

Verre Eglomise (gold gilding on glass) Escarbuncle
on a Gold in Glass Bead Necklace.



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RESEARCH

Gold glass:

Two years ago my wife and I went to the Metropolitan Museum of Art to look at the stained glass collection and European collection of artwork. One of the first things to catch my eye were a few pieces of what was called gold glass.

Gold glass is glass that has a layer of gold foil that is adhered to the glass and then the foil is scraped off to produce an image (Whitehouse).

The basic technique is as follows. First get a clean piece of glass, coat it an adhesive or size, such as a layer of water, oil, dissolved gelatin or gum Arabic. Place the gold foil on the glass, let it dry, smooth it out, add more foil if necessary, and then scrape away what you don't want in order to create the image you are seeking. It is important to know that when looking at the image, that the foil is on the back of the glass, so when you are creating the image you are actually working in reverse (Cantz). I go into more detail in the project section of this paper as I describe each step of the gold gilding process.

There are several techniques that can be used at this point. A common method for protecting the gold foil and enhancing the gold is by painting over the gold foil. In some cases the paint is the focal point of the piece and in other cases it is used to bring out the gold color. Black paint will bring out the best in the foil.

(http://www.gilding.net/m_by_reverse1.html). I used the paint method in my project.

In Roman gold glass, a layer of glass is fused onto the layer of glass that has the gold foil. The example below (photographed at the MET) was originally the base of a bowl. It may have been formed in the following way. First a bowl was created, the gold foil image was created on either the base or the backside of the bowl, and then the foot of the bowl or a second bowl was fused over the gold (Whithouse).



Bowl Base with Saints Peter and Paul Flanking a Column with the Christogram of Christ

Byzantine, from Rome

Made late 300s

Inscribed in Latin: *Peter; Paul*

Rogers Fund, 1916 (16.174.3)

Saints Peter and Paul are shown with the short curly hair and pointed beard typically associated with each man.

The Corning Museum of Glass has a great u-tube video of how a roman gold glass bowl was made (<http://www.youtube.com/watch?v=ALNMn6DGQJg>). The technique they used is not completely period. In the video they blew two bubbles of glass, one for the foot of the bowl and another bubble of glass for the actual bowl. They scored the bubble where they wanted to separate the glass, and rotated it while heating it with a torch. This caused a thermal crack and the top of the bubble at the score and the top popped off. The bottom portion became the foot of the bowl. They used the same process to create the bowl. In an email, I talked to Dr. Whitehouse (the first narrator in the video, the museums executive director and author of many books and articles on roman gold glass) and asked him how the glass base and bowl would have been cut in roman times and he told me that they could have used a coil of hot glass wrapped around the bubble to induce a thermal shock to crack and separate the parts of the glass to make the foot and bowl portions. The gold gilding and fusing techniques that were used in the video were done the same in period.

Mostly what remains of the roman bowls or cups are the roundels or fragments of the gold glass. Secondary uses (after the bowl broke) for the gold glass were grave markers, and house identifiers (Stern, pp139)

I did try to make the medallion using a form of the roman gold method. I used my lamp working torch to create a glass disk and then I annealed the disk. When it was cool, I set the gold leaf on it, let it adhere to the glass then scraped a test pattern. Next was to reheat the disk to about 1000 degrees F. I then created another disk and quickly moved the newly formed disk to the original disk in an attempt to fuse the two together. What happened was the disk with the gold leaf cooled to quickly and broke. I tried it again but this time I took a blob of molten glass and tried to cover the gold disk. I succeeded in fusing the glass pieces but burned off the gold. I determined that I did not have the correct equipment to do the job.

Other uses of the gold gilding on glass were for jewelry, glass panels, and tiles such as the Viking tile pictured below. For the purposes of this project I chose to use the Verre Eglomise method or gold glass painting for the escarbuncle medallion



Gold-Glass Tile

Syrian, from northern or central Syria
Made 800–1200

Rogers Fund, 1946 (46.174)

This lustrous tile is made of dark purple glass overlaid with gold foil and sealed again with clear glass. The gold foil triangles form a cross pattern. Such tiles may have been used to decorate walls or other objects in a Syrian church.

Gold in glass beads:

For the bead portion of my project I chose to make foil beads. This technique calls for the creation of the bead and then the bead while hot, is coated in a layer of foil or foil bits. The heat fuses the gold to the glass. The Vikings used this technique with both gold and silver foil. They also were known to add a layer of clear glass on the bead to protect the gold. This type of bead is called gold in glass. The example below is from what is believed to be a Viking burial site in Froyland, Norway.



To make a bead one simply gets a metal rod or mandrel and coat it with a bead release, usually a clay like material that is not affected by the heat of the furnace. The bead release puts a coating of material that acts as a barrier between the metal and the glass allowing the molten glass to adhere to something and then allowing the bead to slip off

the mandrel when it is cool. If the glass hits the metal of the mandrel it will adhere to the mandrel and it will never come off... in one piece that is. A rod of glass or pieces of glass are held in the flame of a torch or in the heat of a furnace and allowed to get soft. The mandrel is then placed in furnace and the molten glass is wrapped onto the mandrel. A separate portion of the furnace has an annealing chamber to hold the beads while they cool. I go into greater detail in the project portion of this paper.

A few years ago at Pennsic, someone had built a working furnace made of clay and manure. This is very close to what is thought to be the way the furnaces worked. Because they break down so easily there are not any known examples (to me anyway) as to what they looked like. Below is a picture of the furnace at Pennsic.



As you can see the front has an opening to reveal the hot coals, the top side openings are vents to help regulate heat, air flow and a work port. The center top opening is an annealing chamber. It worked quit well. Pictured below is the furnace in use.



As you can see the artist is wrapping a glass onto the mandrel.

Linkage:

To make the chain I decided to make wire wrap links. This is technique has been around for a long time and is still used today pictured below is a photo of a few links of a necklace from the Carthage Treasure (circ. AD 400) (Tate pp.98). I go into detail how the links are made in the project portion of this paper.



PART 1: CONSTRUCTION OF THE ESCARBUNCLE MEDALION.

1) Cut the glass.

Here I used a circle cutter to cut the glass and a glass grinder to shape and smooth the edges. In period they would have used a hot iron to cut the glass, a grozing rod to shape the circle, and then smooth the edges with a stone (Theophilus).



2) Match the pattern.

Once the glass was cut shaped and smoothed I drilled 2 holes in the glass to serve as points to attach the chain. In period they could have used a bow saw (Kornbluth). This is a bow shaped device with a string that is attached to both ends of the bow. The center of the string is wrapped around a metal rod. The tip of the rod would be placed on the glass with some abrasive material. By holding the metal rod in place and moving the bow with a back and forth action, the rod would rotate and cut through the glass.

Once the holes were drilled I placed the pattern under the glass to line it up with the holes and to center it on the disk.



3) Painting on an adhesive.

To hold the gold leaf in place the glass must be cleaned completely so that when water runs on it, the water sheets. If it bubbles up then the glass is not clean. Next an adhesive must be added to hold the gold leaf in place. For this project I used a premixed solution of gum Arabic. I could have also used a solution made of a gelatin capsule dissolved in warm water or egg whites (Theophilus). I painted on a very thin layer and let it set for a second or two to get tacky.



4) Adding gold leaf.

Once the gum Arabic set, I flipped the disk over and set it directly on a sheet of gold leaf. The gold leaf I used is made from 22k gold. Another method would be to moisten the tip of a paint brush touch it to the gold foil sheet and transfer it onto the glass. I don't know how many of you have tried working with gold leaf but if you look at it wrong, it balls up and blows away. Even Theophilus states "Be careful of draughts and hold your breath because if you breath out you will lose your leaf and only retrieve it with difficulty" (Theophilus, 22). Placing the disk directly on the foil works best for me for this part of the project. I let the disk sit as the gum Arabic dried locking the gold leaf into place.



5) Tracing the pattern.

After letting the piece sit for a while, I trimmed off the extra gold leaf and set the scraps aside for another part of this project. I then glued the pattern onto the back side of the glass and placed into the top of a flash light. The flashlight acted as a light table. Using the tip of an exacto knife I traced out the shape of the escarbuncle. In period they could have used wooden or metal styluses. In a past project I used a combination of materials for a certain look. For this project only the knife was needed. I also did not have to worry about the orientation of the escarbuncle as it is symmetric. Had there been writing then I would have had to create a reversed image so that when it is viewed it the image would not be backwards.



6) Finishing the escarbuncle.

Once the basic shape of the escarbuncle was created, I no longer needed the flashlight. I then proceeded to scrape away the rest of the gold leaf that wasn't in the shape of the escarbuncle.



7) Protecting the gold leaf.

One of the aspects of gold englomise is to paint over the gold to protect it. I was thinking of using red paint but when I placed the disk over something red, the gold almost seemed to wash out. With black, the gold just pops right out, so I painted over the gold with a black enamel paint.



8) Below is the final outcome of this portion of the project.



Part 2: CONSTRUCTION OF THE GOLD ON GLASS BEADS.

- 1) The first step is to coat a mandrel with the bead release. One mandrel was used for each bead. I usually let the bead release dry overnight but this particular formula also allows me to flame dry the release. The recipe for the bead release can be found in the appendix of this paper



- 2) Glass was never wasted so keeping true to form I took some scrap glass and cut it into $\frac{3}{4}$ inch by $\frac{3}{4}$ inch squares for the large beads and $\frac{1}{4}$ x $\frac{1}{4}$ squares for the smaller beads. Not all the cuts were exact so there is some variation in the size of the beads.



- 3) Next we heat up the mandrel and at the same time warm up one of the bits of glass by flashing it in and out of the flame. We need to do this otherwise the glass develops thermal shock and breaks apart. After a few passes in the flame, I held the glass in flame until it started to melt and began to wrap it on the mandrel.



- 4) Rotate the mandrel until the glass wraps all the way around the mandrel and forms a nice round bead



- 5) As you can see in the picture, I already have bits of the gold leaf prepped on a marver (flat surface used for shaping glass). I used the same 22k gold leaf for the beads as I did for the medallion. I let the glass cool a bit then roll the bead over the gold leaf. The leaf sticks to the glass. I then briefly put the bead back into the flame to seal the gold leaf onto the bead. This completes the bead and I placed it in a thermal blanket to let it cool slowly. If this is not done then again, a thermal shock could occur causing the bead to break. I repeat this set of steps for all of the beads.

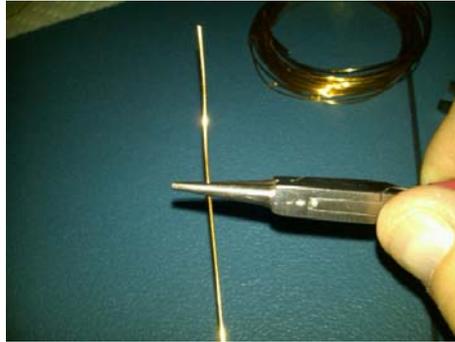


- 6) When they have all cooled I remove the beads from the mandrels. I use a bead reamer (long thin rod with an abrasive. I use diamond) to clean out the remaining bead release from the beads core (the opening formed in the center of the bead when the glass was wrapped around the mandrel).
- 7) The last step is called annealing. I place all of the beads in a kiln and slowly ramp the temperature to about 940 degrees F. I let the beads set there for a while then slowly cool them. The purpose of this step is to equalize the stress in the beads to make them more durable.

Part 3: FINAL ASSEMBLY.

In this section I will be describing how I put the chain together. The technique is a simple one and is very versatile. The wire I chose to use is a 20 gauge round wire. Normally I would use gold filled wire but because of the short amount of time I had to do this project and the price of gold, I decided to use a gold colored wire and 24K gold plated spacer beads.

- 1) I cut 22 lengths of the gold colored wire each 4 inches long. To do the wire wrap first take one of the wires and hold it in a pair of round nose pliers about an inch and a half down the wire



- 2) Next bend the top of the wire at a 90 degree angle.



- 3) Then move the bent portion of the wire between the two tines of the pliers and bent the wire up and around the top tine of the pliers to start forming the loop.



- 4) Continue to wrap the wire around the bottom tine until the end of the wire is facing away.



- 5) Next wrap the horizontal wire around the vertical wire making nice tight wraps. When satisfied with the number of wraps snip off the excess wire. The end of the wire is sometimes jagged so run my pliers over the end of wire in a circular motion in the direction of the wrap several times to smooth it out.



- 6) Now place the beads. First a gold bead, then a small gold-glass bead, a large gold-glass bead, another small gold-glass bead, then another gold bead.



- 7) Lastly let the pliers rest on top of the bead (as in the above picture) and create the wrap just as I did in steps 1-5. Remember to run your pliers over the end of your wrap to smooth out any jagged pieces of wire.

- 8) The first link is done.



- 9) To add the second link I started off with steps 1-4. Before wrapping the wire I slipped the wire from the new link through the loop in the first link. Then I wrapped the loop shut.



- 10) I then proceeded as I did with steps 5-7. And now I have 2 links done.



- 11) I kept repeating this process until all 22 links were made. I added the medallion using the same technique



CONCLUSION:

This was a fun project. I learned about the limitation of some of my equipment and the versatility of some of my glass. I have used gold leaf in other Gilding projects but never with beads. This was a first but not my last.

What I liked most about making this project was that it allowed me to realize one of my goals, to combine my jewelry skills with two different types glass working skills. I have more projects in mind.

BEAD RELEASE RECIPE:

At Pennsic 39 I was lucky enough to attend a class taught by THL Rivka de Rojo on how to prepare your own bead release. Some months later I tried it. The materials list was not detailed so I did some guessing, nor did she say in the documentation if the measures were by weight or volume. I guess I should have paid closer attention in class. The following is my interpretation of her instructions. I am happy to say that I am very pleased with the way it came out for both price and quality. It is much better than the commercial release I was buying.

I based my measurements on weight.

6 ounce kaolin (there are lots different forms of kaolin which is a clay material. I used Lone.

6 ounce alumina hydrate (calcinated...placed in a kiln then ramped to 1200 degrees F. Let hold for a few minutes then turn off the kiln and let cool to room temperature.)

6 ounce high temp kiln wash powder.

¼ ounce diatomaceous earth.

I mixed all the dry ingredients up then added water and stirred slowly. I added water a little bit at a time until the mixture had a cold crème texture.

This bead release can be air dried or flame dried with the same results. The beads slide off the mandrel with little to no effort.

GOLD LEAF

Theophilus (a 12th century monk) wrote in his book “De Diversis Artibus (The Diverse Arts), a very detailed method for creating gold leaf. I will paraphrase his description.

Take a parchment made from linen rags and treat both sides with a finely ground ochre powder. Rub an animal tooth such as boar or beaver on the parchment until the ochre adheres and shines. Then cut the parchment into four square pieces.

Next take a pouch made from calf velum big enough to hold the pieces of the parchment. Take a piece of pure gold and beat it flat on a smooth anvil being careful not to crack the gold (Note: sometimes assumptions have to be made while following Thophilus’s writings. I am assuming by cracking he means cracking due to work hardening the gold or hitting so hard you create tears in the metal sheet you are making.). Sandwich pieces of gold between the layers of parchment and place them in the pouch.

Place the pouch on a large smooth stone and lightly beat on it with a broad headed bronze hammer. Inspect the gold frequently until you reach the desired thickness.

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http://www.beadbabe.com/archives/html/the_history_of_lampworking.html a short overview on the history of lampworking.

http://www.gilding.net/m_by_reverse1.html good overview on gilding.

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