The Mérode Cup - Plique-à-Jour Enamel

Atlantia's 12th Night - Edgar Refskegg

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Overview

The procedure for creating this plique-à-jour (PaJ) piece that I present is multi-tiered with several distinct steps. This document will separate them out into hopefully easy to digest steps. The intent here is to provide a general overview of both the period method of preparing metal and subsequent enameling, the modern steps, and an explanation on why the differences exist. Additionally, I intend to add other information as necessary to provide amplifying information and otherwise.

For greater amplification of the steps, differences, or historical background, either look for other documentation I've written or simply ask me! I enjoy helping others learn and typically it's much easier to convey the nuances of enameling through a conversation. Reach me at edgar@refskeggbrewing.com

Relevance to Tempore Atlantia 1350-1500 CE Competition

The plique-à-jour piece here is an attempt at reproducing the style of enameling from the Mérode Cup, a gorgeous goldsmithed cup made in 1400. It is an amazing piece of art and highly representative of this style of enameling and sits right between the dates delineated for this competition. Since this style of enameling was difficult, delicate, and rare, even in period, very few examples of it remain. An image of the Mérode Cup from a side with the window can be seen in Figure 1 of the accompanying photo document. However, despite the rarity, the Mérode cup is still intact and is one of the best quality and oldest examples of plique-á-jour enameling. The cup is of beautiful craftsmanship and my goal was to recreate the windows used in the design to showcase the difficulty and uniqueness of this style of enameling. Thus, the colors and design of the window are taken exactly from the Mérode cup's design.

Benvenuto Cellini's book Treatises of Benvenuto Cellini on Gold-smithing, written in 1568 is a significant resource used when trying to understand how medieval plique-à-jour was created.[1] In it he describes the method for creating a plique-à-jour enameled bowl, which was in the possession of King Francis in the year 1541. The Mérode Cup was likely created in a very similar way. It too is made using plique-á-jour, among other very interesting goldsmithing techniques, but is about 168 years old by the time of Cellini's writing. The processes to create these are similar. Further, primary source material regarding the description of how to create this style of enameling is scarce, hence the use of a source that is out of the time period of this competition. However, despite Cellini's writing being younger, as mentioned, the process is likely similar - as it is today. For the most part, despite the distinct improvement of tools, enameling is a labor intensive process that remains quite like how medieval artisans performed it.

The key difficulty in creating this piece was figuring out how to apply the enamel safely in a large open area. Most examples of this type done today are done without a backing and thus with much tinier areas. Smaller areas allow the surface tension of the enamel and water to hold everything together. That is not the case with areas this large.

What is Plique-à-Jour?

Plique-à-jour is French for "letting in daylight," and is a challenging enameling technique that is difficult and prone to failure. It is similar to cloisonné or champlevé where enamel is applied into open cells. However, in this style, the backing is ultimately removed and therefore allows light to come through transparent enamels (See Figure 9 of the photo document). The technique is similar to stained glass but is done in a much smaller area. To achieve this, the enameling is done with a temporary backing that is removed upon finishing the work. In period, this was done using an iron template shape, like a bowl[2] (I've also heard of

[1] B. Cellini, *The Treatises of Benvenuto Cellini on Goldsmithing and Sculpture*, Dover Books on Art History, Surveys, Aesthetics, Classics (Dover Publications, 1967), https://books.google.com/books?id=CGBQAAAAMAAJ.

[2] Ibid.

clay being used) that is painted with an adhesive upon which the wires are shaped and glued. When the enameling is done, the template shape is removed. This is called, modernly, the filigree method. The style I used for this plique-à-jour, by contrast, is called pierced plique-à-jour, where metal is cut away. See Figures 2 through 4 in the accompanying photo document.

Medieval Method

The process by which medieval artisans created plique-á-jour enameling is described in only a few primary sources, but most notably by Benvenuto Cellini as mentioned above.[3] In his chapter on Filigree work Cellini describes the plique-á-jour process. The full quote from Cellini is copied below, and an additional print from his book will be provided as well.

The plique-á-jour enameling noted by Cellini is essentially filigree work (ornamental work of fine wire such as silver or gold formed into delicate shapes) combined with enameling. A template shape of some sort is created to be used as a temporary backing. In Cellini's description, he would have used an iron bowl painted with a clay adhesive. This adhesive is used first to temporarily hold the wires in place, and then to ensure the completed piece can be removed from the iron bowl at the end. He'd then glue cloisonné wires down on to the bowl using a different adhesive. These wires can be soldered or un-soldered - artist's choice. After all the wires are placed, the enamel work can begin. This involves crushing lumps of glass with water into a fine powder. These enamels are then wet inlaid into the interstices of the wires. When this is finished the piece is fired at a heat just high enough to fuse the glass. The inlay process is repeated as necessary and with higher heat in order to fully fill the areas required. Afterward, when the inlay is sufficient, the piece of stoned down to grind everything to an even surface, and subsequently sanded with finer and finer stones to achieve a nice gloss.

The text of his description follows:[4]

> If you want to make a bowl like this, you must begin by making one of thin sheet iron,about the thickness of a knife back larger than the one you want ultimately to produce in filigree. Then with a brush you paint it inside with a solution of fine clay, cloth shearings & Tri-poli clay finely ground; then you take finely drawn gold wire of such a thickness as your wise-minded master may wish that of his bowl to be. This thread should be so thick that if you beat it out flat with a hammer on your clean little cup, it bends more readily in the width than other-wise, in such a way that it may then be flattened out to a ribbon shape, two knife-blades broad, &as thin as a sheet of paper. You must be careful to stretch your thread out very evenly, & have it tempered soft, because it will then be easier to twist with your pliers. Then with your fine design before you, you commence to compose your stretched thread inside the iron bowl, first the principal members, according to their way of arrangement, piece by piece painting them over with solution of gum tragacanth, so that they adhere to the clay-solution with which you pasted the inside. Then when your craftsman has set all his principal members and larger outlines, he must put in the spraywork, each piece in its place, just as the design guides him, setting it spray by spray, bit by bit in the way I have told you. And then when all this is in proper order,he must have ready his enamels of all colours, well ground and well washed. It is true you might do the soldering first before you put in the enamel, &you would do it in the way that I explained above when I considered the soldering of filigree work, but it's as good one way as the other, soldered or not soldered. And when all the preliminary work is carefully done,and all the interstices nicely filled with the coloured enamels, you put the whole thing in the furnace, in order to make the enamel flow. To begin with you must only subject it to as light heat, after which,when you have filled up any little openings with a second coat of enamel you may put it in again under a rather bigger fire, & if it appear after this that there are still crannies to be filled up,you put it to as strong a fire as the craft allows and as your enamels will bear. When all this is done you remove it from

[3] Chapter 2, On Filigree Work is where Cellini describes the process.
[4] Ibid.

> the iron bowl,which will be easy by reason of the paste of clay to which the actual work and the enamels are attached. Then with a particular kind of stones called “frasinelle” and with fresh water you begin the process of smoothing it down,and you must go on with this so long till the enamel is polished down to an equal thickness throughout and as may seem good to you. And when you have got as far as the “frasinelle” can take you, you may continue your polishing with still finer stones, and lastly with a piece of reed and tripoli clay (as I explained it in niello work), then the surface of your enamel will be very smooth and beautiful.’

Lastly, gilding in this time period was done using the fire gilding method. The gold or silver was dissolved in mercury to create an amalgamation with consistency similar to butter. This amalgamation was rubbed onto the metal and then heated in a furnace, which boiled off the mercury, leaving the precious metal behind. Mercury vapor is incredibly hazardous.

Step by step - generalized (medieval)

1. Create iron template shape and apply adhesive
2. Obtain flat wires (cloisonné) and form onto shape
3. Solder wires together
4. Prepare enamel for packing
    - This was done using lump enamel (large chunks of glass) that was ground in a pestle and mortar to the appropriate grain size.
5. Moisten enamel and pack into the empty areas.
6. When sufficiently packed, fire enamel in furnace
7. After cooling, re-pack and re-fire enamel as necessary to completely fill the metal
8. For plique-á-jour enameling, this process would be repeated many times (15-20 usually) because the glass fusing contracts substantially.
9. Polish metal
10. Finished!

Modern (My) Method

The process I used was largely similar to the medieval method except for a few key differences which mainly involves the use of a few electronic procedures in addition to using cutwork instead of cloisonné. I also use pre-ground and sifted enamels, but the result is the same. Overall, the core process is effectively similar, though overall requires slightly modified steps to ensure the best work.

The art is done electronically (Illustrator, usually) and then printed onto regular printer paper to be glued onto the metal for cutting (Figures 2-4 in photo document). I then used a drill to pierce the negatice spaces of the design to cut out. Afterward, I used a jeweler’s saw to remove the required metal. I then used a thin sheet of copper foil to provide the backing for the piece (medieval artisans would have used a metal or clay backing), see Figure 5 in the photo document for how this looks.

The enamel is then rinsed and wet slightly for the inlay process. For inlay, I do not use a quill, but instead use fine paintbrushes, dowel rods with darning needles (fulfills a similar purpose as a quill) embedded, and long fine pointed metal tools. For reference in this process, see my main Champlevee enameling photo document, and Figure 6 and 7 in the accompanying photo document. Figure 8 in the document shows a second firing after more enamel has been applied. Between Figures 6 and 7 the difference between pre and post fusing can be seen readily.

After the inlay and firing process is complete (Figure 9), 150 and 220 grit alundum stones are used for the initial grinding to smooth down all of the glass to be level with the metal. 400+ grit sandpaper (I go up

to 1000, but more is certainly fine) is used to do the final polishing steps. In the case of PaJ enameling, these pieces are very fragile so I went very light on the polishing portion.

Also, it's important to note that I do not gild (fire gilding, very hazardous). Fire gilding is not a safe process and should be avoided.

Step by step - generalized (modern)

1. Determine art desired and draw electronically. Print onto printer paper
2. Glue design onto metal
3. Cut metal out and drill holes for pierce work
4. Thread saw blade through holes and remove negative space.
5. Create temporary backing for the plique-á-jour piece. I used thin copper foil.
6. Pack copper with wet enamel
7. Dry the enamel (I do it on top of the kiln) and then fire for a few minutes. The drier the better, especially for PaJ.
8. Re-pack and re-fire as necessary. PaJ requires more time through the kiln than Champlevé to get it right.
9. Polish
10. If gilding... electroplate it now (or do fire gilding, if you hate your health and the law).
11. Finished!

Explanation of Differences

The key differences between my window and the Mérode cup's windows are that I used piercework to define the edges of the design, I used copper for the material instead of silver gilt with gold cloisonné wire, and my type of backing varies from the type used by medieval artisans. The reason I used copper instead of silver gilt is mainly the cost. Copper is cheaper and behaves similarly and, more importantly, I've never used silver or gold before. Additional differences will be described below.

Cloisonnè vs. Pierce Work

This is the most major difference between the plique-á-jour work on the cup and my own creation and ties in to the PaJ Medieval vs Modern method commented on below. The work done on the Mérode Cup was performed using cloisonnè wires, whereas mine was done using pierce work, as seen in the accompanying picture document (Figures 1-4). I chose to do mine using piercework because I have little experience with cloisonnè and ultimately wanted to showcase one particular aspect of the Mérode Cup. Despite using pierce work, the process to make these was very similar.

Plique-à-Jour Medieval vs My method

Cellini describes plique-à-jour in his book on Goldsmithing and Sculptures, as mentioned and quoted.[5] His method and the method used in the Mérode cup used a template shape and cloisonné type wires to outline the shapes. The enamel was much thinner than what I used, which is the key reason the opacity on my windows is much higher. Overall the process is similar, however.

[5]Cellini, chapter 2, pg 13. He talks about how a king asked him how his (the king's) filigree bowl was made and Cellini describes the medieval plique-à-jour process.

Electric Kiln vs. Charcoal Furnace

Simply, the electric kiln is much more portable and has a far superior temperature control than a charcoal furnace. The charcoal furnace is not portable, requires substantial maintenance, and again is simply not practical for the goals I have.

Polishing and Gilding

Interestingly, the grinding and polishing process that I use is very similar to medieval smiths as far as the general process is concerned. I can use consistent and standardized stones and sandpaper, both wet and dry. I also finish mine with spray polyurethane to resist tarnishing (because mine usually aren't gilded!). By contrast, Theophilus[6] uses the following: sandstone, a smooth hone, potsherd from ancient pots, flat smooth lead plate, goatskin fastened to a wooden board. All of his are done wet and dry in various combinations.

Miscellaneous

A lot of the tools I use are likewise different than what is described in period manuals and artwork. However, unless otherwise described they are functionally similar. Something to note is that in medieval workshops these tasks all would be divided amongst a team of metal workers. By contrast, the work is done mostly by me and occasionally a few helpers (especially for the art). We're able to accomplish a lot with only a few people with the methods we use to enamel.

Also, the enamel powder we use is likely more consistent as well, and possibly uses different additives to create the various colors. I typically use 80 mesh enamel and don't have to worry about sifting any myself. Medieval enameling was done, as mentioned above, using lump enamel. This has to be broken up and sifted to the proper size. However, it is generally still placed using wet inlay.

Conclusion

Ultimately the creation of this piece involved a ton of learning. It's really difficult to find modern sources on how plique-á-jour is done in this way, as it's a rare endeavor. I broke one my first attempt trying to figure out how to polish it and properly fire it in the kiln. The second one came out decently, at least. In the future, I would like to use this in a larger design and incorporate it into an actual cup, or maybe create pendants out of them.

[6] Theophilus, book III chapter 55, pg. 128

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