

AGENDA

19.00 - 19.30:
Walk-in, drinks & snacks

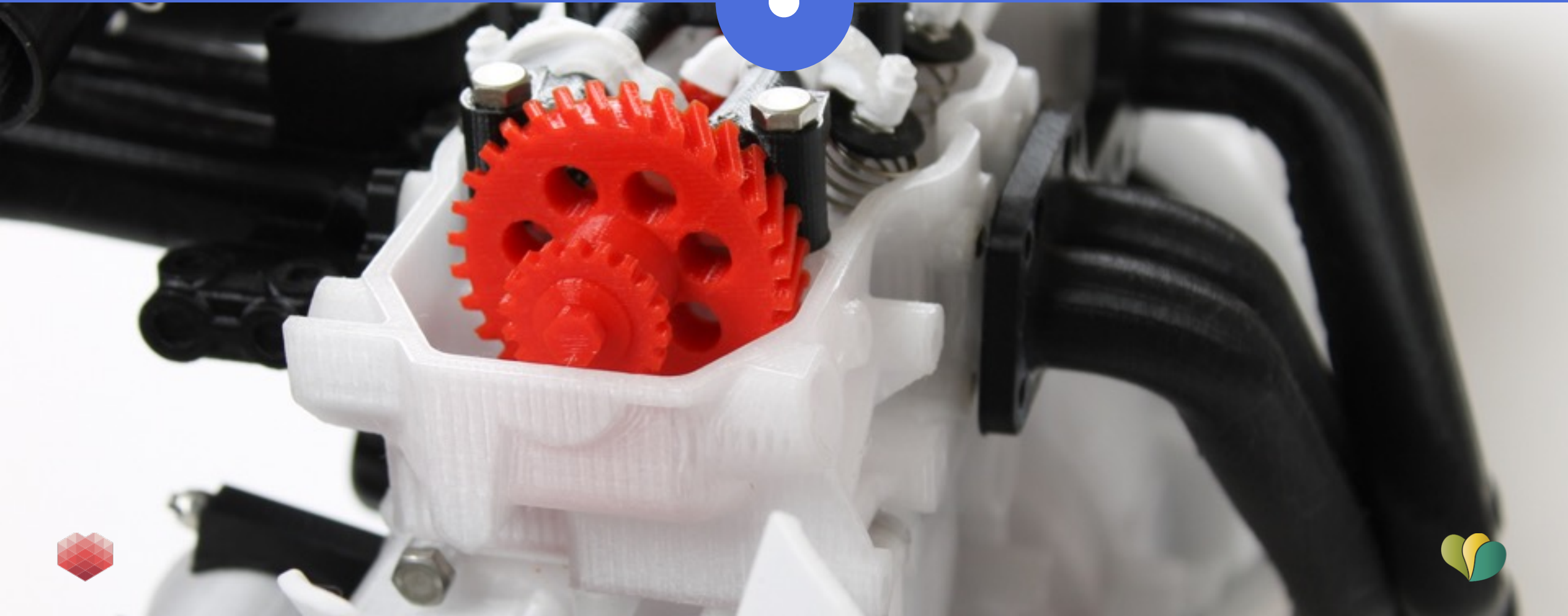
19.30 - 20.30:
Presentation Workshop

20.30 - 21.00:
Discuss, drinks & snacks



CO-POLYESTER FOR 3D PRINTING

3D Hubs & Colorfabb Workshop



MATERIAL FOCUS



GUIDELINES



USEFUL RESOURCES



Choosing the right material



Fairphone case



Print+



3DLabprint



Why you should offer Co-Polyester to your customers

- Tough & durable printed parts
- Heat resistance temperature starting at 75C up to 110C
- Complies with certain FDA food contact regulations
- Chemically resistant



Why you should print in Co-Polyester

- Odor neutral printing, no funny smells in your maker space
- Low fine particle emissions
- Traceable source, Amphora 3D Polymer
- Range of co-polyesters to choose from, mechanical properties and temperature resistance (75C to 110C)



What's a Co-Polyester?

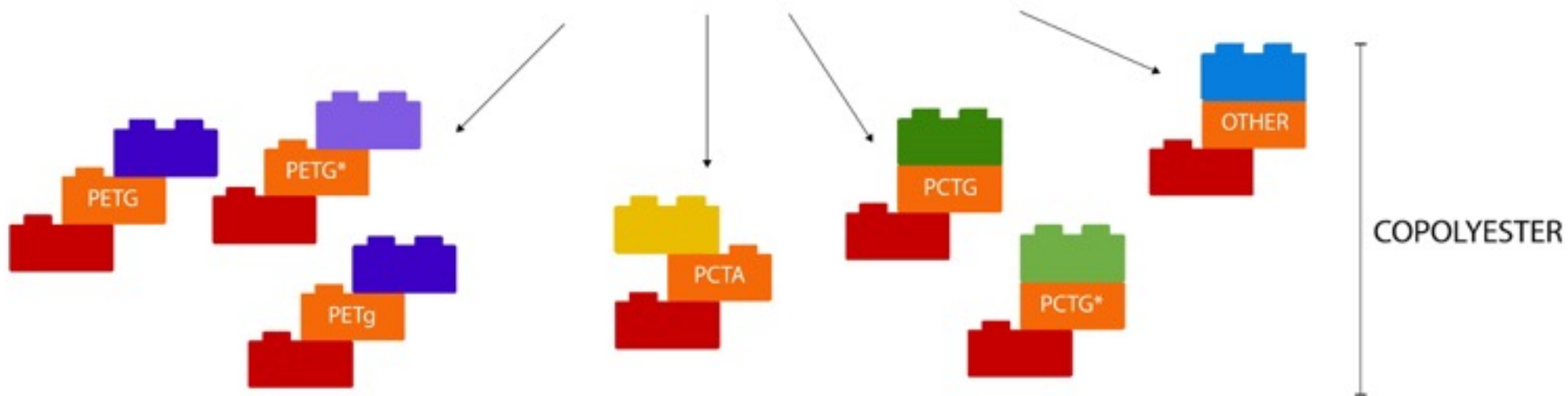
Co-Polyester \neq PET





COPOLYMERIZATION

adding various chemical building blocks



What's a Co-Polyester?



- PET is a crystalline material mostly dedicated to Injection Stretch Blow Molding (*ISBM*) to produce bottles (soft drink and water)
- PET copolymerization gives a wide range of transparent materials suitable for:
 - *Injection*
 - *Extrusion blow molding*
 - *Injection blow molding*
 - *Sheet extrusion*
 - *Glass Polymer*



What's a Co-Polyester?

Number of grades is virtually infinite
EASTMAN & colorFabb select and tweak the
best ones for FFF 3D printing.



Sample Pack

colorFabb nGen
Eastman Amphora 3300

Around



Sample Pack

colorFabb XT
Eastman Amphora 1800

Tough



Sample Pack

beta

colorFabb 910A

Eastman

**Temperature
Resistant**



beta

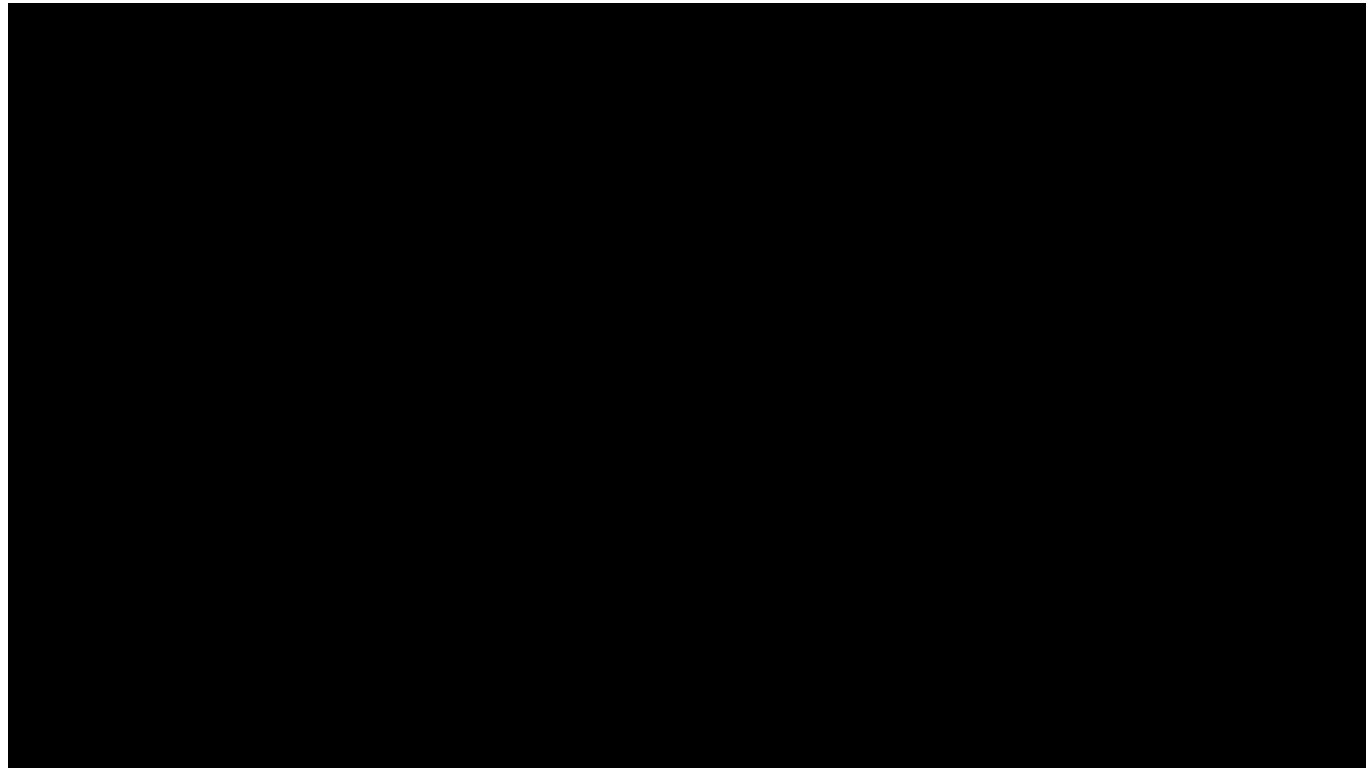
	colorFabb nGen	colorFabb XT	colorFabb 910A
Processing Temperature	220/240C	240/260C	250/280C
Bed Temperature	70/80C	65/75C	100/110C
Temperature Resistance	80/85C	70/75C	105/110C
Toughness	■	■ ■	■ ■ ■
Ease of printing	■ ■ ■	■	■ (Warping)



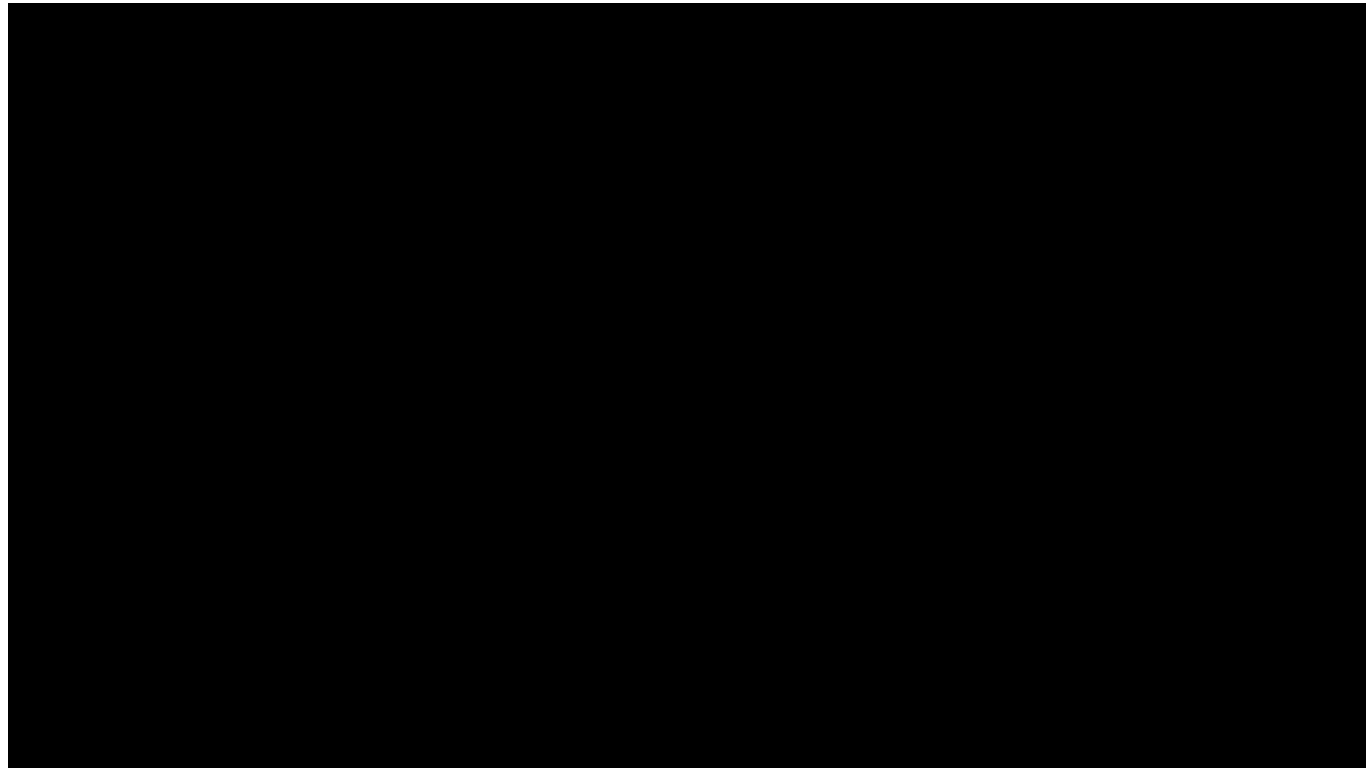
	colorFabb nGen	colorFabb XT	colorFabb 910A <i>beta</i>
Visual prototyping	■ ■ ■	■ ■	■
Functional prototyping	■	■ ■ ■	■ ■ ■
	Typical Alternative to PLA	Typical Alternative to ABS	Typical alternative to ABS and other high temperature resistant filaments



What's a Co-Polyester?



What's a Co-Polyester?



When to use Co-Polyester?



Applications which need heat resistance.



Creep resistance
Parts under constant load



Durable applications



Chemical resistance, acids, base, oils etc.



Toughness, impact resistant.



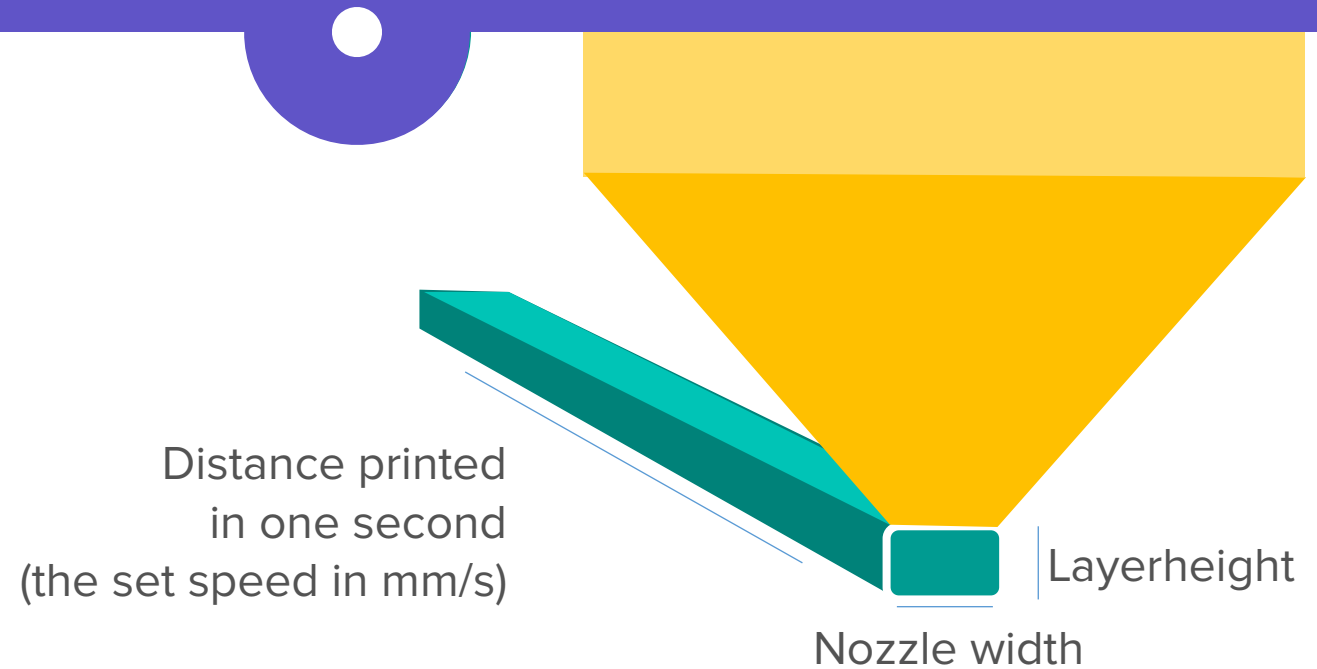
Settings to use



- 1. Speed | temperature | layerheight
- 2. Bridging
- 3. Retraction
- 4. Part cooling
- 5. Warping



Speed, Temperature, Layerheight



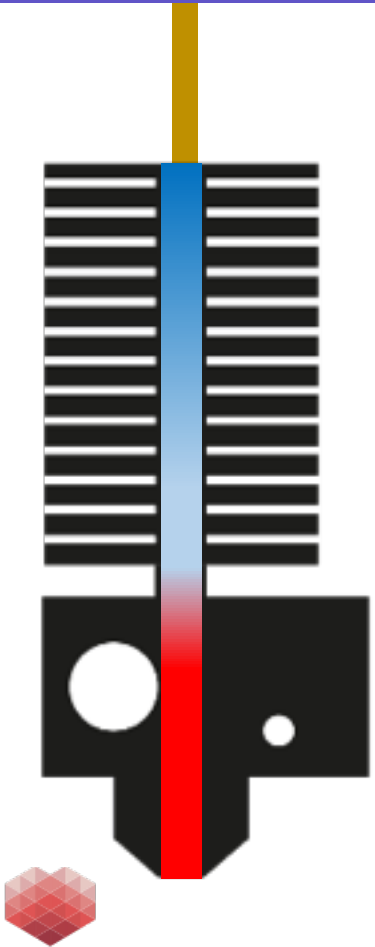
Layerheight x nozzle width x print speed

=

Volume per second



Speed, Temperature, Layerheight



$$0.05\text{mm} \times 0.4\text{mm} \times 50 \text{ mm/s} = 1 \text{ mm}^3 / \text{s}$$

$$0.2\text{mm} \times 0.4\text{mm} \times 100\text{mm/s} = 8 \text{ mm}^3 / \text{s}$$



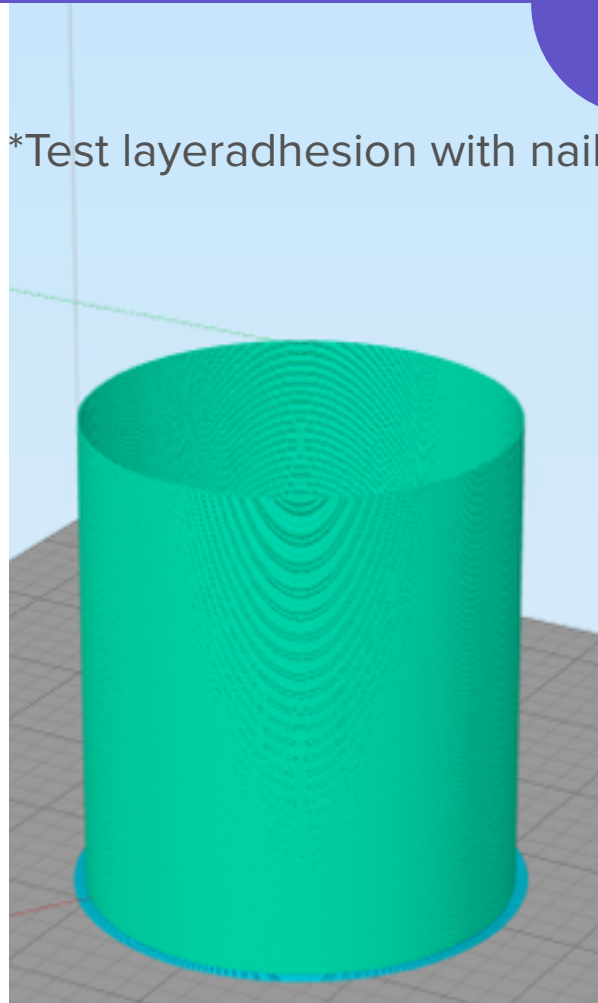
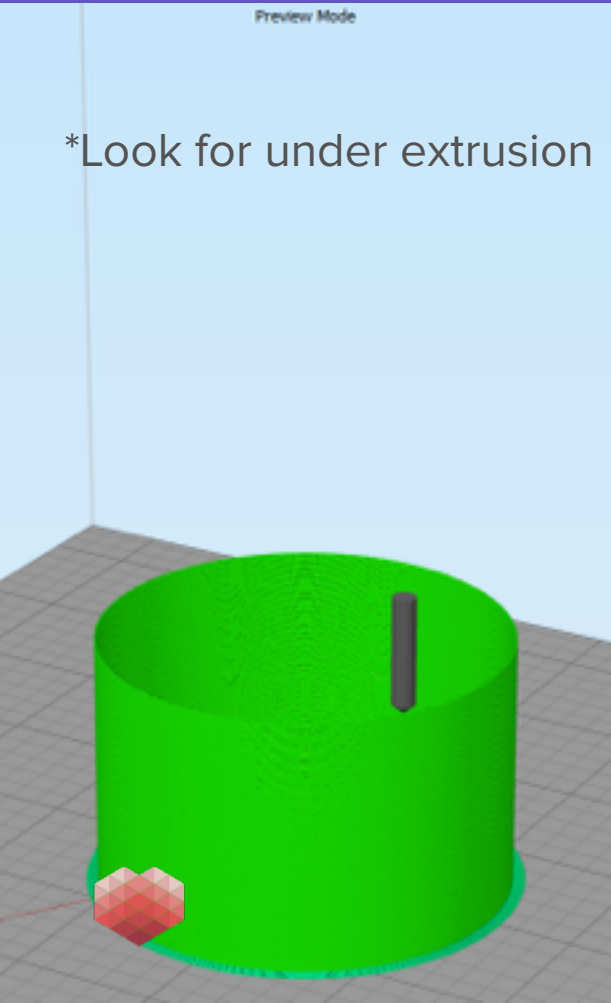
Speed, Temperature, Layerheight



<https://www.youmagine.com/designs/test-print-for-ultimaker--2>



Speed, Temperature, Layerheight

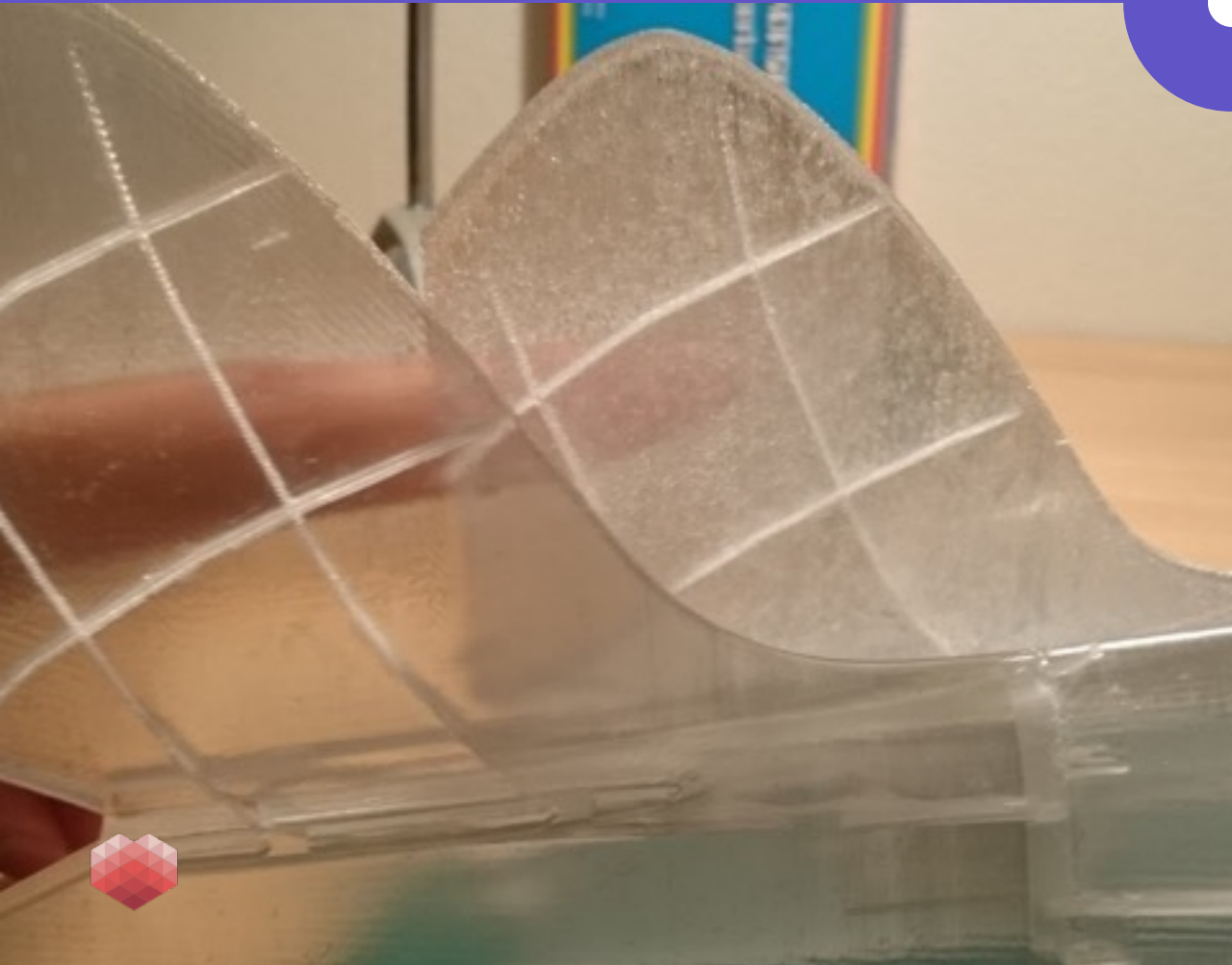


Make your own speed test Solid cylinder

- ✓ No infill
- ✓ Spiralize mode (vase)
- ✓ No top / bottom
- ✓ Disable speed overrides, layer time, slow down for outer perimeters etc.
- ✓ Set speed
- ✓ Set temperature
- ✓ Set layerheight
- ✓ Set nozzle width



Speed, Temperature, Layerheight

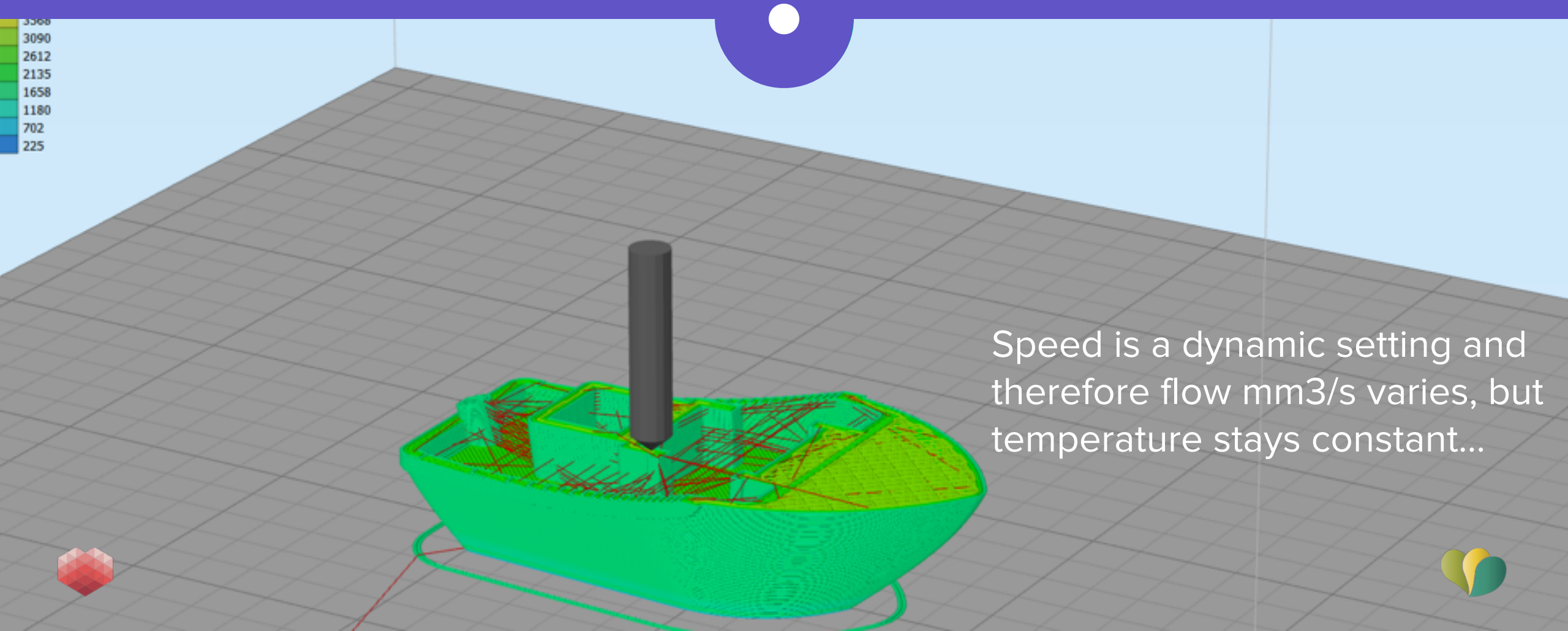


Too fast printing: under extrusion, material collecting on the nozzle instead of the layer, bad layer adhesion, not connecting perimeter lines

Too slow printing: residence time too long, bubbly effect



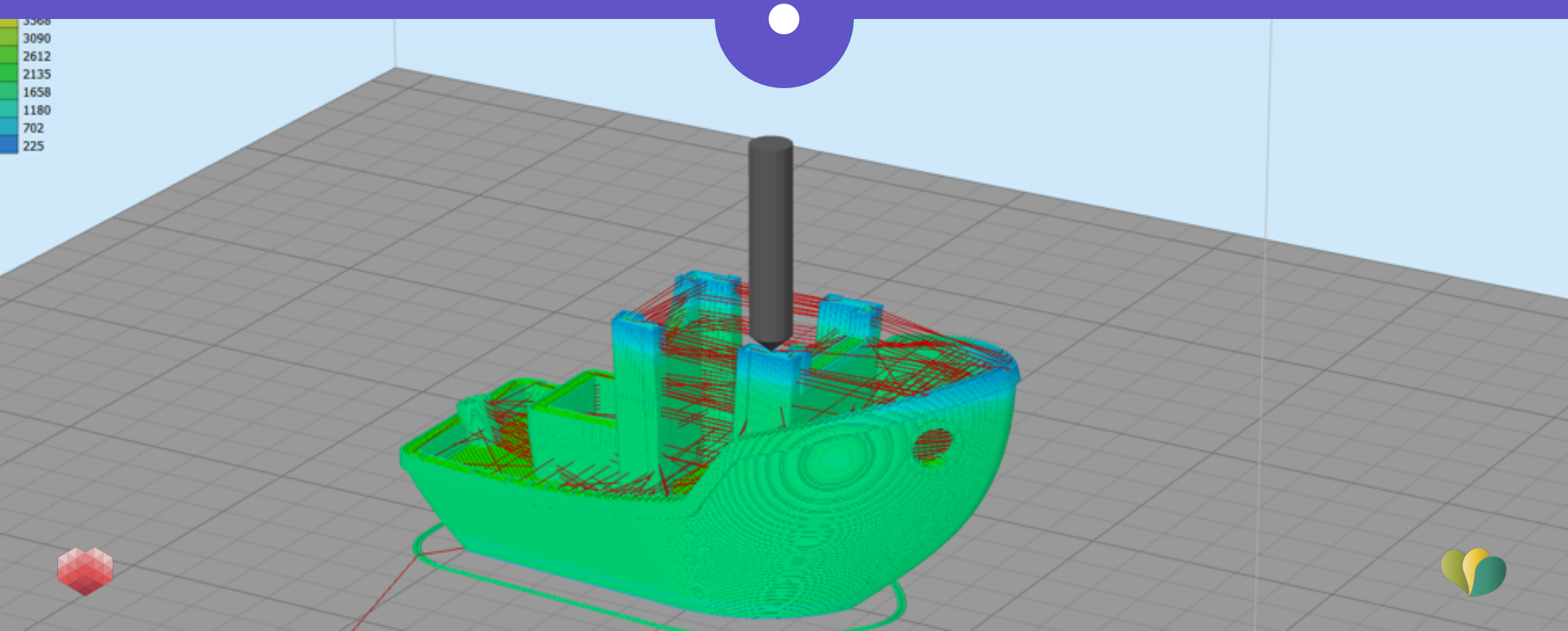
Speed, Temperature, Layerheight



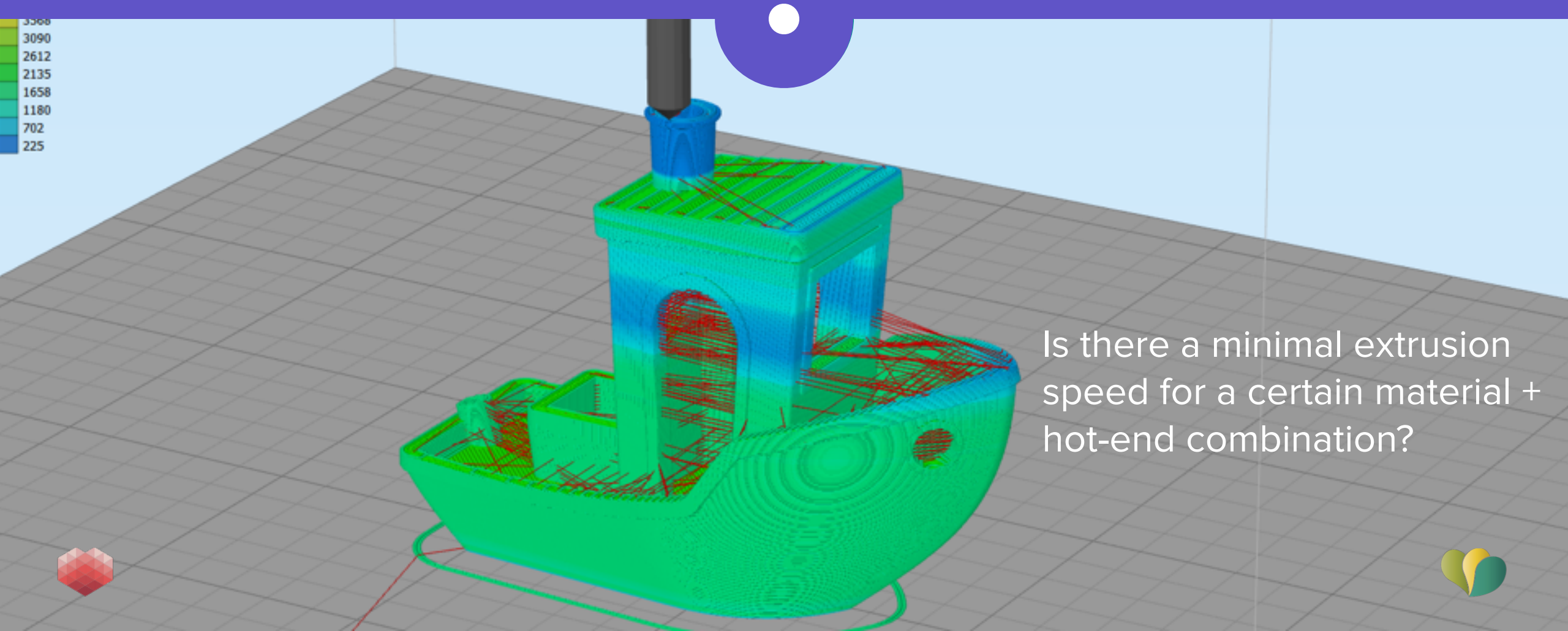
Speed is a dynamic setting and therefore flow mm³/s varies, but temperature stays constant...



Speed, Temperature, Layerheight



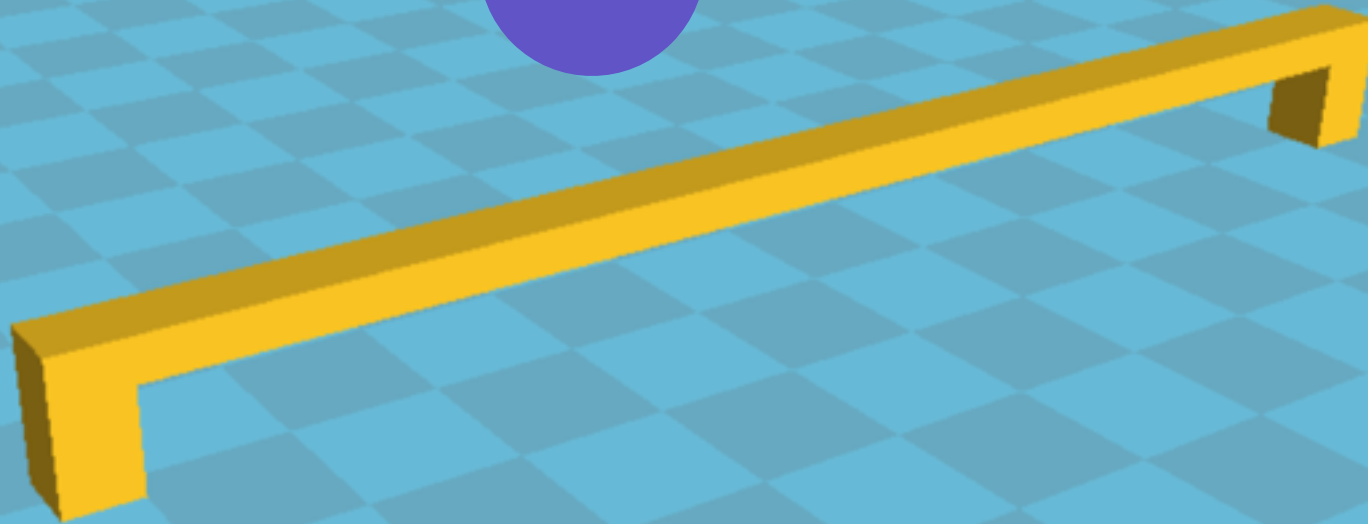
Speed, Temperature, Layerheight



Is there a minimal extrusion speed for a certain material + hot-end combination?



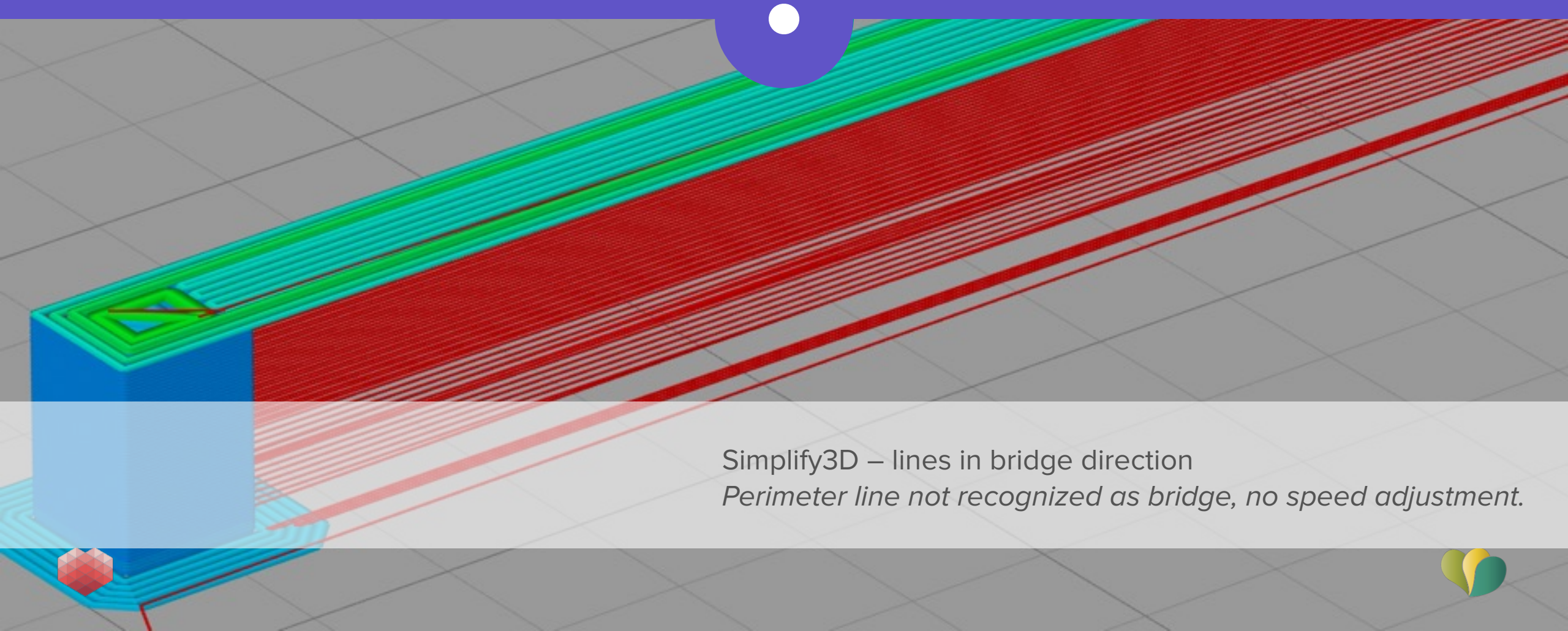
Bridging with Co-Polyester



Slicers have different ways of handling bridges.



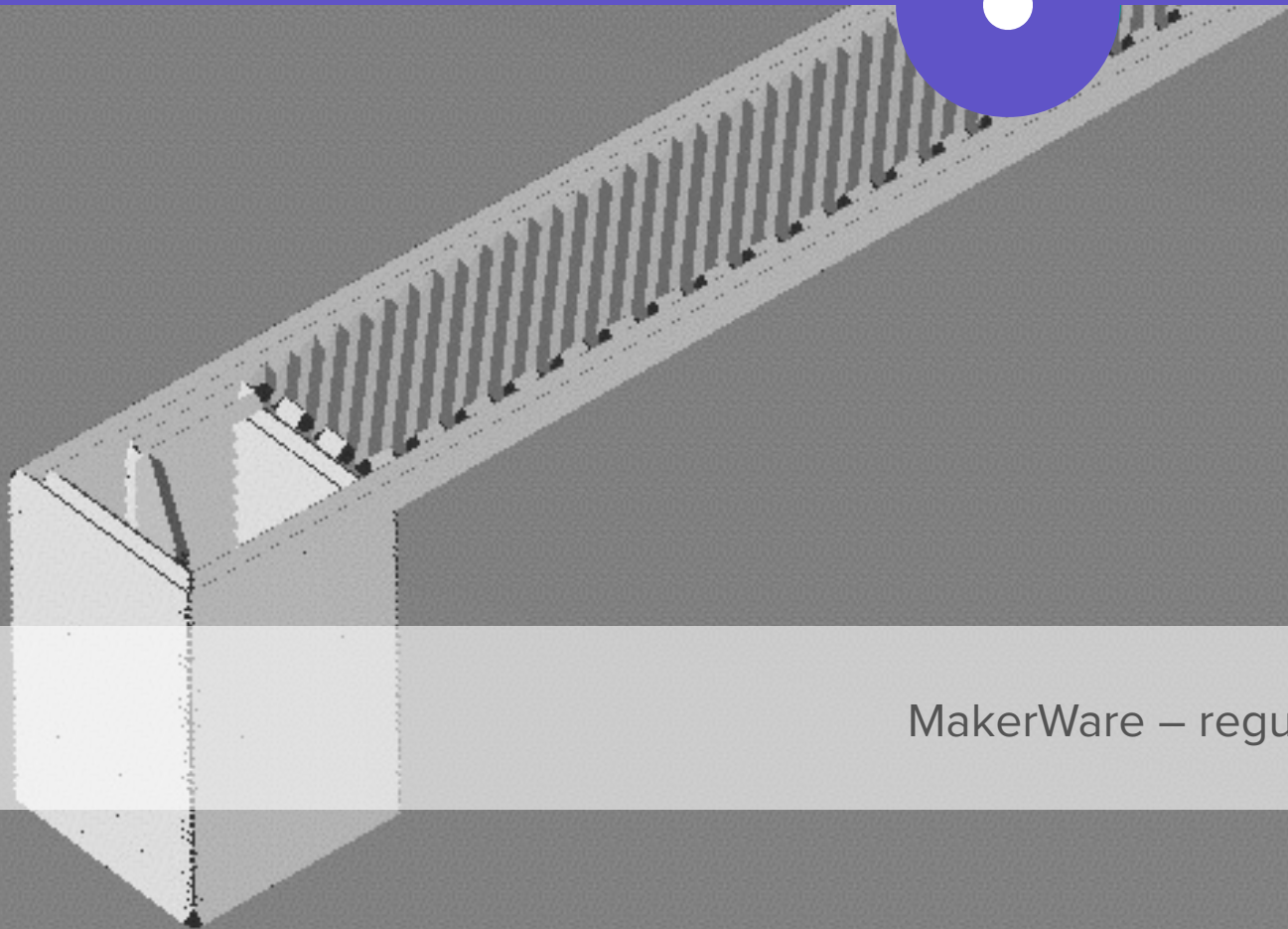
Bridging with Co-Polyester



Simplify3D – lines in bridge direction
Perimeter line not recognized as bridge, no speed adjustment.



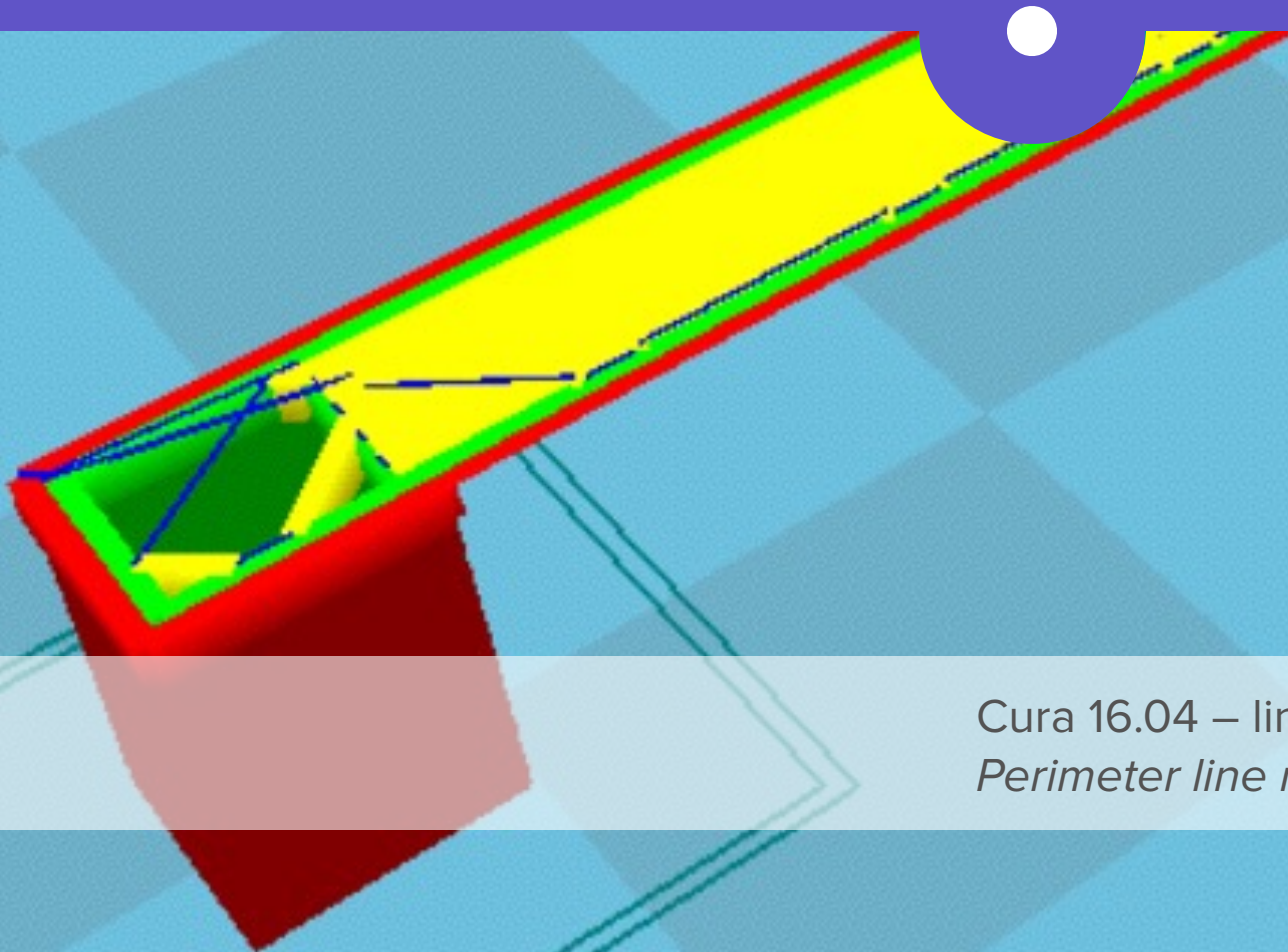
Bridging with Co-Polyester



MakerWare – regular infill lines



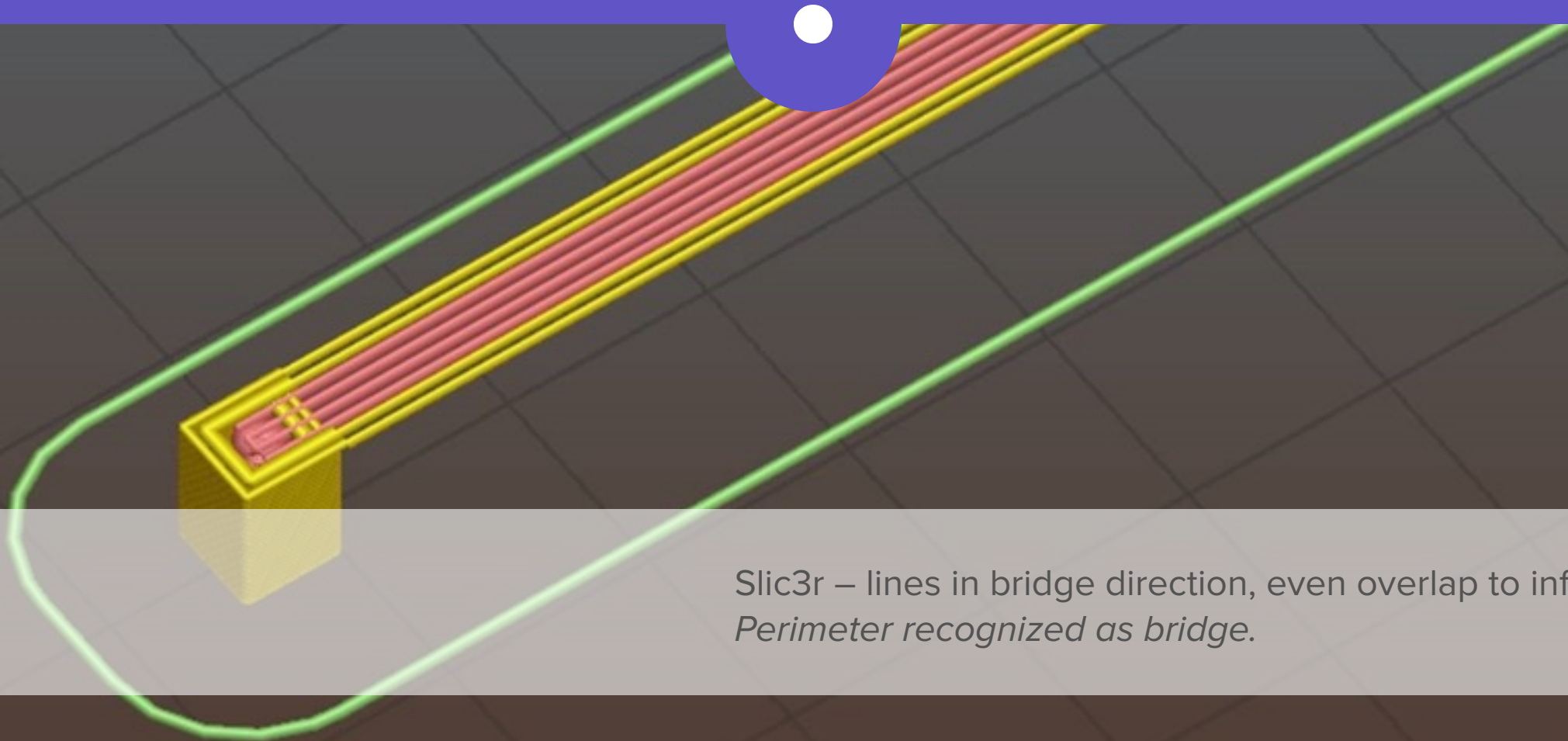
Bridging with Co-Polyester



Cura 16.04 – lines in bridge direction
Perimeter line not recognized as bridge, no speed adjustment.



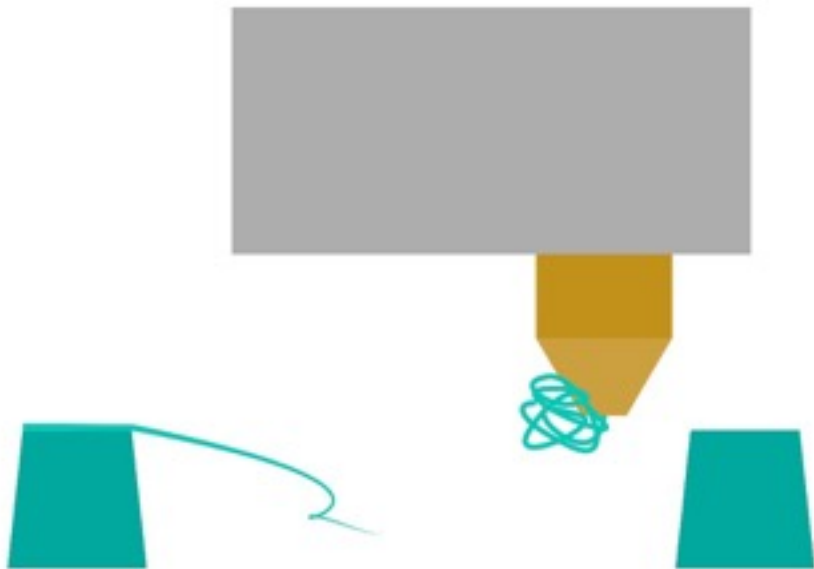
Bridging with Co-Polyester



Slic3r – lines in bridge direction, even overlap to infill
Perimeter recognized as bridge.



Bridging with Co-Polyester



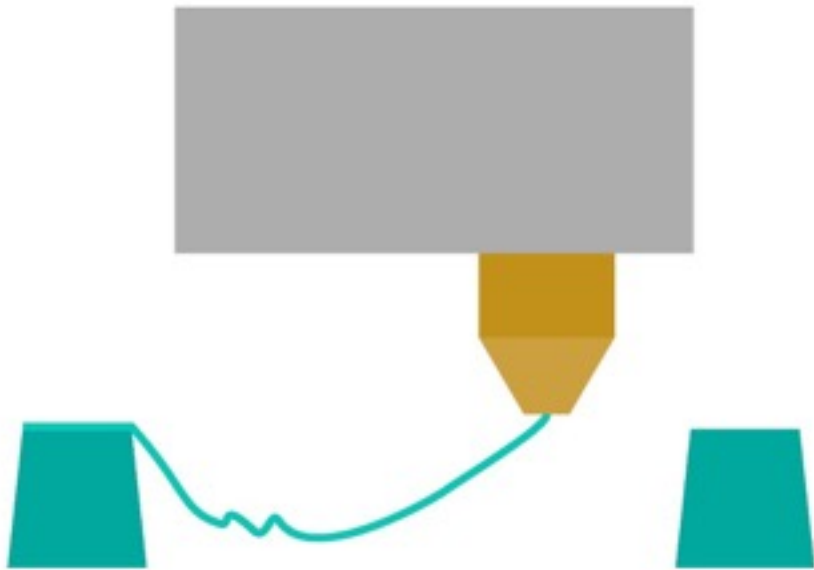
Bridging too fast: break the melt, material collects on the nozzle

Bridge material multiplier too low can give similar result.

Parameters to tweak: bridging speed and bridge flow multiplier



Bridging with Co-Polyester



Bridging too slow: material tends to drool and drop in loops
Too much material gives the same result.

Parameters to tweak: bridging speed and flow multiplier



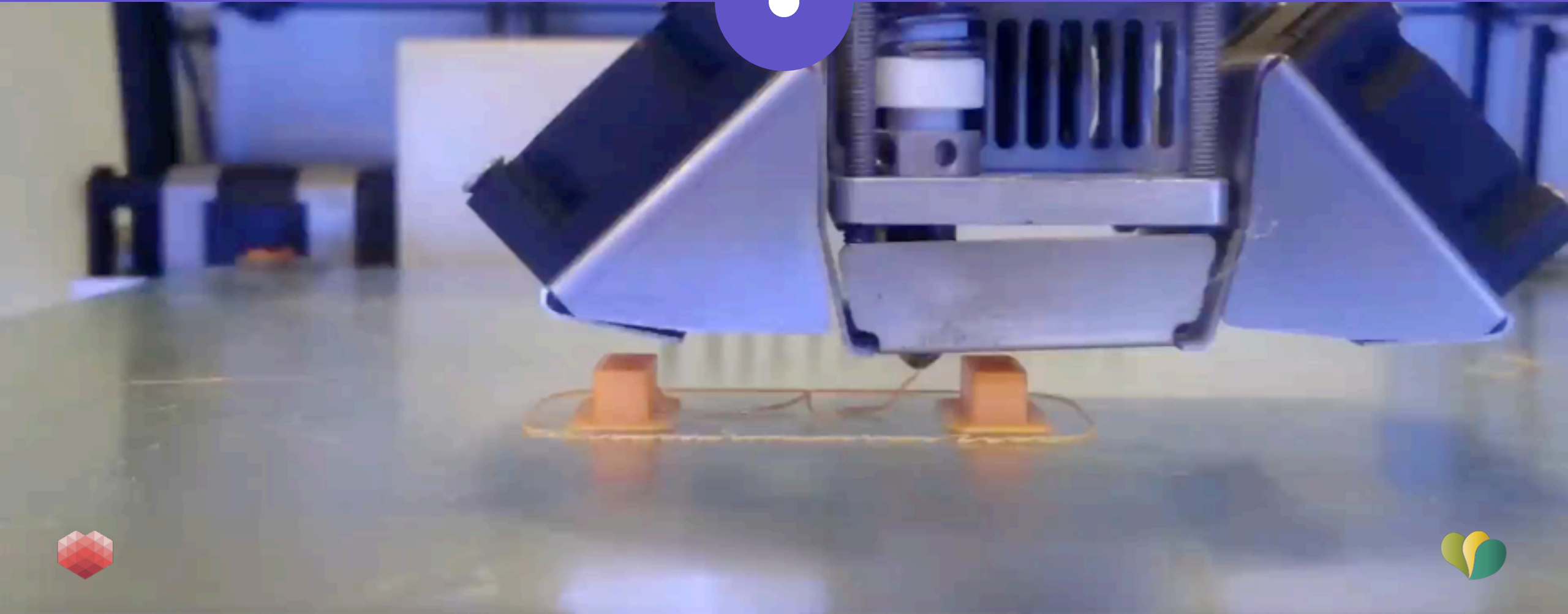
Bridging with Co-Polyester



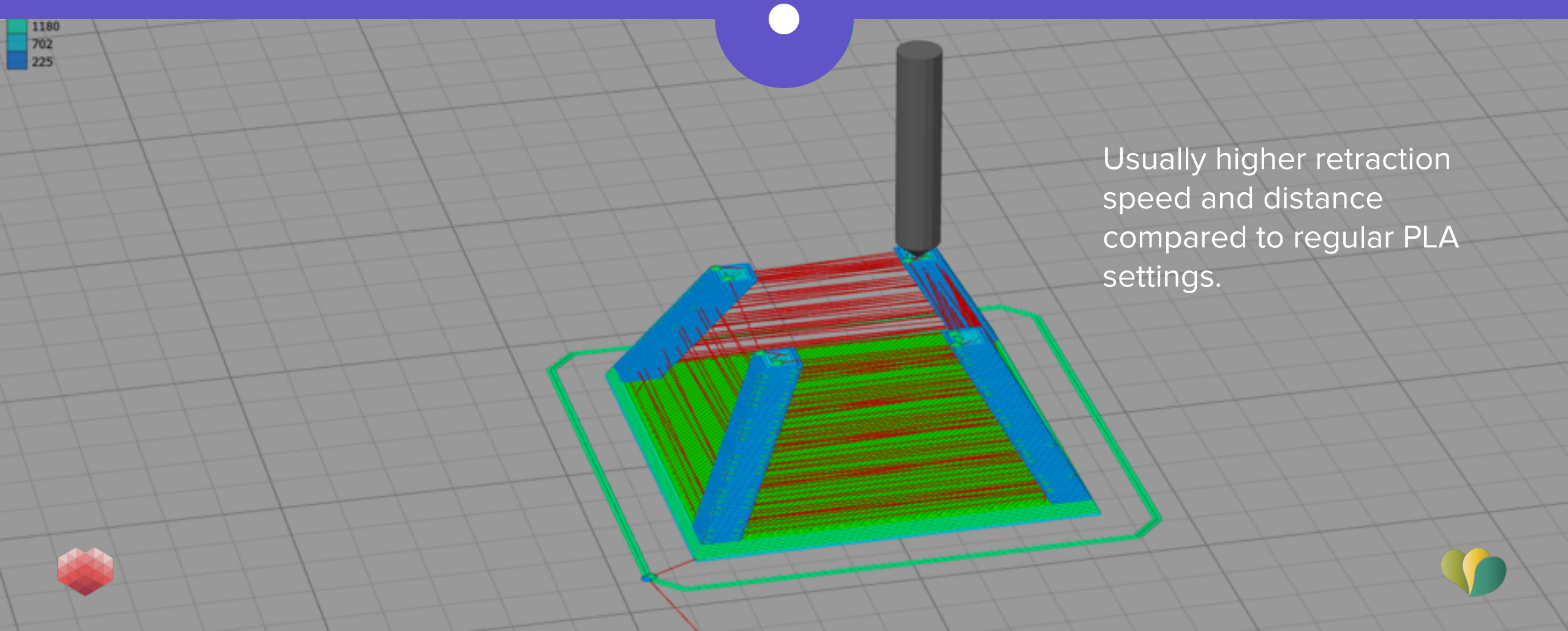
- ✓ **Tip** – use extra bottom / top layers to make sure bridge is fully closed.
- ✓ **Tip** – check cooling settings, 100% cooling for bridging usually helps.
- ✓ **Tip** – Play with bridge multiplier / speed



Bridging with Co-Polyester



Retraction



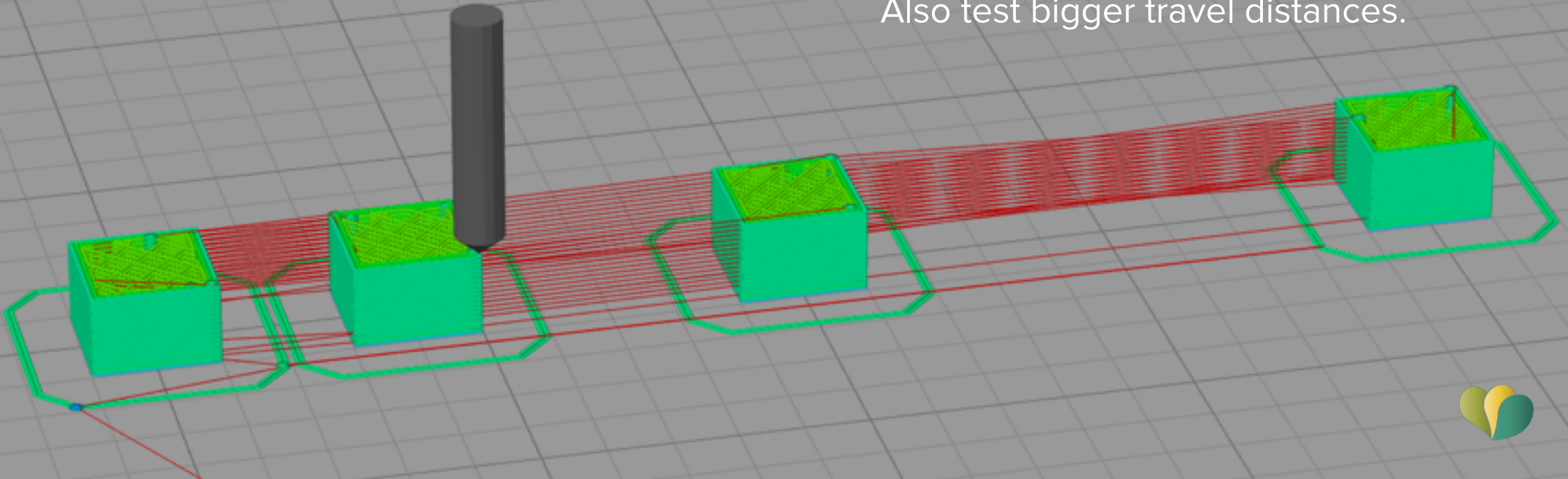
Usually higher retraction speed and distance compared to regular PLA settings.

Retraction



1180
702
225

Also test bigger travel distances.



Retraction

Are the stringing a result of retraction settings or other reasons?

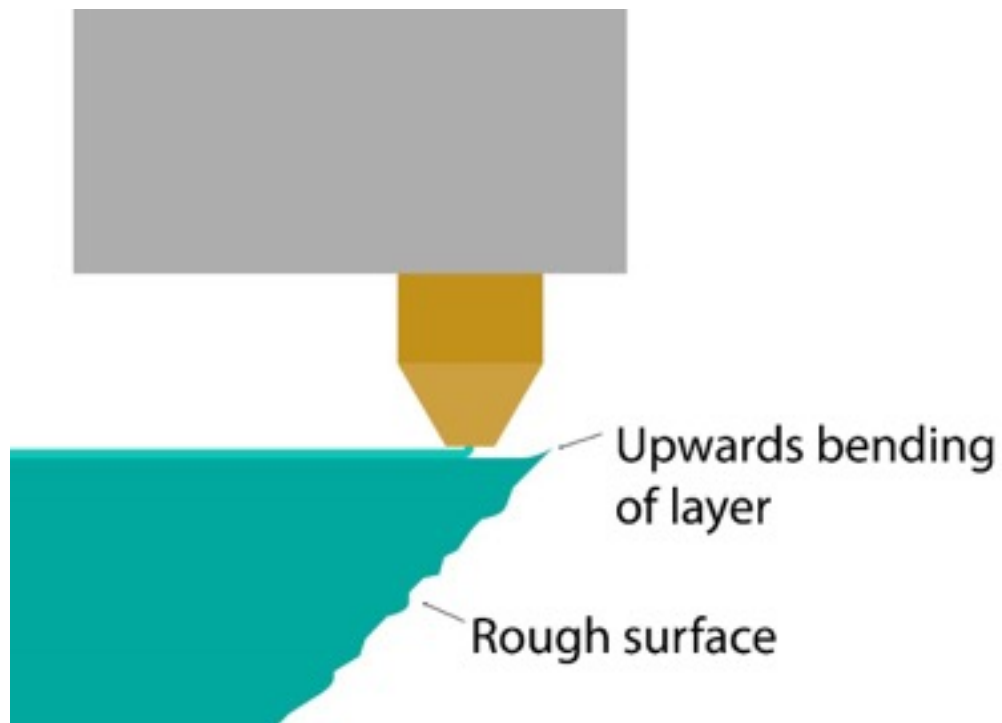
- Not enough cooling leads to upwards smearing leads to stringing.
- Travel moves over print can cause stringing.
- Failed bridges can result in stringing.

Parameters to tweak:

- ✓ Travel speed – speed of movement without extruding
- ✓ Retraction distance
- ✓ Retraction length
- ✓ Temperature



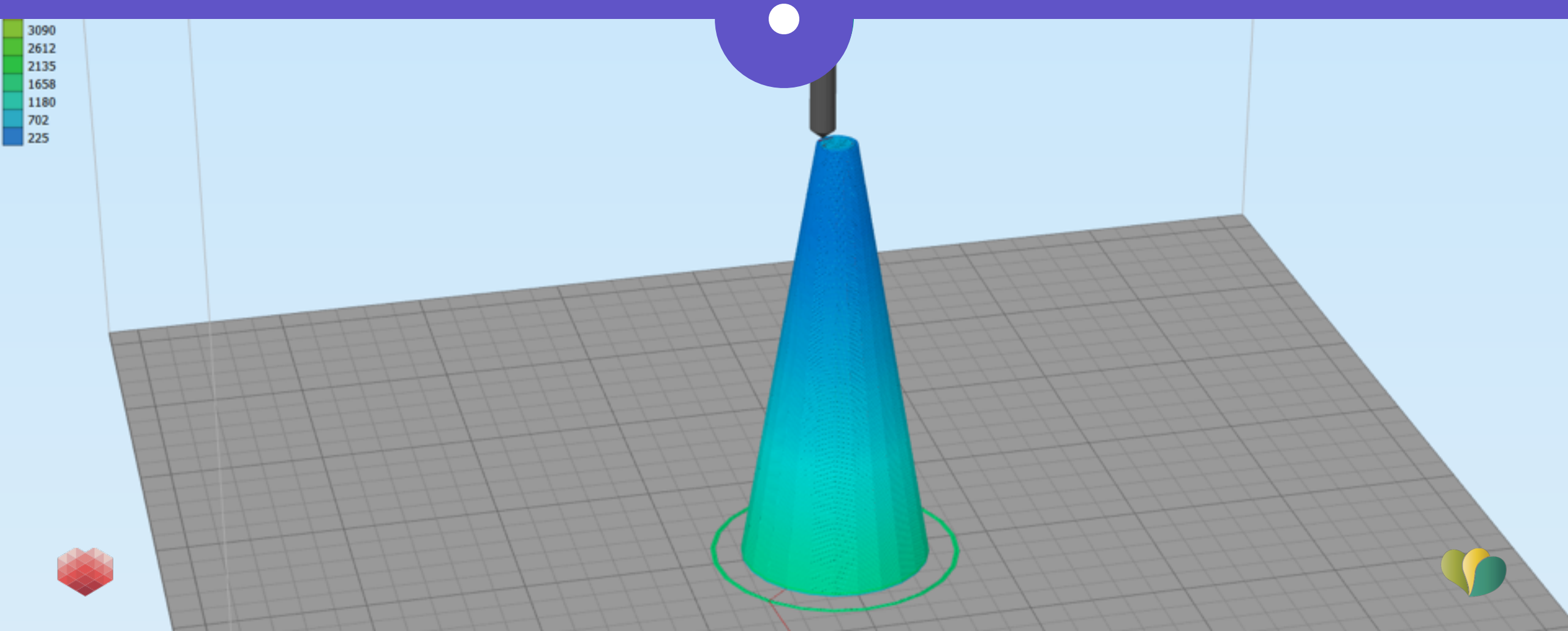
Part Cooling / Minimal Layertime



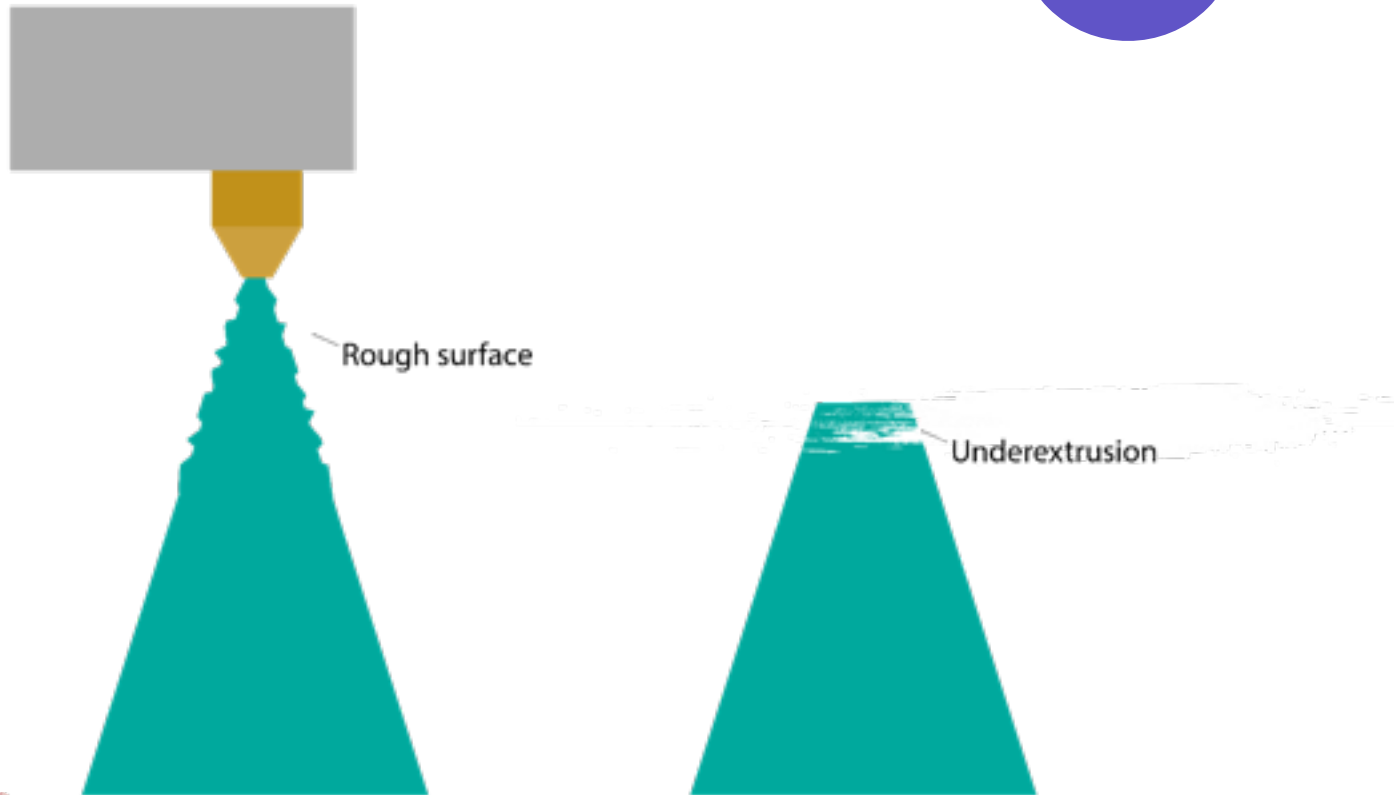
Cooling down below heat resistance temperature from processing temperature.



Part Cooling / Minimal Layertime



Part Cooling / Minimal Layertime



- Minimal Layertime too short / cooling to little?
- Minimal layer time too long / minimum print speed too slow
- Too much cooling? -> bad layeradhesion.



Part Cooling / Minimal Layertime

Too much cooling? -> bad layeradhesion -> usually noticeable after printing, not during.



Warping

Co-Polyesters need heated buildplate

- Good start point Heated bed around TG of material.
- 5/10 C lower or higher
- Buildsurface; 3DLac, BuildTak
- Add a brim or raft.

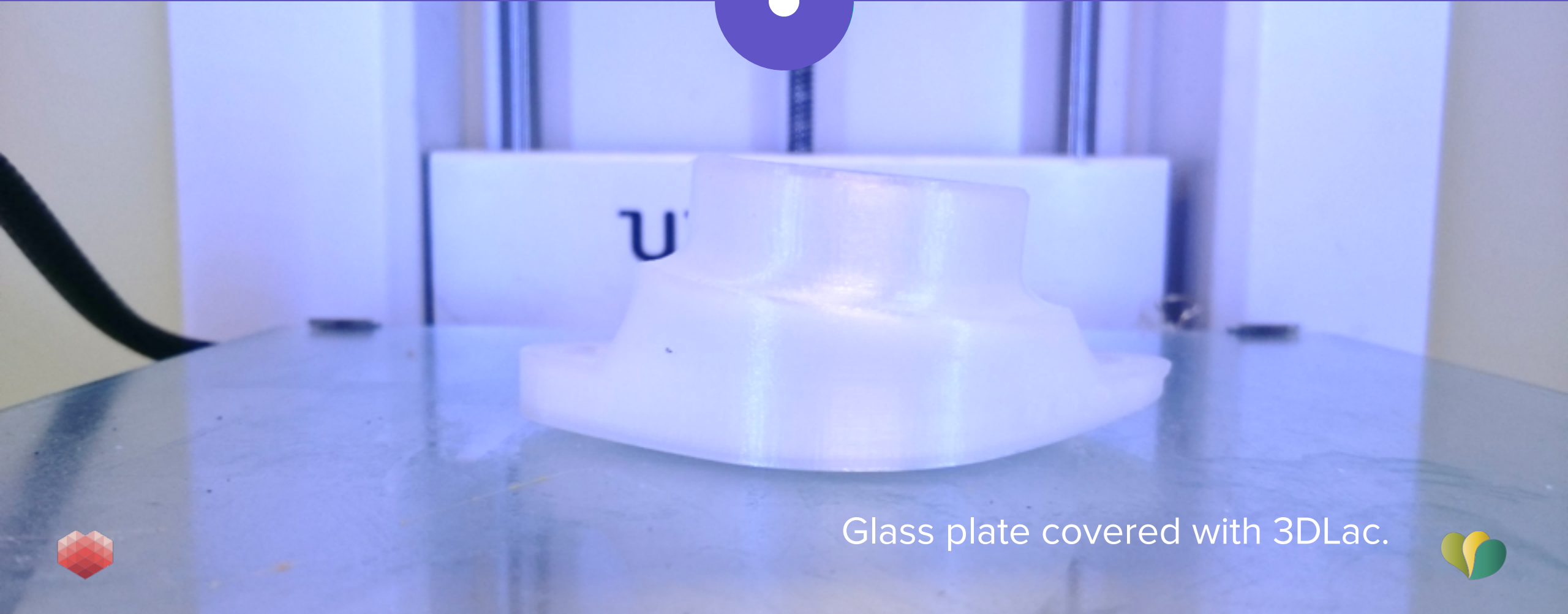
- ✓ **Tip** - Carefully check if you're part needs cooling, if not leave it off.
- ✓ **Tip** - Check for airflow in the room, cold air makes it worse.
- ✓ **Tip** – more infill, more warping

colorFabb 910A

- high bed temperature 100/110C for glass
- 80/90C for PEI
- 100C /110C for BuildTak



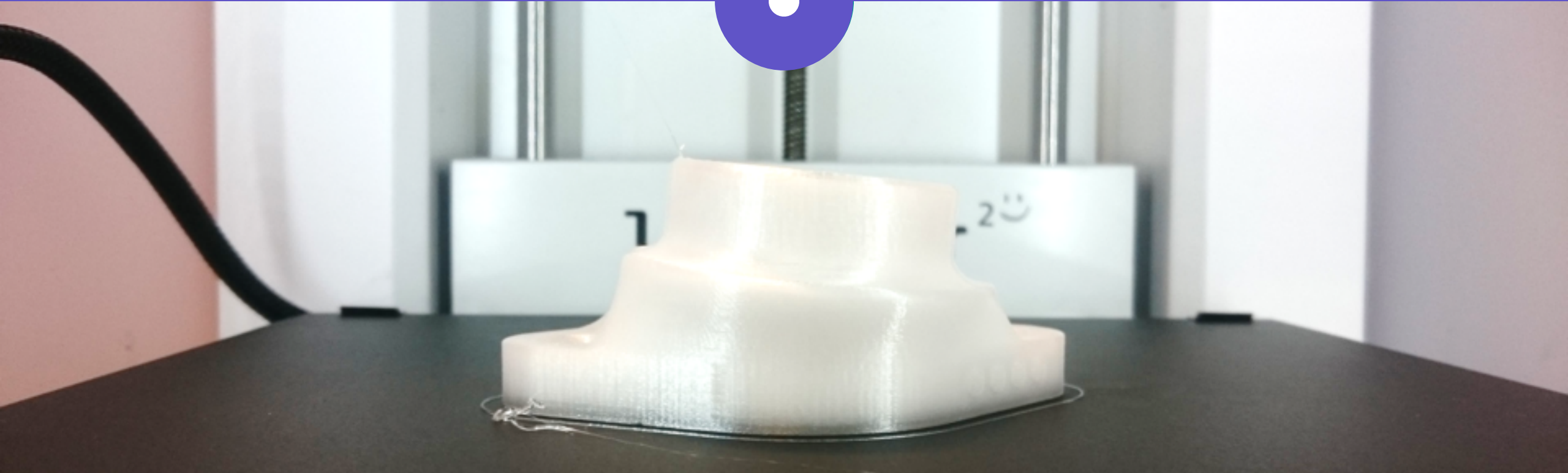
Warping



Glass plate covered with 3DLac.



Part Cooling / Minimal Layertime



Glass plate covered with Buildtak



Part Cooling / Minimal Layertime



Glass plate covered with PEI



Sample Pack



colorFabb nGen
Eastman Amphora 3300

Around



colorFabb XT
Eastman Amphora 1800

Tough



beta
colorFabb 910A
Eastman

**Temperature
Resistant**



General Settings - Ultimaker 2

	colorFabb nGen	colorFabb XT	colorFabb 910A <i>beta</i>
Temperature Settings	230C	245C	260C
Bed Temperature	80C	75C	110C
Print Speed	50 mm/s	40 mm/s	50 mm/s
Layer Height	0.1 - 0.2 mm	0.1 - 0.2 mm	0.1 - 0.2 mm
Retraction Speed	25 - 45 mm/s	25 - 45 mm/s	25 - 45 mm/s

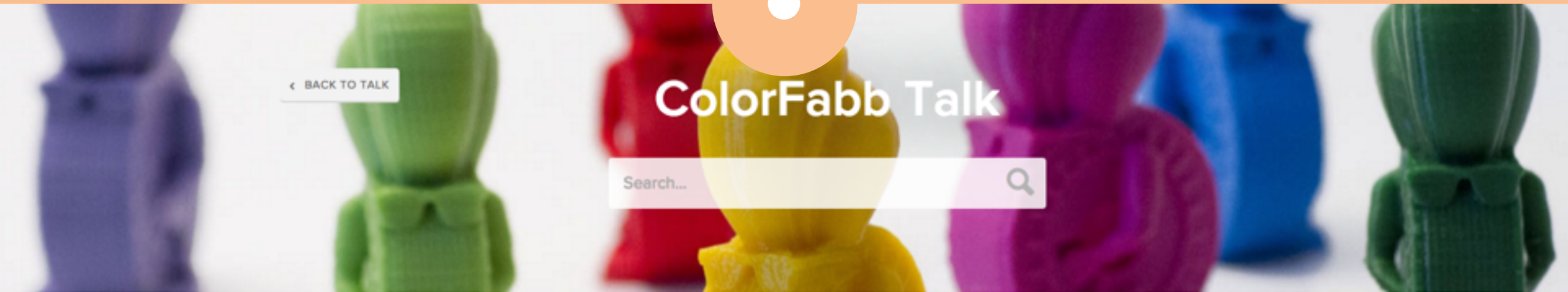


General Settings - Lulzbot Mini

	colorFabb nGen	colorFabb XT	colorFabb 910A <i>beta</i>
Temperature Settings	230C	240C	260C
Bed Temperature	70C	60 - 65C	90/100C
Print Speed	50 mm/s	40 mm/s	50 mm/s
Layer Height	0.1 - 0.2 mm	0.1 - 0.2 mm	0.1 - 0.2 mm
Retraction Speed	20 mm/s	10 mm/s	20 mm/s



Share settings and learn from others



← BACK TO TALK

ColorFabb Talk

Search...



POPULAR

NEW

MY TAGS

START A NEW /COLORFABB THREAD

▲
18
▼



Show me what you've gooooot !

Since I begin my internship at 3D Hubs I always wanted to learn how to use sculpting software like Z-Brush. Lucky I was to have a great sculptor working just next to me. After spending a few bucks in



victorp

6 days ago

14 comments (14 new)

/3D Hubs Team

/bronzeFill

/ColorFabb

/Zbrush

ColorFabb Talk

77 followers



UNFOLLOW /COLORFABB



About ColorFabb

Hub Perks

The screenshot shows the 'My Hub' page on the 3D Hubs platform. At the top, there is a navigation bar with '3D HUBS', '3D PRINT', 'TALK', and 'LEARN'. A user profile icon and a '3D PRINT 1' button are on the right. A left sidebar lists navigation options: My Hub, Edit Hub, My printers, Perks, Powertools, Print Queue, Invite Friends, Messages, My Account, My Orders, Edit My Account, Notification settings, Payout Info, My Events, Events I Organize, API integrations, and API orders. The main content area is titled 'My Hub' and includes 'View my hub' and 'EDIT HUB' buttons. A prominent green banner displays a '10% DISCOUNT' badge with a 'LEARN MORE' button. Below this, there are six performance metrics: Completed Orders (1), Hub Views (1 K, AVG POS. 12.4), Level (Rookie, 0% to Starter), Avg. Rating (5 stars), Response Time (0h 33m), and Active Print Queue (empty). A blue arrow points from the text on the right to the 'LEARN MORE' button.

The discount is based on the order activity of your Hub. It goes from 10% to 30%, so the more orders you have the more discount you get!



Hub Perks

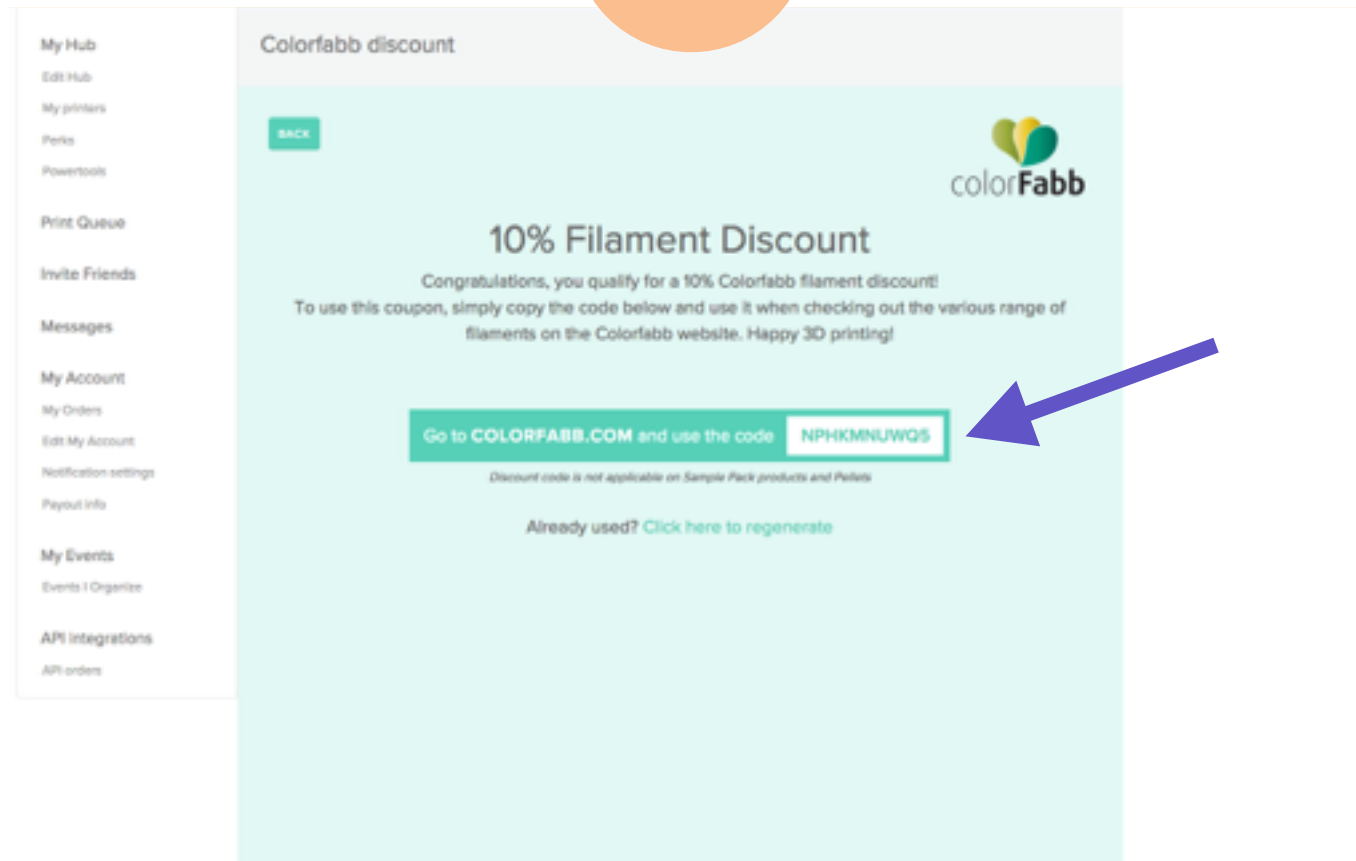
The screenshot shows a user interface with a sidebar on the left and a main content area titled 'Perks'. The sidebar contains the following items: My Hub, Edit Hub, My printers, Perks (highlighted with a green bar), Powertools, Print Queue, Invite Friends, Messages, My Account, My Orders, Edit My Account, Notification settings, Payout info, My Events, Events I Organize, API integrations, and API orders. The 'Perks' section displays five cards, each with a 10% discount:

- colorFabb**: 10% FILAMENT DISCOUNT. Description: ColorFabb is a producer of a broad color range of PLA/PLA Filaments, next to that they offer exclusive materials such as: BronzeFill, CopperFill and WoodFill.
- FLIBBIT**: 10% DISCOUNT. Description: Flibbit is a producer of the famous Filament extruder: Flibbit. They also sell a range of Filaments and printer kits.
- MADE SOLID**: 10% MATERIAL DISCOUNT. Description: MadeSolid is the producer of a wide range of advanced materials including 3 different types of Resin and two ranges of Filaments.
- Proto-pasta**: 10% FILAMENT DISCOUNT. Description: Proto-pasta is known for their exotic Filaments, they include Conductive, Magnetic, Carbon Fiber and Stainless Steel.
- 3D HUBS SWAG**: 10% DISCOUNT. Description: From T-shirts, to Hoodies and Stickers you can now get all the 3D Hubs Swag you want with this special Hubs discount.

What Perk would you like to see next? [Let us know.](#)



Hub Perks



The screenshot displays a user's account page with a sidebar on the left and a main content area. The sidebar contains the following links: My Hub, Edit Hub, My printers, Perks, Power tools, Print Queue, Invite Friends, Messages, My Account, My Orders, Edit My Account, Notification settings, Payout info, My Events, Events I Organize, API Integrations, and API orders. The main content area is titled "Colorfabb discount" and features a teal background. At the top left of this area is a "BACK" button. The Colorfabb logo is in the top right. The main heading is "10% Filament Discount". Below it, the text reads: "Congratulations, you qualify for a 10% Colorfabb filament discount! To use this coupon, simply copy the code below and use it when checking out the various range of filaments on the Colorfabb website. Happy 3D printing!". A teal box contains the text "Go to COLORFABB.COM and use the code" followed by a white box containing the code "NPHKMNUWQS". A blue arrow points to this code box. Below the code box, a small note states: "Discount code is not applicable on Sample Pack products and Perks". At the bottom, it says "Already used? [Click here to regenerate](#)".

Colorfabb discount

BACK

colorFabb

10% Filament Discount

Congratulations, you qualify for a 10% Colorfabb filament discount!
To use this coupon, simply copy the code below and use it when checking out the various range of filaments on the Colorfabb website. Happy 3D printing!

Go to **COLORFABB.COM** and use the code **NPHKMNUWQS**

Discount code is not applicable on Sample Pack products and Perks

Already used? [Click here to regenerate](#)



Technical Datasheet

colorfabb.com/materials



Search entire store here...

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- SPECIALS ^{Fabulous!}
- SAMPLES
- VALUE PACK
- PELLETS
- PRINTERS ^{New}
- LEARN

Home → materials

colorFabb

Technical Datasheet

- COLORFABB
 - Technical Datasheet PLAPHA
 - Technical Datasheet woodFill
 - Technical Datasheet bambosFill
 - Technical Datasheet bronzeFill
 - Technical Datasheet copperFill
 - Technical Datasheet XT-CF20 carbon
 - Technical Datasheet XT-CF20 carbon

MSDS

- COLORFABB
 - MSDS PLAPHA
 - MSDS woodFill
 - MSDS bambosFill
 - MSDS brassFill
 - MSDS copperFill
 - MSDS bronzeFill
 - MSDS XT-CF20 Carbon

Foodcompliance

- COLORFABB
 - Declaration of Compliance Bio-Flex V 135001_2014-04-22
 - Konformitätserklärung Bio-Flex V 135001_2014-04-22



colorFabb XT - Eastman Amphora™ 3D Polymer AM1800



Have fun experimenting!

support@colorfabb.com

3dhubs.com/talk

