

PolyJet & VLT Rubber-based Process for Jewelry

Skill Level  Time  Cost 

Background

The recent introduction of Castaldo®'s VLT™ [Very Low Temperature] molding rubber opens the way to a new time-saving process for jewelry molding using Objet Eden™ 3-Dimensional Printing Systems. The new rubber allows users to utilize their PolyJet™ patterns as master models and mold them in as little as one hour. This eliminates the need to go through the time-consuming process of creating a metal master model.

Direct casting of resin models made by most rapid prototyping systems do not burn out cleanly. However, using cold-mold compounds that do not damage the pattern and an RP system that supports the specialized material offers the perfect alternative.

Another recently developed alternative method involved making a liquid rubber mold of the model, curing it overnight, injecting the wax, and then casting the wax (another overnight process) to get the master model. Finally, they make a traditional rubber mold, shoot waxes, and start production casting. All together, the process would take more than two days.

Many casters, while still preferring to make a mold of the resin model and shoot waxes are unhappy with the long curing times: quite simply, they want to make their models as fast as possible.

New Methodology

Now this entire process can be done rapidly – in less than half the time. rubber can be cured at temperatures ranging from 160°F (71°C) to 180°F (83°C), well below the softening point of most resin materials. At a temperature of 160°F, a standard 3/4-inch mold will be cured and ready for injection in 90 to 120 minutes. At 180°F, that time is further reduced to just 30 to 45 minutes. However, as with traditional casting rubbers, longer curing times mean better molds – the longer the cure, the more likely it is that the rubber will flow into every nook and cranny to provide detail. In addition, when VLT™ rubber cures, it shrinks just 1.4 percent.

Perhaps one of the greatest benefits of VLT™ rubber is that it makes rapid prototyping more useful for mass production. Specifically for the jewelry industry, enabling PolyJet™ models to be used directly as master models is a important development because it offers significant time savings in a market where time can be a vital competitive edge.

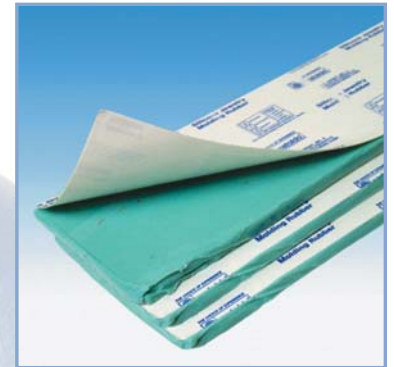


Figure 1: The VLT™ Silicone Molding Rubber



Figure 2: Placing the Objet model inside the mold



Figure 3: Finished mold can be complex with even spiral plugs

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On a practical level, it is too expensive and time consuming to run a rapid prototyping machine a thousand times in order to create the high number of castings needed. Now, with VLT™ rubber and PolyJet™, a prototype piece can be directly molded, and the subsequent wax models can be used to make thousands of castings.

VLT™ rubber also works well with traditional hand-carved waxes. And, VLT™ rubber is designed specifically for molding – i.e. it acts like any other molding rubber, only at much lower temperatures.

Essentially, the VLT™ and PolyJet™ methodology leverages traditional technology, tools, and techniques. This means there is no one needs to learn anything new, buy new equipment, or train people in new techniques. If you are already doing lost-wax casting, the VLT™ and PolyJet™ methodology fits right in.

How does it work?

Castaldo® VLT™ Silicone Molding Rubber can be vulcanized at any of a wide range of time and temperature combinations, depending on the characteristics and requirements of the model material. Below are some suggested combinations for a typical mold that is 3/4" / 19 mm thick

- 88° C / 190° F for 30 minutes
- 82° C / 180° F for 45 minutes
- 76° C / 170° F for 60 minutes
- 71° C / 160° F for 90 minutes

The only change from established mold making techniques required by Castaldo® VLT™ Silicone Molding Rubber may be the need to coat the wax or plastic model with a release spray before vulcanizing to ensure easy release of the model after vulcanization. Teflon® (PTFE) sprays work very well, as do common household cooking oil sprays made with olive oil or canola oil, such as PAM®.

Key Advantages

Tools and technology. The VLT™ and PolyJet™ methodology utilizes the simple tools and easy technologies you already have and know how to use.

Easy to work with. VLT™ Silicone Molding Rubber has the consistency of modeling clay or putty, reducing mold packing time to a few minutes. There is no need to cut and shape the pieces to fit the mold frame. Merely pull off a piece with your fingers and push it into the mold frame as desired.

Easy to cut. Molds made of VLT™ rubber are firm, yet they “cut like butter”.

Minimal shrinkage. Rubber shrinkage is only 1.4%

Easy, spray-less release of wax injections. Finished molds require no mold release spray. Wax patterns release easily because the rubber already contains anti-stick compounds.

High-shine finish. Molds made of VLT™ rubber provides waxes with an extremely shiny finish, reducing the polishing work required on your casting.

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Figure4: The resin Release Spray



Figure5: Objet Jewelry Models

High tear strength. For a silicone rubber compound, VLT™ rubber is exceptionally high in tear strength, meaning that molds made from it last for years.

Cheaper and easier than RTVs. Room temperature vulcanizing (RTV) compounds require exact measuring and exact mixing. They have limited working times and require vacuum de-bubbling to provide usable molds.

VLT™ Rubber Specifications

Sizes:

Regular strips: 18" x 2 7/8" x ~3/8" (45.7cm x 7.3cm x ~6mm). Packaged in 5lb (2.27kg) cartons.

Double-wide strips: 18" x 5 3/4" x ~3/8" (45.7cm x 14.5cm x ~6 mm). Package in 10lb (4.5kg) boxes.

Storage:

As with any unvulcanized rubber compound, store away from any source of heat and light. Unvulcanized shelf life is at least one year if properly stored.

Processes

Castaldo® VLT™ Silicone Molding Rubber is compatible with all mold making techniques, including mold cutting and powder and cream separation molds. It is particularly adaptable to the powder and cream separation processes since the parting line is so easily controlled. For patterns strong enough to resist some pressure, merely push the model into rubber to the desired point. If not satisfied with the results, remove the model, smooth the rubber over with your finger or tool and re-insert the model.

Disclaimer

Objet Geometries LTD is not responsible for misuse of our products or their use in conjunction with unsafe or improperly maintained equipment or for uses other than intended as jewelry casting mold making material.

Silicone Molding Rubber



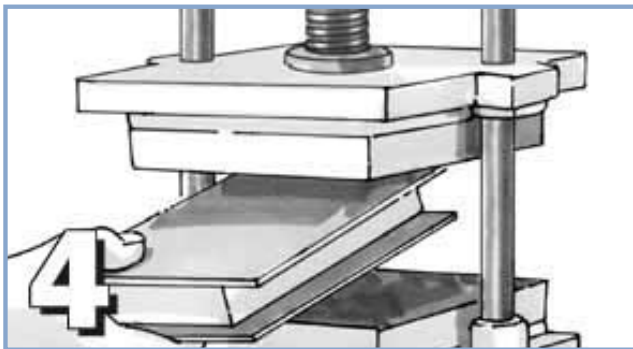
Silicone Molding Rubber is soft and pliable, with a consistency like putty or molding clay



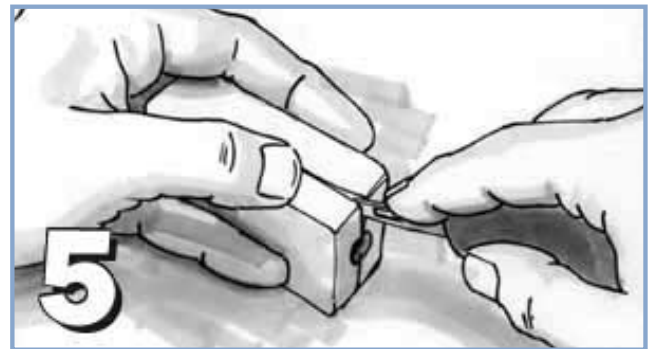
Place the Objet model inside the Silicone Mold



Placing and embedding the rubber onto model



Curing Silicone Jewelry Molding Rubber Molds involves no mixing, and at low temperature



The Silicone Jewelry Molding Rubber Molds are then to be cut and open by hand.



Parting lines are easily controlled and corrected by hand when used with the powder separation



Finished molds can be complex with cores, straight plugs or even spiral plugs.