

# 3D Printers, Model Railroading, Stages of Love, and You

Dave Ackmann – Gateway NMRA – 15 December 2020

My environment: Creality Ender 3 Pro, Windows 10, Tinkercad, Cura 4.7 slicer

My Observation: Your 3D printer usage will go through stages; grow with it.

3D printers are complex, as complex as DCC; there will be frustration, printing disasters

Don't expect to save money; do hope to build things that are somewhat unique.

Enter only with open eyes and open wallet

How does 3D printing work:

- "Models" are designed in Computer Aided Design (CAD) software

- Models are converted to Stereo Lithography (STL) or other formats

- "Slicer" software converts STL files to "G-code" files for specific printers

- Printer executes G-code, extrudes filament while moving in 3 dimension

3D Printers cost from \$140 to \$15,000 and costs vary greatly by seller; buy only from someone with a 30 day full refund guarantee (I bought from MicroCenter).

PLA filament is \$18-24/Kilogram per color, and is paintable and glueable. I like filament brands Eryone and CO3D. A HO building might weight 25-50 grams. Store filament in air tight bags with desiccant.

Many models are stored in online "libraries", available for free or a fee

- Thingiverse, TurboSquid, 3DWarehouse are several of many libraries

Models can be printed by "Service Bureaus"; turnaround time can be 2 weeks

Models, when shrunk more than 50%, may be too fragile for use.

Visit YouTube before purchase, search for model name and "Unbox", "Setup", "Problems", "Troubleshooting". Check out YouTubers "Just Vlad" and "Tom Tullis".

My Ender 3 Pro has many aftermarket enhancements, but make your printer work first.

- Buy extra nozzles (AMAZON ASIN: B082RY31SX)

- Buy extra geared extruder wheels (AMAZON ASIN: B07BFT6VCV)

- Buy extra Capricorn Bowden tubes (AMAZON ASIN: B079P92HN9)

- Buy extra hot end fittings (AMAZON ASIN: B01IB81IHG)

- Buy metal MK8 extruder mechanism (AMAZON ASIN: B081DN6RM2)

- Buy extra PLA (AMAZON ASIN: B07DN4MCD7)

- Buy Upper Z-Axis bearing (AMAZON ASIN: B0872YRHVV)

Replace bed leveling springs. Upgrade CURA slicer. Upgrade Z-Axis Shim.

Check out Thingiverse.com, and search for your scale (e.g. "HO scale"). Be advised: don't scale down more than 50%; upscaling is OK.

Check out STLfinder.com to locate useful HO models.

Designing building interiors? Make walls intersect, not just touch.

Want advanced typefaces? Save from PPT into PDF, convert PDF to STL with ANYCONV.COM, import into CAD, scale factor may be as high as 10000 in TinkerCAD.

Designing in 2 colors? Remember the M206 trick to raise Z Axis for subsequent layers!

Be Patient. Schtick Happens. Watch YouTube. Keep Your Filament Dry. Have Fun!



Thingiverse: Main Street 3



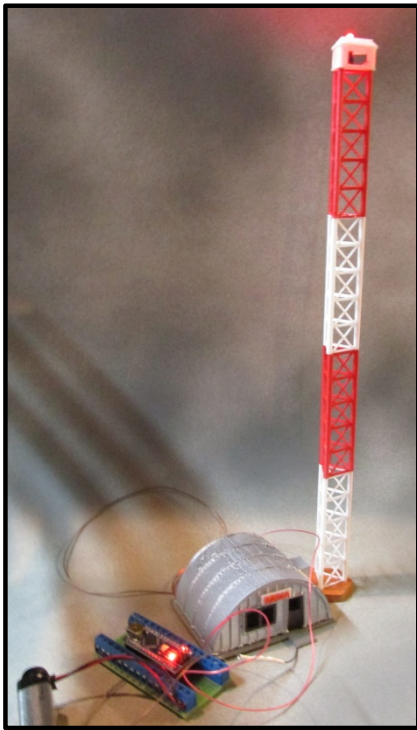
Original design herald by Dave Ackmann



Thingiverse: Ionia and Dayton



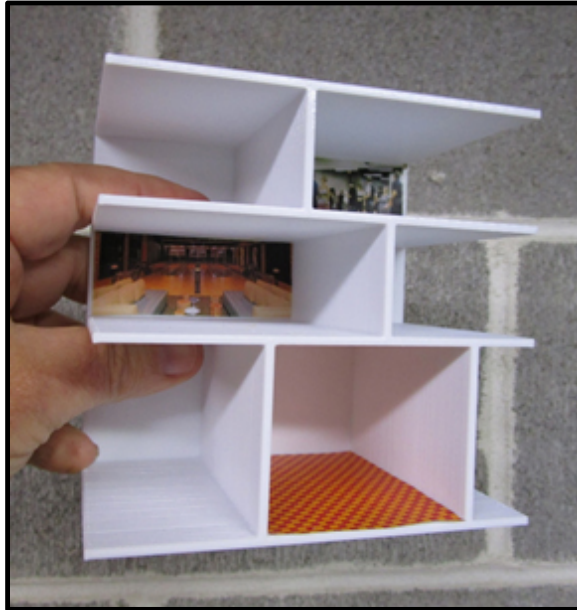
Thingiverse: Miner's Cottage



**Thingiverse: Broadcast Tower  
With Arduino blinking LED**



**Original design Hot Tub by Dave Ackmann**



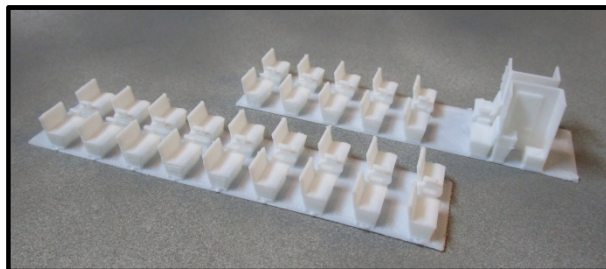
**Original design building interior by Dave  
Ackmann**



**Thingiverse: Trailers**



**Original design billboard by Dave Ackmann**



**Thingiverse: Athearn Heavyweight interior**