3D PRINTING and PIXELS

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OHIO LIGHTING MINI

A PICTURE IS WORTH A THOUSAND WORDS

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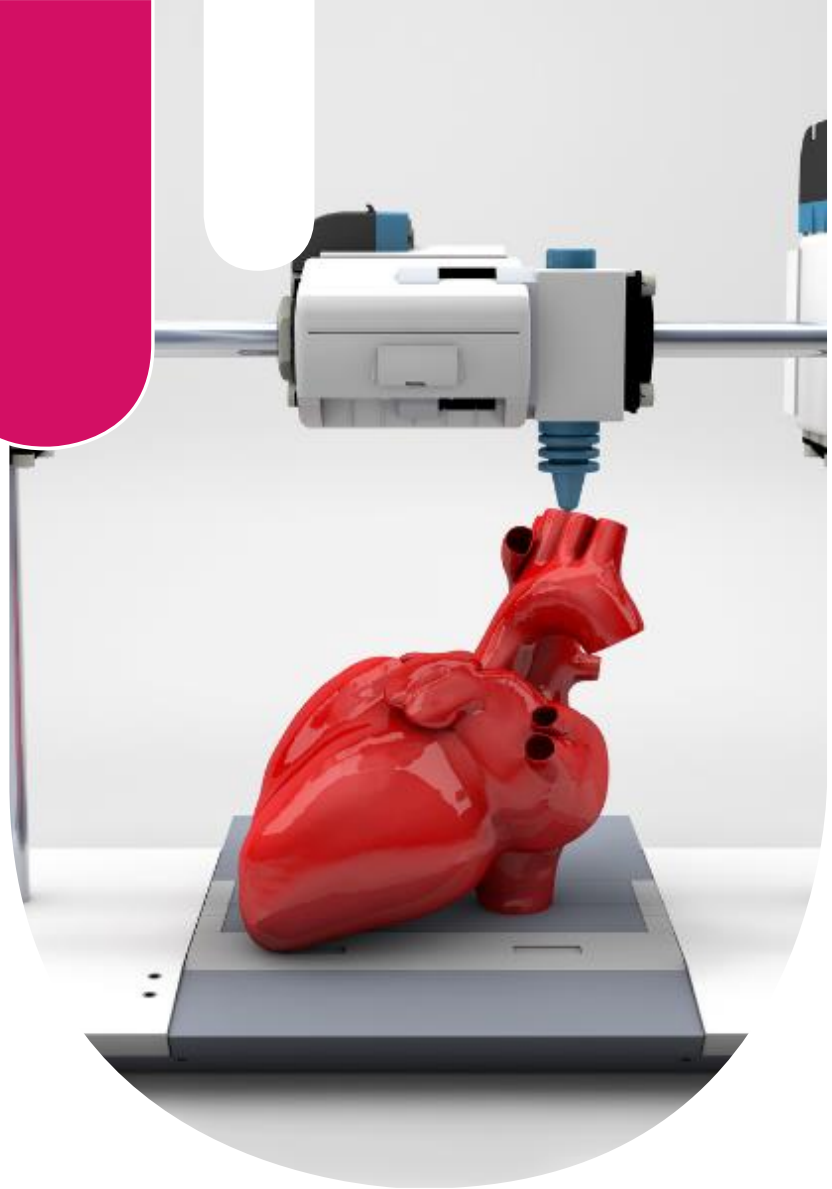
itwinkle.org > Support > Christmas Lights Users Groups



OHIO LIGHTING MINI

CONTENTS

- History
- How they work
- Christmas lights uses
- Print your own or buy
- Where to find them
- Design your own or buy
- Filament
- 3D printing software
- Printing tips
- Makerspaces

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HISTORY

It’s been around longer than you think!

HISTORY

- **First idea in 1980**
  photo-sensitive resin & UV light
- **First patent in 1986**
  Charles “Chuck” Hall of 3D Systems
- **Patent expired in 2009**
  anyone can sell a 3D printer

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HOW THEY WORK

From idea on computer screen to printed reality

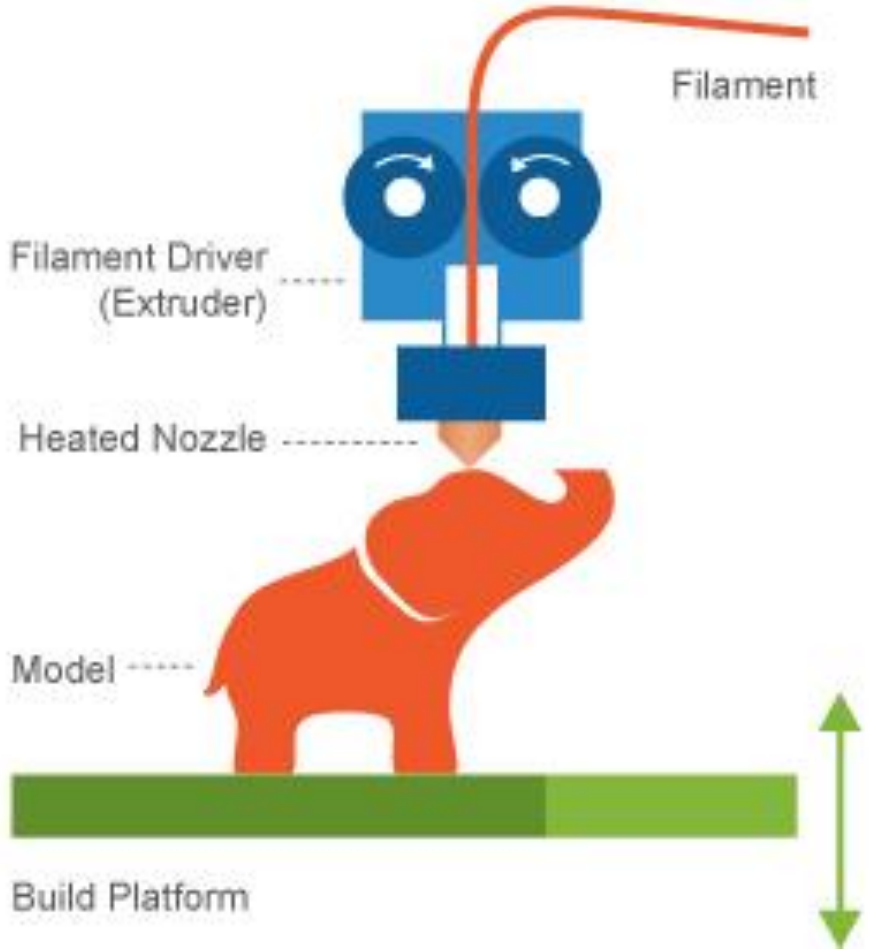
HOW THEY WORK

- **Similar ideas**
  ice cream machine
  glue gun
  additive vs subtractive

HOW THEY WORK

- **Temperature**
  nozzle up to 260°C
  bed adhesion

- **Layers**
  0.2mm common
  thicker layers = faster



CHRISTMAS LIGHTS USES

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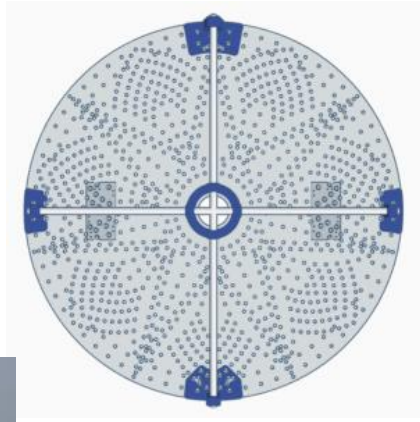
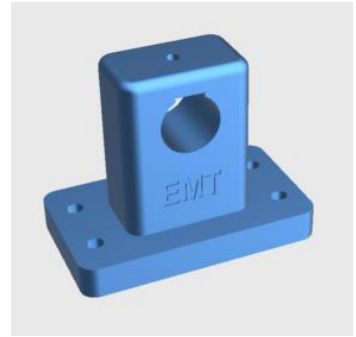
How 3D printing can simplify and improve what you do

WHAT CAN YOU MAKE?

- **House clips**
  Gutter, shingle, eves, siding
- **Conduit attachments**
  House mounts, pixel clips
- **Prop mounts**
  House/yard mounts, coro braces





WHAT CAN YOU MAKE?

- **Tools**
  Pixel pushers/jigs
- **New props**
  Stars, spinners, candy canes
- **Modify traditional props**
  Spiral trees, RBLs
- **Controller/power supply mounts**

3D PRINTING VS. TRADITIONAL

- **3D printing**
  Small
  Repetitive
  Complicated
  Custom

- **Traditional**
  Large, strong parts

PRINT YOUR OWN OR BUY

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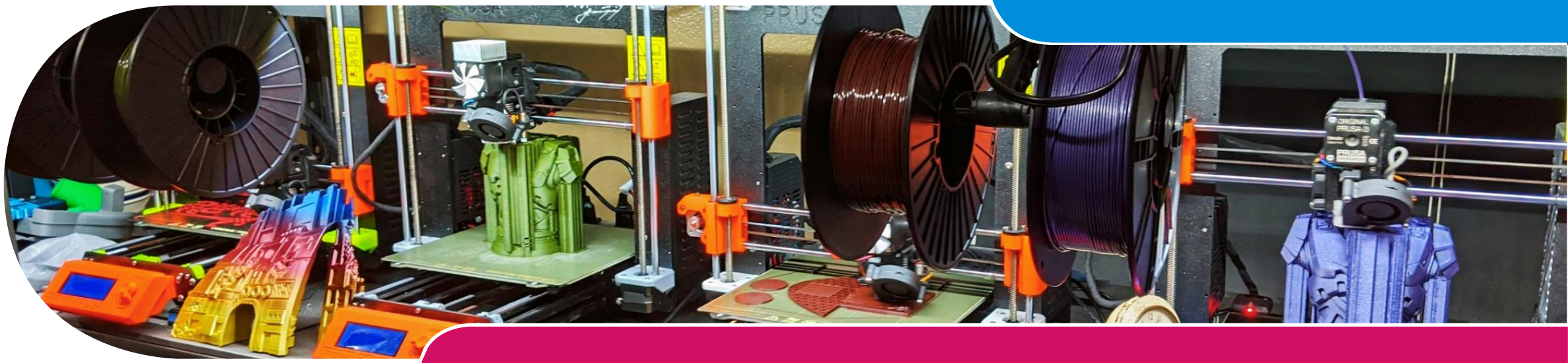
Should you own a 3D printer or buy parts preprinted?



PRINT YOURSELF OR PREPRINTED?

- **Buy a printer**
  Printer & filament cost, machine repair/maintenance, time to print
- **3D printing services**
  wide variety of materials
    shapeways.com
    craftcloud3d.com
    treatstock.com

shapeways

Craftcloud®

TREATSTOCK

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WHERE TO FIND THEM

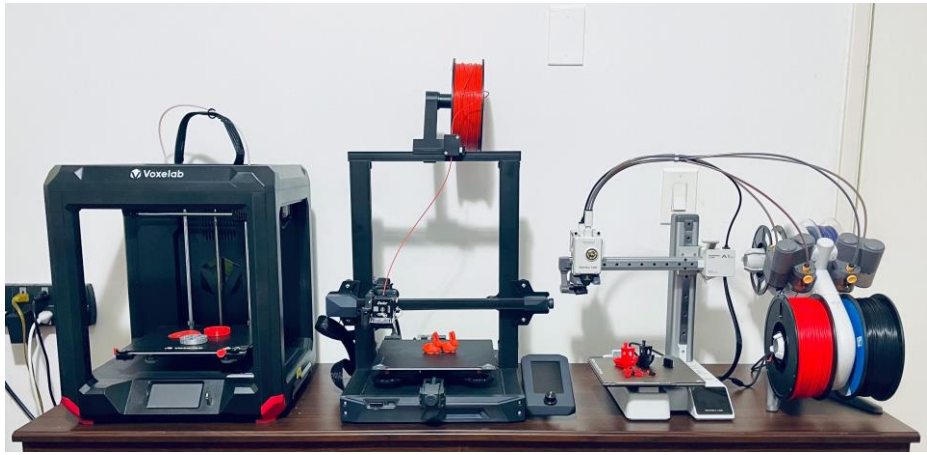
Buy, borrow, or build one yourself

WHERE TO FIND THEM

- **Where to buy**
  - Amazon, Micro Center
- **Best ready-to-run (Apple)**
  - Prusa, Bambu
- **Best budget/tinkering (Android)**
  - *Ender*
- ***Buyer's guide:*** *All3DP.com*

WHAT TO LOOK FOR

- Open vs. enclosed
- Heated bed vs. enclosure
- Build volume
- Auto leveling
- Bowden tube vs. direct drive
- Nozzle temp
  - Up to 260C for PETG, 270 for ASA
  - Fast material flow for fast printing



DESIGN YOUR OWN SHAPES OR BUY

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Making custom parts yourself or buying premade ones

WHERE TO FIND SHAPES

- **Facebook**
  - *Official xLights Sharing Group*
  - *Official xLights Support Group*
  - *3D Printing For True Holiday Light Enthusiasts*
  - *3D Printing For Holiday Lighting Enthusiasts Group.*
- **3D printing repositories**
  - *thingiverse.com (DIY Christmas)*
  - *printables.com*
  - *makerworld.com*

WHERE TO FIND SHAPES

- **Christmas lighting vendors**
  - *Flash The Neighbors*
  - *Inspire Light Shows*
  - *JustinZDesign*
  - *SFL Designs*
  - *Your Pixel Store*

DESIGNING SHAPES

- **Beginner 3D design software**
  tinkercad.com

- **Next-level software**
  Fusion 360
  (free personal/hobbyist license)

  YouTube is a great way to learn!

FILAMENT

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Choosing the correct filament for your needs

FILAMENT TYPES

- **PLA**

  Low temp, brittle, outside maybe, easy to print

- **ABS**

  High temp, strong, outside friendly, not UV safe, warping & cracking

- **PETG**

  High temp, strong, outside friendly, UV safe, somewhat easy to print

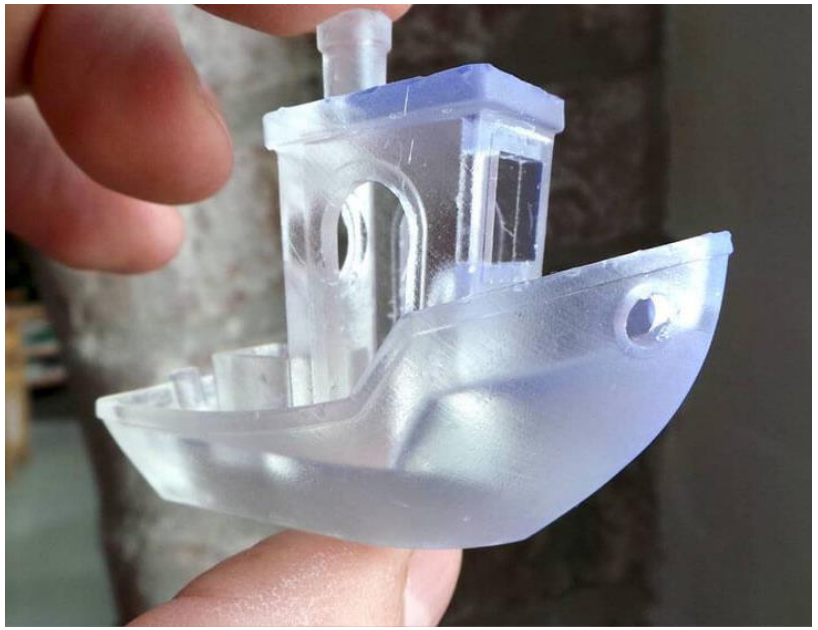
FILAMENT TYPES

- **TRANSPARENT**

  Tricky to get "clear", PLA/PETG, nozzle temp, fan cooling, thin layers, vase mode

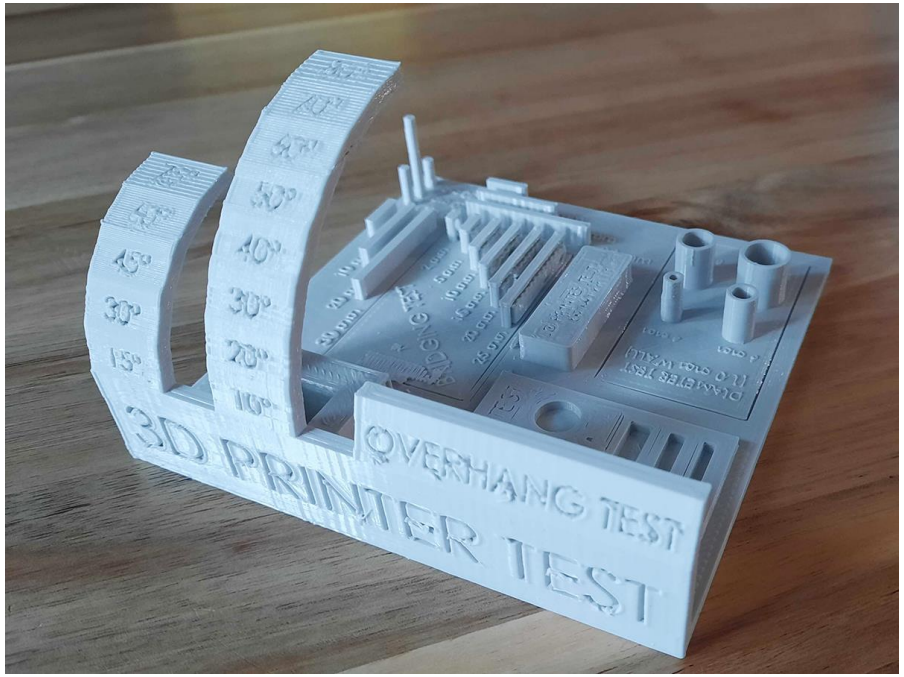
- **TPU**

  Rubber-like, shore hardness, very strong, NinjaFlex



FILAMENT CALIBRATION

- **Temperature**
  Drooping, layer fusing
- **Speed**
  Under extrusion, layer separation
- **Flow**
  Bulging, under extrusion
- **Retraction**
  Stringing, under extrusion



FILAMENT CARE

- Filament aborbs moisture
  PETG the worst
- Becomes brittle & snaps
- Store in sealed bag with desiccant packet
- Dry in oven (low temp) or food dehydrator

3D PRINTING SOFTWARE

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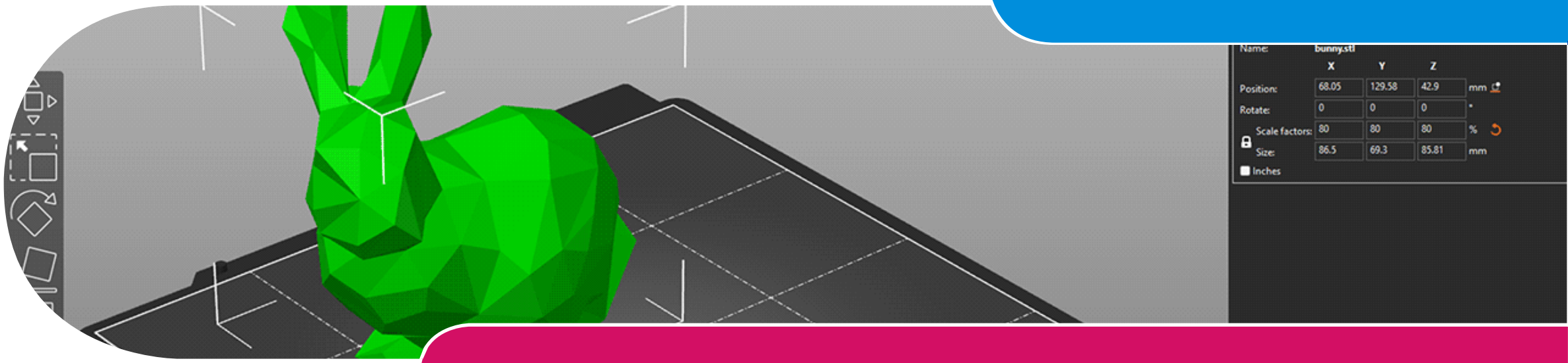
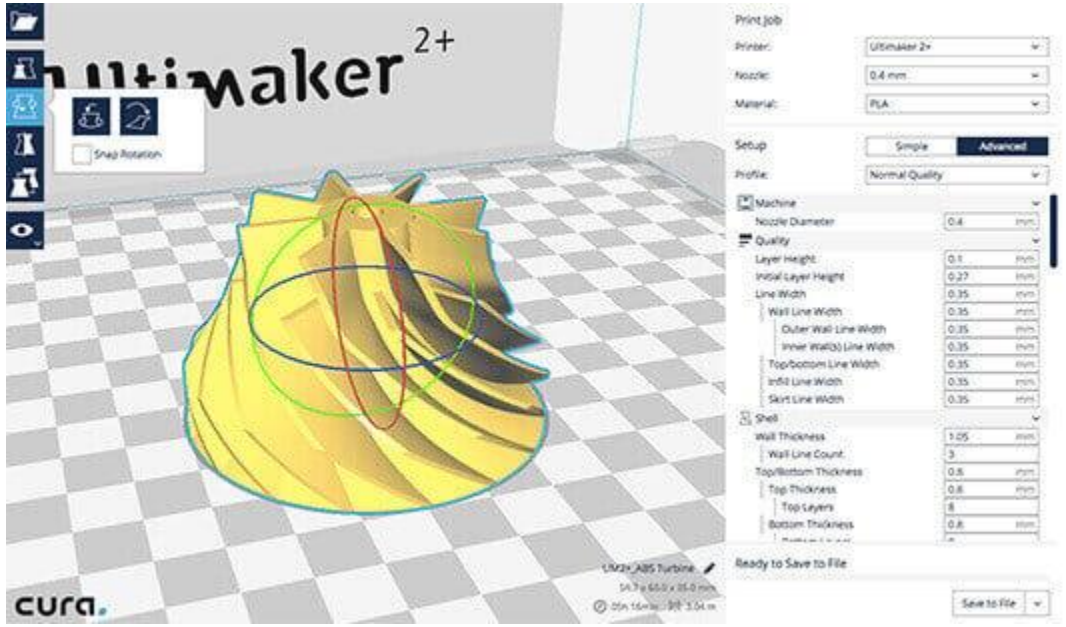
Sending shapes from your computer to the printer



3D PRINTING SOFTWARE

- **"Slicer"**
  Converts shape (.STL file) into printer movements (.gcode file)
  Come with printer

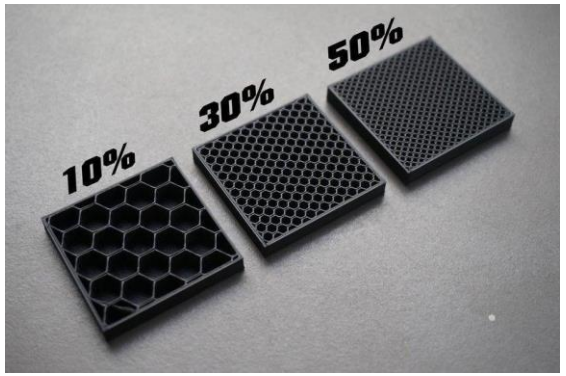
- ***Types***
  Proprietary
  Universal
    Cura, PrusaSlicer, others

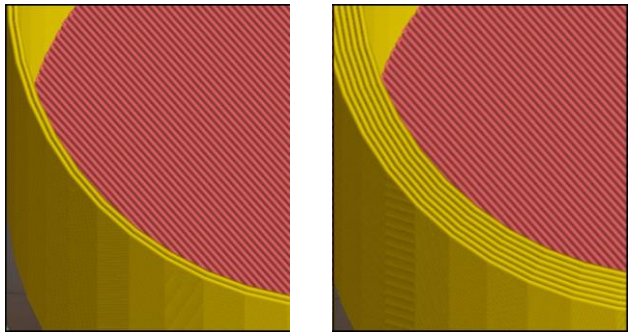


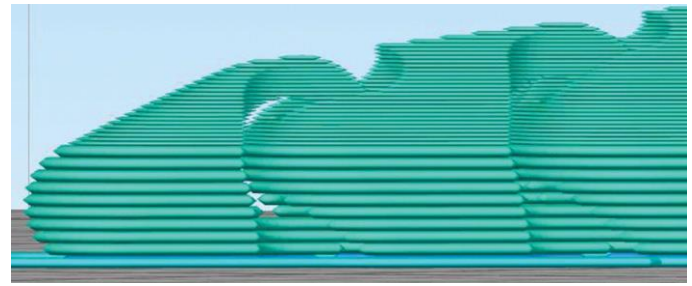
3D PRINTING SOFTWARE

- **Common software settings**
  - *Infill*
  - *Supports*
  - *Perimeters, vertical shells*
  - *Layer height*
  - *Filament type*

  Your favorites?







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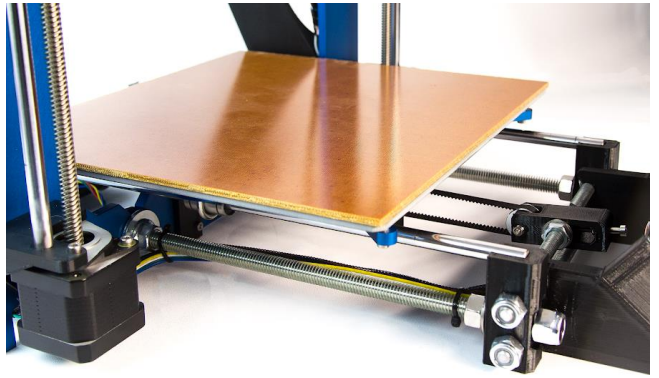
PRINTING TIPS

Advice for successful 3D printing

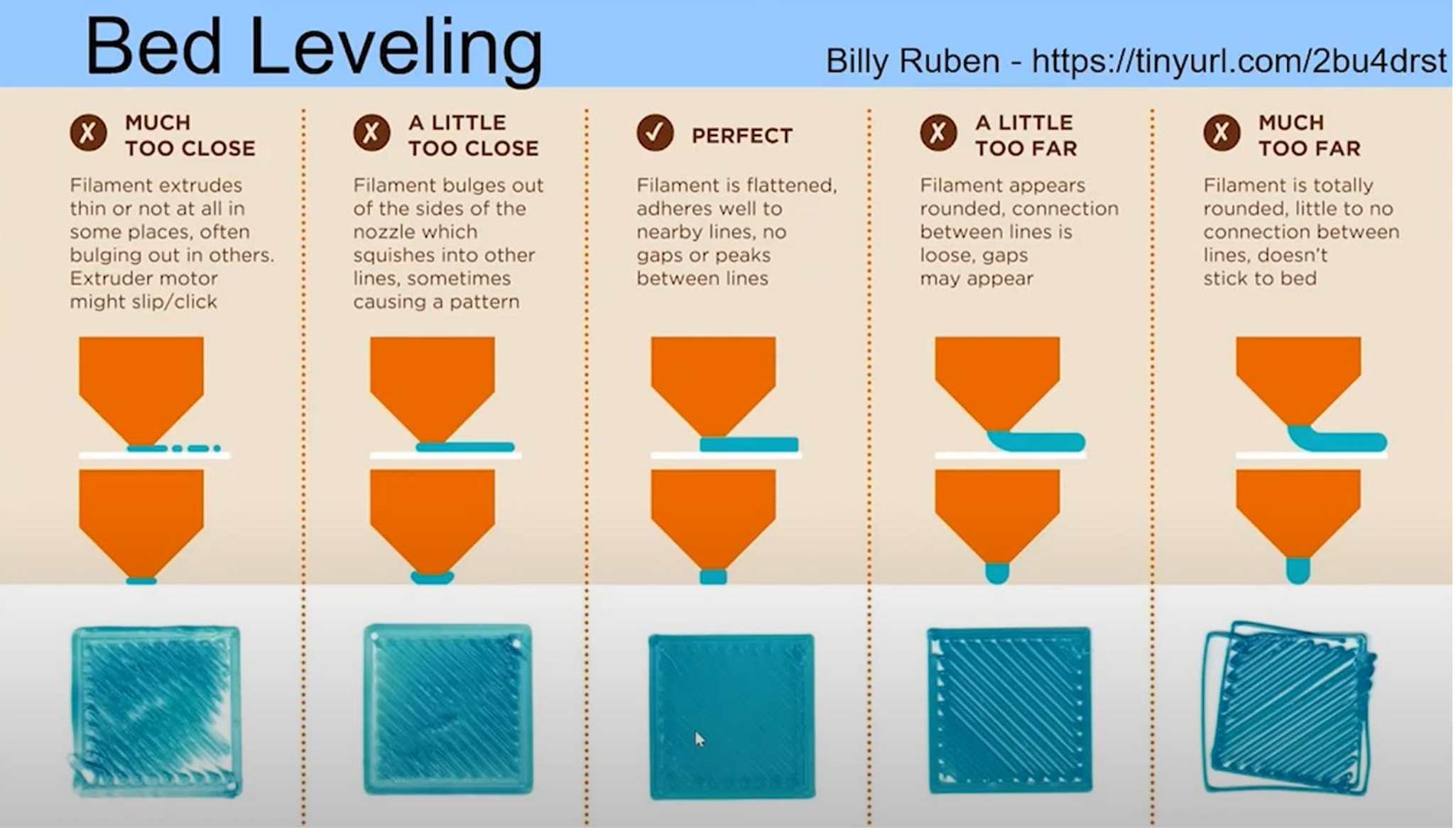
FIRST LAYER IS IMPORTANT!

- **Bed type**
  - *Glass (PETG sticking issue)*
  - *PEI (powered coat vs. laminate)*
  - *Rigid, flexible, magnetic, steel*
- **Adhesion**
  - *Glue stick, Kapton tape, painter's tape, hairspray, none*



Bed Leveling

Billy Ruben - https://tinyurl.com/2bu4drst



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Optimal gap is two sheets of 20-weight (standard thickness) paper

Nozzle too low, elephant's foot, affects layer fusion

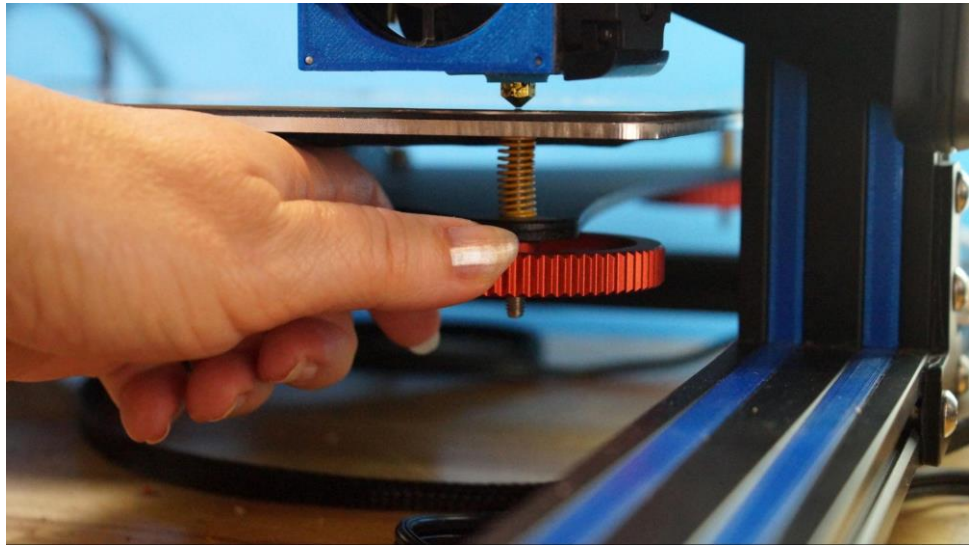
Filament must slightly "squish" into bed

Nozzle too high, part comes loose during printing

FIRST LAYER IS IMPORTANT!

- **Prep**

  Level bed (manual/probe/ load cell)

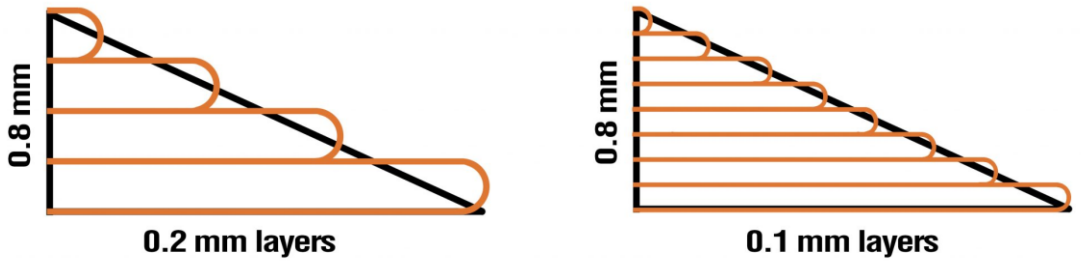


  Skirt/brim/raft

  Clean surface (hand oil, rubbing alcohol, Dawn dish soap)

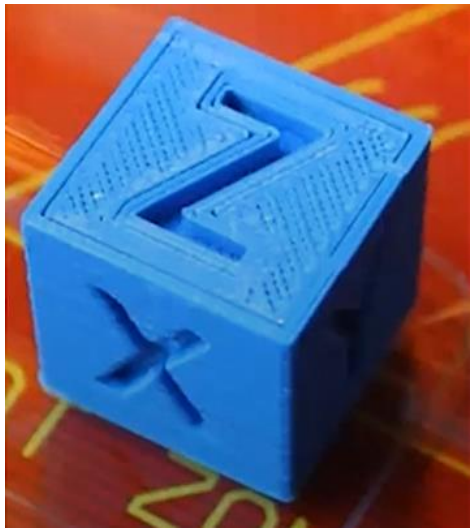
PRINTING LARGE OBJECTS

- **Nozzle size**
  fewer layers, less detail, 0.04-1.0+mm, high-temp heat block
- ***Filament difficulty***
  PLA → PETG → ABS → ASA
- **Heated enclosure**
  Reduce warping & cracking



PRINTER CALIBRATION

- **Needed for "budget/tinker" printers (Creality)**
  - *X Y Z axis steps*
  - *E steps*
  - *As simple as using a ruler & calipers*



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MAKERSPACES

Be part of the maker movement!

MAKERSPACES

- **Traditional and modern tools**
  Wood/metalwork, 3D printers, laser cutters, electronics, sewing
- **Classes & workshops**
- **Make friends, build community**
  People of different backgrounds helping each other

MAKERSPACES

- **Area Makerspaces**

  Sears think[box] at
  Case Western Reserve University

  - *50,000-square-foot facility*
  - *Space & tools for any project from electronics to blacksmithing*
  - *Free and open to the public*

  case.edu/thinkbox

MAKERSPACE COMMUNITY

- **Area Makerspaces**

  Akron Makerspace

  - *3D printers, laser cutter, metalsmithing, welding, CNC router*
  - *$40/month membership*

  akronmakerspace.org

MAKERSPACES

- **Area Makerspaces**

  Libraries

  - *Cleveland Public Library TechCentral*

    cpl.org/location/techcentral

  - *Akron Public Library TechZone@Main*

    akronlibrary.org/locations/main-library/techzone-main

WANT TO KNOW MORE?

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Get more information about 3D printing

WANT TO KNOW MORE?

- **All3DP.com**
  get on their mailing list
- **Facebook support groups**
- **Makerspaces**

QUESTIONS?

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THANK YOU!

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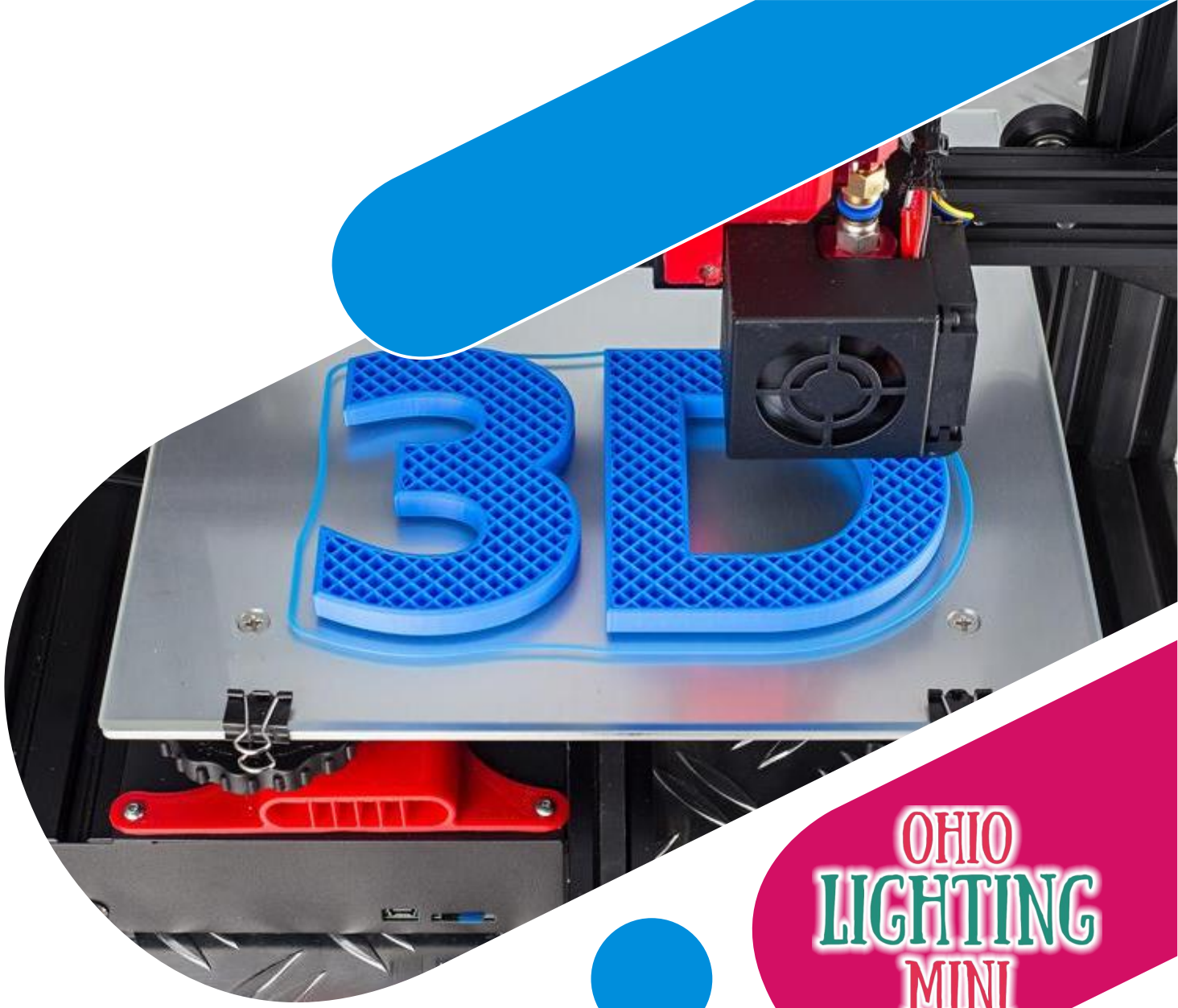

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