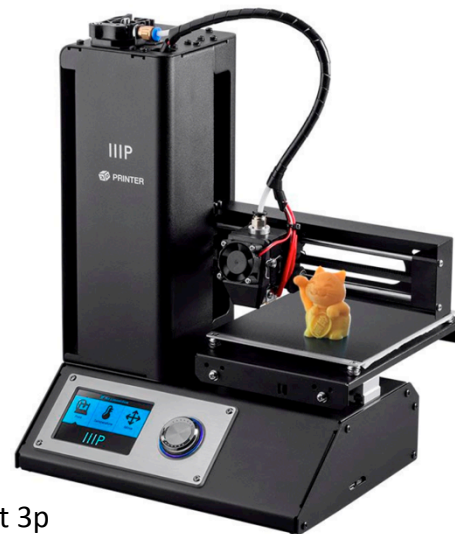


**Custom  
Kenwood  
TH-D74  
Handheld  
Holder  
In Vehicle**

**More  
Examples  
To  
Follow**

# What is a 3D Printer?

- **Tabletop appliance that melts (mostly) plastic to create objects.**
- **Features of 3D printers:**
  - **Can utilize different types of plastic, i.e., PLA, ABS, PETG, woodfiber, et.al.**
  - **Can utilize different colors of plastic**
  - **Very precise creations**
  - **Very reproducible results**
  - **No computer needed to actually print an object (it's stand-alone)**  
**(But also works with Windows/Mac and WiFi capable!)**
- **Prices range from \$200 to \$3000**
- **Plastic filament averages \$20 for 2 pounds**

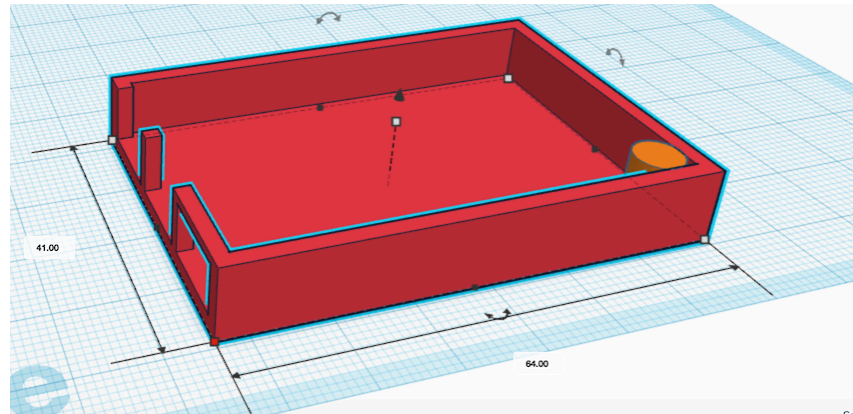


# Where Do I Get 3D Designs to Print?

- Find designs already created and download 'em from:
  - Thingiverse.com
  - Myminifactory.com, Printables.com, etc.
  - Most 3D printer's web site...
- Design it yourself! Tools like TinkerCAD, FreeCAD, SketchUp, AutoCAD, Doodle 3D, Blender, et.al.
- Pay someone to design your object (CADing and scanning)
- My typical approach:
  - Check first for it on [www.thingiverse.com](http://www.thingiverse.com)
  - If not there, create it in [www.tinkercad.com](http://www.tinkercad.com)

# How Does the Magic Work?

- Acquire a 3D design, either from the Internet or you create it! (.stl file)

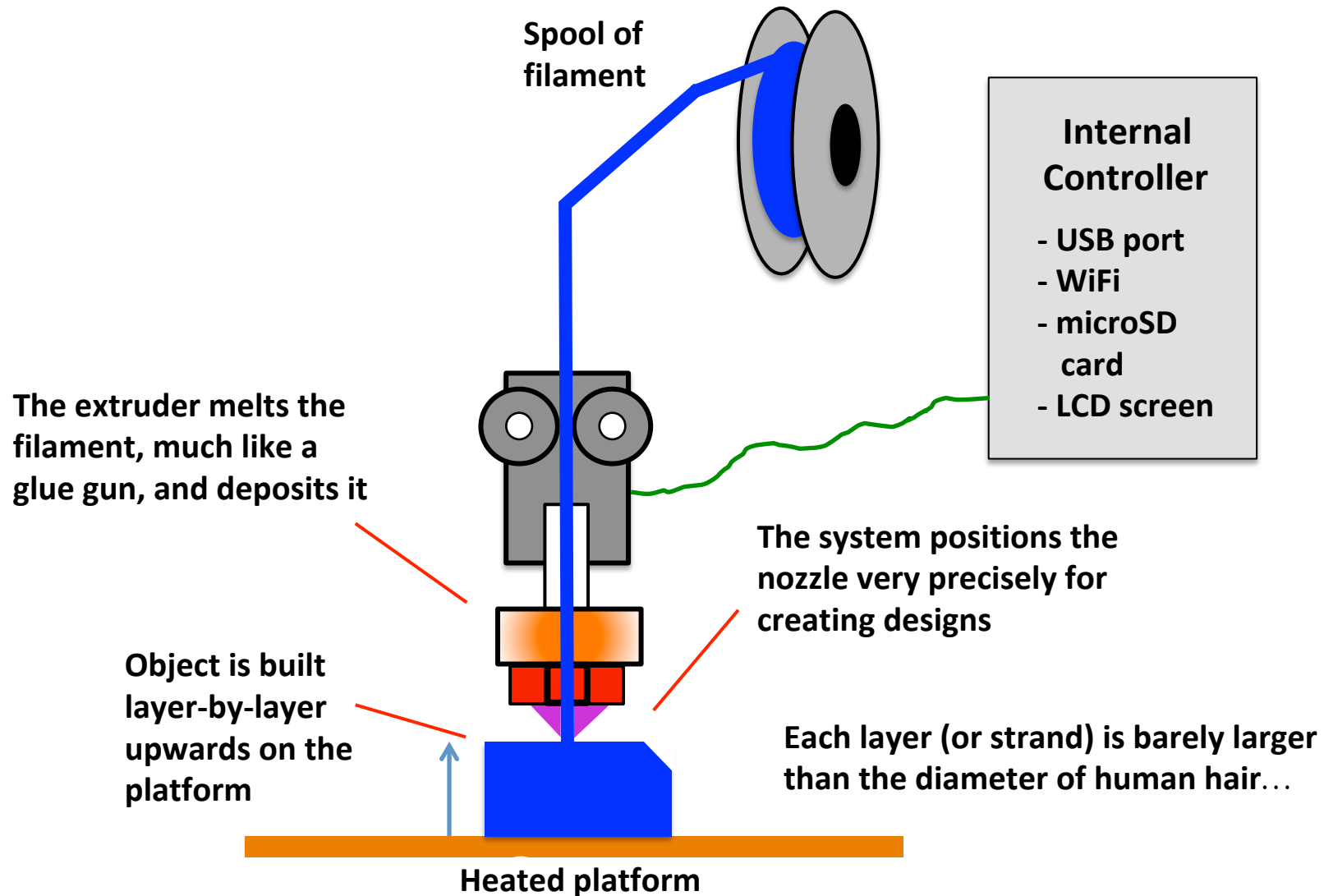


Raspberry Pi Case

- Pick a plastic (type, color) based on characteristics wanted
  - PLA is very easy to print. Great for rough draft and everyday items.
  - PET is very strong, flexible and impact resistant, cool colors.
  - ABS can be persnickety to print, resists higher temps, and very strong.
  - Nylon / Flexible – strength, stretchable, softer to touch



# How Does the 3D Printer Work?



## 3D Printers

- Buy a 3D printer based on your needs and budget.
- Or utilize 3D printer services located in your area or online.
- 3D printer's main features that determine price:
  - Print size (from roughly 6"x6" up to 12"x12")
  - Print speed (from takes-all-day to just a few minutes)
  - Plastic types (PLA-only, or also ABS, PETG, soft metals)
  - Heated printer-bed, 2<sup>nd</sup> extruder, "cloud", etc.
- Example printers:

### Good

Monoprice  
Mini Delta V2  
\$179

### Better

FlashForge  
3D Finder 3  
\$350

### Kid-Friendly

Toybox 3D 1-Touch  
Childrens Toy Printer  
\$299

### Pro

Creality 3D Ender 3  
S1 Pro  
\$500



# Types of 3D Printers

- **Student 3D / Toy Printer**
  - Low Cost (less than \$200)
  - Usually small print sizes, like a 6" cube
  - Very slow to print, when you don't care about speed
  - Often can only print PLA type of plastic
- **Home / Hobby / School Printers (Good, Better, Best)**
  - Can handle different plastics (PLA, ABS, PETG, Nylon, etc.)
  - Price usually determines maximum print size
  - Price usually determines speed of printing
- **Pro Hobbyist / Business**
  - Very fast print speeds
  - Extremely reliable
  - Less tweaking / automatic calibrations
  - High volumes of printouts
  - Large print sizes, cubic foot or larger

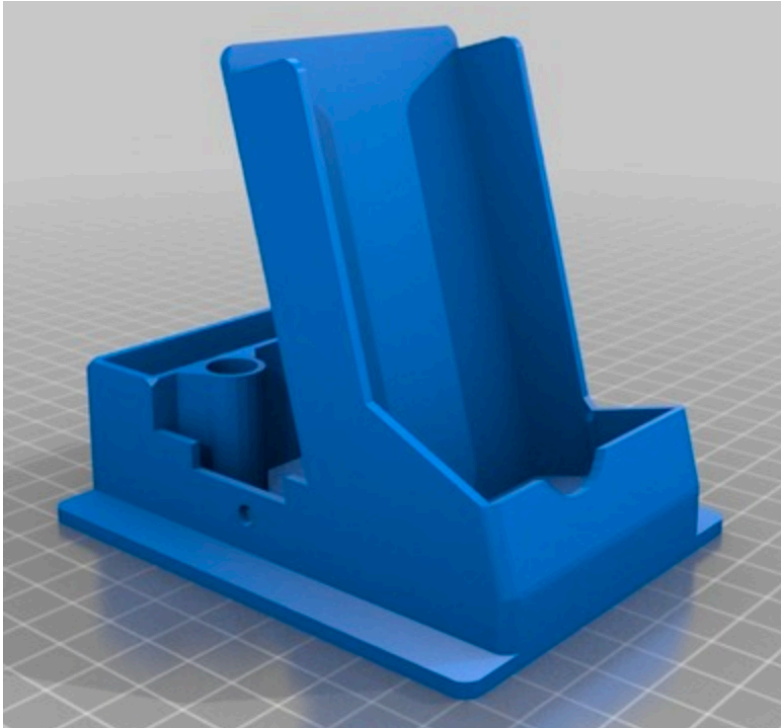
## Some Additional Thoughts

- **Determine some of your 3D printer needs**
  - **Project types, replacement parts, hobby projects, etc.**
  - **Occasional prints or cranking out a lot of pieces?**  
Analogy: can you do with a cheap ink-jet printer <or> a laser printer is needed?
- **Chat with 3D printer owners, read thru forums...**  
(Just like if you were looking for a new radio)
- **Learn to design with [TinkerCAD](#) – if you can “power-point” you already have a good start with TinkerCAD.**
- **3D printers are mostly for plastic results – parts, pieces, toys, and the like. Lots of variety in plastic materials, from rigid ABS, to flexible soft rubber-like, to dissolving materials. If you need mostly metal-parts, consider a “CNC machine”.**

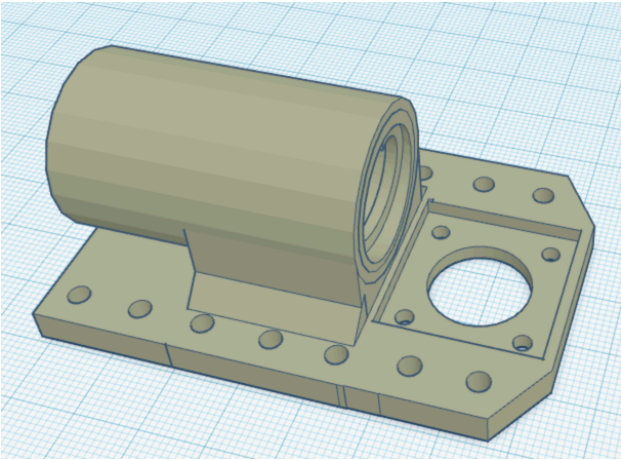
# Some of My Designs



Custom bracket for Icom ID-4100 head



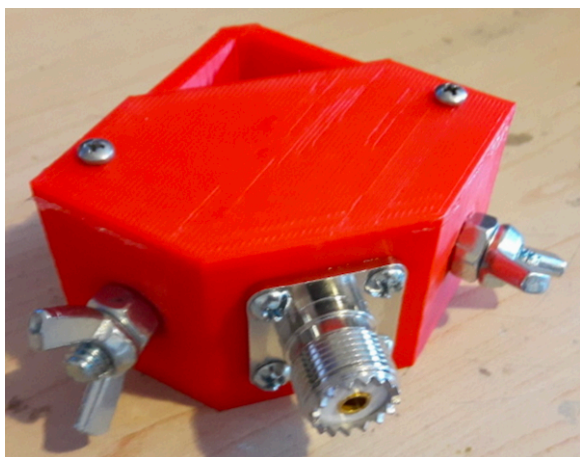
Kenwood TH-D74 and Icom ID-51a desktop holder



SO239 Connector, Dipole Antenna  
Painter Pole Bracket

# Time Permitting – Quick Demonstrations

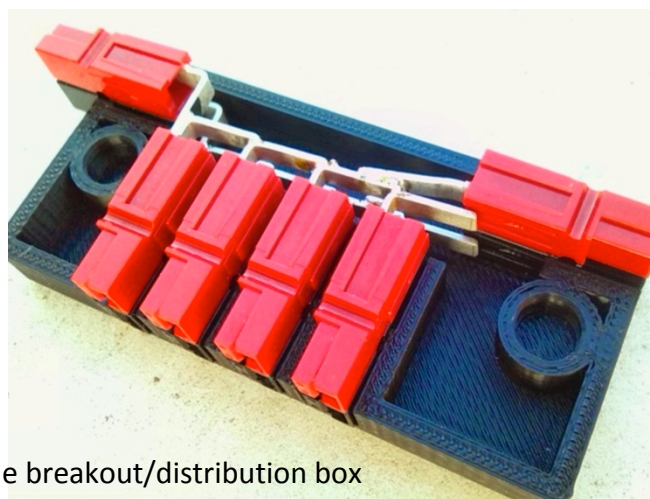
- [Thingiverse](#) – find free objects
- [TinkerCAD](#) – design 3D objects



Centerpiece for dipole antenna



Kenwood TH-D74 desktop holder



PowerPole breakout/distribution box