



Tips for Being Successful Using Silicone Rubber To Make Molds of UV Resin 3D Prints

As costs have come down in recent years, the popularity of SLA printers (using UV cure resin media to print 3D models) has grown immensely. Often, people want to make rubber molds of their UV resin 3D prints and subsequently multiple urethane or epoxy resin castings.

Both tin-catalyzed (condensation cure) and platinum-catalyzed (addition cure) silicone rubbers are used to make molds of 3D printed models made with UV cured resin. There are advantages and disadvantages to both.

The following offers tips on increasing your chances for success using Smooth-On silicone rubber products.

Using Platinum Silicone Rubber to Make Molds of UV resin 3D prints

Platinum silicones offer the advantage of dimensional stability and long-term library life. However, platinum silicones are more subject to cure inhibition against a UV cure resin model that is not fully cured.

Smooth-On platinum cure silicones will work against most SLA 3D print models with one caveat; the printed model must be fully UV cured. When models are done printing, they are not fully cured.

Cleaning and Curing Procedure:

- 1. Clean the Print** – While wearing disposable gloves, dip the 3D print in isopropyl alcohol (91%). This eliminates excess uncured resin on the model surface. Next, wash the print with dish soap and water. This should remove all alcohol. Let model fully dry.
- 2. Full UV Cure – place model in a UV cure chamber or direct sunlight for a minimum of 6 hours.** You cannot overexpose the model and the longer the exposure, the better. Cure time may vary depending on how well all areas of the print are exposed to the UV light. You must make sure all areas of the print are fully UV post cured. **The print should be turned and rotated to make sure the light hits all surfaces** of the print. It needs to hit all areas for the 6 hours otherwise under post cured areas will have inhibition.
- 3. For efficient UV curing, clear or translucent resin is better than using an opaque resin.** A clear resin will allow the UV light to penetrate through the print and cure the entire print, inside and out. The print will yellow under the post cure which is a good visual indicator UV light has reached all areas on the print. If your intention is to make a silicone mold of your 3D print, do not use an opaque resin.
- 4. Model Configuration Dependent** - deep areas, odd angles on the model or pass throughs within a print that are not exposed to UV light may cause the resin not to cure and subsequent inhibition in the mold. For example, if your model is a skull with deep set eyes and the UV light does not reach all the way down into the eyes, the model will not cure fully and will cause inhibition in the rubber mold.
Remedy; rotate and turn the 3D model frequently to maximize UV exposure to all surfaces.

Preparing to Make the Mold

Applying a Sealing Agent – Referencing the columns below, recommended sealing agents are XTC-3D epoxy coating or Krylon Crystal Clear Acrylic Spray (Gloss). Using very little material, XTC-3D coating will leave a smooth, glass-like finish on the surface of the 3D model. Krylon Acrylic Spray is widely available. However, it will leave a slight texture on the surface. Apply sealer and let fully dry.

Applying a Release Agent – Referencing the columns below, some mold rubbers require application of a release agent only (Ease Release 200) to all surfaces of the fully UV cured model. Apply a light mist coating of Ease Release 200 to all model surfaces. This will help minimize scuffs and scratches and improve the surface finish significantly. It will also make demolding the model from the rubber mold easier. After applying the release agent allow it to dry fully then proceed to mold your model.

| MOLD RUBBER | Ease Release 200 | XTC +200 | KRYLON +200 |
|----------------------|-------------------------|-----------------|--------------------|
| Mold Star 15 Slow | Not Recommended | Good | Good |
| Mold Star 16 Fast | Not Recommended | Good | Good |
| Mold Star 30 | Good | Good | Good |
| Mold Star 19T | Not Recommended | Good | Good |
| Mold Star 20T | Good | Good | Not Recommended |
| Mold Star 31T | Not Recommended | Good | Good |
| Dragon Skin 10 VF | Not Recommended | Good | Good |
| Dragon Skin 10 Fast | Not Recommended | Good | Good |
| Dragon Skin 10 Med | Not Recommended | Good | Good |
| Dragon Skin 10 Slow | Not Recommended | Good | Good |
| Dragon Skin 10 NV | Not Recommended | Good | Good |
| Dragon Skin 20 | Not Recommended | Good | Good |
| Dragon Skin 30 | Not Recommended | Good | Good |
| Dragon Skin FX PRO | Good | Good | Good |
| EcoFlex 00-10 | Good | Good | Good |
| EcoFlex 00-20 | Not Recommended | Good | Good |
| EcoFlex 00-30 | Not Recommended | Good | Good |
| EcoFlex 00-35 | Good | Good | Good |
| EcoFlex 00-50 | Good | Good | Good |
| Smooth-Sil 936 | Good | Good | Not Recommended |
| Smooth-Sil 940 | Good | Good | Not Recommended |
| Smooth-Sil 945 | Good | Good | Not Recommended |
| Smooth-Sil 950 | Good | Good | Good |
| Smooth-Sil 960 | Not Recommended | Good | Good |
| Rebound 25 | Good | Good | Good |
| Rebound 40 | Good | Good | Good |
| Sorta-Clear 12 | Not Recommended | Good | Good |
| Sorta-Clear 18 | Not Recommended | Good | Good |
| Sorta-Clear 40 | Good | Good | Not Recommended |
| Body Double Standard | Good | Good | Good |
| Body Double Fast | Good | Good | Good |
| Body Double Silk | Good | Good | Good |
| Skin Tite | Good | Good | Good |
| EZ-Brush Vac | Good | Good | Good |
| Solaris | Good | Good | Good |

Note: For extraordinarily complicated models, using Smooth-On's 'Inhibit-X' is an option and can help if you experience cure inhibition in your mold. Inhibit-X is only for use with platinum cure silicone.

Using Tin-Cure Silicone Rubber to Make Molds of UV resin 3D Prints

Advantages - Tin cure silicones are far less likely to be inhibited by UV cure resin which makes it a good choice when molding an SLA print. A tin catalyzed silicone will also yield approximately the same amount of castings from a similar platinum cure mold at a lower cost. But it does have some disadvantages when compared to platinum cure silicone.

Disadvantages - Tin cure silicone has a shorter library life than platinum cure silicone. Tin cure silicone needs to be mixed by weight and require the use of a gram scale making it less convenient and slightly more difficult to use. Tin cure silicones are also very thick and require vacuum degassing before pouring over any model. By comparison, many platinum cure silicones are lower in viscosity and are easier to measure/mix with 1 to 1 mix ratios by volume.

Making a Mold of Your 3D Print Using Tin-Catalyzed Silicone - Models should be fully UV cured before applying silicone mold rubber. Sealing is optional. Apply a light mist coating of Ease Release 200 to all model surfaces. This will help minimize scuffs and scratches and improve the surface finish significantly. It will also make demolding the model from the rubber mold easier. After applying the release agent allow it to dry fully then proceed to mix and pour mold rubber.

Note - If you are making UV resin prints with the goal of med sim or prosthetic applications, tin catalyzed silicone can not be used if the final parts/pieces are to be cast in a platinum cure silicone such as Dragon Skin or EcoFlex. Tin cure and platinum cure silicones are not compatible and cannot be used together.