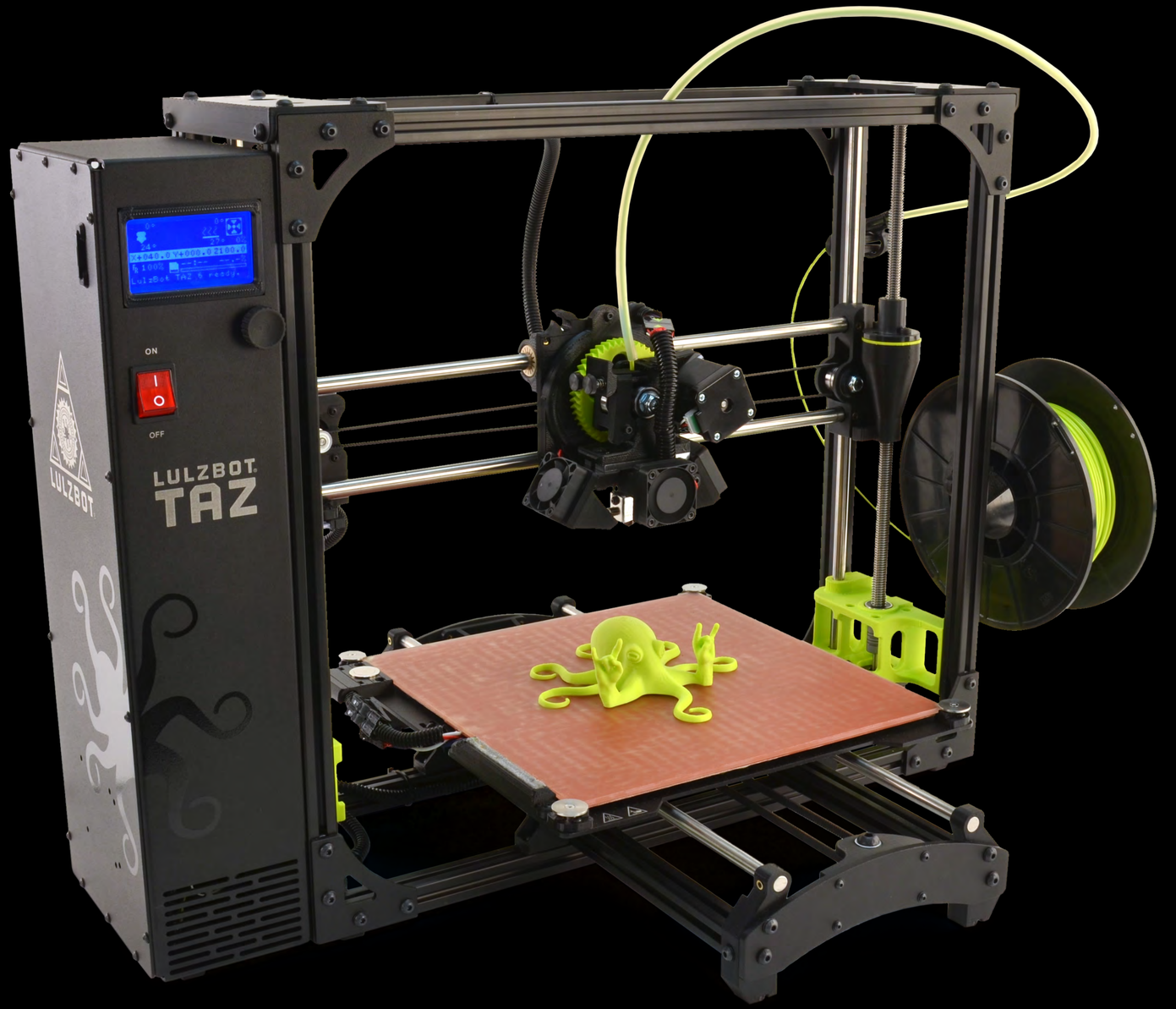
3D Props 101
Why, How, & When to Make 3D Props

Wondercon 2019 Edition



Who are we?

David McGreavy

DomBobomb

Chad Hoku

Hoku Props

Macy Dailey

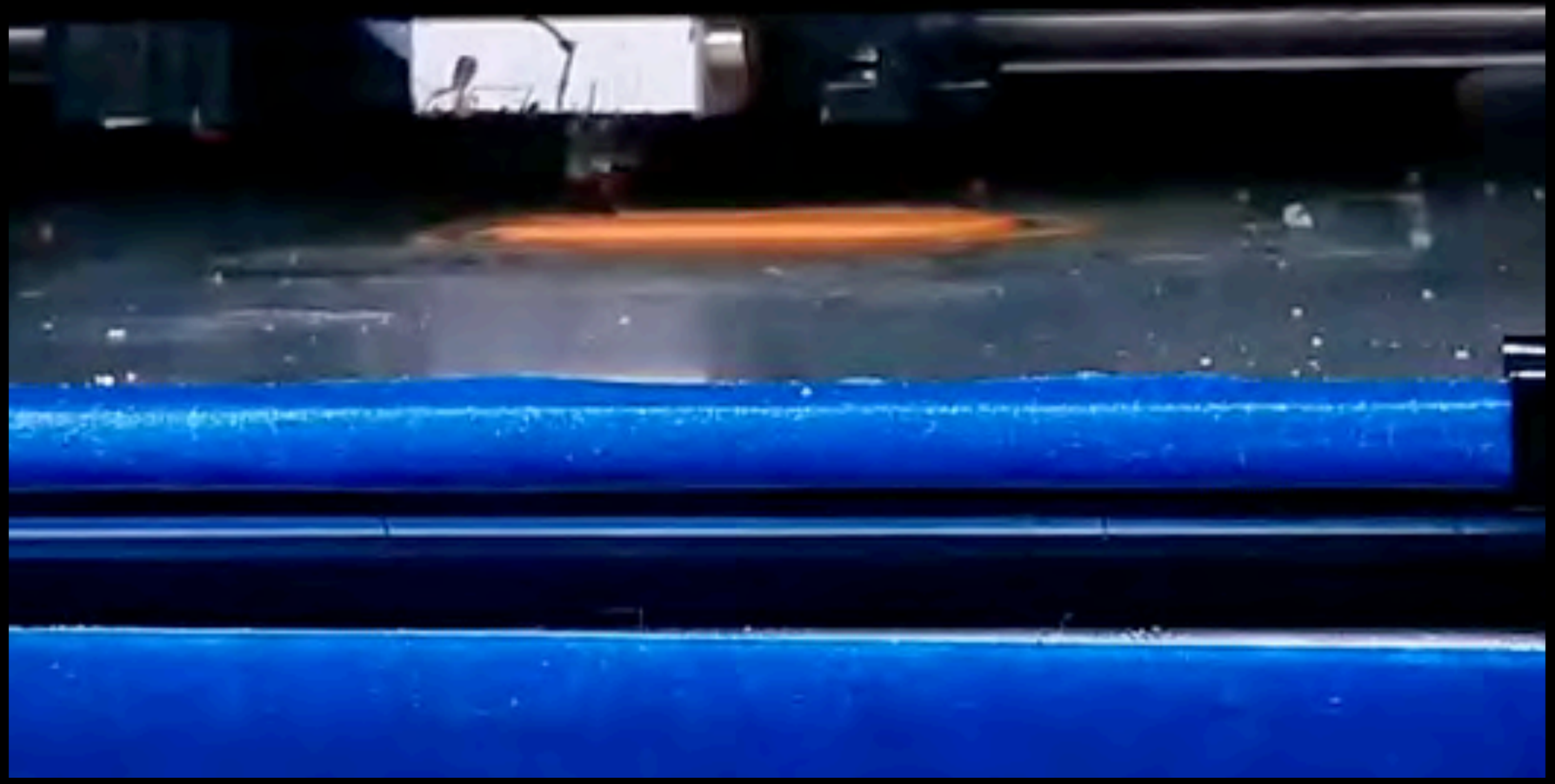
May You See Costuming

Jesse Kwan

Prop Department

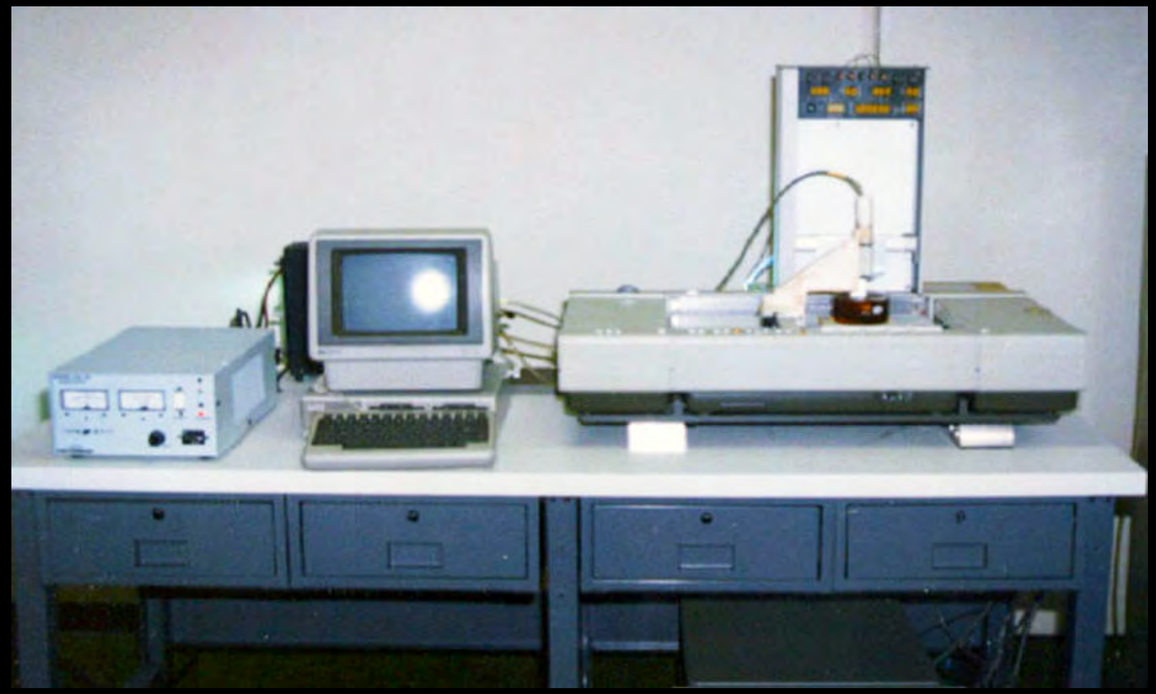
What is 3D Printing?

3D printing is the automated process of building a three-dimensional object by laying down successive layers of material until the object is finished.

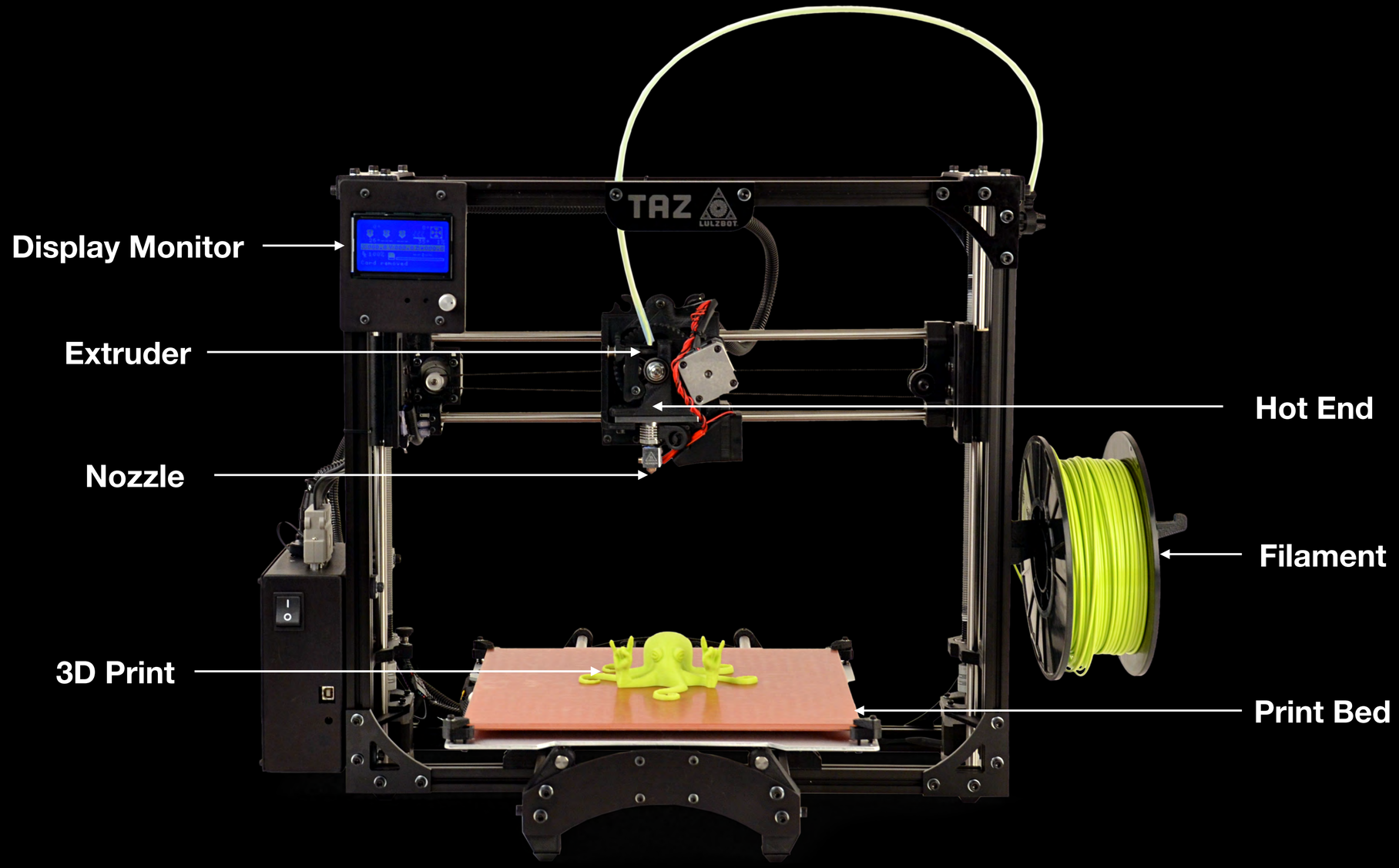


The History of 3D Printing

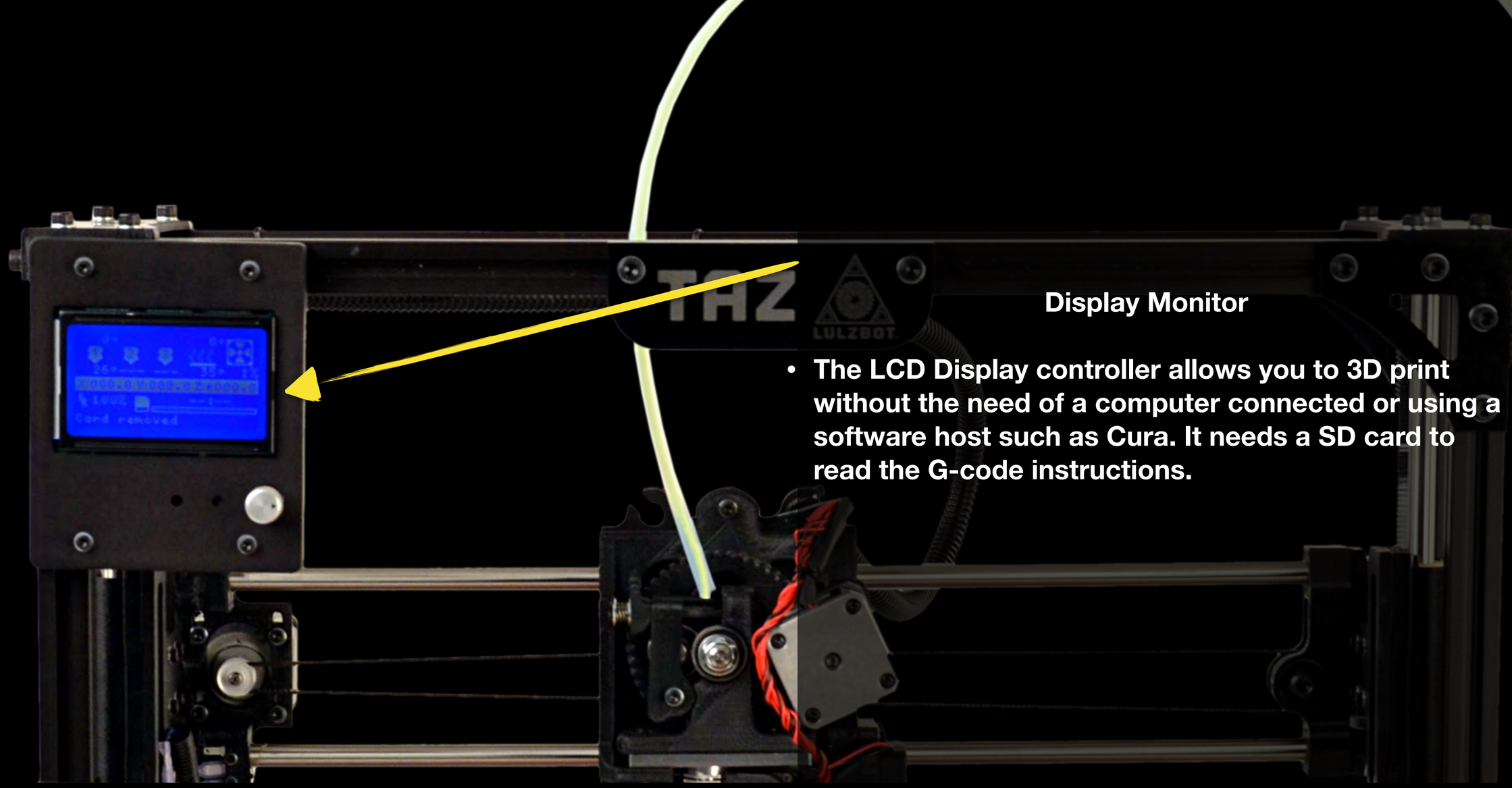
- 3D printers aren’t a new thing, they actually first started development in the late 1980’s, with the same principals being used today.
- The technology became available to the masses in 2009 with the release of the RepRap printer, and it’s open source code, which the community have been building onto ever since.



SLA-1 (1987)


Display Monitor
Extruder
Nozzle
3D Print
Hot End
Filament
Print Bed
TAZ
LULZBOT

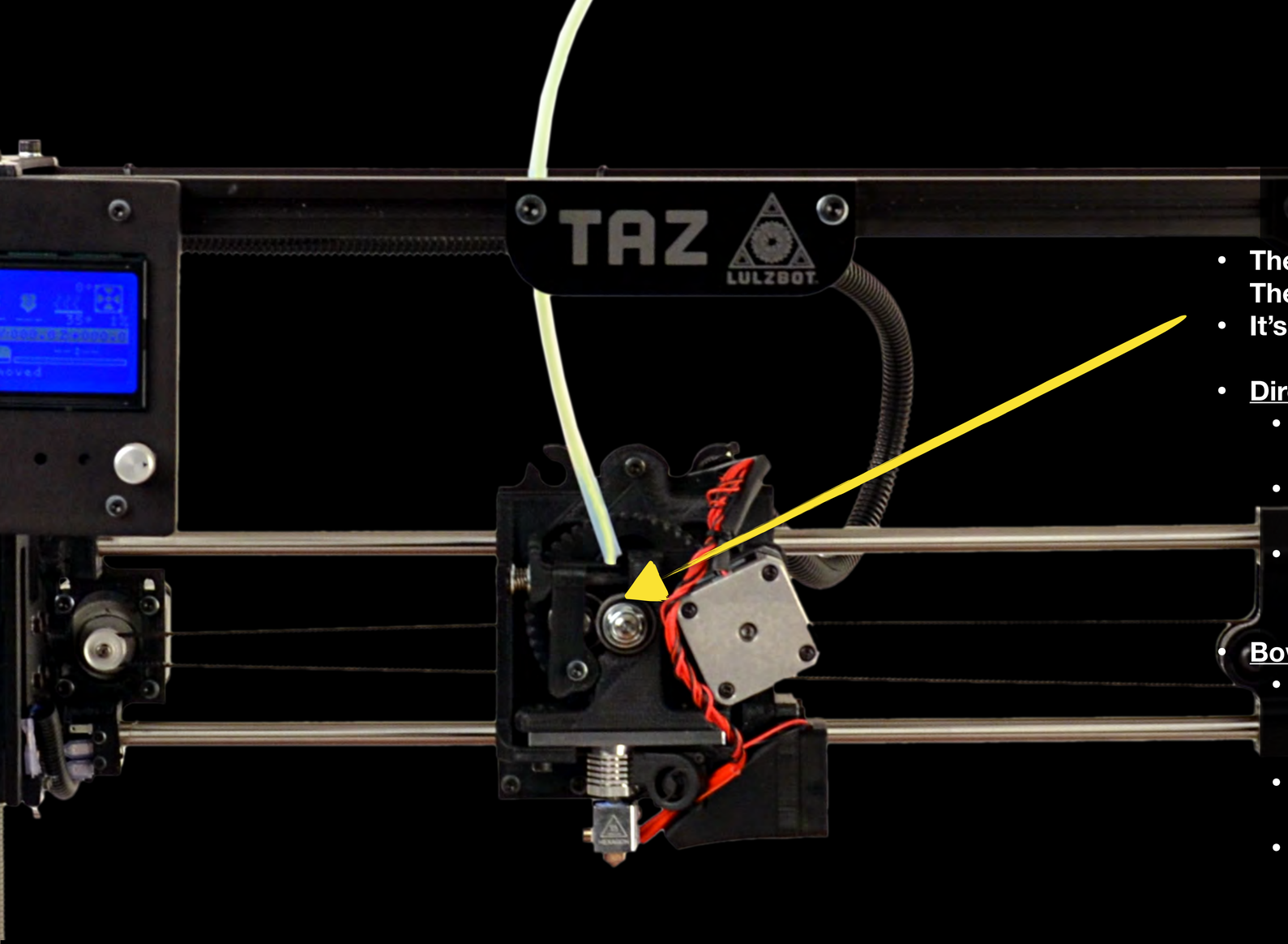
Printer 101



Display Monitor

- The LCD Display controller allows you to 3D print without the need of a computer connected or using a software host such as Cura. It needs a SD card to read the G-code instructions.

Printer 101



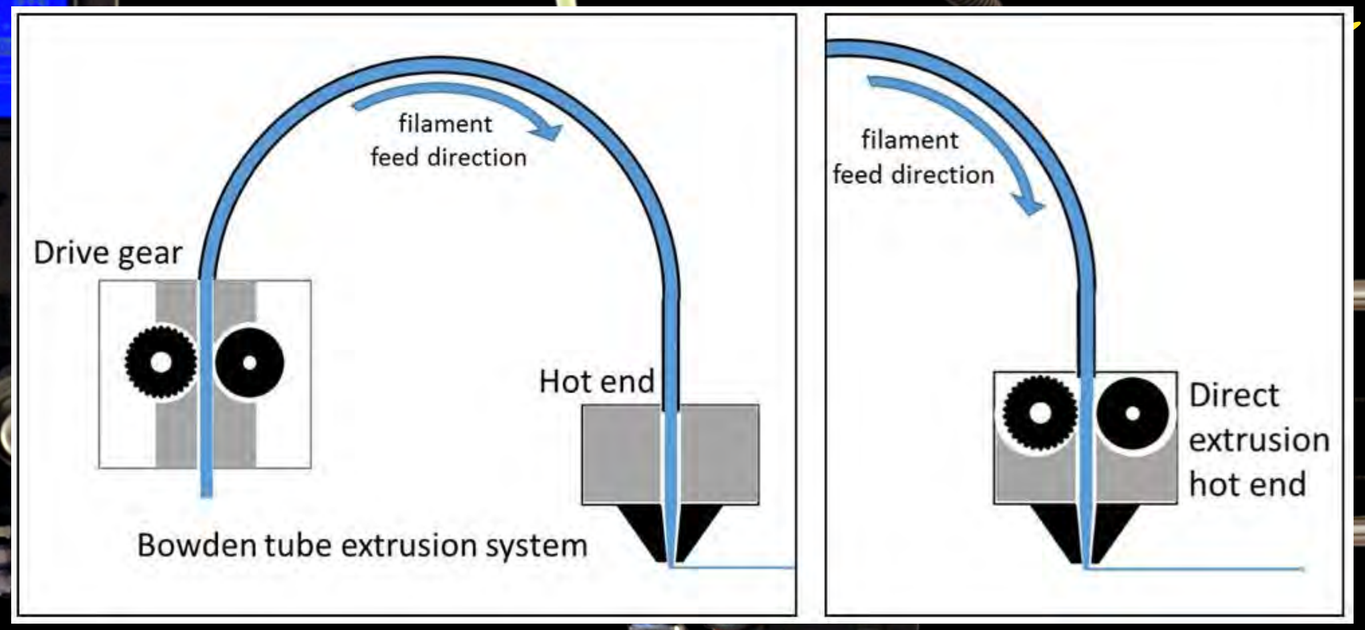
Extruder

- **The Extruder is the part that feeds the filament to the hot end. There are two different types of extruders available.**
- **It’s an outgoing conversation which one is better.**

- **Direct**
  - When the filament is fed directly to the Hot End from the motor spindle.
  - With this mechanism the Extruder is mounted on top of the hot end.
  - It allows finer control over the extrusion and is easier to work with.

- **Bowden**
  - When the filament is fed form a certain distance to the Hot End. The difference is that the filament has to travel a distance until it reaches the hot end through a tube.
  - This reduces weight and allows for faster movement and less vibrations.
  - It’s harder to print certain filaments (eg. Flexible filaments). Bowden extruders require better extrusion and retraction calibration

Printer 101



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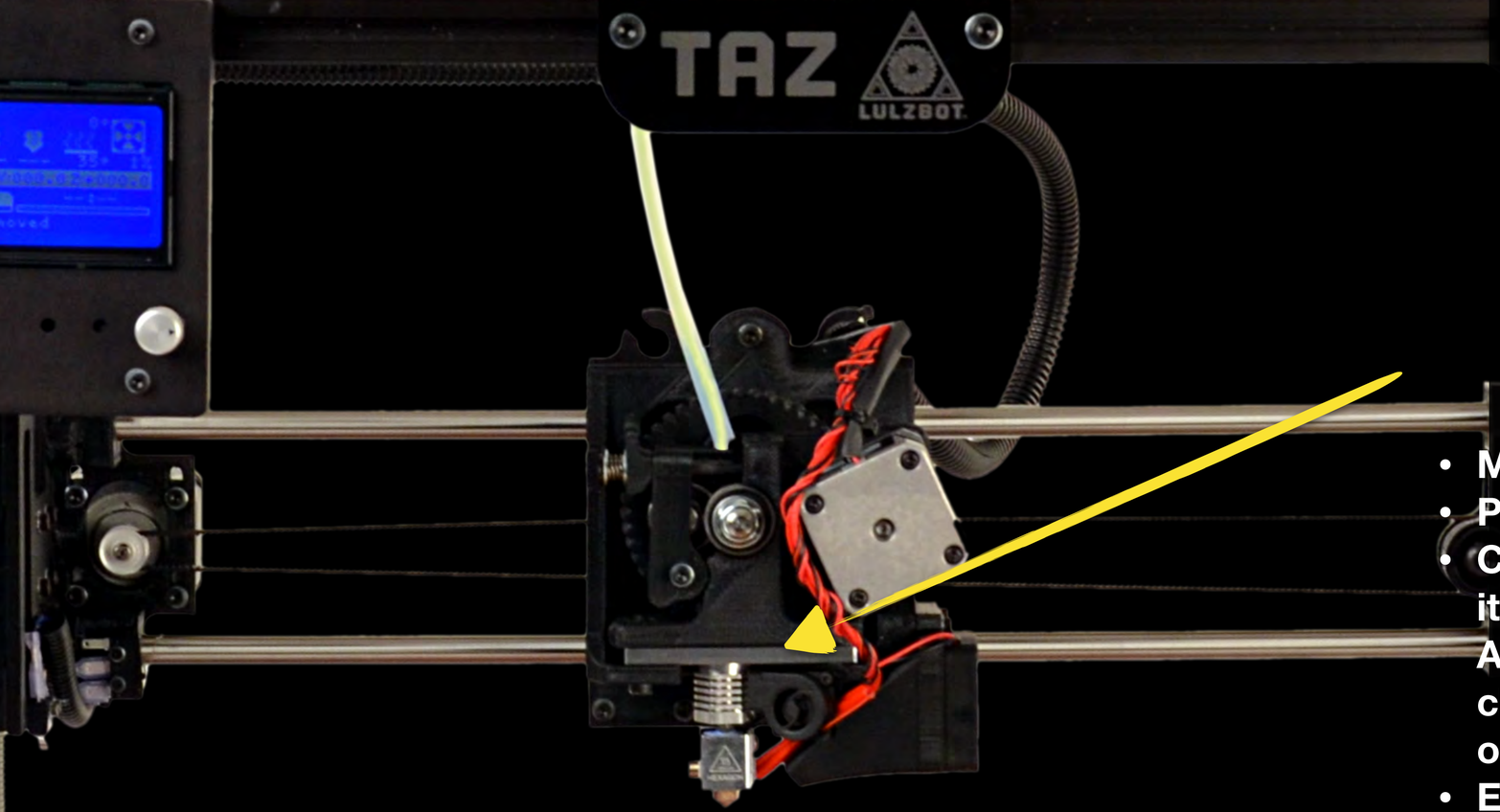
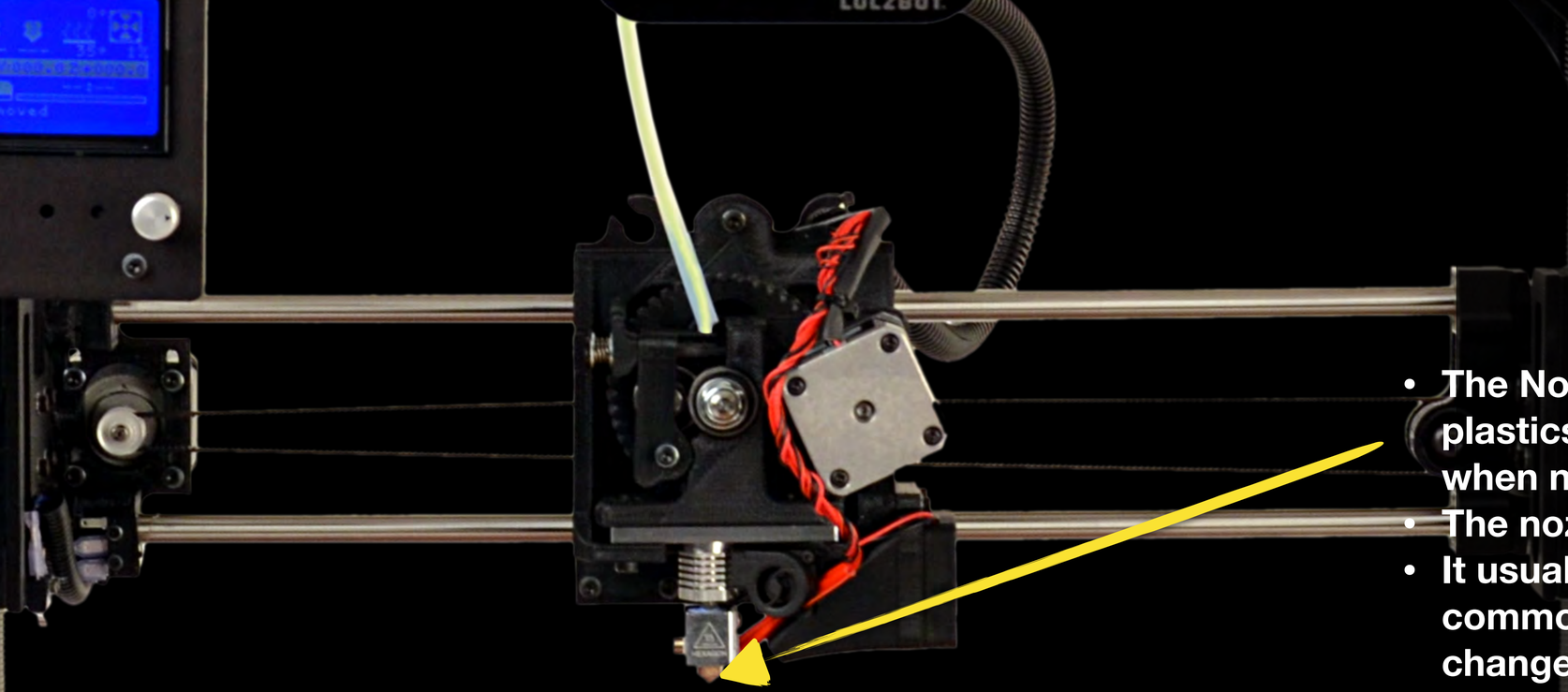


Hot End

- Max temperature 320°C
- Prints with all materials available
- Cleaner prints with the Hexagon all metal hot end as it has active cooling in order to isolate the melt zone. A smaller melt zone means more control. Therefore cleaner retraction and less oozing that results in overall better print quality.
- Easy to maintain as it has fewer parts and smaller size make it almost jam free and easier to clean.
- Very little maintenance is required – mainly when changing between different kinds of filament.

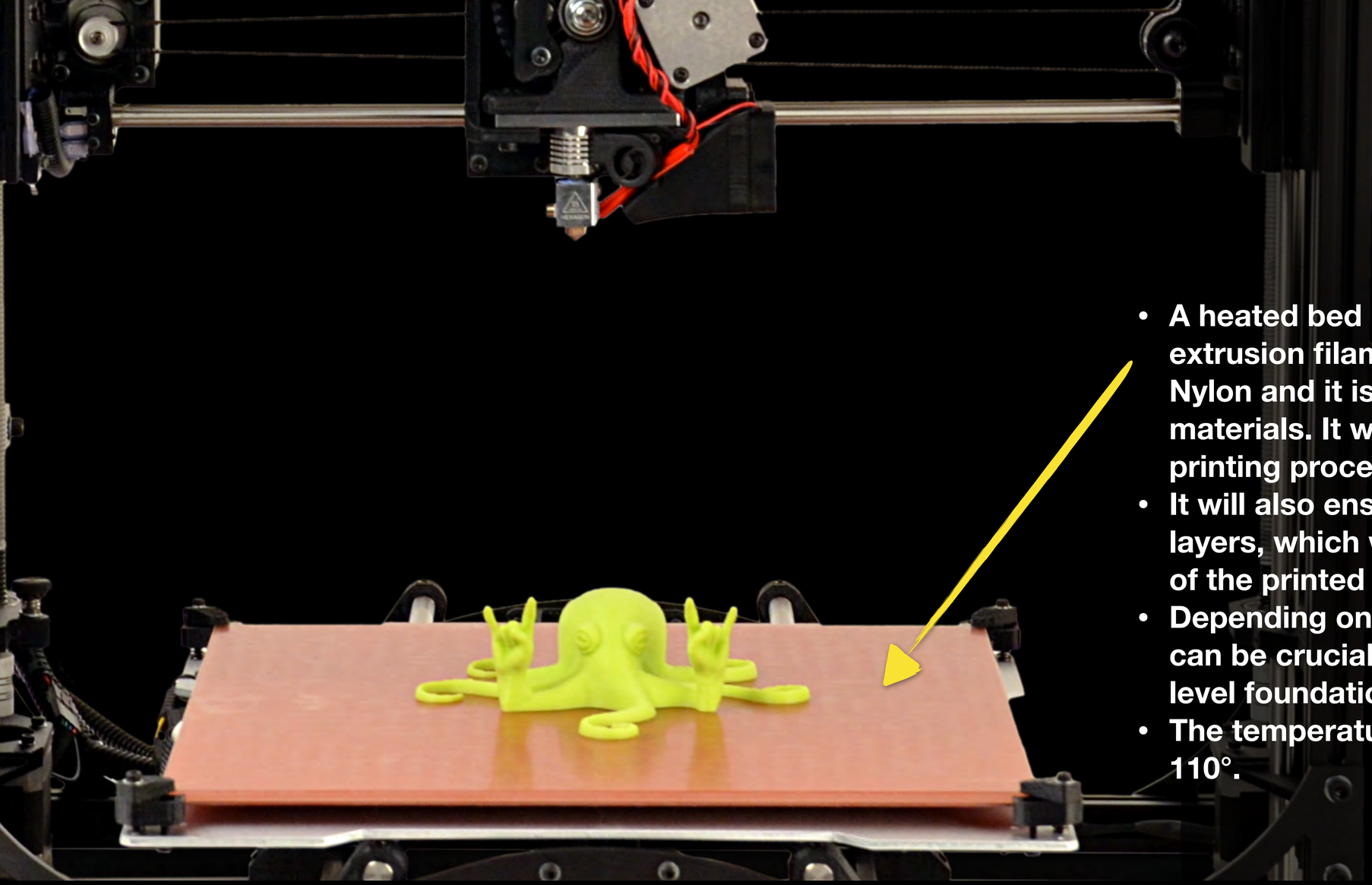
Printer 101



Nozzle

- The Nozzle is the tip of the Hot End where the plastics comes out. It needs to be exchangeable when needed.
- The nozzle size is really important.
- It usually varies from 0.25mm to 0.75mm. The most common size is 0.5mm. The best practice is to change the nozzle sizes depending on your design and desired results.

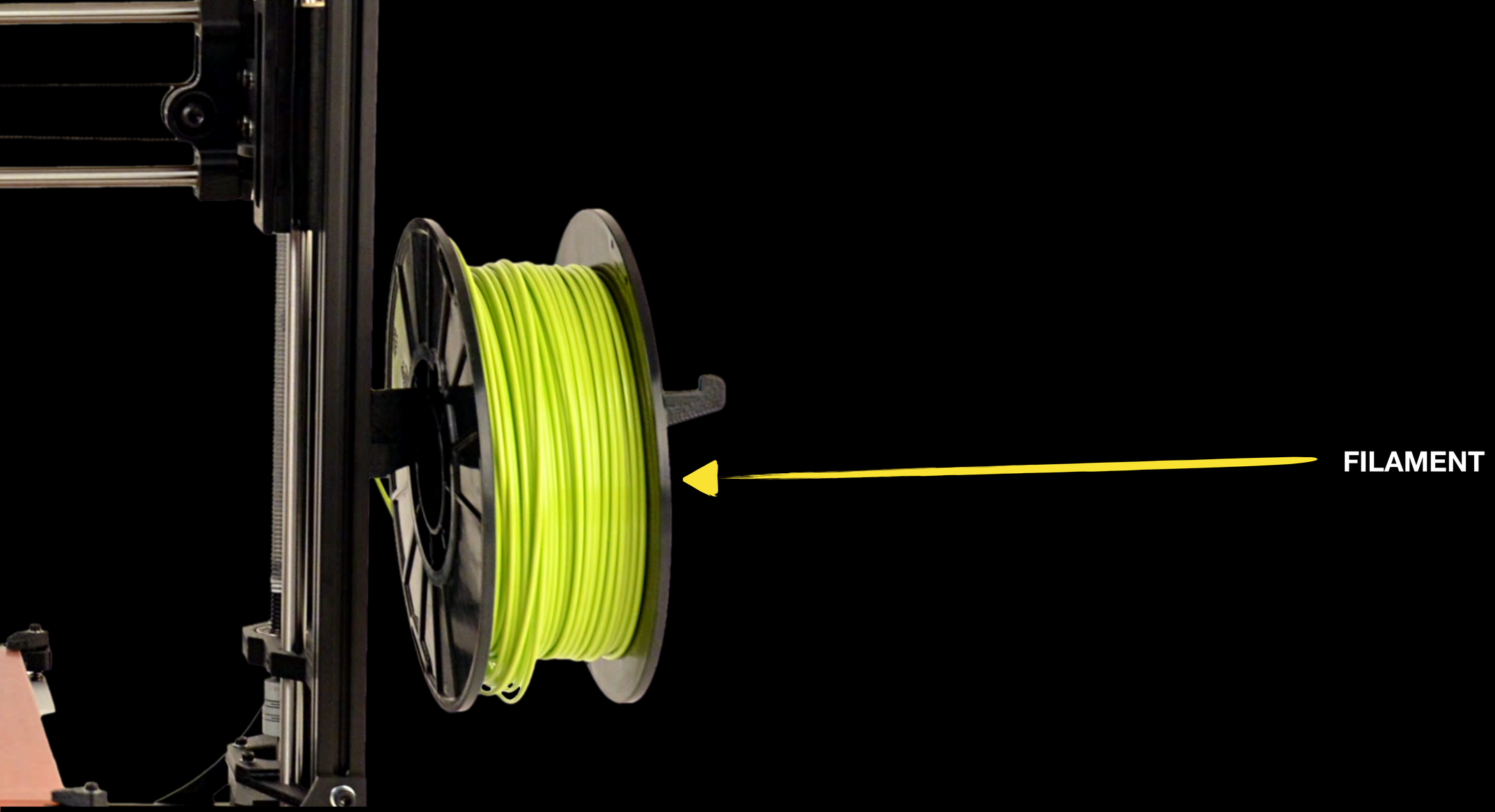
Printer 101



Heated Bed

- A heated bed is required for all high temperature extrusion filaments like ABS, HIPS, Polycarbonate, Nylon and it is very beneficial for almost all the materials. It will keep the plastic warm during the printing process and prevent it from warping.
- It will also ensure a better adhesion between the layers, which will result in a better structural integrity of the printed parts.
- Depending on the printer and material, a heated bed can be crucial for the first layer to ensure a good level foundation.
- The temperature usually will be between 40°C to 110°.

Printer 101



Printer 101

Filaments?

Type	Properties	Price	Print Temperature
ABS (*Acrylonitrile Butadiene Styrene*)	Durable, more resistant to temperature	~$20/Roll	210°C - 250°C
PLA (*Polylactic Acid*)	Low Cost, Odorless, Eco Friendly	~$20/Roll	190°C - 230°C
PVA (*Polyvinyl Alcohol*)	Eco friendly, dissolvable in water	~$40/Roll	180°C – 230°C
HIPS (*High Impact Polystyrene*)	Low Cost, biodegradable in water	~$40/Roll	220 - 230 °C
TPE (*Thermoplastic Elastomers*)	High elasticity, but difficult to print	~$25/Roll	210°C - 225 °C

Software

3D Modeling

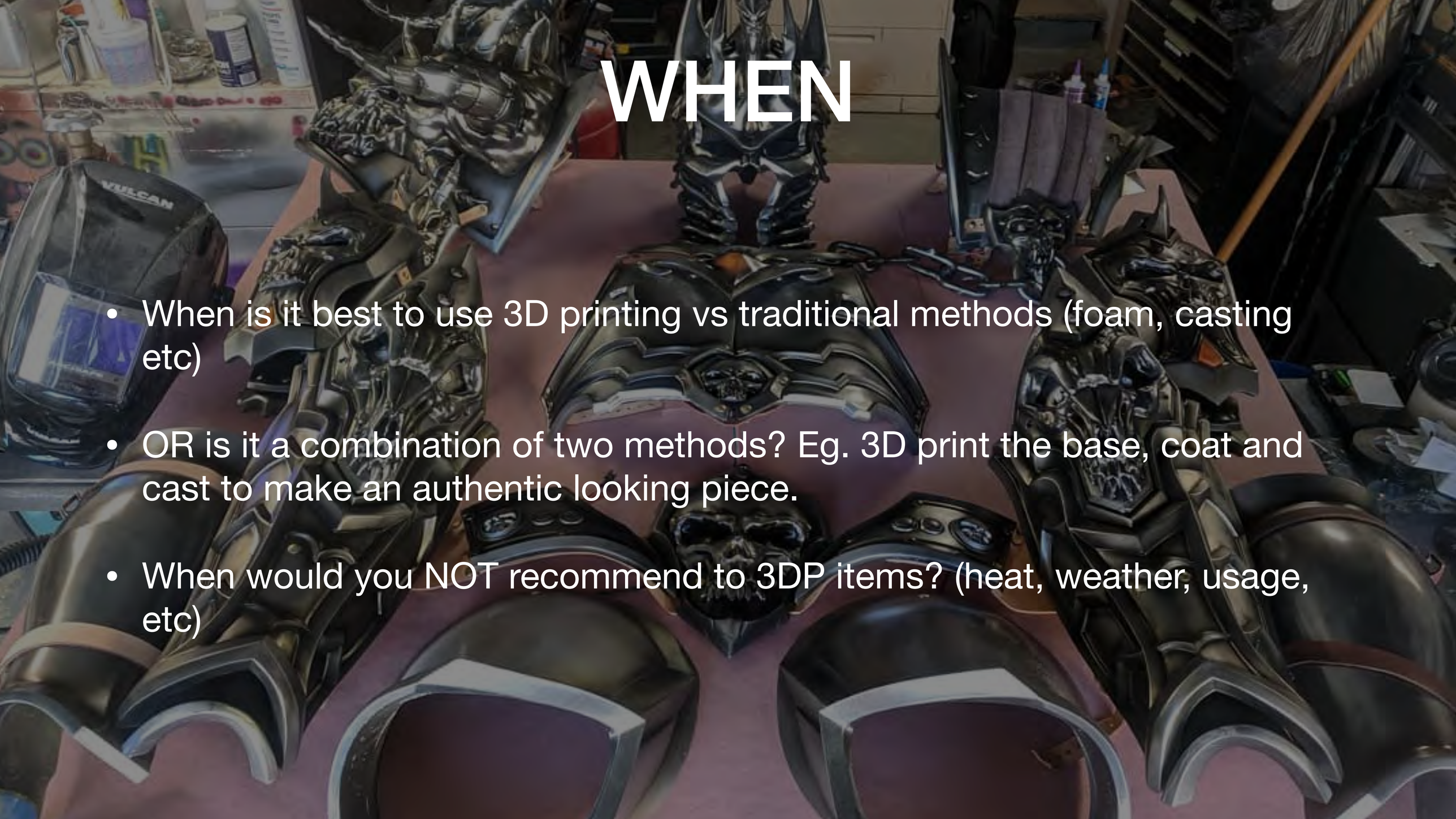
	Software	Price	Modeling Type
	TinkerCAD	FREE	Solid/Box
	Fusion360	Free for students or $60/month	Solid/Box
	FreeCAD	FREE	Parametric/ Procedural
	MeshMixer	FREE	Sculpting/ Cutting
	Blender	FREE	Polygonal
	Zbrush	$895	Sculpting

Slicers

	Software	Price	OS
	Slic3r	Free	PC/OSX/Linux
	Cura	Free	PC/OSX/Linux
	MatterControl	Free	PC/OSX/Linux
	Octoprint	Free	PC/OSX/Linux
	Simplify3D	$150	PC/OSX

Where do you find models?

- Thingiverse (free)
- Sketchfab (free)
- Cgtrader (free or paid)
- Turbosquid (paid)
- Etsy (paid)
- Patreon from your favourite modelers! (eg. Yasu)



WHEN

- When is it best to use 3D printing vs traditional methods (foam, casting etc)
- OR is it a combination of two methods? Eg. 3D print the base, coat and cast to make an authentic looking piece.
- When would you NOT recommend to 3DP items? (heat, weather, usage, etc)

WHY

- Why 3D print?
- Why do you think 3D Printing is getting so popular now with prop making?
- Where do you see the technology developing towards?

HOW

- How do you plan a costume around being 3D printed?
- How do you plan a BIG build? Obviously, it won’t print in one piece right?…
- How do you put multiple pieces together?
- How much does it cost to do these?

Gripes

- What mishaps have you had with 3D prints? How did you solve them?
- Machine gripes
- Problems with files and prints themselves

Where can you find us?

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Macy Dailey

May You See Costuming

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Jesse Kwan

Props Dept

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