



BEST USE GUIDE FOR ROXEL3D LOST WAX PATTERN RESIN

Our Appreciation

Thank you for using ROXEL3D resins! Please find below our advice on using our LOST WAX PATTERN RESIN, Type I & Type II. This guide is not intended to replace experienced procedure. But we have been casting 3D printed patterns successfully for dental and jewelry since 2005, with a combined experience of a few decades, and would like to offer our short list of best practices to help you achieve excellent results.

Resins Covered

Type 1 and Type 2 Lost Wax Pattern Resin may be used with jewelry (gypsum) or dental (phosphate) investments. They may also be used with fused quartz shell casting technique in foundry applications.

Type 1 – Has low shrinkage and a slightly higher heat deflection than wax, which makes it most useful in dental investment for minimizing distortion during bench set as the investment undergoes crystallization. Liquid resin is burgundy in appearance, olive in soft-cure, and leaf green when fully post cured.

Type 2 – Is similar to a microcrystalline carving wax and may be filed and carved and even polished in a similar manner. Due to its much lower melting point it will burnout without typical expansion cracking of the investment seen in plastic parts. Liquid resin is orange in appearance, light orange in soft-cure, and cream yellow when fully post cured. If it has been sitting for a day or more, mix thoroughly before printing.

In both Type 1 and Type 2, a few minutes post curing in 385nm-405nm light of not more than 7.0mW is recommended to improve handling and finishing.

Investment Considerations

Always follow the manufacturer's instructions for preparing the investment. Unless otherwise indicated, use room temperature distilled water in a clean mixing bowl. The reason for this is that mineral and salt content in tap water and deionized water is known to weaken investment. Other contaminants or residual set investment can prevent or rapidly increase set up of the investment, so make sure to keep bowls and instruments clean. Easily half of the failures we see are from improper preparation of the investment.

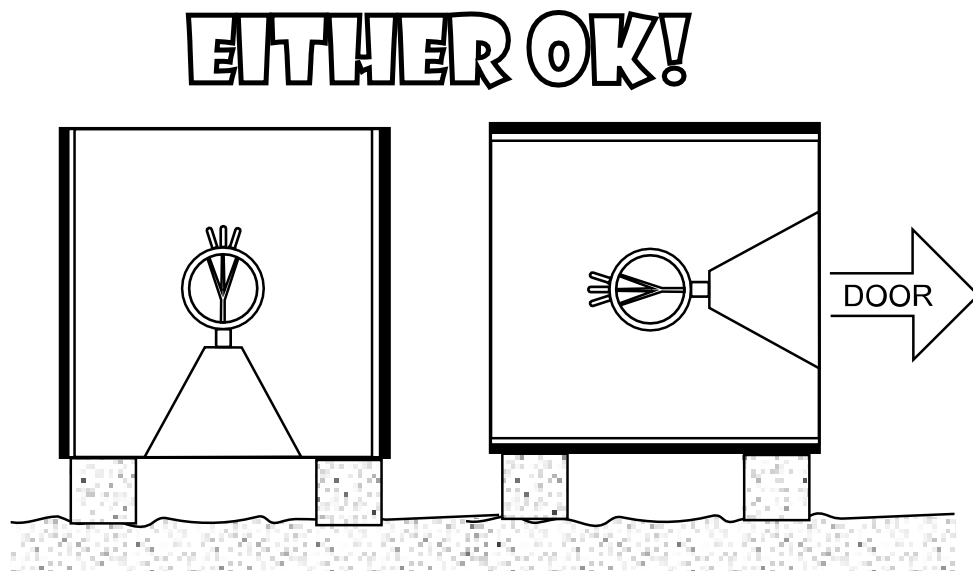
Flask or Ring Venting

There is some debate or confusion on proper venting of investment, but here is our position: When using perforated flasks or a dental ringless systems, breaking the glaze on the fill surface of the investment before burnout is most often enough. If however a solid metal flask or ring is used, it is highly recommended that not only the glaze on the fill side of the investment be broken, but also that an asbestos free ring liner, or wax web liner be used. The reason for this is that gas released during heat up must be able to move through the investment for proper curing of the investment. This is also true for proper burnout of the pattern, and proper outgassing during casting. Preventing this may cause the investment to fail or promote porosity in the casting from trapped gas.

Placement of the Flask in the Furnace

One of the most troublesome things we see is poor placement of the flask in the burnout oven. It is unfortunately common to see failures stemming from placing the flask button-side down, flat on the cold bottom of an oven with no ability for gassed product to escape.

What we recommend instead is to make sure the flask is in the thermal mass of the oven, with as much air surrounding it as possible. Setting the flask on oven furniture to achieve this highly suggested. And while 3D printed parts do not tend to flow like melted wax, facing the button down or to the side facing the door offers the best chance at even heating and air exchange over the flask. This promotes the best removal of the pattern in the shortest amount of time.



Burnout Cycle

If you talk about burnout schedules with 3 casting technicians you will get 4 opinions. And we would not attempt to change whatever is working for anyone. However, this is what we do for good results, and it may ring true for anyone trying to get great casts with plastic patterns:

Long burnout					
C	SV F	SV C	T	Time in min	
C1	AMB	AMB	T1	20	
C2	300	149	T2	30	
C3	300	149	T3	10	
C4	400	204	T4	30	
C5	400	204	T5	95	10deg/min
C6	1350	732	T6	120	
C7	1350	732	T7	40	20de/min
C8	*	*	T8	120	
C9	*	*	T9	-121	

* = casting temperature of the alloy

This is a classic long burnout that is conservative and holds well for most all gypsum investments. Whenever there is a combination of traditional wax and 3D printed patterns, we recommend this approximate schedule. The “*” indicates proper alloy casting temperature. Please make sure to consult the alloy manufacturer, as improper temperature will greatly affect the quality of the cast.

While there may be variances in burnout strategy, we do strongly suggest that the gypsum not be allowed to dry after a full bench set time, and that temperatures of 300F/150C be reached as fast as possible, if not simply starting from 300F/150C. The reason is that the steam-out helps release the pattern, be it wax or plastic, from the investment wall. Secondly, that peak temperatures reach and hold at no less than 1200F before dropping to casting temperature. The reason here is that the final cure of the gypsum does not happen completely at temperatures lower than about 1200F. The gypsum is not considered fully cured until it has become an even white color with no traces of brown or black remaining.

Rapid burnout				
C	SV F	SV C	T	Time in min
C1	1350	732	T1	120
C2	1350	732	T2	40
C3	*	*	T3	120
C4	*	*	T4	-121

* = casting temperature of the alloy

If **only 3D printed patterns** are being burned out and negative detail is not overly small, we have adopted a rapid burnout strategy. After a full bench-set, the flask may be placed in the furnace at peak temperature. The soak times are calculated as 1 hour minimum plus 30 minutes for each 100g of investment. So, for a 200g ring: 1 hour, plus 1 hour for the 200g of investment. There are some thoughts that this weakens the investment by curing it too quickly. But we believe that this observation comes from wax boiling against the investment, which does not happen the same way with plastic patterns. It would be worth doing a test cast to see if this method works in your production environment. In our jewelry group it has been shown effective, improving surface quality and saves considerable time and energy.

Happy printing, and excellent casting!

Roxel3D Team.