



Vitrolite®



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Vitrolite is a photocurable polymer resin for use in SLA or DLP printers. After firing, Vitrolite is a glass ceramic with high strength, low porosity/high density and thermal shock tolerance. Vitrolite does not conduct heat or electricity and is chemical resistant.



Unfired Vitrolite



Matte, fired <1940 F



Semi gloss, fired >1980 F

Recommended Printing Tools



Wire Cutters to remove supports from 3D print



Metal Paint Scraper to remove object from print bed.



Plastic Paint Scraper - used to remove settled resin from bottom of the resin tank after printing



Kitchen Strainer to filter Vitrolite



Wear nitrile gloves when handling Vitrolite



Wear safety glasses when handling Vitrolite

Printing Guidelines

1. Shake the Vitrolite bottle upside down for 5 minutes. Make sure all of the material has mixed together before printing.
2. Add Vitrolite to resin tray.
3. The first time printing in Vitrolite it is recommend to make a small object first to test your machine and assess if there are any trouble shooting steps that need to be taken before printing at large scale.
4. Remove wiper bar if available. Print five layers and pause printer to assess if design is adhering to the build plate. If it is, attach wiper bar and continue. If it is not, see recommendations under Troubleshooting.

When recycling leftover Vitrolite after a print, it is recommend to pour the leftover Vitrolite through a kitchen strainer to break up sediment. Mix the leftover Vitrolite back into the original bottle and shake well before printing again.

Printer Settings

1. Vitrolite works on most grey or black settings for SLA / DLP 3D printers. Print in castable if parts are not adhering
2. Increasing exposure time of the laser or projector will lead to best results.
3. Flexible settings can be used for more delicate parts.
4. Average first layer cure time is 13 seconds.
5. Average burn layer is 9 seconds.
6. Average general layer is 7 seconds.

Tips for Printing

1. Vitrolite is heavier than most 3D printing resins. It may require increased contact size on supports. Increasing the density of the supports is also helpful.
2. Clean your build platform with Isopropyl Alcohol. This ensures there is no other resin on the build platform that could interfere with Vitrolite adhering properly.
3. Scratch the build plate if your parts are not sticking. Vitrolite is heavier than most 3D printing resins it may need a rough surface to adhere to the build platform.
4. Increase the overall exposure time of the machine if prints are not sticking to the build platform.

After the Print has finished

1. Remove object from the build bed by cutting the supports. (Scrape the base and remaining supports off build plate later with the metal paint scraper.)
2. Soak object in Isopropyl alcohol for no longer than ten minutes. (Warping may occur if soaked longer).
3. Cure 1-8 hours in a UV light box . Rotate every hour. Longer curing required for thicker more solid objects. **Curing time can be equal to printing time**
4. Remove supports (optional – see firing instructions).
5. Sand and file support marks on print if necessary. (Sanding is easier before firing.)
6. Use the Plastic Paint Scraper to scrap settled resin from bottom of the resin tank.
7. Filter unused Vitrolite and sediment through a kitchen strainer.
8. Take the filtered Vitrolite and pour back into the original Vitrolite bottle.
9. Shake Vitrolite bottle to remix.

Firing Instructions

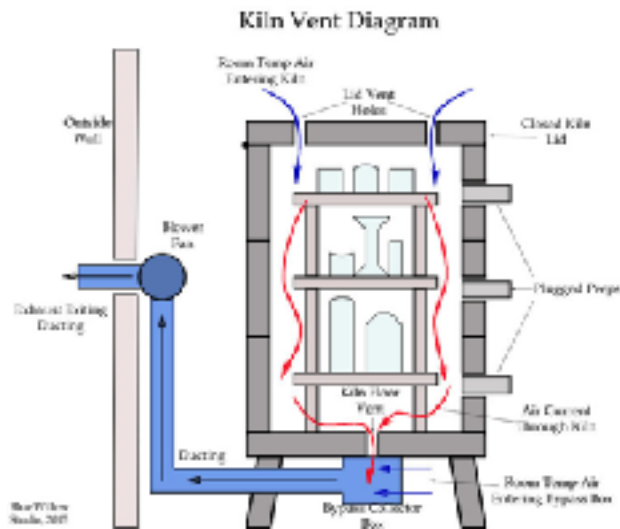
Vitrolite should be fired to 1940°F - 2000°F (1060°C - 1093°C) for body maturity. The final temperature is dependent on desired surface finish. For a matte white surface fire up to 1940°F. For a semi gloss finish fire to a minimum of 1970°F. Do not use a reduction firing environment for Vitrolite. Use oxidized environments only during burn out process. Vitrolite shrinks during firing. Shrinkage is dependent on the geometry of the part and layer thickness.



Adding liquid Vitrolite to printer



Apply a Polyester adhesive backed film for easy part removal



Vitrolite needs to be fired slowly between 350-900°F (176 - 483°C). This ensures all of the gas escapes from the object. Firing the print too fast will cause the object to bloat and crack in the kiln.

Fire in a well vented kiln. Avoid breathing fumes generated during firing. DO NOT prop open the kiln lid. That allows fumes to escape into the room and may cause combustion of your objects within the kiln. (And yes, you may use unvented kilns that sit outdoors.)

Vitrolite 3D prints can be supported in the kiln to prevent warping. Unfired Vitrolite objects may be fired with the printed support fixture

and/or placed on a thin low-fire clay slab. The choice is dependent upon the design of the object (risk of warpage, base design, overall size). A low-fire clay slab or support structure helps objects shrink and prevents breakage and warpage. Vitrolite prints may also be fired with printed supports still attached and broken off later. (See Firing tips for more information)

Kiln Firing Schedules for Vitrolite 3D Prints

Slow Bisque - Some kilns have pre-programmed firing schedules. Most Slow bisque programs will work with Vitrolite. Fire to Cone 04 - 03 for final parts.

A slow ramp up to 1200°F is required to prevent cracking.

Manual Kiln Program

TOTAL TIME =

0 – 600°F 50°F per hour **Can go as low as 25° per hour for thick parts over 5mm.**

600 – 1200°F 50°F per hour

1200 – 1700°F 400°F per hour

1700- 1940°F 270°F per hour

The final temperature can change depending on desired surface finish.

Cool down naturally.

Kiln Firing in Celcius

20 - 150°C 25°C per hour

150 - 600°C 25°C per hour (this is an average firing time for parts with a 1mm wall thickness
- can go as low as 5°C per hour for thick parts over 5mm)

600 - 1070°C 112°C per hour

Firing Tip

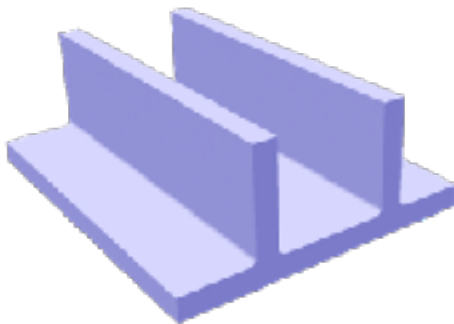
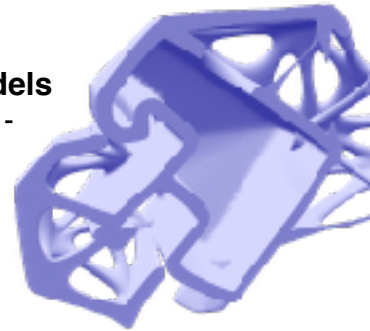
Firing Vitrolite hotter than 1940*f will increase the density. Do not fire above 2000*f

Design Tips

These tips are to help uniform shrinking during the kiln firing.

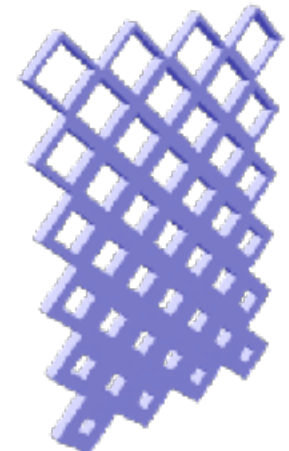
Hollow Models

Solid objects should be hollowed. 1mm - 3mm wall thickness is recommend, for desktop 3D printing. Do not trap unfired resin when hollowing models. Escape holes need to be added so the resin can escape. Trapped resin will cause cracking



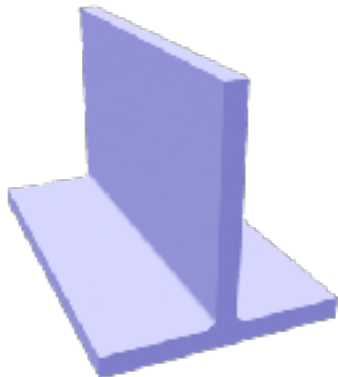
Wall thickness

Structures need to be supported with appropriate wall thickness. Thinner walls will warp. Details can be less than your supporting wall. Thinner walls will reduce cracking



Lattice Thickness

Lattices will benefit from a structure that is thicker on the bottom than at the top. Lattice structures can be used for infill.

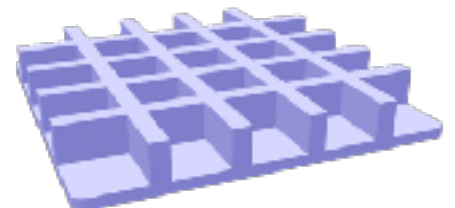


Rounding Corners

Rounding corner and where edges they meet can help reduce cracking during firing.

Using Ribs for interior solid wall supports

Using ribs on the interior of a thin solid wall will help reduce sagging during firing. A thin outer wall, with ribs supporting will improve firing results.



Troubleshooting Vitrolite®

Vitrolite® works on most UV curing 3D printers. Sometimes there needs to be fine tuning to ensure the best quality objects from your 3D printer. Here are some tips if you are having trouble. Please contact Tethon 3D if problems persist.

Vitrolite® not sticking to the build plate

Make sure the build plate is clean. Clean with isopropyl alcohol and paper towel.
Increase exposure setting on the 3D printer. Black or Castable settings often have the longest exposure times.
Lower the build plate further into the resin tank.
Decrease the layer thickness of the 3D model.
Scratch build plate.

Vitrolite® has wings or ragging during printing

Filter and remix Vitrolite resin.
Reduce exposure settings.

Vitrolite® is cracking during firing

Reduce firing speed between 300-900°F.
Decrease wall thickness, use ribs to increase strength and stability.
Increase exposure time for printing. Using castable settings will cure Vitrolite longer in between layers. This will help reduce cracking as well.

Vitrolite® warps during firing

See design guides to improve geometry of object.
Use thinner print layers.

Vitrolite® settles during printing

Using a printer with a wiper bar will reduce or eliminate this.
This does not affect how Vitrolite cures.
Use a plastic paint scraper to remove settled Vitrolite and remix in original bottle.

Vitrolite® gives off a strong odor during firing

Vent kiln during firing.

Vitrolite® shrinks more than 20% after firing

Make sure all of the Vitrolite® is properly mixed. If all the resin is not mixed together at the time of printing greater shrinkage may occur.
Check the firing tips and make sure the final temperature is not above 2000F

Storage of Vitrolite®

Store in a dark cool room free from moisture.
Shake Vitrolite® bottle for a few minutes every two weeks.
Remove Vitrolite® from resin tray if not in use longer than 3 days.