

## TECHNICAL TIP

### Why Silicone Molds Can Inhibit the Cure of Clear Resins



#### Clear part with an uncured surface

If I had to come up with a list of the most common issues our customers call us about, along with air bubbles, a sticky surface on their clear castings would be at the top. My first question to them is always: *Are you using silicone?*

In 95% of tacky surface issues, I can only remember a few instances when silicone wasn't used either as the mold material or release agent. The problem seemed large enough to dig deeper and I found this issue to be more complicated than any one factor.

#### ***Why is this phenomenon more common with clear resins?***

The properties of a polyurethane are greatly influenced by the types of isocyanates and polyols used to make it. Of the two types of isocyanates, aromatic and aliphatic, aromatics are the most common. In general, they are less costly and produce shorter gel times, while aliphatics are used when longer gel times or UV stability is necessary. If you are using a water clear resin, chances are it is an aliphatic system.

The chemistry of aliphatic urethanes is not necessarily incompatible with the chemistry of silicone; however, the more time it takes for an thermosetting material to crosslink and cure, the more chance it has to react with by-products of the silicone, particularly on the surface.

#### ***Is there a difference between tin or platinum cured silicone?***

The type of silicone used, tin or platinum cured, is an important factor when looking at this problem. Isopropyl alcohol is a by-product of the chemical reaction in tin cured systems.

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The presence of alcohol on the surface of a mold reacts negatively with aliphatic urethanes, resulting in a semi-cured part with a sticky surface.



### Ultraclear Part cast in an RTV silicone mold

While it's true that some platinum silicones worked better than others, **post curing** any silicone with heat can be the difference between a perfect part or a reject. Many of the platinum silicone users who called in regards to this issue didn't know they had to post cure their molds. Even tin based silicones designed to work with aliphatic resins must be post cured to flash off any alcohol. In addition to flashing off negative by-products, preheating a mold to around 90F prior to casting is a good way to avoid shrink marks and suck backs, especially in larger parts.

### PVA release agent

Even though silicone molds are self releasing, many customers choose to use a mold release to extend their useable life. Using silicone based mold releases with aliphatic urethanes can exacerbate the problem even further. A PVA based release agent is recommended.



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## **TECHNICAL TIP**

*What can be done to avoid this issue?*

The best advice we can give is:

- 1.) **Always post cure your platinum or tin catalyzed silicone molds even if it will cure at room temperature.**
- 2.) **Always test a small amount of your desired casting resin with whatever silicone you plan on using.**