



## Cura Retraction Settings: How to Avoid Stringing

*Hironori Kondo*

*6 months ago*

*Retraction is an easy and powerful way to reduce stringing and oozing in your 3D prints. Find out how to tune the Cura retraction settings.*

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## CURA RETRACTION SETTINGS

### What Is Retraction?

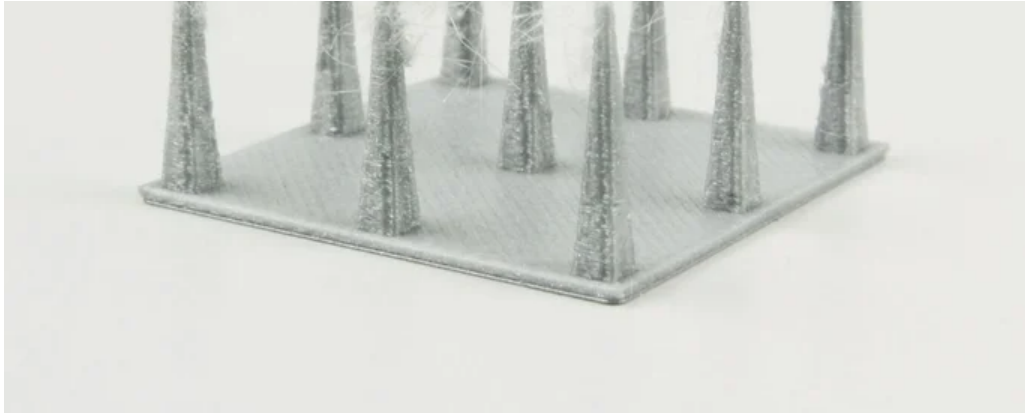


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A stringy model with poor retraction settings. Source: Ultimaker

[FDM 3D printing](#) works by melting plastic and extruding it to construct 3D objects. Sometimes, this molten plastic can ooze out of the nozzle when you don't want it to, leaving unsightly strings and wisps on the print.

[Retraction](#) is a process used to reduce this effect. By pulling some of the plastic out of the printer's hot end before it travels, the pressure in the molten plastic is reduced, decreasing the odds of stringing over open spaces.

This setting is accessed and adjusted through your printer's [slicing software](#) and can be tuned to achieve clean, precise prints. Here, we'll run you through the right settings for the best results in [Cura](#).

Before we get started, consider downloading this [retraction test print](#) for tuning your settings.

With that, let's get into it!

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## CURA RETRACTION SETTINGS

### Retraction Distance and Speed



Retraction distance and speed alter the extruder's behavior during retracts. Source: Ultimaker

As their names suggest, retraction distance and speed deal with how the plastic filament is pulled out of the hot end. Both will require tuning to find the optimal “sweet spot” between retraction performance and the hardware limitations of your printer.

Retraction distance changes how far back the filament is pulled. Too low of a value



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...minimum. Starting with the current Cura settings, increase the speed by 1 mm/s at a time to find the optimal value.

### Setting names:

- Retraction Distance
- Retraction Speed

### In Cura settings category:

- "Material"

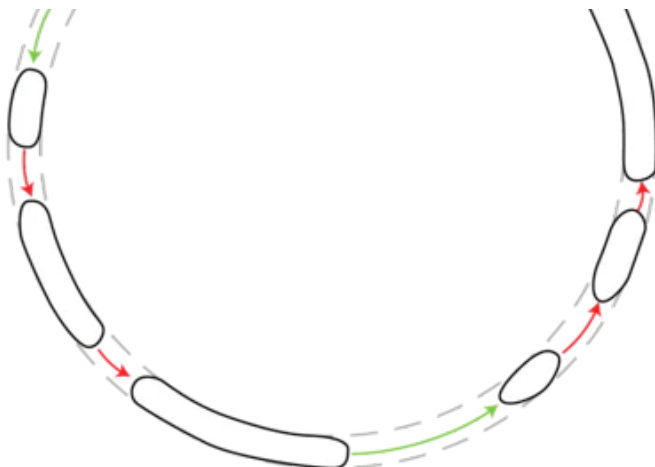
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☐ Model shell

Retractions are performed only when the minimum travel distance is met (green). Source: Ultimaker

This setting determines the minimum distance for which retraction will occur. It is a safety precaution against unnecessary, repeated retractions in close proximity to each other, in order to prevent filament grinding. A retraction is only performed if the print head will be traveling far enough to warrant one.

This setting should be as high as acceptable to decrease the risk of print failure. A lower value will allow for smaller features to be printed cleanly, which is sometimes necessary, but it will also increase the risk of grinding. Try **starting at 1 mm** and adjust as necessary by **0.5 mm increments**.

#### Setting name:

- Retraction Minimum Travel

#### In Cura settings category:

- "Material"

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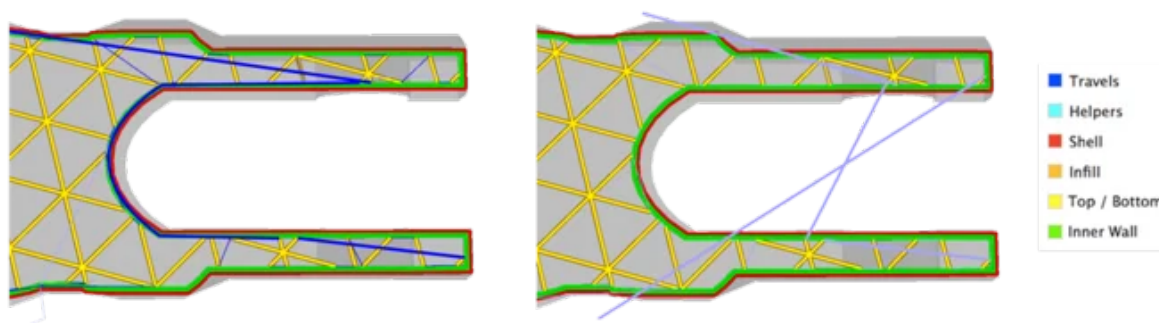
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## CURA RETRACTION SETTINGS

# Combing



"Combing" keeps the print head within the model (dark blue), instead of retracting and moving over open space (light blue). Source: Ultimaker

"Combing" readjusts the printer's travel moves to avoid unnecessary retractions. Instead of retracting the filament and crossing open space to reach its next location, the print head will try to travel directly across the interior of the model. This limits opportunities for strings to form, as any oozing is left within the print.

By turning combing on, you'll likely also see a decrease in print times, as the printer no longer has to stop to retract. Surface quality will also improve. You may, however, see an increase in scarring on the top layer of the print, left by the nozzle as it drags across the surface. Avoiding combing on top layers is possible by setting it to "Within Infill" or "Not in Skin" instead of "All".



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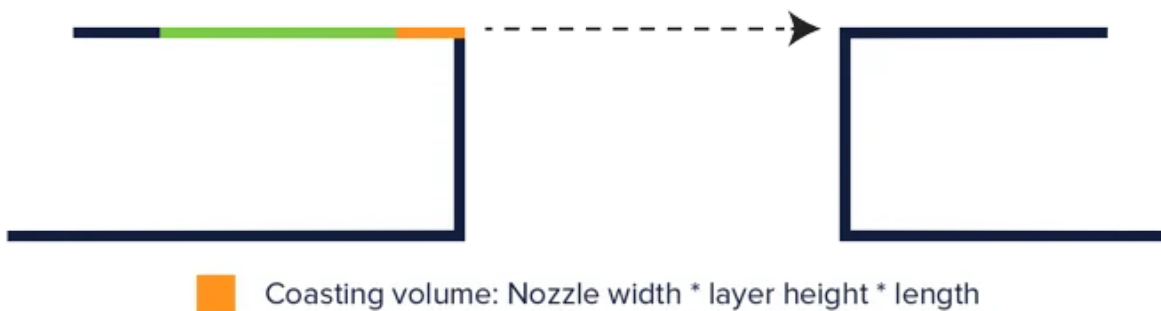
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## CURA RETRACTION SETTINGS

### Wiping and Coasting



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“Wiping” and “coasting” are not directly retraction settings, but they can both improve retraction performance. Both do what their names suggest: “wiping” moves the nozzle a short distance across the outer wall of the model to smear off any leftover plastic, and “coasting” turns off the extruder for the final millimeters of a print line. This decreases the pressure buildup in the hot end and minimizes any blobbing or zits left by retractions.

Work with the default values (0.4-mm wipe distance, 0.064-mm<sup>3</sup> coasting volume) and **adjust by 0.1 mm and 0.01 mm<sup>3</sup>**, respectively. Take special caution with coasting, as too much can lead to holes in the print from print lines not being completed. Consider setting a **Minimum Volume Before Coasting** at around **0.8 mm<sup>3</sup>**, which will limit coasts that are too long.

#### Setting names:

- Outer Wall Wipe Distance
- Enable Coasting
  - Coasting Volume
  - Minimum Volume Before Coasting

#### In Cura settings categories (respectively):

- “Shell”
- “Experimental”

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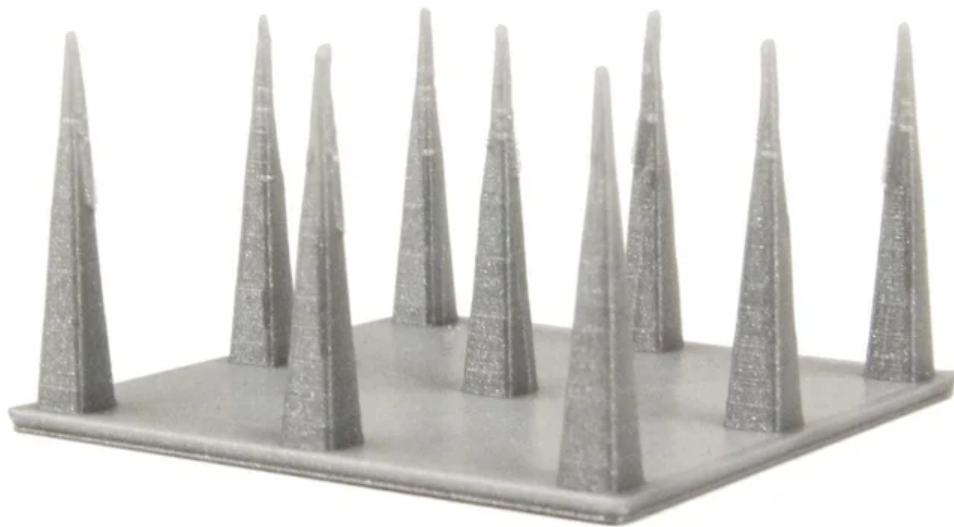
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## CURA RETRACTION SETTINGS

# There You Go!



A clean, string-free print with proper retraction settings. Source: Ultimaker

There you have it: the most important Cura retraction settings for nailing retractions. By understanding and tuning each of these, you can minimize stringing and improve print quality.

For more on Cura, check out our [in-depth Cura guide](#) and [Ultimaker's official manuals](#). If you're interested in discovering more about retraction in general, we also have a [handy breakdown](#) available.



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**Christopher Ryan** • 19 days ago

Hello there,

My model 3D print always comes a seam line. Some of the solution told my from googling that using Coasting can reduce the seam line.

IF yes, using coasting do i need to enable outer wall wipe distance together with coasting? What input value do you recommend for outer wall wipe distance?

Thank you

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