Polishing Copper

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Polishing copper and comparing marks to determine what they will look like when magnified.

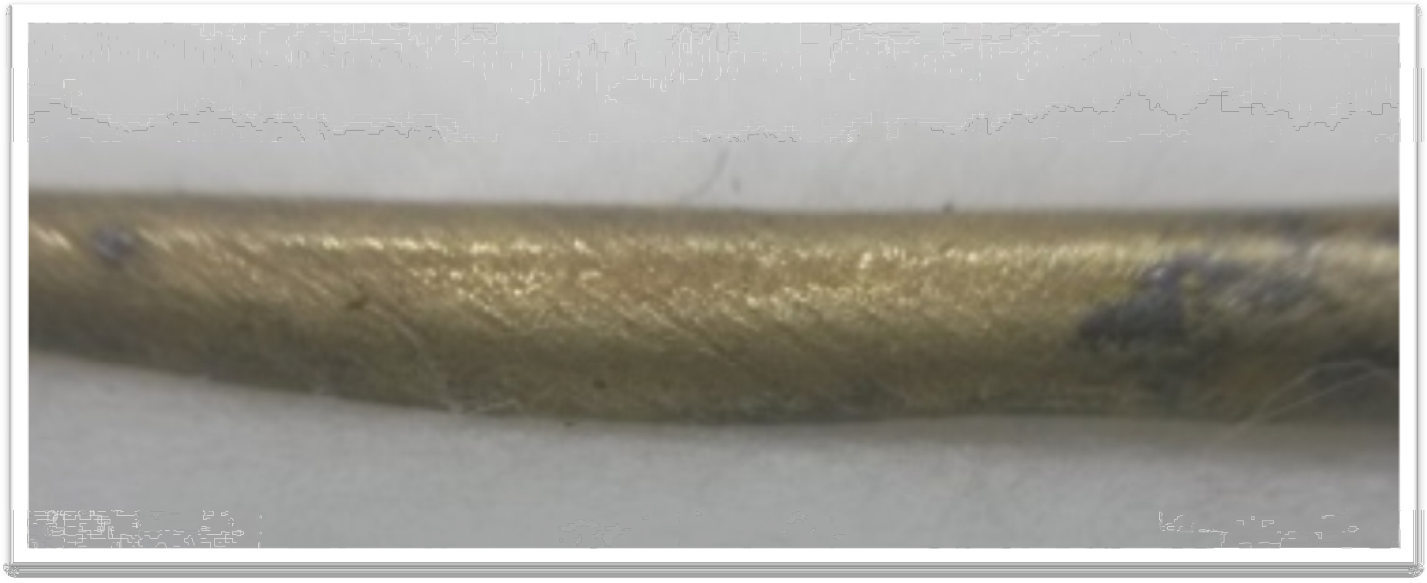
Tools used in this.

- Elma E30H Ultrasonic cleaner
- Leica Stereozoom 6 gemological microscope 15X by 4-7
- Samsung Galaxy Mega (Camera)

I started by taking several copper pieces that were previously cut for enameling samples. I polished them with Tripoli and rouge to clean them. Polished to remove many of the marks on them and give them a shiny surface.

It looks like many of these would make good finishing compounds. I suspect that the ground glass, clay, pumice and sandstone would make the best compounds to use when polishing a large flat piece of metal. Either cloth or a scrap of leather would work well with a bit of an oily substance to suspend the media.
I know this is not super accurate as an experiment but it gives some idea of what could be done.
I feel that the pumice and sandstone might leave enough of a patterned surface that later, with many years of being buried in the Thames river, might slowly etch the metal to look like the surface of the aiglet. A friend suggested that the structure of the metal alloy would make a notable difference in the way the metal patina's and I have to agree completely. As well as using modern metal versus metal processed in the same way as it was done in the past.
But as I do not have the metallurgical background to investigate that, I will have to look into that later. Right now, this will have to do.
Please visit my website www.livingstonjewelers.com for further information.

Thames Aiglet cleaned and pickled to remove oxides.



These are the following materials used to polish the copper.

#	Item	Cloth	Leather	Notes
1	Control	X	X	Oil was used but no polish was used to determine if marks would be left by the polishing material
2	Sawdust	X	X	Hardwood
3	Jewelers talc	X	X	
4	Chalk	X	X	
5	Ground glass	X	X	
6	Fired Clay	X	X	Ground flower pot
7	Charcoal	X	X	
8	Pumice	X	X	"F" fine
9	Sandstone	X	X	
10	Arkansas Stone	NA	NA	Whetstone
11	Rawhide	NA	NA	
12	Waterstone	NA	NA	Whetstone for fine polishing steel. This piece was rubbed under water with the stone.
13	Steel burnisher	NA	NA	
14	Brass brush	NA	NA	Made from very fine brass wire.

All but one of the pieces were rested on a wood block with a clean piece of paper towel under it. The left side was rubbed with a piece of 100% cotton cloth moistened with boiled linseed oil and the polishing material. There were 20 strokes starting at just below the top of the copper piece and going down.

This was repeated with leather moistened with boiled linseed oil on the right side.

First is a picture of common buffing and finishing wheels to polish jewelry. While wonderfully efficient, these would not have been available in the 16th century. So how are we to decide how polishing could have been done. No rotary tools and no sandpaper.

All samples were ground in a mortar and pestle and then sifted through a metal coffee filter to get a maximum particle size.

I started with deciding what to use as a way to apply the different finishing compounds. I decided to go with 100% cotton (the fiber) fabric and squares of leather. As it is natural oil, I decided to go with linseed oil. Easy to clean and slightly sticky so it should hold ground materials.

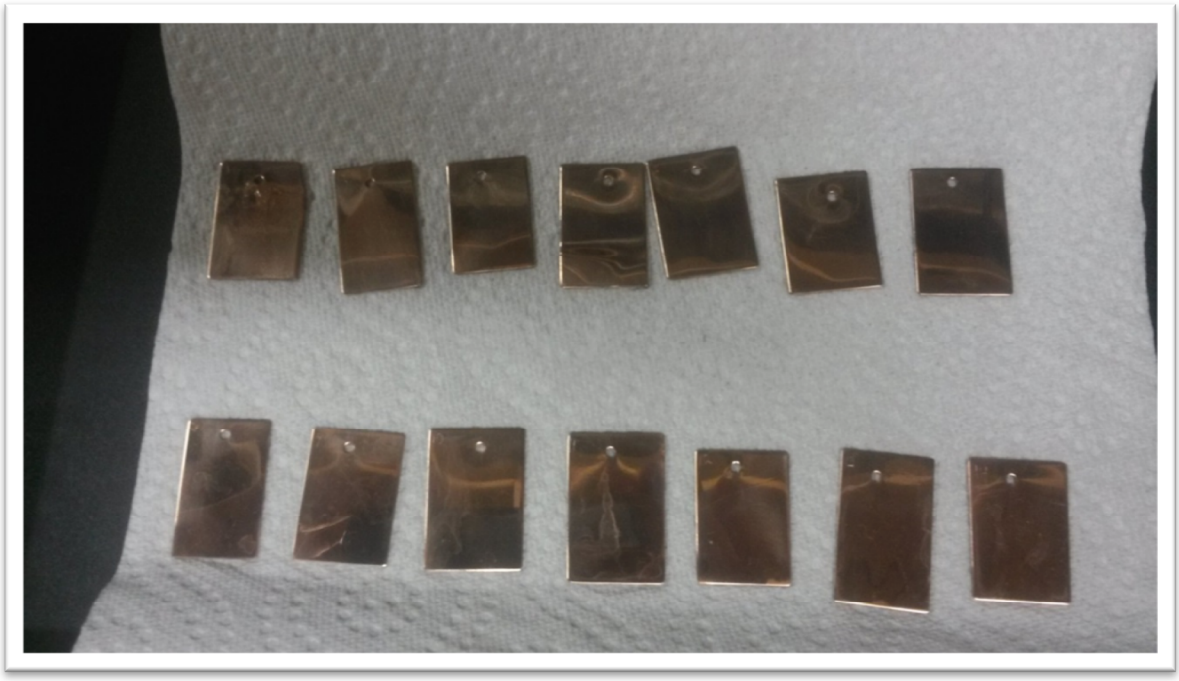
All of the samples were placed on an oak board that has been covered with a clean paper towel. The paper towel and the cotton and leather pieces were used only once then discarded.

After the application of the different substances the samples were cleaned in soapy hot water in the ultrasonic and scrubbed with a soft toothbrush. Patted dry with an piece of paper towel and then examined with a microscope at a setting of 20 magnification.

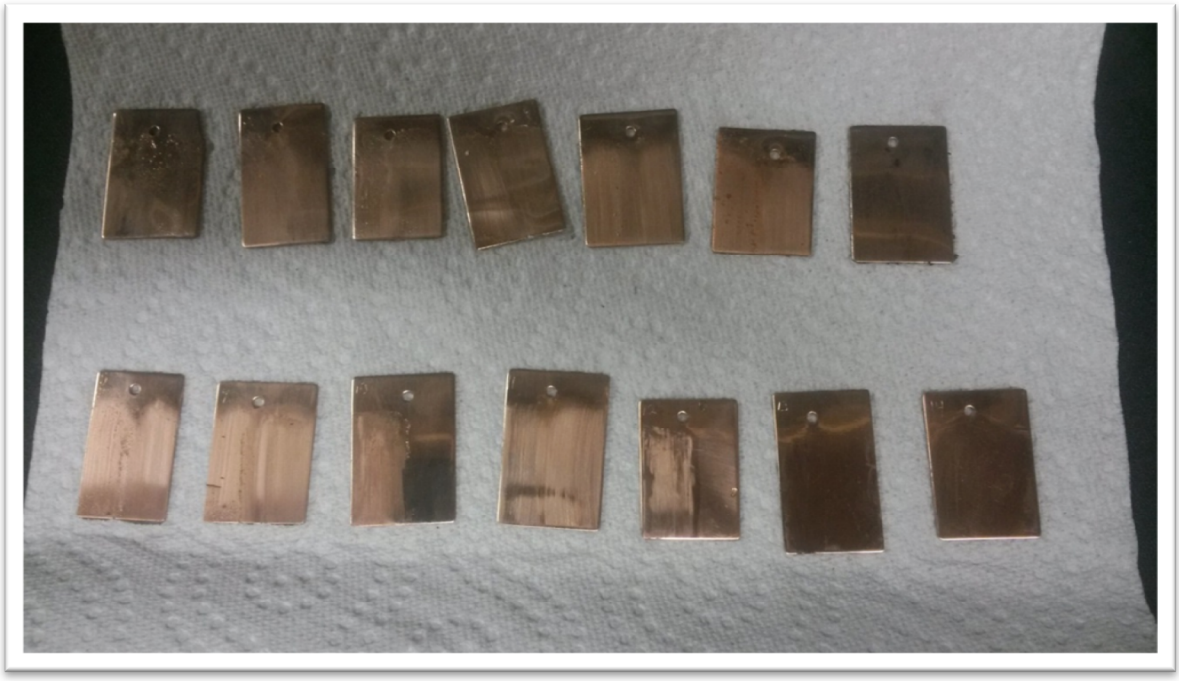
I used materials that I suspected might have been used as well as several suggestions from friends. 13 total samples.

The samples before and after processing.

Before



After



1 Control
As you can tell there is very little change after rubbing with fabric or leather dipped in linseed oil. A few minor blemishes at 20 times magnification from cleaning with an old soft toothbrush but that is all.

2 Sawdust

Hardwood sawdust did nothing different that I could see. I did not expect to see a difference as sawdust is sometimes used to suspend polish and help polish items in vibratory media polishers

3 Jewelers Talc
Very soft, I did not see anything here that suggested this was a finishing compound at all.

4 Chalk
Not as soft as the talc, I used ground up blackboard chalk. No notable results.

5 Ground Glass

I used ground glass (old enamel powder) for this sample and was surprised at how uniform of a matte finish it created. I would not class this as a polishing compound but a very fine finishing compound as it would remove a very slight amount material from the surface. There was no noticeable difference from using cloth on the left side versus leather on the right side.

6 Fired Clay

From a clay flowerpot that I pulverized with a mortar and pestle. Both sides looked about the same. Uniform deep marks in the metal. I suspect this could have been used commonly as a finishing compound. I t made a very nice matte finish. When rubbed on a large sheet of metal I could easily see this being a good compound,

7 Charcoal
This worked more as a polishing compound then a finishing compound as I suspected.

8 Pumice
Used to clean metal, this left a uniform finish. This is commercially prepared pumice that is F fine for the grit size. Each bit of pumice is about 0.00160 inches in diamerter.

9 Sandstone

I ground this myself and the results were about the same as with pumice but with larger grit size. (filtered through a coffee filter screen). I feel this made the deepest scratches and could be very close to the type of material used to finish the aiglet in question.

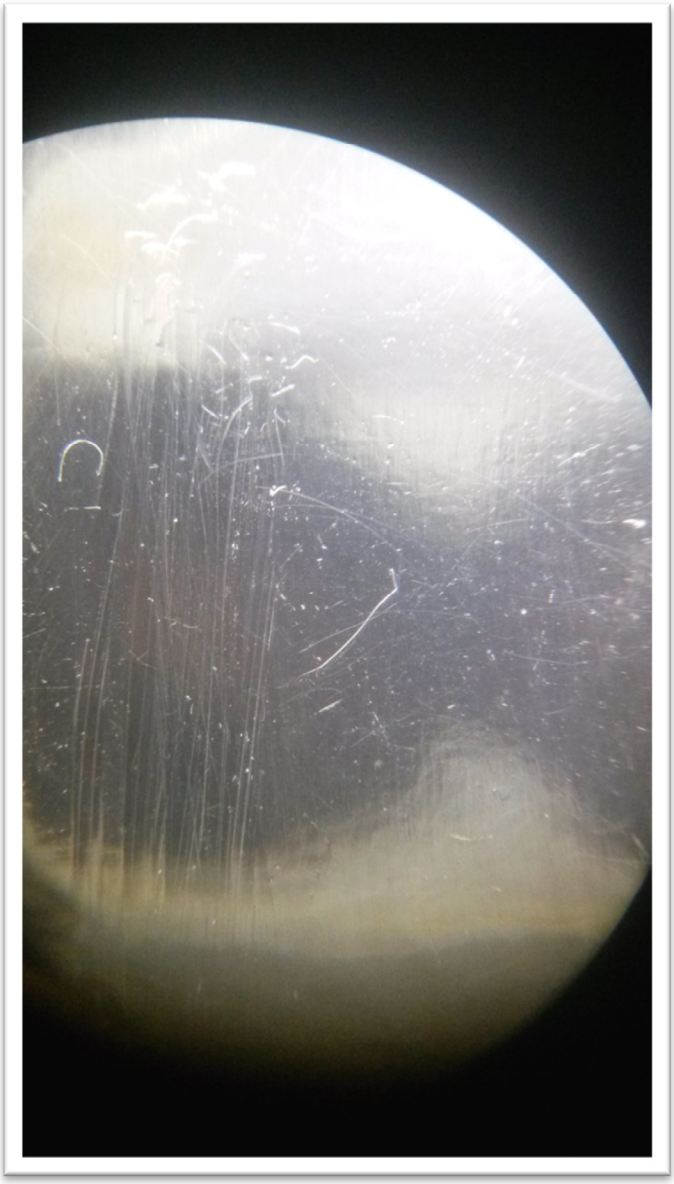
10 Arkansas Stone
This was scratched on one side with a natural whetstone. It did a good job and I suspect that these were used to finish metal. Nice uniform marks.

11 Rawhide

This was a new piece of rawhide with no linseed oil on the left and a bit of oil on the right. The first 5 or so passes made the most effect on the metal. After that, the pressure had softened the rawhide to the point of just polishing the surface.

12 Waterstone
Polished under water, this left uniform marks on the metal.

13 Steel Burnisher
20 strokes with a burnisher made little affect to the metal. For a large piece of metal, this would be too labor intensive.



14 Brass brush
This made a nice uniform matte finish on the metal.