

Wax Casting

Handbook created by Shane and Julia Stratton

1. Gather tools and materials

- Casting wax broken into chunks. We will be using a mixture of 80% K-wax and 20% Victory Brown Microcrystalline. Determine proportion by weighing chunks on scale.
- A wax pot for melting wax. This can be a commercially made electric wax pot, a electric fryer with a rheostat (temperature adjustment) that can reach at least 300 degrees, or a cooking pot and burner.
- A small propane torch and striker.
- A "seasoned brush" for paint in techniques. (A natural hair house painting brush that has been hanging in molten wax long enough for its bristles to become impregnated with wax becomes seasoned. It will no longer bubble when in hot wax.)
- A thermometer that reads to at least 300 degrees. Candy thermometers meet this requirement.
- A metal ladle, cup, can or pot for pouring wax.
- A metal funnel for pouring wax into small openings. This can be made from a cone of aluminum flashing secured with duct tape.
- Other pots for cooling wax.
- Vaseline and brush.
- Release agent for mold.
- C-clamps or straps.
- Metal tool for trimming wax.
- Pieces of brick or wood to prop molds.
- Safety equipment: latex or rubber gloves, a plastic apron and eye protection.

2. Prepare the mold

- Rubber molds must be seated into the shell. Remove any debris from the shell surface and release with a coat of Vaseline before seating the rubber.

- The casting surface must be clean. If necessary, rubber molds can be scrubbed with alcohol and blown dry with compressed air. Plaster molds can be washed with water.

3. Release the mold

- With rubber molds, it is best to use the type of release recommended by the manufacturer. These can be ordered from the manufacturer. With urethane rubber (examples Smooth-On 724, Polytek 7430) a silicone spray (Polytek 2300, Smooth-on Universal mold release or a silicone spray available in hardware stores) can also be used. Apply a thin coat, according to manufacturers directions, making sure that all areas of the mold are covered. Some mold rubbers do not require a release (examples are silicone rubbers).

- With plaster molds, submerge the mold in water until no more bubbles are released. Remove the mold promptly and drain. Allow the mold to dry just until the surface is no longer shiny. Cast promptly.

4. Melt wax

- Know the recommended casting temperature for the type of wax you are using. For K-wax / Victory mixture it is 230 degrees. Plaster molds require a lower casting temperature (200 - 220) than rubber molds. The following procedures are for the K-wax / Victory mixture but can be adapted for any casting wax with some experimentation.

- Know the "flash point" (temperature at which the wax can ignite). For the K-wax / Victory mixture this is 300+ degrees.

5. Cast the Pattern

- This can be done three basic ways:

1.) SOLID FILL (can not be thicker than 2" at any point)

Assemble the mold - Check registration and clamp.

"Flame off" wax - Pass the torch flame over the surface of the wax causing any surface bubbles on 230 degree wax to break.

Pour into mold - The mold can be in a tilted position to help vent trapped air out of mold while pouring.

Jostle or turn the mold - to ensure all areas are filled and any bubbles are dislodged.

Fill to replace any spilled wax - Flame off wax in mold and prop up to cool. As the wax cools and shrinks, you may need to add a little more hot wax.

2.) SLUSH CASTING (easy to handle molds with simple forms).

Assemble the mold - check registration and clamp.

First coat - Flame off 230 degree wax, angle mold to vent air if necessary and pour into mold to fill completely. Flame off any bubbles and pour out immediately, rotating the mold as you pour to ensure even erosion. If possible, avoid pouring wax in only one area. Allow wax in mold to cool until just above room temperature.

Second coat - Ready 210 degree wax and follow above procedure when first coat is cool enough.

Third coat - Ready 180 degree wax and follow above procedure when second coat is cool enough.

Fourth coat - Ready 160 degree wax and follow above procedure when third coat is cool enough.

Check thickness of casting by trimming small areas at edge. Ideal thickness is 3/16" .

Fifth coat should not be necessary but can be done by repeating procedure for fourth coat.

3.) PAINT UP (Detailed patterns, large molds)

First coat - Apply a coat of 230 degree wax to all mold pieces with a seasoned wax brush. Apply a single stroke of wax directly from the pot onto the mold surface. Return brush to the pot before applying the next stroke. This will ensure that the wax is 230 degrees when it reaches the mold surface. Tilt the mold so that the area you paint onto is close to parallel to the table. This will help you to build up the edges of the pattern instead of just the middle. Work quickly. Do not "brush around" wax after the first stroke. This will cool the wax you are applying and cause surface bubbles. It will also erode wax already applied. After surfaces are covered you can then spread out any puddles. First coat should cool just until it looks dull before applying second coat. This happens very quickly.

Second coat - Same as first. Wax can be slightly cooler.

Third coat - Apply cooler wax (about 200 degrees) in the above manner with the following additions: Build up high points in the mold carefully. Be sure to keep a even thickness. Avoid over brushing (eroding) any one area. It is especially important to tilt the mold now to ensure even build up at the edges.

Forth - Apply cooler wax (about 170 degrees) with the same method as for the third coat. At this point you should not be able to see rubber showing through. Check high points and edges especially. Wax thickness should be approximately 1/8" thick.

Reinforce high points and trim - If the mold is large enough to contain about a gallon of wax, high points should be thickened to 1/4" to allow for erosion during the slush. Trim the wax to remove all wax from the mold shim line. Do not trim around the opening for the fill.

Assemble the mold - Lightly Vaseline the mold shim line. Close the mold bringing the two halves together on their edges, as if closing a book. Clamp together.

Slush the pattern - Flame off the bubbles from 165 degree wax. Fill the mold completely. Mold can start in a tilted position to help vent air. If possible, avoid erosion

by pouring wax over different areas. Flame off the bubbles on the wax before emptying the mold. Quickly pour the wax out of the mold (wax should be in the mold for as short of a time as possible). Rotate the mold as you pour out the wax so that the edge of the pattern does not erode unevenly. Make sure that all the wax has drained before righting the mold.

6. Demold the pattern

- Allow the pattern to cool until the wax has just reached room temperature. Demolding a pattern when it is too cold can cause breakage or delamination. In warm weather, with small pieces, simple forms or solid casting, this is not as much of a concern. Demolding a pattern too warm can cause loss of detail, distortion and breakage. The cooling time will vary greatly depending upon the size of the opening in the mold, the thickness of the casting and the temperature of the room. Cooling can be quickened by filling the mold with or submerging the mold in water after the wax looks dull (is set).

- Trim the opening into the mold flush to the pattern.

- With rubber molds, loosen the bottom edge of the rubber from the plaster shell. Remove half of the plaster shell leaving the rubber behind. Release the edges of the rubber from the pattern all the way around. Remove the exposed rubber. Release the other half of the rubber around the edges from the remaining shell. Lift the rubber with the pattern in it out of the shell. Remove the rubber from the pattern.

-With plaster molds, soak the mold in water and gently pry the mold until the pattern releases from the mold.

- Hard to remove molds can be coaxed along by jiggling the rubber while pulling and/ or pouring a small amount of soapy water between the pattern and the mold.