

# CORE FORMED VESSELS

1 CE



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Delftwood

## Introduction

There is a story that was told by Pliny the Elder (23-79 AD) of a ship carrying a cargo of natural soda that made shore for the night. Having nothing to hold their pots and pans on for cooking, the crew took several blocks of the soda and placed them over the fire. The blocks, mixed with sand began to heat up and the crew saw a strange liquid begin to flow. This was the discovery of glass (History of Glass Engraving, pp 1). Who knows if it is true or not, but it is an interesting tale. What we do know is that glass has been around for a very long time.

Colored glass has its roots as far back as ancient Egypt around 3000 years ago. The Egyptians pressed glass for perfume bottles, beads, and a wide variety of other uses. Glass was preferred over pottery. They discovered that by heating silica (sand, quartz) with potash, the silica could be fused. It wasn't until between 1554 BC and 1075 BC that the Egyptians discovered how to make clear glass. At this point in time they learned that they could cast this new glass into rods and while hot, mold them around cores to create vessels. The colors they created were more accidental than design due to the impurities in the materials they used. Color could be somewhat controlled by heating or cooling (Brisac).

The blowing iron came into use somewhere in the second century BC. This allowed the artisans to attach a blob of glass to the end of a tube and blow air into it. The glass could be easily shaped by heating, blowing, rotating, and then repeating the process again until the desired shape was achieved (Lee, Seddon, Stephens, pp 10).

By the first century AD, it was discovered how to make glass transparent and colorless. Color could be controlled by adding certain oxides.

This study pertains to the creation of small core formed vessels. These vessels were popular in the ancient world as ornaments and were used to hold perfumes, or ointments. The vessels and core forming techniques I am using were widely used in Rome (Gantz). This is very early in our period. I checked the SCA website to make sure this wasn't too early but the site said anytime prior to the 17<sup>th</sup> century so I figure 1 CE was good.

## **Overview of the techniques.**

The topic of this study is the recreation of core formed vessels. This study reflects two of three methods used to create the vessels. There are some similarities between the three methods of which I will describe.

The first method is relatively simple. Molten glass was wrapped in strands around a thick metal mandrel. The mandrel has a coating of a clay like material so that the glass will not adhere to the metal allowing the glass to slide off when done. Then the vessel is shaped the same way one would create a glass bead. Next any decorations to the vessel could be added such as color, handles, a base and so on. When the glass is cooled, the mandrel is removed. The space the mandrel occupied is now the space that holds the essential oils, scrolls, or whatever the owner cared to place inside. The opening is sealed with a cork.

The second method is a bit more complicated but creates a larger interior for the vessel. In this case mixture of manure and clay is wrapped on a mandrel and shaped (CMOG). This becomes the core of the vessel. The mandrel is then baked burning off the biologic matter creating a hard core for the glass. Once the baking is done then like the first method, molten glass could be wrapped around the core and shaped to conform to the core. Once the core is coated, shaping and the addition of decorations could be added. Once the glass is cooled the mandrel that holds the core can be removed and the core scraped out leaving a cavity for the owner to fill as they wished. The vessel is then capped with a cork.

The third method starts off the same as the second. A core is formed around a mandrel with manure and clay, then baked creating a hard core. With this method instead of wrapping coils of molten glass around the core, the entire core is dipped into a vat of molten glass thus covering the core in one step. Then decoration as in the other two methods can be added.

In this study, I created vessels using the first two techniques. As I guide you through the steps of construction, I will explain the differences in materials used. In both methods I used a Nortel Minor torch instead of the beehive furnace. A beehive furnace was a predecessor to lamp for lampworking. It is basically a coned shaped furnace with an opening at the top to allow hot gas to escape and an opening in the bottom to let cooler air in. The beehive furnace created enough heat to melt glass (Giberson 1995). I am also using Morreti glass which is softer glass that is similar to Roman soda glass. Below are two examples of core formed vessels from Rome about 1 CE.

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Cat. No. 209 **MINIATURE JUG**

Palestinian  
Mid fourth to early fifth century CE  
Height 2.0 cm; Diameter rim 0.7 cm; Weight 3 gr.

Provenance: not recorded



i. 210 **MINIATURE JUG**

Palestinian  
Mid fourth to early fifth century CE  
Height 1.7 cm; Diameter rim 1.2 cm; Weight 3 gr

Provenance: not recorded



### **Method one... construction of a core formed vessel using only a mandrel.**

- 1) I started off by coating a mandrel (which serves as our core) with a bead release and let dry. This is a clay like material very similar in nature to what was originally used in period.



- 2) Next I took a cane (or rod) of glass and preheated it in the flame, thrusting the end in and out of the flame rapidly. The preheating or warming of the glass prevents the glass from shattering from thermal shock (thermal shock is the stress caused by a radical gradient change in temperature within the glass causing different rates of expansion. The result is shattering glass. The best analogy would be throwing a chunk of ice into boiling water. The sudden contact of hot water with the surface of the ice causes stress to be built within the ice causing the ice to crack).
- 3) Once warmed, I placed the tip of the glass cane in the flame until I had a good gather (molten ball) of glass at the end.
- 4) Keeping the mandrel below the flame I coiled the glass around the mandrel by rotating the mandrel and keeping the cane still.



- 5) Once a basic layer of glass was added to the mandrel, I added more glass to the center using the same wrapping technique, to thicken the center.



- 6) I shaped the vessel using a marver. A marver is a graphite pad used for shaping and smoothing. In period they would have used a smooth wet board.



- 7) Once the body was shaped I used a pair of tweezers to pinch just below what will be the top of the vessel to form the neck. I took a metal punch and dragged the smooth round side of it around the vessel compressing the glass to form the neck. Any number of tools would have achieved the same results.

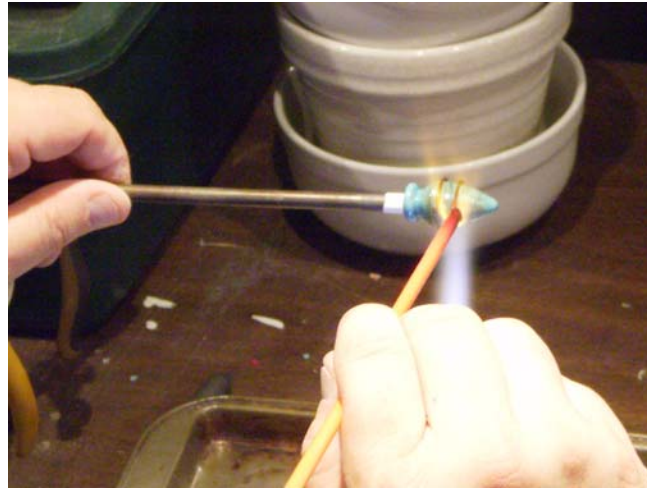


- 8) While the neck was being formed, glass was pushed up towards the top of the vessel. This became the lip of the vessel. Glass is also pushed down towards the base of the vessel which was smoothed out using a marver.



- 9) The basic shape of the vessel is now complete. The next step is to decorate.

10) For this example I wound thin lines of colored glass along the lower portion of the vessel, melted them in and smoothed them down using a marver.



At this point my battery died in my camera and because of the nature of the glass I could not stop while it recharged. You can see the results in the example provided with this paper, and with the photo supplied at the end of this section.

11) Next I heated one side of the vessel, pulled it out of the flame and then dragged a pick all the way down the side of the vessel. This caused the lines to bend down in a “V” pattern towards the base of the vessel.

12) I rotated the vessel a little and repeated the last step.

13) I repeated step 12 until I went all the way around the vessel then reheated the entire vessel and smoothed it down using the marver.

14) When I was satisfied with the piece, I fire polished it (placing the vessel into the flame again and heating slightly to remove any marks from the marver), and placed it into a thermal blanket overnight to slowly cool. By slowly cooling the piece you reduce the chance cracking due to thermal shock. In period they would have used a clay chamber.



15) The next day I removed the mandrel and removed the remainder of the bead release from the inside of the vessel making it ready for use. This vessel measures about 3.5 cm long and 1.5 cm wide. The cavity is 2.5 cm deep and .5 cm in diameter.

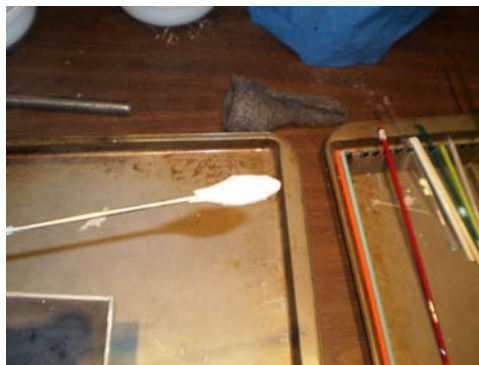


**Method two... construction of a core formed vessel using a mandrel and a formed core (and a recharged camera battery)**

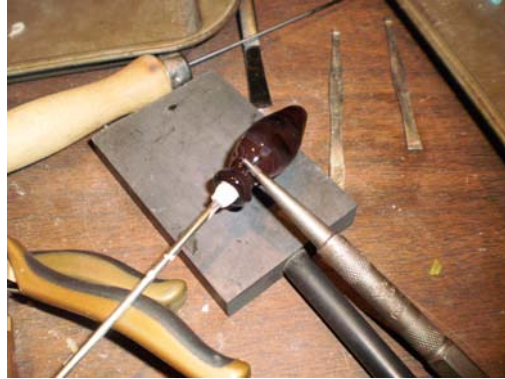
- 1) I started by taking a strip of steel wool and wrapping it tightly around the mandrel until I obtained the rough shape of the desired core. I am using steel wool instead of dung because of health reasons and because it's just plain gross.



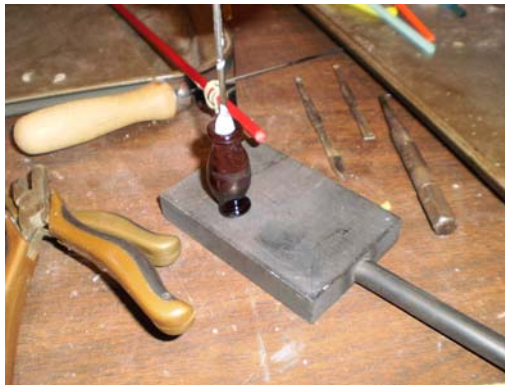
- 2) Next I passed the mandrel and steel wool through a flame to burn off any excess steel wool fibers. The loose fibers would have interfered with the application of the application of the bead release.
- 3) I coated the steel wool with bead release and let dry. In this example I am replacing the clay dung mixture with steel wool and bead release.



- 4) Then I used steps 2-9 of the last method to create the body, neck, and lip of this version.



- 5) Next I placed a gather of glass on the base of the vessel and pressed it to a marver to create the base of the vessel.



- 6) I created the handles by taking a cane of glass and melting a small gather of glass at the end. Then I touched the gather on the side of the vessel. I pulled the vessel and the attached cane of glass out of the flame and let it cool for just a second. I then pulled the cane away from the vessel creating a thin strand of glass and bending into a handle shape, then attaching it to a lower section of the vessel.



Letting the gather cool briefly gave me better control of the glass. If the gather is too hot when stretched, the resulting strand of glass will quickly slump and break. If it is a little cooler then the strand becomes more malleable and easier to control. If you pull the gather quickly the result is a thin strand of glass. If you pull the gather slowly you get a thicker strand of glass.

- 7) I created the second handle the same way as step six, on the other side of the vessel.
- 8) Next I fire polished the entire piece and placed it in thermal blanket over night to cool slowly.



I made two examples one of which I will be cutting in half length wise to show the shape of the interior.

- 9) The next day I removed the mandrel and scraped out the inside of the vessel to remove the steel wool and bead release making it ready for use.



This vessel ended up being about 3.5 cm high and 1.5 cm at its widest. The inside cavity measured about 3mm high and 1mm wide.



### Conclusion:

If you look into the opening of the mandrel only vessel you will see that the inside of the vessel reflects the shape and size of the mandrel. Unfortunately you cant look inside of the core formed vessel but I did provide another example that is cut in half so you can see the inside shape. It clearly can hold more liquid for the same size vessel. In this project the two vessels were different sizes and there is no set standard for size of the vessel. The amount of glass used is also less using the clay core form technique as opposed to the mandrel only type (assuming identically shaped vessels). The mandrel only technique however, takes less time to make.

It never ceases to amaze me that when I sit down to do some lampworking that the steps I follow are identical to the ones that have been used since humanity started working with glass.

## Bibliography

### Books

Dunham, Bandhu, "Contemporary Lampworking" Salusa Glassworks, inc. Prescott, AZ; 2002 (*shows fantastic examples with instruction on core forming and lampworking in general*)

Brisac, Catherine. "A Thousand Years of Stained Glass". Doubleday & co, Inc. Garden City, N.Y.; 1986. (*This is a great source for examples of glass, history and procedure*)

Cantz, Hatje. "Roman, Byzantine, and Early Medieval Glass 10 BCE - 700CE" D.A.P. Distributed Art Publishers, Inc. New York, NY; 2001) (*lots of glass examples from the collection of Ernesto Wolf*)

Jenkins, Cindy "Making Glass Beads", Lark Books, Ashville, N.C.; 1997 (*Good instructional book*)

Van Wylan, Gordon, "Fundamentals of Classical Thermal Dynamics", Wiley & Sons, inc. New York, NY; 1973. (*Its an engineering book... what can I say???*)

Whitehouse, David. "Medieval Glass for Popes, Princes, and Peasants", Corning Museum of Glass, Corning, NY; 2010 (*fantastic period resource for glass*)

### Journals

Royce-Roll, Donald; "Twelfth Century Stained Glass Technology", Avista Forum, Volume 10, Number 2/Volume 11 Number 1, Fall 1997/Spring 1998 (*Great analysis of medieval glass color*)

Zerwick, Chloe. A Short History of Glass. The Corning Museum of Glass, Corning, N.Y.;1980. (*Good history of glass but not really for stained glass*)

### Internet sites

<http://www.cmog.org/dynamic.aspx?id=5774> (*this site has a description of core forming and a video of a vessel being made.*)

[http://www.beadbabe.com/archives/html/the\\_history\\_of\\_lampworking.html](http://www.beadbabe.com/archives/html/the_history_of_lampworking.html) (*good description of a beehive furnace*)

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