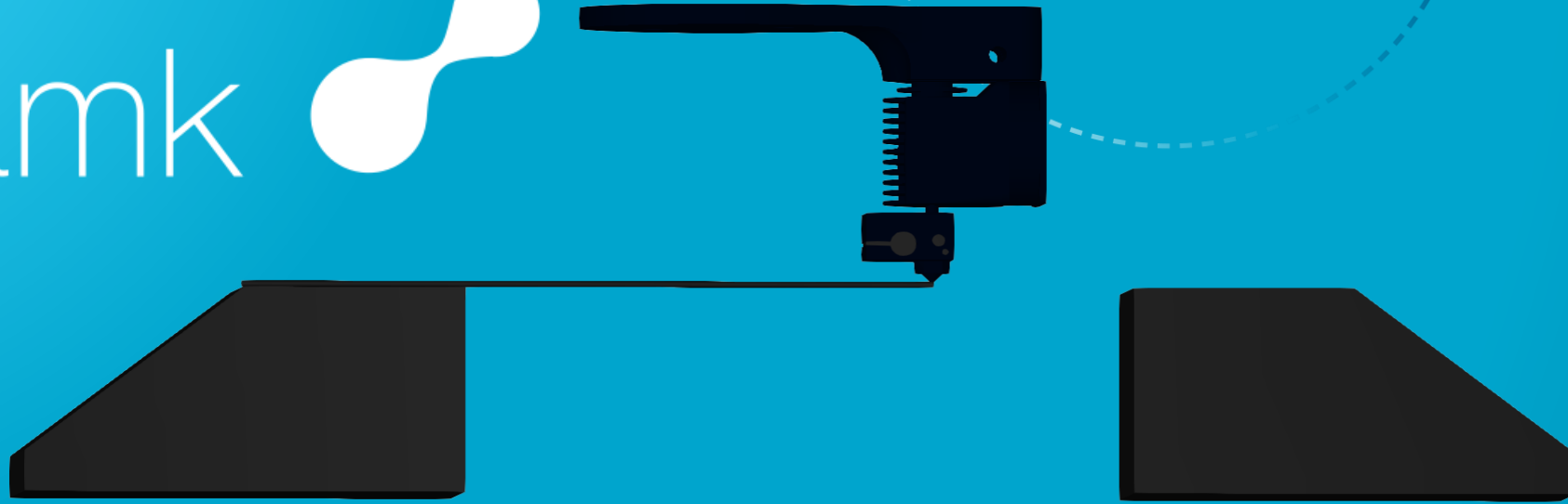
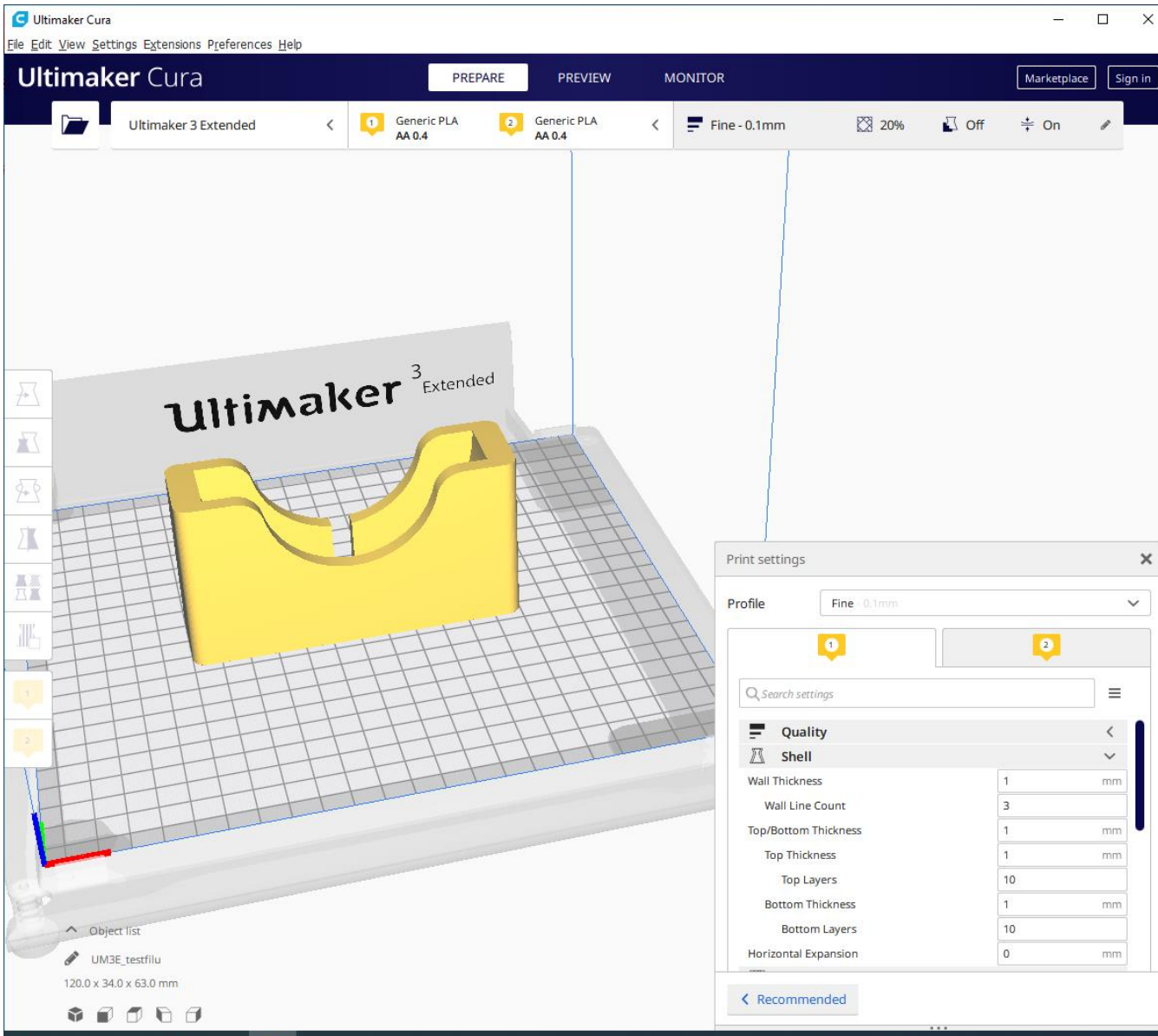


samk



3D-PRINTING – Slicing and slicer settings

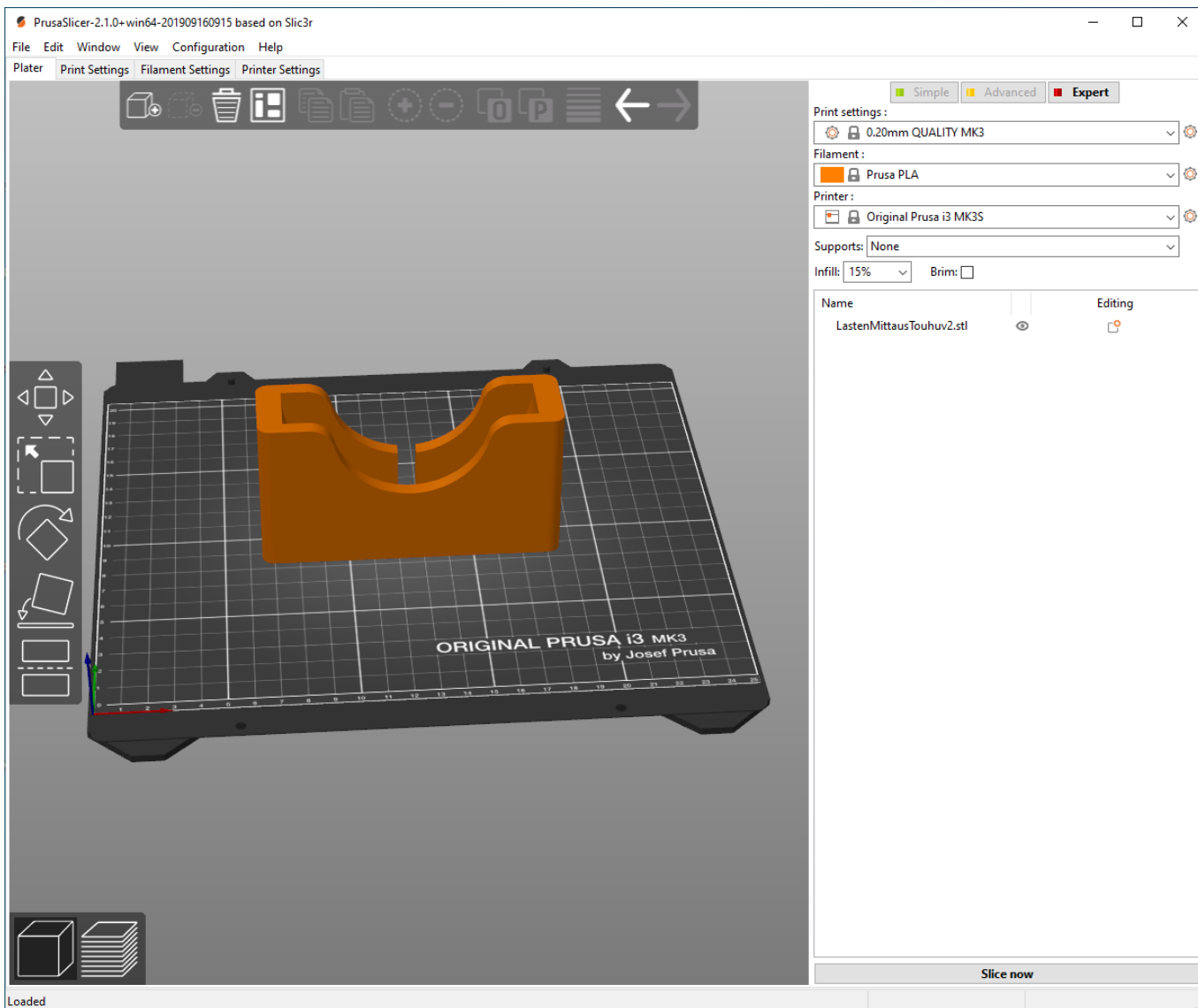
Slicing softwares



Cura



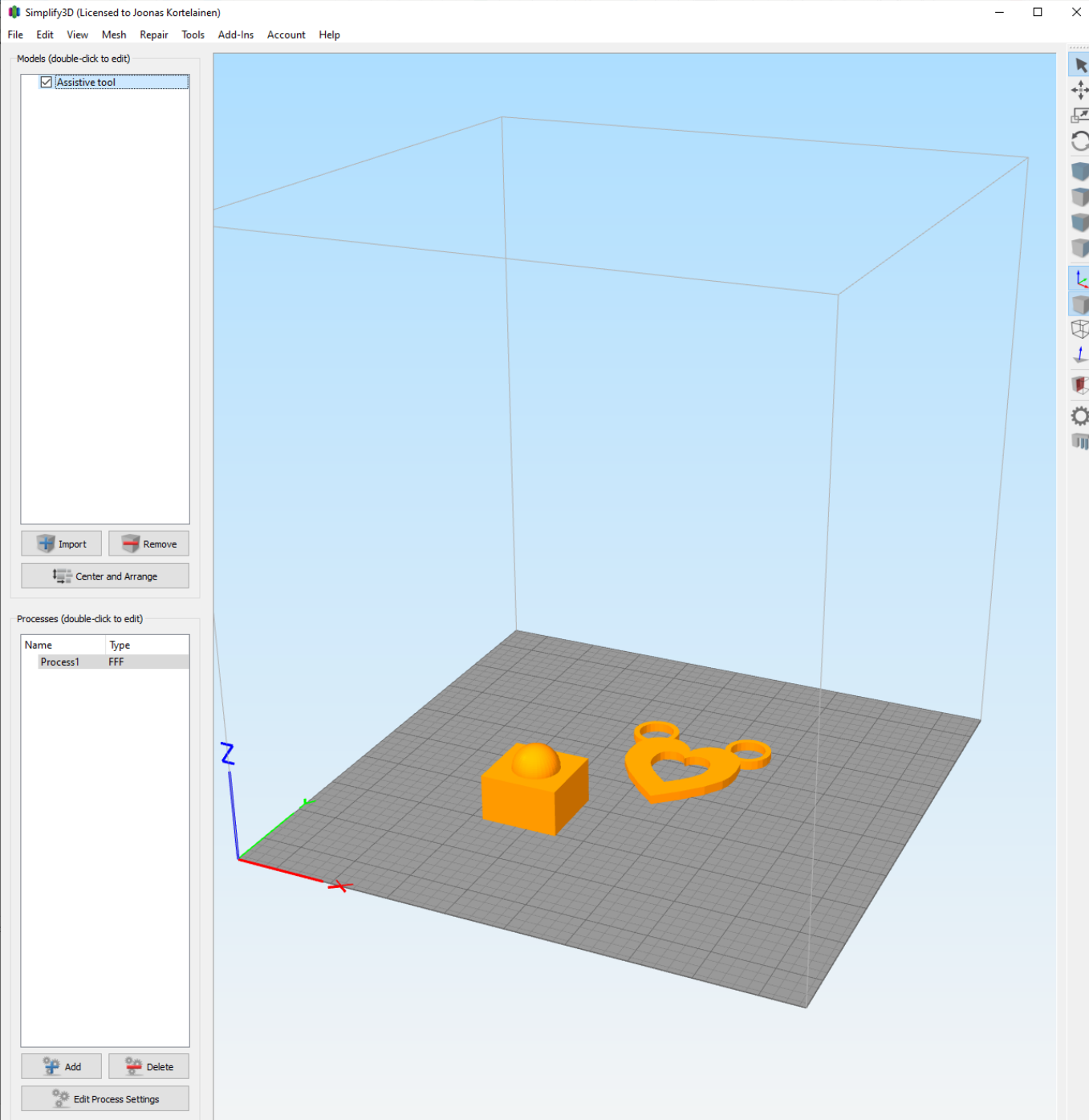
- Free
- Works with all printer types
- A lot of pre-installed profiles
- Large selection of settings



PrusaSlicer



- Free
- Works with all printer types
- A lot of pre-installed profiles (Nowadays)
- Large selection of settings



Simplify3D



- Pay to use (150 €)
- Works with all printer types
- A lot of pre-installed profiles
- Large selection of settings

Slicer settings

LAYER HEIGHT 0.20 mm	LAYER HEIGHT 0.10 mm	SMOOTH VARIABLE LAYER HEIGHT 0.07 ~ 0.25 mm
1h : 50min	3h : 45min	2h : 20min

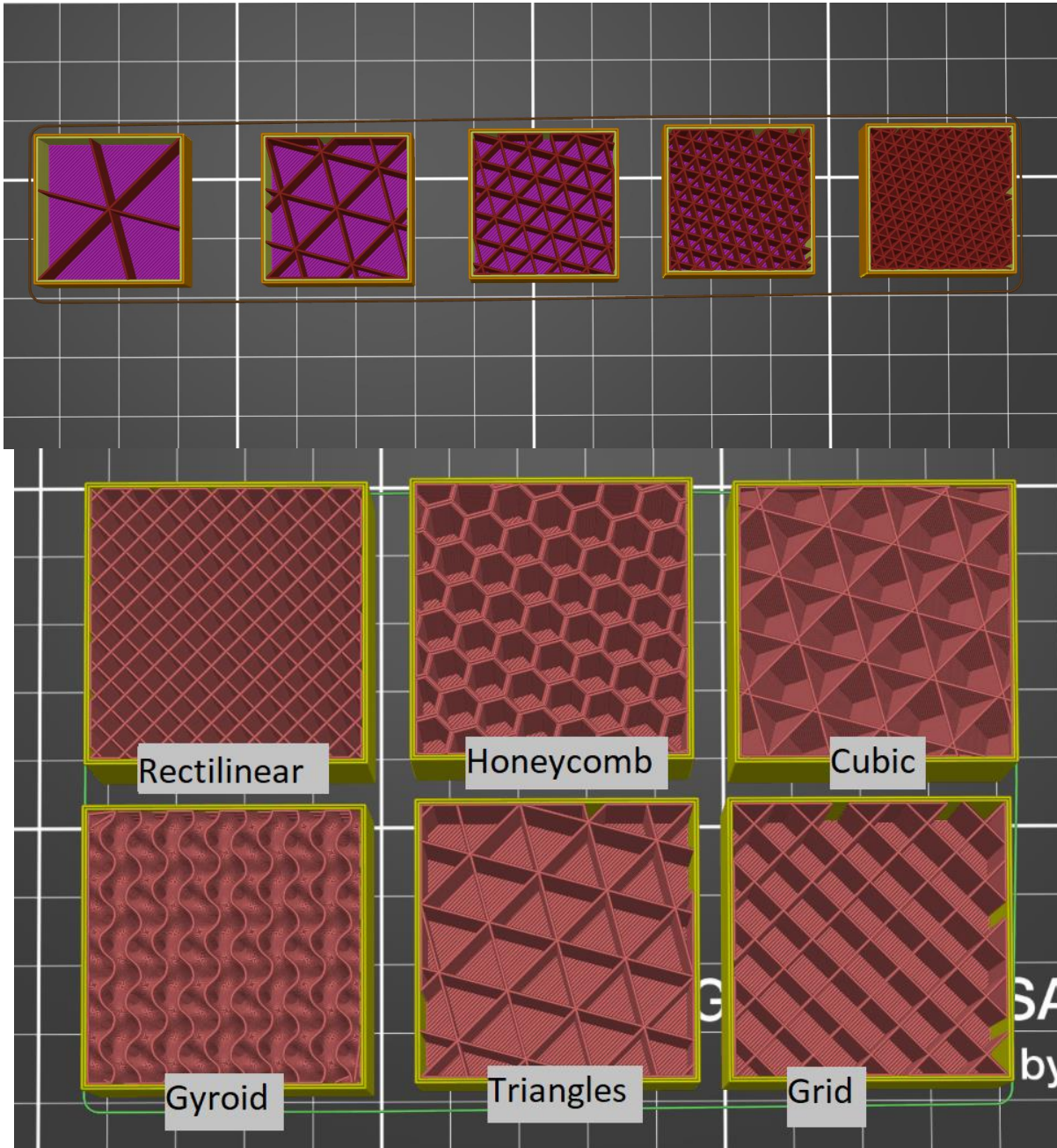


Picture: prusa3d

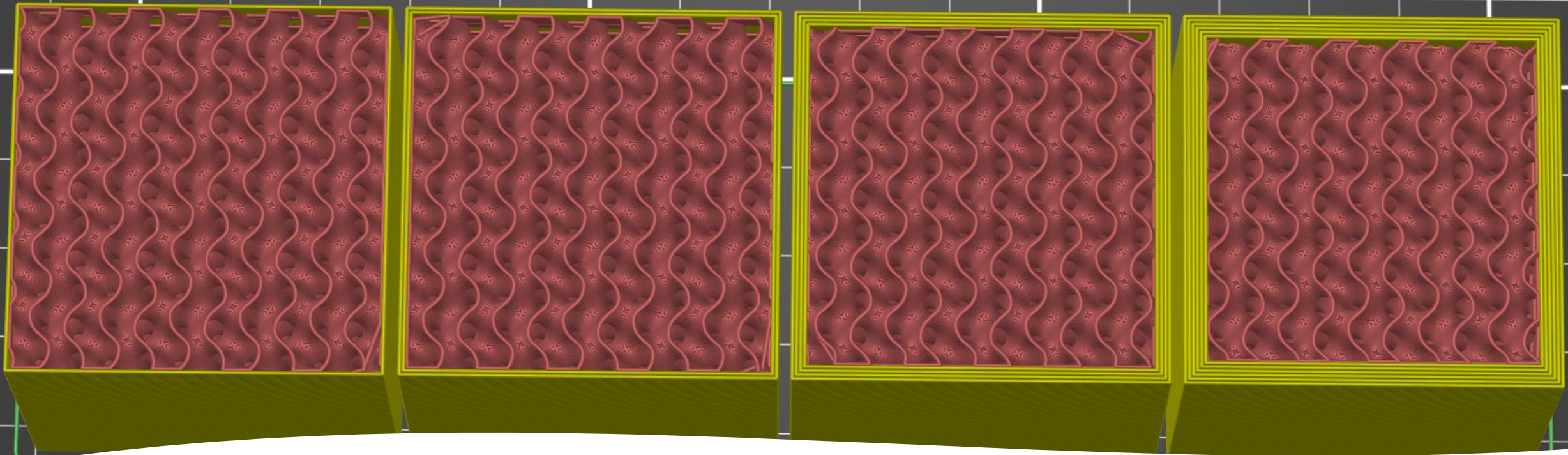
Layer Height

- Significant setting
 - Directly affects speed and print quality
 - Most common 0.15 mm
 - Can vary between 0.05 – 0.5 mm, depends also on which nozzle size used

Infill

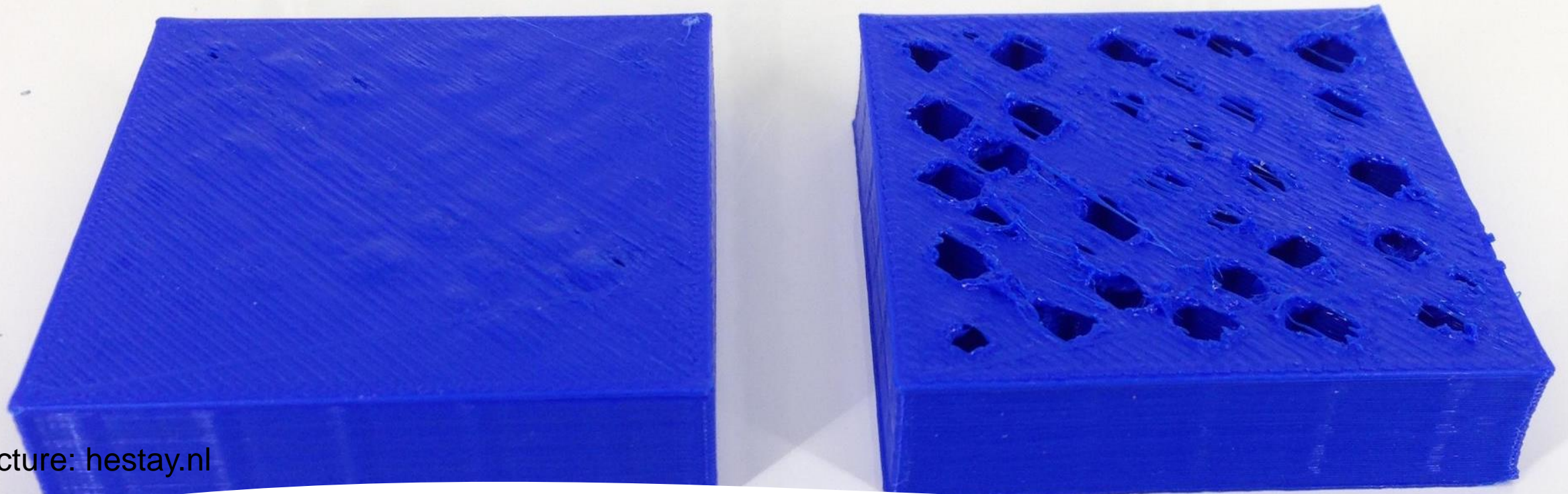


- Determines the % amount of inner supports inside the print
 - Affects print speed, weight and strength
- Several infill types
 - Affect speed, weight and strength



Perimeters / Wall Thickness

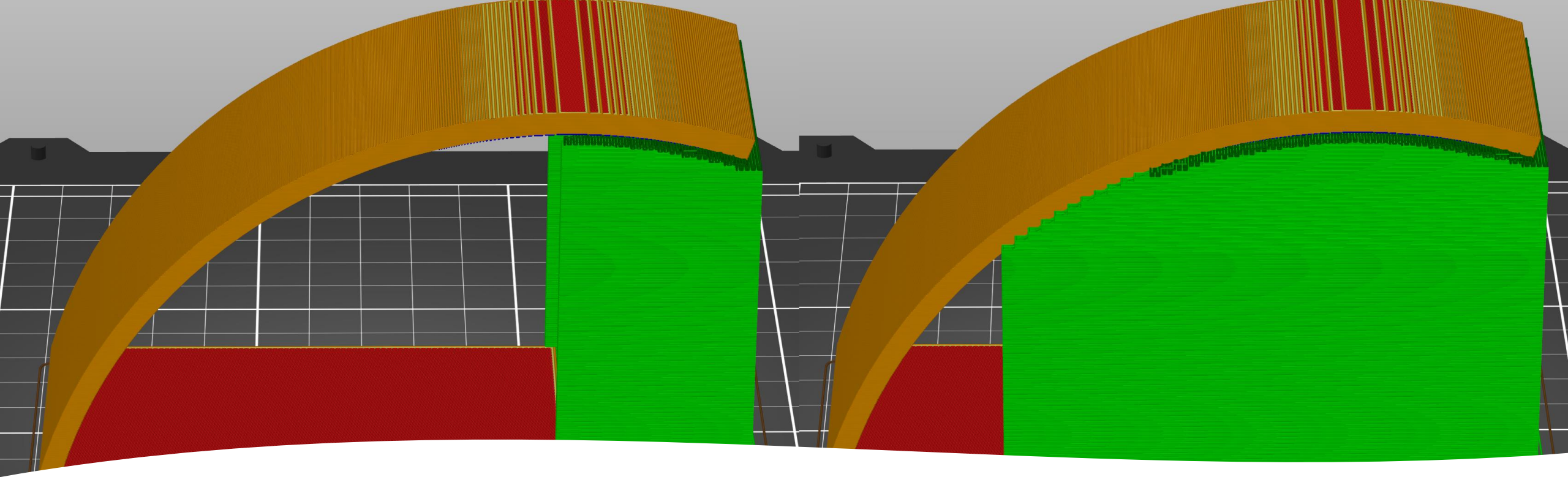
- Determines how many perimeters will be in the print
 - Affects durability/strength, weight and print speed
- Bigger meaning than with infill, when considering durability
- Most common setting is 2 perimeters
- Wall thickness is basically same thing



Picture: hestay.nl

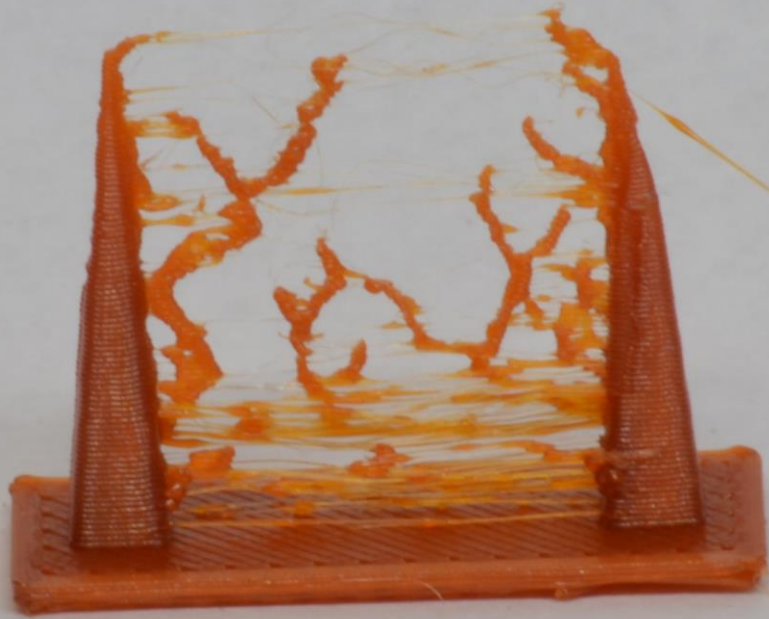
Top and bottom solid layers

- Amount of top and bottom layers
 - Affects bottom and top surface quality
 - Affects strength



Supports

- Supports are created when surface is created in air
 - Created on surfaces which curve $>45^\circ$
 - Supports placement
 - Build plate
 - Everywhere

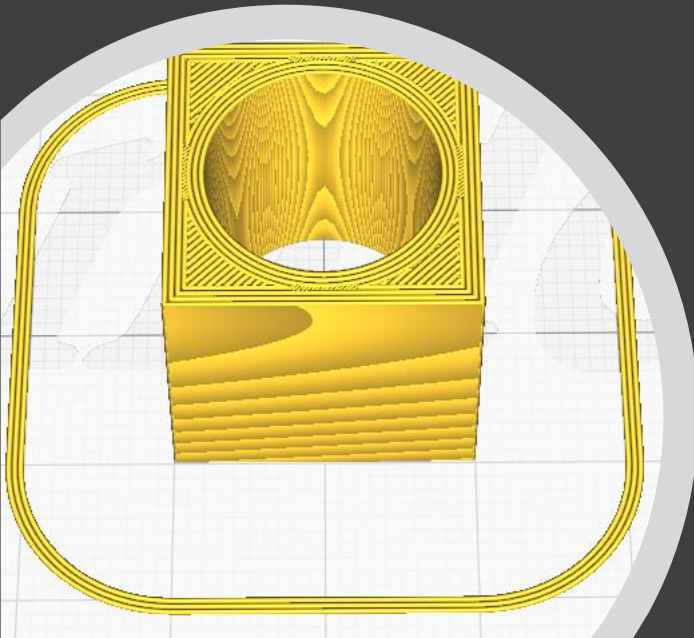
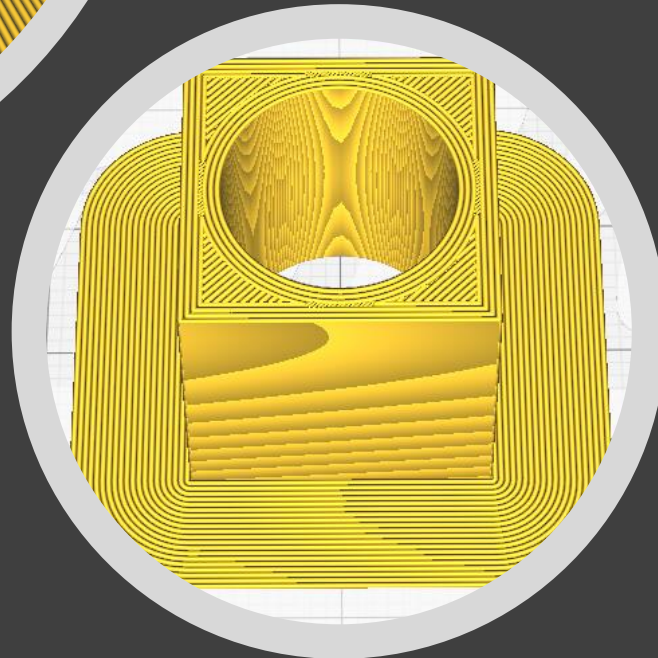
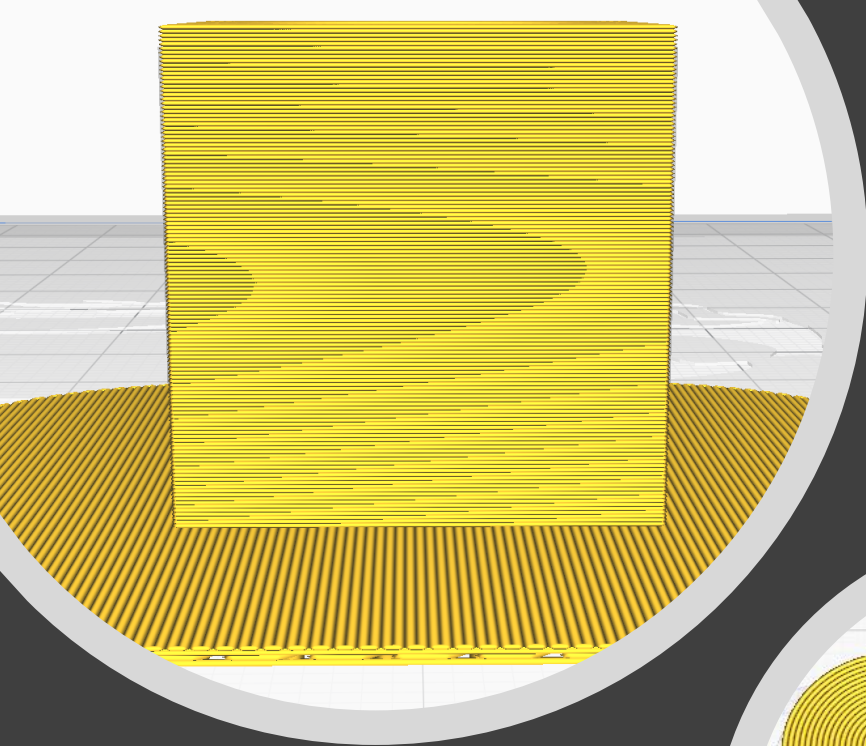


Retraction

- Affects material back draw
- Speed and retraction distance is set
- Affects how the print looks and prints in the end

Adhesion

- Brim
- Skirt
- Raft



Speed for print moves

● Perimeters:	<input type="text" value="45"/>	mm/s
● Small perimeters:	<input type="text" value="25"/>	mm/s or %
● External perimeters:	<input type="text" value="25"/>	mm/s or %
● Infill:	<input type="text" value="80"/>	mm/s
● Solid infill:	<input type="text" value="80"/>	mm/s or %
● Top solid infill:	<input type="text" value="40"/>	mm/s or %
● Support material:	<input type="text" value="50"/>	mm/s
● Support material interface:	<input type="text" value="100%"/>	mm/s or %
● Bridges:	<input type="text" value="30"/>	mm/s
● Gap fill:	<input type="text" value="40"/>	mm/s

Speed for non-print moves

● Travel:	<input type="text" value="180"/>	mm/s
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Modifiers

● First layer speed:	<input type="text" value="20"/>	mm/s or %
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Acceleration control (advanced)

● Perimeters:	<input type="text" value="800"/>	mm/s ²
● Infill:	<input type="text" value="1000"/>	mm/s ²
● Bridge:	<input type="text" value="1000"/>	mm/s ²
● First layer:	<input type="text" value="1000"/>	mm/s ²
● Default:	<input type="text" value="1000"/>	mm/s ²

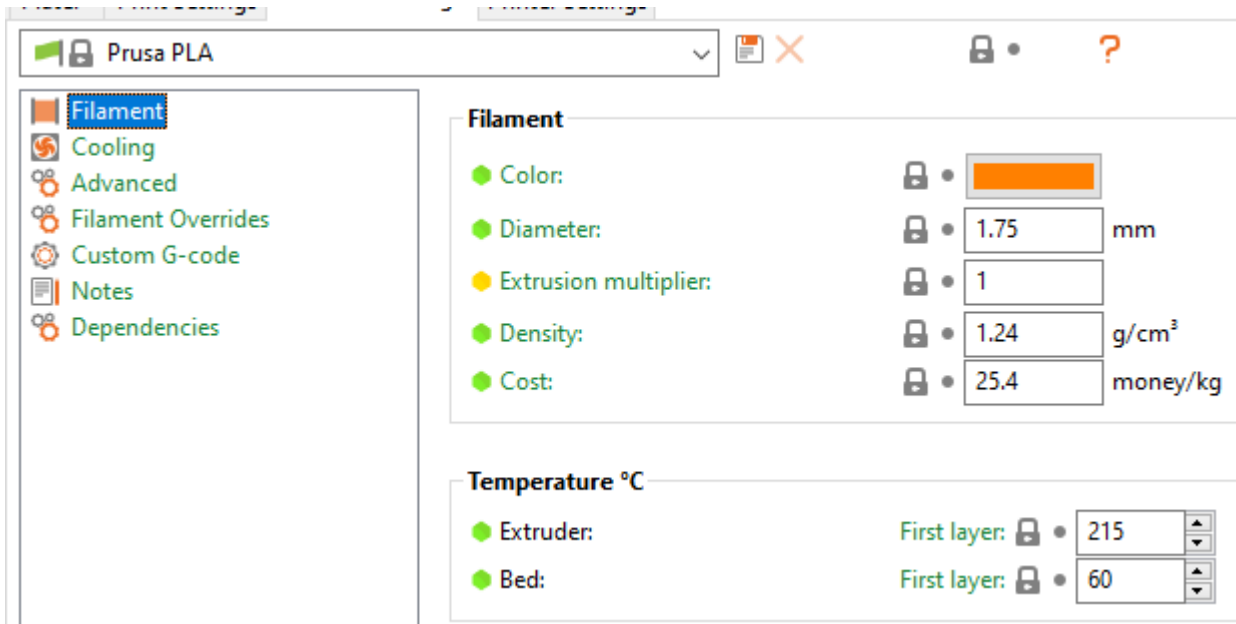
Auto Speed (advanced)

● Max print speed:	<input type="text" value="200"/>	mm/s
● Max volumetric speed:	<input type="text" value="0"/>	mm ³ /s

Speed		
Print Speed	<input type="text" value="70"/>	mm/s
Infill Speed	<input type="text" value="70"/>	mm/s
Wall Speed	<input type="text" value="30"/>	mm/s
Outer Wall Speed	<input type="text" value="20"/>	mm/s
Inner Wall Speed	<input type="text" value="30"/>	mm/s
Top/Bottom Speed	<input type="text" value="30"/>	mm/s
Travel Speed	<input type="text" value="250"/>	mm/s
Initial Layer Speed	<input type="text" value="20"/>	mm/s
Initial Layer Print Speed	<input type="text" value="20"/>	mm/s
Initial Layer Travel Speed	<input type="text" value="71.4286"/>	mm/s
Skirt/Brim Speed	<input type="text" value="20"/>	mm/s
Number of Slower Layers	<input type="text" value="2"/>	
Equalize Filament Flow	<input type="checkbox"/>	
Enable Acceleration Control	<input checked="" type="checkbox"/>	
Print Acceleration	<input type="text" value="4000"/>	mm/s ²
Infill Acceleration	<input type="text" value="4000"/>	mm/s ²
Wall Acceleration	<input type="text" value="1000"/>	mm/s ²
Outer Wall Acceleration	<input type="text" value="500"/>	mm/s ²
Inner Wall Acceleration	<input type="text" value="1000"/>	mm/s ²
Top/Bottom Acceleration	<input type="text" value="500"/>	mm/s ²
Travel Acceleration	<input type="text" value="5000"/>	mm/s ²
Initial Layer Acceleration	<input type="text" value="500"/>	mm/s ²
Initial Layer Print Acceleration	<input type="text" value="500"/>	mm/s ²
Initial Layer Travel Acceleration	<input type="text" value="625.0"/>	mm/s ²
Skirt/Brim Acceleration	<input type="text" value="500"/>	mm/s ²
Enable Jerk Control	<input checked="" type="checkbox"/>	
Print Jerk	<input type="text" value="25"/>	mm/s
Infill Jerk	<input type="text" value="25"/>	mm/s
Wall Jerk	<input type="text" value="10"/>	mm/s
Outer Wall Jerk	<input type="text" value="5"/>	mm/s
Inner Wall Jerk	<input type="text" value="10"/>	mm/s
Top/Bottom Jerk	<input type="text" value="5"/>	mm/s
Travel Jerk	<input type="text" value="30"/>	mm/s
Initial Layer Jerk	<input type="text" value="5"/>	mm/s
Initial Layer Print Jerk	<input type="text" value="5"/>	mm/s
Initial Layer Travel Jerk	<input type="text" value="6.0"/>	mm/s
Skirt/Brim Jerk	<input type="text" value="5"/>	mm/s

Printing speed

- Each movement's speed can be adjusted
- Affects print quality and print time
- Basic speeds vary from 40-60 mm/s



Material		
Printing Temperature	200	°C
Printing Temperature Initial Layer	205	°C
Initial Printing Temperature	190	°C
Final Printing Temperature	185	°C
Extrusion Cool Down Speed Modifier	0.7	°C/s
Build Plate Temperature	60	°C
Build Plate Temperature Initial Layer	60	°C
Flow	100	%
Prime Tower Flow	100	%
Initial Layer Flow	100	%
Standby Temperature	100	°C

Extrusion multiplier / Flow

- Affects how much filament is extruded on each movement
- Should be calibrated for each material for best results

G-code

What is it?

Start G-code



```
M862.3 P "[printer_model]"; printer model check
M862.1 P [nozzle_diameter]; nozzle diameter check
M115 U3.8.1; tell printer latest fw version
G90; use absolute coordinates
M83; extruder relative mode
M104 S[first_layer_temperature]; set extruder temp
M140 S[first_layer_bed_temperature]; set bed temp
M190 S[first_layer_bed_temperature]; wait for bed temp
M109 S[first_layer_temperature]; wait for extruder temp
G28 W; home all without mesh bed level
```

End G-code



```
G4; wait
M221 S100
M104 S0; turn off temperature
M140 S0; turn off heatbed
M107; turn off fan
{if layer_z < max_print_height}G1 Z[z_offset+min(layer_z+30, max_print_height)]endif; Move print head up
G1 X0 Y200 F3000; home X axis
M84; disable motors
```

- Developed in 1950's
 - CNC
- 3D-printers follow same standard (NIST RS274NGC)

```

M107
M115 U3.1.0 ; tell printer latest fw version
M201 X9000 Y9000 Z500 E10000 ; sets maximum accelerations, mm/sec^2
M203 X500 Y500 Z12 E120 ; sets maximum feedrates, mm/sec
M204 S1500 T1500 ; sets acceleration (S) and retract acceleration (T)
M205 X10 Y10 Z0.2 E2.5 ; sets the jerk limits, mm/sec
M205 S0 T0 ; sets the minimum extruding and travel feed rate, mm/sec
M83 ; extruder relative mode
M104 S215 ; set extruder temp
M140 S60 ; set bed temp
M190 S60 ; wait for bed temp
M109 S215 ; wait for extruder temp
G28 W ; home all without mesh bed level
G80 ; mesh bed leveling
G1 Y-3.0 F1000.0 ; go outside print area
G92 E0.0
G1 X60.0 E9.0 F1000.0 ; intro line
G1 X100.0 E12.5 F1000.0 ; intro line
G92 E0.0
M900 K30; Filament gcode
G21 ; set units to millimeters
G90 ; use absolute coordinates
M83 ; use relative distances for extrusion
;BEFORE_LAYER_CHANGE
G92 E0.0
;0.2

G1 E-0.80000 F2100.00000
G1 Z0.600 F10800.000
;AFTER_LAYER_CHANGE
;0.2
G1 X101.160 Y66.929
G1 Z0.200
G1 E0.80000 F2100.00000
M204 S1000
G1 F1800
G1 X102.893 Y64.175 E0.10199

```

How it's read

-
- G1 X102.893 Y64.175 Z1.0 F3000 E0.10199
 - X - coordinate
 - Y - coordinate
 - Z - coordinate
 - F – speed
 - E – length of extruded material