Making Large Hemisphere 28

A step by step guide to lost wax glass casting and metal forging as practiced in the studio of Brian F. Russell.

Making the Mold and Pouring the Glass

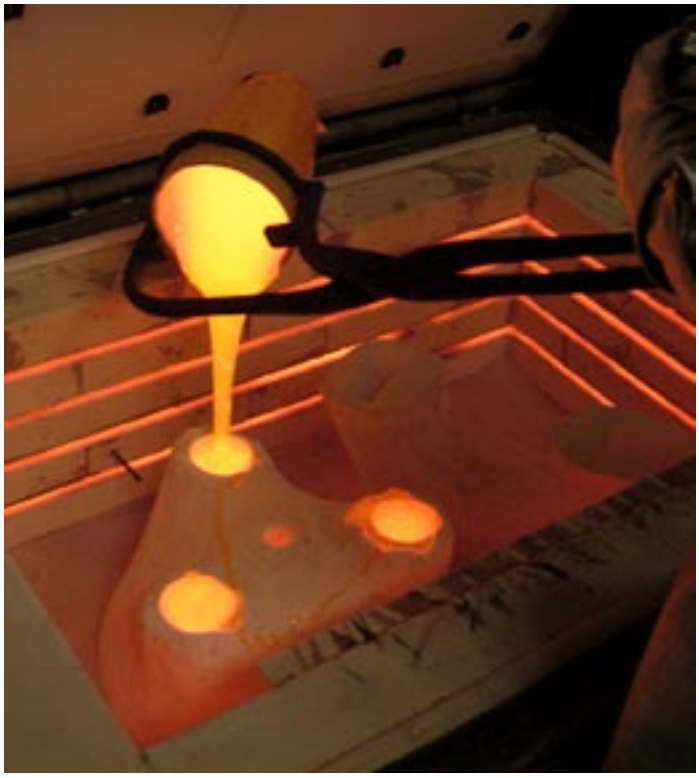
1.The wax blank is carved, bent and manipulated to the desired shape. This wax positive determines the exact shape of the glass casting. Every piece of "lost wax" cast glass begins with a unique wax.

2. Sprues, to allow an entry for the molten glass, are attached. Vents allow for trapped air to escape. These will be removed during finishing.

3. The investment, or mold material, is made of plaster and silica. It is carefully applied in layers over the entire surface of the wax.

4. The completed mold is about 1.5" thick. The tops of the sprues and vents are left uncovered.

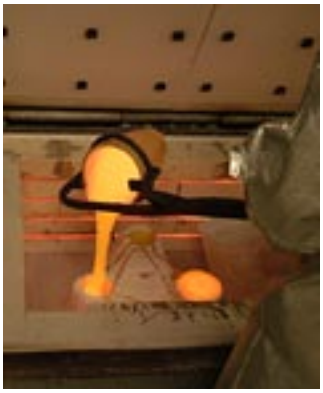
5. The wax is removed from the inverted mold by melting with steam. This wax can be recycled , but the original wax positive is "lost". Only the negative cavity inside the plaster mold remains. The mold must now be dried for several days.



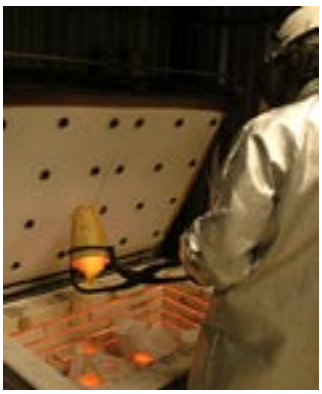
6. The raw glass frit is loaded into crucibles in the melting furnace. The colors in the glass derive from various metal oxides introduced by the glass manufacturer during the production of the batch.

7. The mold is placed into a kiln (right) and heated to 1625˚F over a 24 hour period. The glass is melted in the furnace (left). Microprocessor controllers precisely regulate the temperature in these electric kilns.

8. A crucible of molten glass is now plucked from the 1850˚F furnace with large steel tongs. The aluminized Kevlar suit is necessary to reflect the intense heat and prevent combustion of the artist.



9. This crucible is carried to the open and waiting kiln containing the hot mold. Slowly the glass is poured into the sprues. Because of its honey-like consistency it will take a few minutes for the glass to flow down into the mold.



10. After the glass settles, more is added . During this process different colors of glass can be poured to produce swirl effects. Depending on the size of the mold it may take as many as 20 lifts over a 3-4 hour period to fill a mold.

Demolding and Finishing the Glass

11. Annealing is the process by which internal stresses in the glass, which could cause cracking, are relieved. It takes about a week of cooling very slowly at a precise rate to anneal the Large Hemispheres.

12. Demolding is the moment of truth, when it is revealed as to whether the work has turned out as planned. Extreme care must be taken not to damage the glass.

13. Demolding is akin to unearthing a fossil: incrementally the treasure is uncovered. The plaster investment can only be used one time.

14. The demolded glass casting has a slightly rough surface. There are frequently spurs and fins which will have to be removed.

15. The sprues are cut from the casting using a water-fed diamond saw blade on a pneumatic angle grinder.

16. A small amount of shaping can be done with the grinder. The casting glass is softer than most other types of glass but still requires diamond abrasives to be efficiently

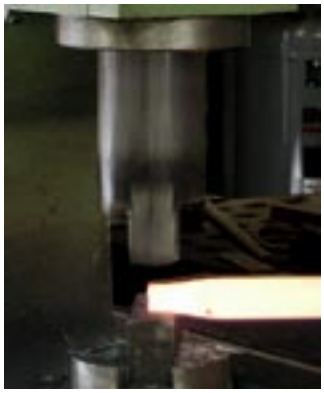
17. The quality of the finished piece is dependent upon a careful and patient attitude. It takes many hours to finish one piece.

The glass used in casting the Large Hemispheres and most of the other work at Brian Russell Studio is made in New Zealand by Gaffer Glass. It is a 45% lead crystal specifically formulated to be poured at a relatively low temperature. As well as being easier to cold work than a blowing glass, it has an incredible optical quality. The molecular structure is such that, owing to the large metals content, it has the ability to transmit light very efficiently and to internally refract the light. This causes the glass to appear to glow when illuminated with even a small amount of sunlight or a halogen lamp.
After the glass has been hand sanded it is lightly abrasive blasted, then placed in a special acid which polishes the surface to a satin sheen. It is possible to then mechanically polish parts of the glass to a higher gloss, although this is not frequently done. Too much gloss reflects light on the surface and makes it more difficult to see into the glass. Inherent in studio cast glass are the inclusion of seeds. These tiny bubbles of entrained air give the thick glass depth perspective and character.

18. Hand sanding with diamond pads further refines the edges and contours. At this stage the glass begins to come alive with its true vibrant colors.

Forging and Fabricating the Metal Elements

19. Rectangular bars of steel are heated to 2100˚F in a gas-burning forge. Even when the end of the bar is glowing yellow hot it can still be handled by the unheated end.



20. At 2100˚F the steel becomes malleable and plastic. Nevertheless, it still requires a great deal of force to radically alter the profile. A power hammer assists in hammering the steel into long tapers.

21. As the steel is hit about 220 times per minute with a radiused die, it stretches in length.becoming thinner in the areas that receive more blows. The steel may be reheated as necessary.

22. The hot part is then bent with bending forks to the desired curve. Once the steel has cooled it wil be very difficult to bend the thick stock.

23. The curve and edges are refined using hammer and anvil. A combination of tradition and innovation work best to achieve the goals of the work: new forms that speak to contemporary aesthetics with timeless materials.

Forging is a direct process, in contrast to casting, which is indirect. When forging metal, the results are instantly visible. This allows for a certain spontanaeity in the working method, as well as reduced levels of stress in the practitioner; there are fewer things to go wrong. Many metals can be forged, and favorites include steel, bronze and aluminum. Bronze has a rich, warm, yellow color naturally, and can be patinaed to a wide variety of hues. Aluminum is lightweight and silver in color. Steel is forgiving, and can also be patinated in a limited range of browns and blacks.

A common factor between forging metal and casting glass is the transformative use of high heat, which is energy input. This energy, synergized with the energies of the artist, provide an incredibly rich source of stimulation in the ongoing exploration of the interplay of form, texture and color. How this relates to our human emotional response when in the presence of these high energy works is the essence of the art.

24. After being cut from the bar, the forged end has its edges sanded and ends rounded. The remainder of the bar will be reheated and another piece forged and cut off.

25. A pile of parts is produced, each unique in its details, but falling into a category of stock size, taper and curve dimensions.

26. Assembly begins with two pieces, just as a painter begins with one brushstroke. Tthis is a process of controlled chaos and accidental paths are followed.

27. As the piece grows and assumes its identity practical considerations must be attended to. The interface between glass and steel is critical to achieve balance. A plaster cast of the generic hemisphere is used for fitting.•