How to Polish copperFill & bronzeFill Filament

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https://learn.adafruit.com/copperfill-filament

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Overview

copperFill and bronzeFill are metal infused 3D printer filament. copperFill has a bit of a browner, more rustic look than its bronze counterpart, once polished.

Produced with a micronized copper powder which has been infused into a common PLA plastic, copperFill will print easily using an all metal hot-end. Colorfabb warns against using any hot-ends which use a teflon isolator coupler, as the filament has been shown to clog these devices.

After polishing, prints look like they were cast in metal. In this guide we'll look at achiving super shiny results, without any liquids or futhers preperations on your part.

Usage

Temperature Guidelines:

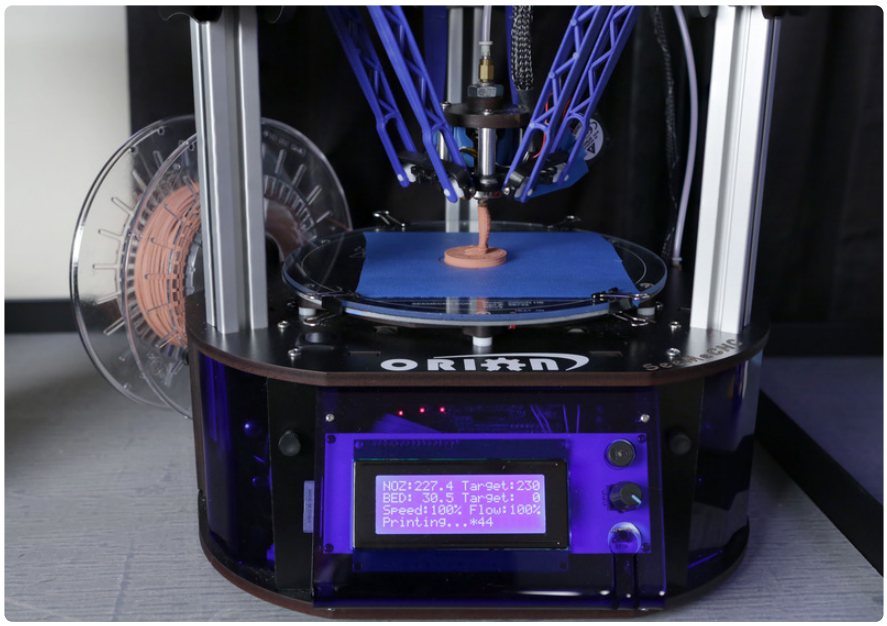
copperFill and bronzeFill prints with your standard PLA settings. Heated bed is not required. For a good adhesion to the platform, we recommend blue painter's tape.

Recommended settings:

- extruder temperature: 190 - 225°C
- platform temperature: 0 - 50°C
- shells: 2 - 4
- resolution: .1mm
- infill: 10%-50%

Download Printer Profiles

https://adafru.it/enD



Compatible Extruders

Direct drive and bowden extruders systems are compaitable with both materials. Colorfabb warns against using any hot-ends which use a teflon isolator coupler, as the filament has been shown to clog these devices.

Resolution

Higher resolutions of 100 microns will help get a smoother shine quicker, without the risk of leaving the part in the tumbler for too long. 200 microns will leave ridges where the layers meet, making it more difficault to smooth out later.

Cleaning Prints

Use flush diagonal cutters and a hobby knife to remove the excess material left behind during printing. You can use your fingers to rub away the loose bits. Use a hobby knife to get in between crevices and remove tiny artifacts.

Tumbling medium

Abrasive material is needed to help bring out the copper metal shine. We used brass screws of different sizes for surface finishing, deburring and polishing. Use wood brass screws sizes #00 to get into the small nooks and crannies of parts, while #2, #4, #6 are used for bigger areas of the model. You'll want to use a good amount of screws - about 50 to 100 screws should be enough to get a good shine. Water or any other liquid is not required.

Tumbler

This 3 lbs tumbler (https://adafru.it/epW) can hold prints that are 90mm tall by 85mm wide. Tumble times vary depeding on how big and complex the model is.

Small prints (20mm x 20mm): 6 hours

Medium prints (80mm x 30mm): 18 hours

Large prints (90mm x 85mm) 36 hours

You'll want to periodically check (about once an hour) on your print to make sure it's still in one piece.

Clean Up

Avoid getting dust on your hands, be sure to use gloves to remove your parts after tumbling as the screws grind together and create metal particles. Use a brush and shop towel to clean off the rest of the dust and particles. Be sure to clean in a well ventilated area.

Before and After

If the model doesn't make it out of the tumbler in one piece, don't worry, some models can easily be glued back together. You can also try using more shells/parameters to strength the model and try again!

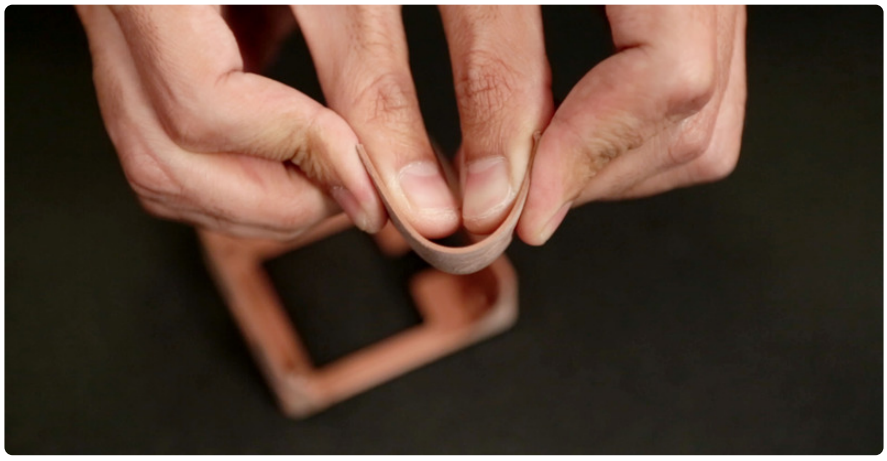
Properties

Retraction

High speeds for retraction can cause the metal filament to clog. Burrs are easy to clean off with your finger or hobby knife. Try to clean as much as you can. Tumbling will smooth out the surface but any larger bumps will only get smoothed out into a blob.

Weight

Parts are heavy compared to PLA prints. The bust pictured above measures 72mm tall x 85mm wide and weighs 80 grams. The same print in PLA weights only 12 grams! Both have 2 shells and 10% infill.



Strength

copperFill has enough flexablity to withstand extreme bends. Applying force will deform the model. When parts break, they slowly tear before snapping.

Tips

Sanding

We've seen great examples using steel wool to polish, but in our test sanding brought out PLAs white color. Polishing compound (Brasso) can also be used to get a patina look on the model.

High Resolution

Use 100 microns or higher to achive a smooth finish. Lower resolutions will take more time to smooth out. The longer the model tumbles, the more likely parts will brake.

Metal Wear

Brass screws wears down after about 120 hours of tumbling. Screws grind and then the metal particles stick to parts, giving them a brilliant shine. We recommend using new screws to help maintain a consistent polish.