Moby3D (Ender 3 NEO)

Machine Settings

Printer Settings

- X: **235** mm
- Y: **215** mm
- Z: **250** mm
- Build plate shape: Rectangular
- Origin at center: ☐
- Heated bed: ☑
- Heated build volume: ☐
- G-code flavor: Marlin

Printhead Settings

- X min: -26 mm
- Y min: -32 mm
- X max: 32 mm
- Y max: 34 mm
- Gantry height: 25 mm
- Number of extruders: 1

Temperature Settings

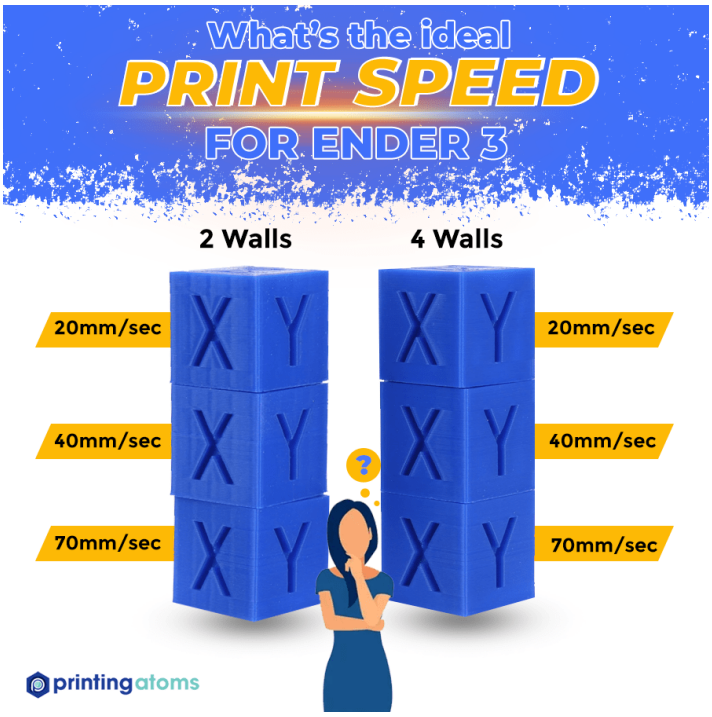
Hot End Temperature

- Max Temp (Stock): **260** °C
- PLA: 190–210 °C
- ABS: 220–240 °C
- PETG: 230–245 °C
- TPU: 220–230 °C

Bed Temperature

- PLA: 50 °C
- ABS: 110 °C
- PETG: 70 °C
- TPU: 50 °C

Speed & Retraction Settings



Print Speed

- Theory Speed: **200** mm/s
- Practical Fast Speed: ***90-120*** mm/s
- Ideal Speed: ***50-60*** mm/s
- Detailed(miniaturs, etc): ***40-50*** mm/s
- Simple: ***70-80*** mm/s
- Initial Layer: **30** mm/s for all materials except TPU (**20** mm/s)

Common Speed

- PLA: 60 mm/s (max 150 mm/s)
- ABS: 60 mm/s
- PETG: 40 mm/s
- TPU: 20 mm/s

Retraction Speed&Distance

- PLA: 40-50 mm/s, 4mm+
- PETG: 25-50 mm/s, 6mm+
- ABS 40 mm/s
- TPU retraction settings: None

Fan Settings

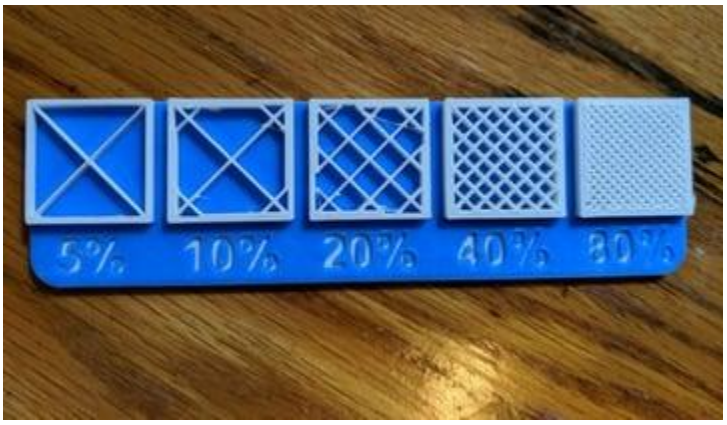
PLA	ABS, PETG, TPU
Initial Fan Speed: 70% for 1-2 layers)	Initial Fan Speed: 0% for (1-2 layers)

Quality Settings

Layer Height	Initial Layer Height
• Between 25% & 75% of your nozzle diameter • 0.12 mm (Best)	• Start from 0.24mm, • Use 0.04mm step

● 0.2 mm (Mid) ● 0.28 mm (Mid Low) ● 0.32 mm (Low) ● Use ±0.4 mm step ### Line Width ● 0.4 mm nozzle: 0.40-0.48mm	

Infill Settings



### Infill Patterns ● Print speed: Zig-zag, Lines, Lightning ● Least amount of filament: Lightning ● Toughness: Gyroid ● Stiffness: Tri-hexagon, Cubic ● Strength by weight and printing time: Cubic Subdivision ● Strength in vertical direction: Grid ● Strength in horizontal directions: Tri-hexagon ● Strength at 100% density: Concentric ● Flexibility: Cross 3D ● Top surface quality: Zig-zag, Grid	### Infill Density ● Visual-only prints: 0–15% infill density ● Standard prints: 15–50% infill density ● Functional prints: 50–100% infill density

Appendix

Ender 3 Cura Setting

PLA (Makershop)

- Hot end temperature: 195 degrees C
- Bed temperature 60 degrees C
- Print speed: 50 mm/s
- Layer height: 0.02mm
- Retraction Speed: 25 mm/s
- Retraction Distance: 6mm
- Infill: 20%
- Infill type: Rectilinear or gyroid
- Initial Fan Speed: 0%

WHAT IS THE FASTEST THE ENDER 3 PRO, MAX, OR V2 CAN PRINT?

Creality lists the mechanical max print speed for a stock Creality Ender 3 3D printer as **200 mm/s**. BUT, the maximum print speed of any 3D printer is usually limited by the flow rate from your hotend. Typical volumetric flow rates are 8mm³/s to 12mm³/s, depending on your hotend setup. These flow rates translate to **90-100mm/s and 140-150mm/s (respectively) at 0.2mm layer height with a 0.4mm nozzle** depending on how your slicer handles the math.
The max speed also depends on the type of filament you use, what STL/model you're building, and how nice you'd like the part to look. But if you really want to have an incredible print speed, learn how to build a 1000mm/s Ender 3 for under $600.

RECOMMENDED PRINT SPEEDS FOR A STOCK ENDER 3 (PRO/V2) WITH 0.4MM NOZZLE BY MATERIAL

Material	Normal Print	First Layer	Fast Prints†
PLA	45 mm/s	20-40 mm/s	80-140 mm/s
PETG	35-45 mm/s	10-30 mm/s	60-65 mm/s
ABS	40-60 mm/s	20 mm/s	60-70 mm/s
TPU	17 mm/s *	17 mm/s	*Don't*
Nylon	40 mm/s	30-40 mm/s	60 mm/s
PC	*Don't***	*Don't*	*Don't*
PEEK	*Don't***	*Don't*	*Don't*

Speed for Fillaments

WHAT IS THE BEST ENDER 3 PRINT SPEED FOR PLA?

When using a 0.4mm nozzle, most of my normal PLA prints are printed at 60mm/s on the perimeters, 25mm/s for small perimeters, 35mm/s for external perimeters, and “200mm/s” (which ends up programmatically limited by Prusa Slicer to ~100mm/s) for infill.
PLA prints well at speeds between 30mm to 90mm per second. For high-quality results stick to lower printer speeds – around 30-50mm/s. As you increase the speed you begin to risk reduced quality prints when printing for high detail.

ENDER 3 PRINT SPEEDS FOR PETG

PETG (aka PET-G) is a 3D printing filament that prints at a higher temperature than PLA. It has fantastic mechanical properties (similar to ABS) but the print difficulty is slightly harder than PLA.
As a general rule, print PETG at roughly the same pace – or slightly slower – than PLA. If you create basic objects at low res you will be able to get it to create as fast as 60 mm/second. However, the best pace for PETG is approximately 40 mm/s since PETG can be a bit stringy. You can usually eliminate stringy-ness by slowing your print speed.

Cura Infill Patterns

Grid

Strong 2D infill
Cura's Grid infill pattern is a strong 2D infill that creates a grid on each layer of the print. The Grid pattern resembles the Lines pattern, but there is a major difference: the Lines pattern only prints in one direction per layer, adding perpendicular lines in the subsequent layer, and so on. By contrast, each layer of the Grid pattern has lines going in two directions.
The Grid pattern is used on everyday prints that require a moderate amount of strength and is Cura's strongest infill pattern in the vertical direction.

Lines

Quick 2D infill
The Lines infill pattern is a fast-printing pattern that uses minimal material. It is suited to visual prints like decorative models.
Sometimes known as rectilinear infill, this pattern prints unidirectional lines on each layer, changing direction 90 degrees for the subsequent layer. This makes a kind of disconnected grid in which layers one, three, five, etc. have lines along one axis, while layers two, four, six, etc. have lines along the perpendicular axis.

Triangles

Strong 2D infill
Cura users can select the Triangles infill pattern for everyday prints as an alternative to the Grid pattern. As its name suggests, the pattern is made up of triangles rather than the squares typical of a grid.
Shear-resistant and strong in every horizontal direction, its main drawback — one shared with Grid — is the interruption of flow at intersections.

Tri-hexagon

Strong 2D infill
The Tri-hexagon infill pattern is suitable for everyday prints. Like the Triangles pattern, it uses three sets of parallel lines. However, these lines are slightly offset, so rather than creating a grid of equally sized triangles, they create a mix of small triangles and large hexagons.
In terms of forces applied in any horizontal direction, this shear-resistant infill pattern is the strongest available in Cura.

Cubic

Strong 3D infill
Cura's Cubic infill pattern is made up of 3D cubes standing on a corner. This orientation prevents overhangs and results in fairly high strength in all directions. Furthermore, because

each cube is enclosed, long pockets of hot air cannot form, which reduces undesirable pillowing of the top layer.
The Cubic pattern is suitable for everyday parts or functional parts which require strength along all axes.

Cubic Subdivision

Strong 3D infill
A “smarter” version of Cubic, Cubic Subdivision is an algorithmically complex pattern designed to use less material and increase print speed while maintaining strength.
Cubic Subdivision features cubes of varying sizes, with the largest cubes (and consequently the least dense areas) placed at the center of the build. It is the best infill pattern for balancing strength with weight reduction and printing time. However, it can take a long time to slice.

Octet

Strong 3D infill
Cura’s Octet infill pattern is made up of tetrahedrons (triangular pyramids) and cubes, creating a very strong internal frame where the edges of these shapes meet. It is particularly suited to thin mechanical parts.
Although boasting high strength, the Octet infill can produce relatively poor top surface quality. This is due to the long required bridging distance: the space that needs filling between solid infill material in order to add the solid shell around the part.

Quarter Cubic

Strong 3D infill
The Quarter Cubic infill pattern comprises tetrahedrons and truncated tetrahedrons. Like the Octet infill pattern, it creates an internal frame to which loads can be dissipated.
It is ideal for very thin functional parts that require a high degree of strength, but top surface quality can suffer due to the long bridging distance.

Concentric

Flexible 3D infill
Cura’s Concentric infill pattern creates concentric rings that follow the shape of the outer walls. When printed at low infill density, it has very low strength in all directions and is therefore suitable for flexible parts, which are designed to bend. (A higher infill density will create a more rigid part.)
Conversely, this infill pattern actually produces the strongest prints at 100% infill, as the lines do not intersect and can evenly distribute loads.

Zig-zag

Quick 2D infill

The Zig-zag infill pattern is similar to the Lines pattern, except the lines are joined up, as the nozzle turns and goes back on itself when it reaches an outer wall (rather than starting a new line). Zig-zag is fast and suitable for visual-only prints.
One potential advantage of Zig-zag over Lines is that the nozzle does not have to retract filament and travel. This reduces the chances of oozing, particularly with low-viscosity filaments like PETG, although it does use fractionally more material.

Cross

Flexible 2D infill
Designed for printing flexible filaments with a low infill percentage, the Cross infill pattern creates a pattern without any long straight horizontal lines. This produces a high level of flexibility across all horizontal directions, with a minimal amount of strength throughout.
The Cross pattern does not require retraction, which prevents oozing of flexible materials. However, a disadvantage of the 2D pattern — for flexible parts, at least — is its relatively high strength along the Z-axis, making it less flexible in the vertical direction.

Cross 3D

Flexible 3D infill
The undesirable vertical strength of the Cross pattern is eliminated in the Cross 3D pattern — with the caveat of longer slicing times. Cross 3D is weak (and therefore flexible) in all directions. Cura's Cross 3D infill pattern is better than Cross or Concentric for part flexibility. Like Cross, it does not require retraction and is therefore resistant to oozing.

Gyroid

Strong 3D infill
The Cura Gyroid high-strength infill pattern creates wavy lines of alternating directions. It is shear-resistant and strong in all directions, but not stiff, making it suitable for some flexible materials (though its flexibility is lower than the three dedicated flexible infill patterns).
Many Cura users favor Gyroid for its aesthetics, especially with transparent filaments where the internal geometry is visible. However, Gyroid infill is algorithmically complex, so slicing the 3D model can be slow.
Recommended reading: Understanding the Gyroid Infill in 3D Printing

Lightning

Quick experimental infill
The newest Cura infill pattern, released in December 2021 as part of Cura 4.12, is a kind of topology optimization tool that generates jagged internal support structures with the sole purpose of supporting the top of the build.
Lightning infill uses minimal material, resulting in faster and more lightweight prints. It is suitable for low-strength parts like visual prototypes.

GCODE

Start

```
; USE 2/27/23
; --- Global Settings
; layer_height = {layer_height}
; smooth_spiralized_contours =
{smooth_spiralized_contours}
; magic_mesh_surface_mode =
{magic_mesh_surface_mode}
; machine_extruder_count =
{machine_extruder_count}
; --- Single Extruder Settings
; speed_z_hop = {speed_z_hop}
; retraction_amount = {retraction_amount}
; retraction_hop = {retraction_hop}
; retraction_hop_enabled =
{retraction_hop_enabled}
; retraction_enable = {retraction_enable}
; retraction_speed = {retraction_speed}
; retraction_retract_speed =
{retraction_retract_speed}
; retraction_prime_speed =
{retraction_prime_speed}
; speed_travel = {speed_travel}

M140 S{material_bed_temperature_layer_0} ;
Start heating bed
M190 S{material_bed_temperature_layer_0} ;
Wait till bed temp reach
M104 S{material_print_temperature_layer_0};
Start heating hotend
G92 E0 ; Reset Extruder
G28 ; Home all axes
M420 S ;recalled mesh
M109 S{material_print_temperature_layer_0}
; Finish heating the nozzle
G1 Z2.0 F3000 ; Move Z Axis up little to
prevent scratching of Heat Bed
G1 X0.1 Y20 Z0.3 F5000.0 ; Move to start
position
G1 X0.1 Y200.0 Z0.3 F1500.0 E15 ; Draw the
first line
G1 X0.4 Y200.0 Z0.3 F5000.0 ; Move to side
a little
G1 X0.4 Y20 Z0.3 F1500.0 E30 ; Draw the
second line
```

End

```
M140 S0 ;Turn-off bed
M106 S0 ;Turn-off fan
M104 S0 ;Turn-off hotend
G91 ;Relative positioning
G1 E-2 F2700 ;Retract a bit
G1 E-2 Z0.2 F2400 ;Retract and raise Z
G1 X5 Y5 F3000 ;Wipe out
G1 Z10 ;Raise Z more
G90 ;Absolute positionning
G1 X0 Y{machine_depth} ;Present print
M84 X Y E ;Disable all steppers but Z
```

G92 E0 ; Reset Extruder G1 Z2.0 F3000 ; Move Z Axis up little to prevent scratching of Heat Bed G1 X5 Y20 Z0.3 F5000.0 ; Move over to prevent blob squish	