



# ALPHASENSE DLP/SLA CERAMIC RESIN USER INSTRUCTIONS

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## **NOTE**

**The ceramic filler materials may sink and stick to the bottom of the bottle. The user should use a long stirrer bar/stick to reach to the bottom of the bottle to fully agitate the filler materials before pouring it to the resin container. It is highly recommended to use an electric mixer/blender to ensure even mixing of the fillers in the resin before pouring it to the resin. A settling time of a few minutes in the resin container should be allowed before printing to ensure that a majority of the bubbles disappear.**

## **INTRODUCTION**

ALPHASENSE DLP/SLA/LCD ceramic resin is a broad- band photocurable polymer system that contains monomers, photoinitiators, ceramic fillers and other additives. Upon light exposure, the photoinitiators generate radicals which promotes the polymerization reactions. The resin product can be cured with typical light sources found in common resin- based 3D printers (e.g. light bulbs and UV LEDs in DLP, and SLA/LCD printers, respectively). The resin is photocurable with UV wavelengths up to 420 nm. It is compatible with printing resolutions from 50 to 200 microns.

## **USAGE**

### **• 3D PRINTING**

The most important parameter to fabricate a 3D model is the exposure time, which is mainly dependent on the following three factors: light intensity, the layer thickness and the cross-section area of the model (if a DLP source/printer is used). A relatively shorter exposure time can be used for a larger model, while longer exposure time is needed for smaller models, such as a jewelry/ring due to their different cross sectional areas. The following parameters are recommended for those two types of models for a layer thickness of 100 microns with a DLP light flux of ~1500 lumens.

Jewelry/ring: 20 seconds for the first 3 layers and 12 seconds for subsequent layers;

Denture: 15 seconds for the first 3 layers and 10 seconds for subsequent layers.



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A settling time of 2-5 seconds is recommended for each layer. The user needs to fine tune these parameters which are specific to his/her own 3D printer. Also, if a different resolution/layer thickness is desired, the user needs to vary those parameters accordingly.

The following printing parameters are recommended for commonly used LCD resin- based 3D printers (e.g. Anycubic Photon, Elegoo Mars, Longer Orange, Phrozen etc.):

- Normal Exposure: 18-36, Off time: 2, Bottom Exposure Time: 80, Bottom Layers: 10

**PLEASE NOTE THAT THE EXPOSURE TIME IS MODEL DEPENDENT. LESS TIME SHOULD BE USED FOR MODEL WITH LARGER CROSS SECTIONS. OTHERWISE, DETACHING OF THE PRINTED LAYERS FROM THE FEP/PDMS FILM MAY CAUSE DEFORMATION/STRETCHING. USER SHOULD START WITH A SHORTER EXPOSURE TIME AND GRADUALLY INCREASE LAYER EXPOSURE TIME TO ACHIEVE THE DESIRED PRINTING QUALITY WHILE ELIMINATING DAMAGES TO THE FILM.**

- **SINTERING**

Figure 1 shows a sample heating curve for the polymer removal and ceramic sintering, which needs to be followed to ensure complete polymer removal and sintering of the ceramic parts. Please note that such a sample sintering curve is for a model with 1" thickness measured from the thickest part. For sample with larger thickness, the duration for the resin removal/burn-out and sintering (i.e. 2- hour and 0.5 hour) at 350 and 1250 °C need to be proportionally increased to achieve good- quality sintered parts.

**NOTE:**

**AVOID DIRECTLY SUBJECTING THE PRINTED MODELS TO OPEN FIRE! OTHERWISE, THE PRINTED MODELS WILL BE BURNED AND DAMAGED!**

**FOR ELECTRIC KILNS, KEEP THE VENT HOLE OPEN TO ALLOW THE GAS AND SMOKE LEAVE THE CHAMBER DURING THE POLYMER BURNOUT AND CERAMIC SINTERING PROCESS TO ENSURE LONG LIFETIME OF THE HEATING ELEMENT!**

**MAKE SURE THAT THE POLYMER BURNOUT AND SINTERING IS DONE AT A WELL- VENTILATED PLACE. THE EXHAUST RESULTED FROM THE POLYMER BURNOUT MAY BE HAZARDOUS TO INHALE!**



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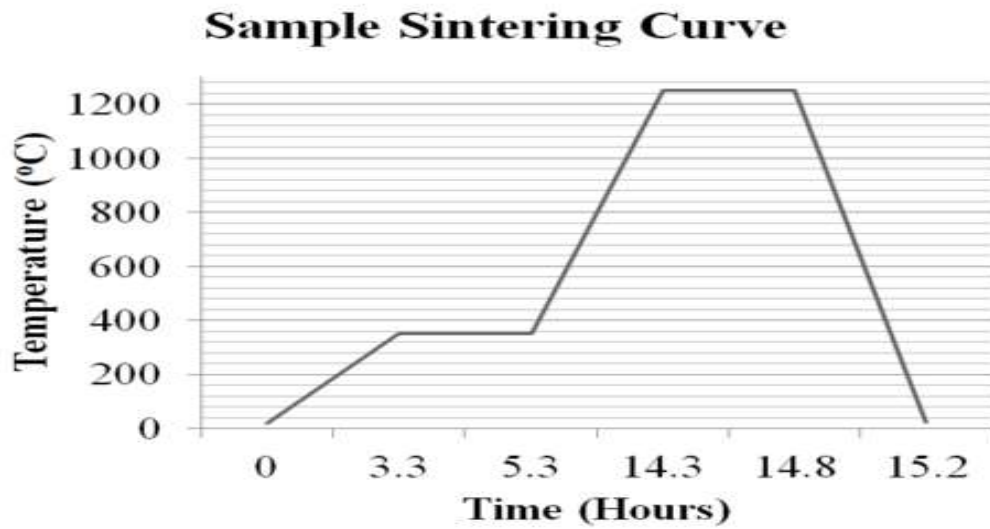


Figure 1. Recommended polymer removal and sintering curve for 3D printed models using the ceramic resin.