

Introduction to RODIN CASTABLE resin for sacrificial pattern casting.

The following is a “best practices” guide for achieving optimal results with RODIN Jewelry CASTABLE resin for gypsum investments, RODIN Dental CASTABLE resin for phosphate investments, or RODIN Foundry CASTABLE resin for shell technique. There are of course many variables and approaches to casting, and it is not our intent to cover all aspects of the art, but rather to illustrate a few points that work well from our perspective.

This is not lost wax casting! You are working with an advanced polymer pattern formed by light. Though it is designed to behave similarly to wax and work well with wax sprue channels, there are notable differences.

After Printing – cleaning and the post cure.

Unpolymerized resin does not burn out well! It is unlikely that the pattern is better than 90% polymerized upon removal from the build platform. Also, as with most resins, the RODIN resins are sensitive to oxygen in the air making it likely that the pattern has an uncured coating on the outer surface. It is critically important that the pattern be fully cured in preparation for investing. Here’s how:

Cleaning

- 1) Clean in clean isopropyl alcohol (IPA) or ethanol – excess resin should be removed off the pattern using a low-pressure rinse from a squeeze bottle or similar. Soaking in alcohol is not advised. This will harm the surface quality of the pattern by extracting unpolymerized material out of the part.
- 2) Blow off the alcohol from the first rinse with low-pressure compressed air making sure to blow out all small details where resin could be trapped.
- 3) Rinse again with alcohol from a squeeze bottle
- 4) Use room temperature water as a final rinse to remove all alcohol and any remaining residue.
- 5) Air dry using low-pressure compressed air

Post-Cure

- 1) Shut off oxygen – this can be done by placing the printed part in water, coating with mineral oil or putting in a shield gas environment (Nitrogen, Argon etc.)
- 2) Below is a list of commercial light cure boxes available. The light source should be even, diffuse, and as omnidirectional as possible. Uneven distribution will cause polymerization to be stronger in some areas more than others. This results in stress and warpage of the pattern.

Recommended curing units and cure times

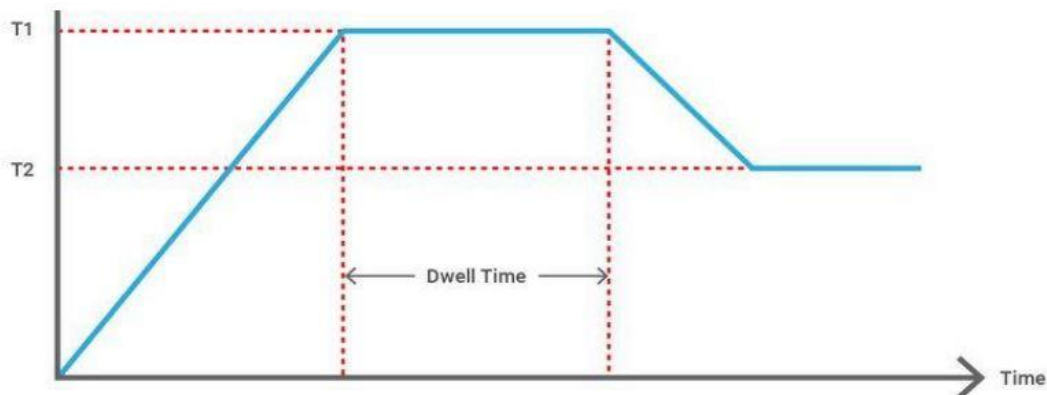
- a. **Otoflash (recommended)** - 4500 flashes**
- b. Dreve PCU LED N2 – 15min @ 40%**
- c. Ackuretta Curie – 20min, P9, D2
- d. Formlabs Form Cure – 10min @ 40C

Investment Casting

Jeweler's gypsum investment – use distilled water in the correct ratios per the manufacturer's instructions. Hand spatulate for no less than one minute before applying first vacuum. Use a pump capable of achieving 1/760th atm with a high enough cfm rating to pull vacuum on the investment in one minute or less. The pattern should not have surfactant applied to it. This weakens the investment and ironically, causes bubbles and porosity. Use a flask with an asbestos free ceramic liner breathing cloth for better air removal. After investing the flask, pull vacuum a second time on the flask with slight vibration to help release trapped air from the pattern. Vent the chamber slowly after bubbles have fallen back and allow to sit undisturbed until fully set.

Burnout

In all investment types, we strongly advise to observe the full bench-set time recommended by the manufacturer. Having said that we recommend after bench set is completed that burnout commence at the peak temperature recommended for that investment by the manufacturer. Typically 700°C for gypsum, 850°C or more for most phosphate investments. The dwell at peak should be as follows:



T1: Peak burnout temperature

T2: Casting temperature

Dwell Time: 1 hour with an additional 30 minutes per 100g of investment

This means that for a 200 gram flask the total time would be 2 hours (1 hr base time plus 30 min x 2 for the investment weight). This is to allow full heat soaking to occur to the center of the ring. Because this is not a wax product the concern for explosive outgassing of liquid wax is not there. Also, because there is no liquid wax to flow out we recommend to **keep the flask horizontal in the center of the furnace rather than vertical**. This promotes even heating and allows maximum oxygen exchange to fully gasify the pattern. Slow burnouts with low oxygen can create secondary products that may not fully or predictably gasify.

Casting

Knowing and understanding the correct casting temperature of the flask and alloy is critical for best results. The flask should be allowed to stabilize at this desired temperature for several minutes before being removed from the furnace.

Gypsum investments should be cast using vacuum or pressure vacuum. “Broken-arm” centrifugal casters are typically too forceful even with light winding. The impact of the liquid metal can easily shear off small details causing large porosities and, of course, fewer small details. Care should also be taken with the gauge and location of the sprue channel as well. Overly generous sprues will allow a large volume of metal through and impart considerable force as the metal courses through the void—even with vacuum casting.

In Summary

- Clean the parts well
- Cure them fully
- Be mindful of investment preparation
- Burnout at peak temperature for the investment used
- Hold at the casting temperature of the alloy before removing from furnace
- Cast using the appropriate method for the investment used