

Mold-Making: An Overview of Techniques for Ceramics

• Model-making

A model, in this context, refers to the original sculpture or three dimensional form (found object, human subject) from which your mold is to be made.

Models can be made from most any material and then cast within a sectional plaster or latex mold. Ceramic clay recipes can be pressed into both plaster and latex molds. Slip clay can be poured and cast within specifically designed plaster molds. Latex molds are used primarily as press-molds.

Alginate is a dental casting material that is non-toxic and very useful for taking non-permanent molds from even the most delicate found objects and human subjects; "life models". This powdery impression material is mixed with water and poured into a rigid container prior to casting. The object to be cast in then pressed into the mixture. The curing time is 2-3 minutes during which time this algae based material gels. The material is lard-like and flexible when set. Alginate has the capability to pick up infinite detail of surface as well as form. After the original form is carefully removed (to prevent tearing) from the gelled alginate, plaster is poured into the material. The plaster model can be used as the tool from which to make the plaster or latex mold. This material can be purchased from dental supply companies in your area and costs approximately \$6.00 per pound can.

Flex Wax is a light waxy material which is heated up to make casts from sculpted originals, found objects, or human subjects. This material is marketed by the Amaco Corporation. Directions come with the product. Flex wax is best used for three dimensional forms smaller than the human hand. The product is heated in a double boiler until fluid. It can be brushed over a form or the form itself can be dipped and layers build up to create a thick enough wax form. The walls should be at least 1/4" in thickness. A rigid plaster holder or mother mold can be cast over the flex wax mold if needed. Plaster can be poured into the flex wax mold to create a model from which a plaster or latex press-mold can be made. The flex wax can be melted down and re-used each time a new model is desired.

Moulage is a synthetic flexible mold-making material, marketed by Sculpture House and found in many retail Art Supply stores. It can be used in the same way that the flex wax is. It is a material that is heated to use and be melted for re-use.

• Latex Press-Molds

Natural latex is tapped from rubber trees that grow to approximately 50 feet in height. These rubber trees called "Hevea Brasiliensis" and native to Brazil require an annual rainfall of about 90 inches and thrive in temperatures of about 80 degrees F. Latex products have become necessary in the medical field and this has spurred research in latex production and more effective farming of the Hevea Brasiliensis trees.

Types of Latex:

Vulcanizeable

Pre-vulcanized

Vulcanization is the process of causing latex to fully cure. The curing process is actually known as "cross-linking". It occurs by either allowing the latex mold to cure for approximately three days after the final coat is applied to the mold. Vulcanization can also be accomplished by heating the completed rubber mold to 120 degrees Fahrenheit for four hours.

A vulcanization test is usually recommended by latex companies. After the final coat of latex is fully dry and not tacky take a sharp instrument and make a small indentation in the surface of the mold. The latex, if vulcanized, will spring back into place within an hour. If the latex does not spring back it is recommended that you re-heat the latex mold to 120 degrees for another hour to fully cure the material.

Vendors:

Latex can be purchased from Art Suppliers, Ceramic Suppliers, and Sculpture Suppliers. You will find advertisement of molding materials in "Sculpture" magazine. Latex is sold by the pint, gallon, and five gallon container. Suppliers that I have ordered from are:

Smooth-On: www.smooth-on.com, the site has the full product line as well as Stocking Distributors for each state.

Polytek Development Corporation
55 Hilton Street, Easton, PA 18042

For quantities of less than a gallon:

Axner Pottery Supply

P.O. Box 621484

Oviedo, Florida 32762-1484

Phone: (407) 365-2600

FAX: (407) 365-5573

Product - Liquid Latex

Liquid latex has a shelf life of approximately 6 months to one year. The product should be kept in an air tight container away from heat and ultra violet light.

Latex molds have a life of 4 - 6 years. They should be kept away from heat and ultra-violet light in a clean, dry place. I cover my molds with cotton cloth and store them in a climate controlled environment.

Latex should be used in a well ventilated room. The strong odor is ammonia used as the preservative for the material.

All latex has a tendency to shrink. Some vendors advertise minimal shrinkage but it is suggested that you make your model 2 per cent larger to compensate for shrinkage.

Step #1: Mold Design

Sections required for the specific form are planned prior to the application of the latex. The flexible latex mold allows complex undercut forms to be made in fewer sections since the mold can be bent and peeled away during use. I recommend two excellent mold-making texts to gain a general knowledge of mold design. They are: "Mold-making", by Donald Frith and "Plaster Mold and Model-making" by Chaney and Skee. Both books have excellent illustrations that show the process of designing a traditional plaster mold. Latex molds have allowed me fewer sections than plaster molds. On the most complex, large scale forms I have used two and three piece latex molds.

Step #2: Separating Planes

I create the separating planes by using plasticine shims. The shimming process is the same on all models regardless of the original material. Planar or slab-like plasticine shims approximately 2 inches wide are applied at the section line. They are supported against the form by triangular plasticine wedges. These triangular wedges are placed behind the plasticine shim at four inch intervals, to brace the separating plane. Mold keys must be relatively large; they are made by attaching 1 ½ inch diameter

hemispheric plasticine buttons at 6 inch intervals along the outside face of the shim line. After the section is shimmed, the liquid latex is applied. (Note: Sections are molded one at a time; shim lines, latex coats, mother mold, are done for each section before going on to the next section of the mold).

Step #3: Application Procedure for Latex

Liquid latex is applied with a stiff, inexpensive house painting brush. The latex is stippled onto the surface of the model to prevent air bubbles from forming in the latex. It takes approximately an hour for the liquid latex to dry between coats. Use of an oscillating fan will help to keep the drying period to an hour. The mold will require fourteen coats of liquid latex. After the seventh coat has dried a layer of cut cheese cloth (pieces of fabric approximately 2" x 2" square) saturated onto the surface with latex is applied. This provides a core webbing that will not allow the latex to stretch or warp with use. Another six coats of liquid latex are applied.

Step #4: The Mother Mold

Turtle Wax is rubbed on to the cured latex to act as a separating agent for the latex and plaster mother mold. Deep undercuts can be filled with either plasticine or Devcon Flexane 80 Putty. Next, #1 Molding Plaster is cast over the simplified mold (undercuts have been filled in). The first layer of plaster is flicked on by hand to create the "gel coat". When the plaster is one inch thick a burlap reinforcement layer is added. More plaster is added to build up the plaster mold to a thickness of approximately 2 inches. It is important to clean the shim line as you add plaster so the edge of the latex mold is visible. The plasticine shim line can now be removed and the latex cleaned with water and a cloth. The latex shim line is sprayed with dental silicon which is an excellent separating agent for latex products. The second section can be begun by applying the first coat of liquid latex.

Step #5 Press Molding

After completing all sections the latex mold is ready to use as a press-mold. The mold is pulled apart using wooden wedges to separate the sections. It is removed from the model layer by layer: plaster mother mold, then plasticine or devcon putty inserts, then latex. Once the latex is carefully peeled from the original model it is cleaned with a water dampened cloth and replaced into the rigid holder (mother mold and inserts).

Each section of the mold is laid out and sprayed with silicone dental release (Dentsply or T&S Dental Spray Multi-Purpose Silicone Lubricant, these are oil free). A slab of soft clay, approximately 3/8 to 1/2 inch thick is pressed methodically into each section of the mold. Clay studs are made from slabs. They are placed into the larger forms much like internal wall supports. Then the sections are left open to air dry; using moistened paper towels on the edges to equalize the drying, keeping the joints moist while allowing the concave areas to become leather hard. An oscillating fan can be used to create subtle air flow in the immediate area.

Step #6 Assembly and Detailing

The sections are scored along the seams when the clay form is leather hard and still within the mold. The mold sections are put together and aligned using the keys for registration.

The form is allowed to set up for an additional 8-16 hours (depending upon the size of the clay form) before the mold is carefully removed. The rigid mother mold easily separates from the latex and inserts. The plasticine or devcon rubber inserts are removed from the undercut areas. The latex mold is peeled away from the clay form. The fine surface textures of the original model are effectively replicated. Only exterior seam lines need to be smoothed and detailed.