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An Exploration of Surface: Deciphering the History and Meaning of the Winterthur Peter Stretch Clock's Finish

On October 28, 2004, the Winterthur Museum acquired a tall clock through Sotheby's for the highest price ever paid for an American clock: 1.7 million dollars (*Fig. 1*). Created between 1735 and 1746, it is considered a masterpiece in part because of its works by Peter Stretch, the most renowned Philadelphia clockmaker of his day. This clock is also set apart from its contemporaries by its stately case, made by an unknown cabinetmaker, and unusual in both decorative approach and wood selection.

When the clock arrived at the Museum, it was decided that two significant questions regarding the case required investigation. The first had to do with corroborating prior art historical research and connoisseurship relating to two important decorative elements. The second related to the determination of treatment possibilities.

Before delving into these issues, it is important to understand why this wonderful object deserves so much attention. First, a short description of the works is certainly appropriate. Referred to as Peter Stretch's most sophisticated accomplishment, they include a lovely brass face which incorporates engraved, silvered, cast, and painted elements. The intricate eight-day movement provides information not only about the time, to the second; but also about the date, moon phase, and tide. These works certainly merit a much closer examination, and in fact a scientific analysis of the clock face was part of my larger technical study of this object. This paper, however, will focus on certain aspects of the case which houses them.

This case is made of expensive imported mahogany instead of the more common domestic walnut. Even more impressive is the mahogany used for the door and base, which has a wavy figure that is so rare, especially on boards of this size, that one could imagine the cabinetmaker hoarding them for years until he received just the right commission. Because of the state of the finish, which will be discussed later, a clearer view of this figure is obtained from the interior of the door. It is important to note that the lighting used for photographs of the exterior falsely reveals the wave.

This dramatic mahogany is topped by an extremely ornate, architectural hood. Here, every horizontal edge is elaborately carved, and every vertical surface displays applied blind fretwork. Even the sarcophagus, which is so high it is difficult to see, is beautifully carved. One last detail is front and center within the arc of fretwork above the face. Here we find a coat of arms declaring proud ownership of this clock.

Tall clocks were status symbols in their day. Parking one of these in the entryway could be considered the equivalent of parking a Rolls Royce in the drive today. *This* clock, with its combination of first-rate Peter Stretch works, priceless wavy mahogany, and showy carving, was meant to elicit the envy of all who saw it.

To return to the subject of the sarcophagus: it is one of only two known carved specimens (*Fig. 2*). The second one sits on another Peter Stretch clock, owned by Independence Hall, in



Figure 1. Peter Stretch clock, Winterthur Museum.

Philadelphia. However, the Independence Hall clock's entire sarcophagus is *not* original. It is a later addition, perhaps inspired by Winterthur's clock. For our clock to be the only one with original carving on its sarcophagus would clearly add to its art historical value. This was not a sure thing at the time of purchase: although the sarcophagus construction appears good, the shiny finish on the carving does not resemble the very textural finish on other parts of the clock, such as the door. In addition, close examination reveals that it may have been carved by a different hand than other decoration. It was possible that the carving was a later embellishment.

Like the sarcophagus carving, the coat of arms in the fretwork is not found on any other tall clock (*Fig. 3*). An evident link to the family that had once owned it, the shield also provided furniture curator Wendy Cooper with the perfect starting point for collaborative research on the clock's provenance, which was unknown at the time of the sale. It was noted that the shield closely resembled the one on a silver tea kettle owned by Yale. Fortunately, the kettle's provenance was documented: it had belonged to the Plumsteds, a prominent and wealthy Philadelphia family who would have known Peter Stretch's work. Other documentary evidence uncovered by Wendy also supported the idea that the Plumsteds could have commissioned the clock. Again, like the sarcophagus, the appearance of the finish on the fretwork differs from that observed on the body of the clock. It also appears to have undergone extensive repairs. Because the provenance of the clock hinges on this potentially unique motif, confirmation that it is integral to the original construction becomes important.



Figure 2. Sarcophagus carving



Figure 3. Coat of arms in fretwork

Establishing the verity of these two key decorative elements was the first goal of my study: Could I confirm that the sarcophagus carving and arched fretwork were original to the clock?



Figure 4. Detail of degraded door finish.

Regarding the state of the finish, as mentioned above, discerning the mahogany's wave on the interior of the door is much easier than on the exterior. The reason the figure is illegible from the outside is apparent when the case is examined closely. Its finish is quite deteriorated, with many losses and a heavily alligatored texture (*Fig. 4*). In addition, the thick islands of degraded finish appear darker than some of the losses around them. The mahogany's vibrancy is almost completely obscured by scattering of light and by a dark, opaque material. These phenomena gave rise to the second goal of my study, which was to set forth a number of possible treatment approaches.

In order to fulfill my objectives, I employed a variety of analytical techniques to understand the surface of the clock. After examining the case under long-wave ultraviolet light, I chose a number of locations from which to sample such that all surfaces would be represented, including the sarcophagus and fretwork. I took cross sections for microscopy and staining, and also removed microgram-sized samples for FTIR and GC-MS.

I performed microscopy first. I observed what I will refer to as a complete finish stratigraphy on original areas of the clock such as the door (*Fig. 5*). The very first layer is the mahogany substrate. Above it lies a discontinuous layer whose white fluorescence is indicative of natural resin. Its coarseness and worn surface suggest significant age. Because it penetrates into the pore structure, as is visible toward the right, it can be said with some confidence that this is the first layer of resin varnish applied to the piece. It can even be hypothesized that this is the original finish. It is possible that there was a previous oil or wax finish, neither of which would have survived within the wood's surface. However, resin varnishes were known for their superior enhancement of wood's grain, and for such a fine object as this one, only the best would have been used. Above this first layer lies another residual varnish, also containing natural resin. The discontinuous surface and granular texture indicate a great deal of age. The cloudy, nonfluorescing layer above this is most likely an accumulation of oil and wax-based polish. It lacks the more particulate look of dirt. That these first three layers seem to have survived only in low areas of the substrate's topography suggests that the clock may have been scraped down prior to the addition of overvarnish.

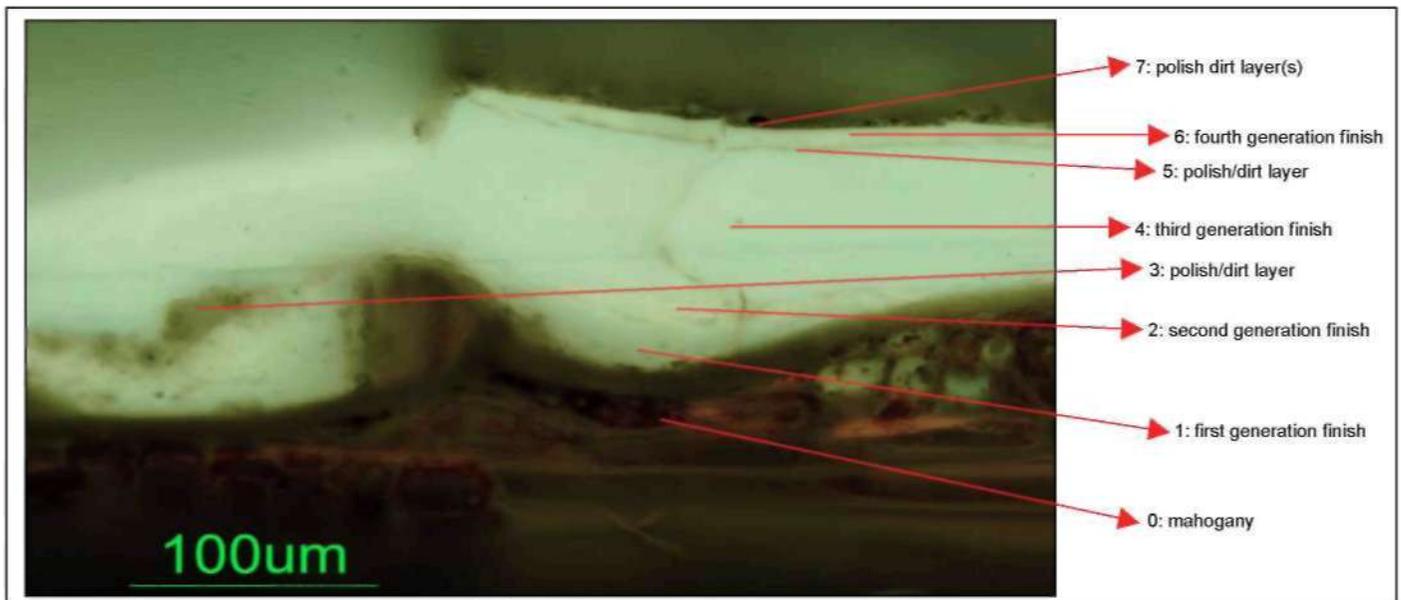


Figure 5. Photomicrograph of sample showing full finish stratigraphy, x200, violet light.

The following layer has a much brighter, even appearance. Again, it contains a natural resin component. This layer is quite thick, and in fact in other cross sections, can be seen to comprise several applications. Such a substantial layer may have been applied to smooth a worn, degraded surface. While somewhat weathered, this third-generation finish is still relatively even, showing much less age than the preceding layers. The barest suggestion of polish above this last layer indicates that the next campaign of refinishing occurred not too long after the third generation had been applied. The fourth generation finish is very thin; it may have been applied as a simple saturating coat to spiff up a surface already in good condition. Over this, a dark layer

can be discerned which is probably composed of applications of oil and wax-based polishes. The significant buildup indicates that the fourth generation, while the most recent, is still relatively old.

Initially, a comparison of this section with a sample taken from the sarcophagus carving shows two surfaces which look quite different (*Fig. 6*). However, a layer-by-layer comparison proves otherwise. There is a grayish material within the pores of the sarcophagus: this seems to correspond to the first generation finish. This layer is followed by an extremely fragmentary second generation finish

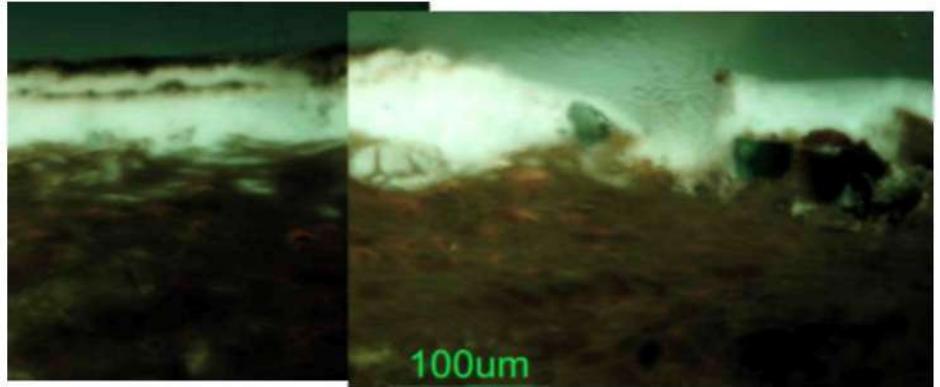


Figure 6. Photomicrograph of sarcophagus carving finish, x200, violet light.

layer. Globules of polish have collected at this point in the stratigraphy, and are followed by the third generation finish. The following polish layer on the sarcophagus seems blacker and grainier than in the first sample. This may very well be a collection not only of polish, but also of soot. The sarcophagus is a horizontal surface on the top of a very tall object. Soot from gas lamps and fires would be quite likely to settle on this high, hard-to-reach surface, and just as likely not to be cleaned. Next, the fourth generation finish can be seen, followed by an even thicker layer of what is probably a majority of soot with a little bit of polish. This analysis shows that the sarcophagus carving seems to give full evidence of containing a complete stratigraphy.

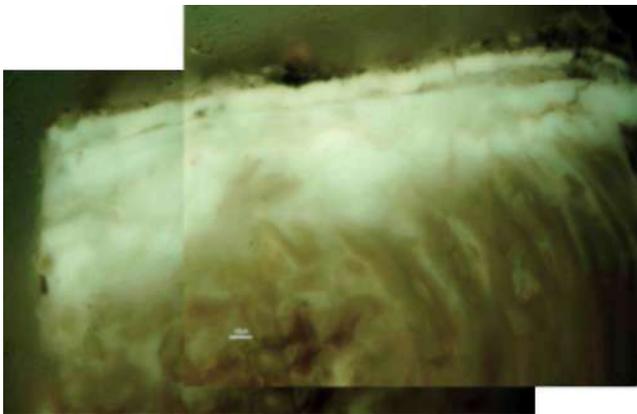


Figure 7. Photomicrograph of fretwork finish, x400, violet light.

Next, a sample from the fretwork will be examined (*Fig. 7*). The now-familiar first layer can be readily detected, embedded in the pores and remaining in crevices on the surface. A noticeably granular second generation layer can be seen over this, followed by just a smudge of a polish layer. In the third generation finish, two application layers can be seen. A polish layer lies over this and underneath the fourth and most recent layer of varnish. Another layer of polish completes this stratigraphy. The fretwork, then, also appears to display a complete finish stratigraphy. In fact, I found the layer structure on this area of the clock to be in the best state of preservation. This may be because this

surface is high enough to be infrequently polished, and also oriented in such a way that it does not attract dirt.

I also carried out fluorescent staining with Rhodamine B to test for an oil component. One sample which was stained came from the side of the hood, which has a full stratigraphy. The resulting bright red-orange, visible with a green cube, was a clear positive reaction for oil, but it should be pointed out that the ethanol carrier also dissolved the varnish layers, giving them a satiny appearance. Therefore, while it can be said that there is oil in the finish, it is impossible to pinpoint the specific layers containing it. However, it is worth mentioning that many period recipes for finish and polish do include an oil component along with resins and other materials.

After this initial analysis, I attempted a more definitive material characterization through FTIR of finish scrapings. However, this technique yielded only the most general information. Most library searches done on the resulting spectra provided a number of matches. A significant limitation of FTIR is its difficulty in analyzing complicated organic mixtures, which these samples certainly were. The only real conclusion that could be drawn was that the surface appears to contain natural resins. Based on microscopy, we already know this is not the whole story. I obtained better results from a scraping of polish residues which had collected on the door's brass keyhole surround, probably because I was dealing with a less complicated composite material. Here, FTIR revealed the presence of oil and an abrasive. Both these classes of materials were common components of period polishing compounds.

GC-MS, being a better technique for analysis of organic mixtures, was the next step. It was able to tell me not only that the natural resins on the clock are pine-derived, but also that there is oil and beeswax in the finish. The oil could be present in both finish and polish layers, and the wax is likely in the polish. These very same materials are present in polish residues, although, not surprisingly, oil is the major component here.

To summarize the results of my finish analysis: I was unable to obtain a layer-by-layer material characterization. Nevertheless, I can say that analysis of the clock case finish has shown a layer structure and material composition consistent with an aged, possibly nineteenth century surface, which may include the original varnish. The sarcophagus carving and fretwork are included in these statements. Other avenues of research are certainly open which could yield even more conclusive evidence. But the present findings, taken into consideration in conjunction with previous scholarship and connoisseurship, provide a very compelling argument that these ornamental flourishes are original to the clock. That the clock appears to be in fact every bit as incredible as we hoped is wonderful news, and one can almost hear the sighs of relief.

Onward, then, to the second question, regarding treatment. A sample from the door, contains no substrate and only traces of the earliest layers, but possesses a third generation layer that is quite apparent, down to the multiple applications (*Fig. 8*). Losses and crazing in this layer are the largest contributors to the alligatored surface and transparency-reducing reflection of light from resulting edges. Also striking about the door finish is the thick and varied layer structure visible in just the polish at the top. No other cross section displays this accumulation of polish. It is likely that routine housekeeping more frequently affected highly visible and accessible surfaces such as this one. Areas out of reach and above eye-level, such as the fretwork and sarcophagus, would have escaped this heavy maintenance. This could explain the more intact appearance of the finish in these areas; they were simply touched less often. The result is that the most visible areas, where the best mahogany was used, have the most numerous polish layers. It is ironic that the portions of the clock that were the most cared-for are in the worst shape today.

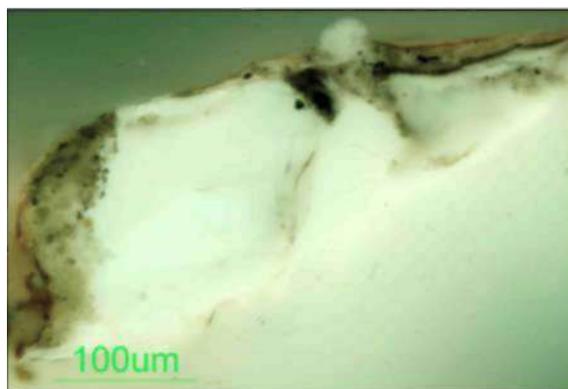


Figure 8. Photomicrograph of door finish, x200, violet light.

The silver lining is a number of treatment options should be possible, because the great majority of the opacifying material lies right at the surface. In addition, there are two layers of overfinish protecting the oldest surfaces and providing a significant buffer for treatment. The general

knowledge gained from material analysis also suggests that separation of layers should be possible to some degree.

Of course, it is just not that simple. In the world of furniture, old-looking finish can be considered sacred, and the market value of objects, though we hate to have to think about it, is often determined by the age and appearance of that outer skin. Knowing a surface *is* treatable does not necessarily make it a candidate for treatment. Furniture, as both a functional and aesthetic class of object, lies in a vast grey area. To oversimplify, high-profile easel paintings, created to be looked at, are generally cleaned, retouched, and revarnished each generation to maintain maximum clarity of surface. Many functional ethnographic objects, on the other hand, despite an element of artistic flair, are often displayed with historic dirt and food remains embedded within their matrix. For these objects, evidence of use is of primary importance. When it comes to *furniture*, we haven't yet come up with a generally accepted approach. Yes, it is functional, and the finish should display evidence of use and age. But finish also serves in an equally important aesthetic capacity to maximize the natural beauty of the underlying materials, and the play of light off their form.

So should we move forward to treat the current surface of the Stretch clock or not?



Figure 9. Base of clock case.

The surface shown to the left contains the object's full history. From one point of view, the fact that this object retains its full history renders it an incredible time capsule which should be left alone, although it no longer fulfills its intended aesthetic function. However, the original intent of the maker, who wanted the mahogany to be shown off to its best advantage, is no longer a factor in our experience of this object. To illustrate the opposing argument, imagine a curly mahogany guitar with a newly finished surface. Almost all curly mahogany used today is found in small objects such as this one, and representations of wavy mahogany seem impossible to find. As has been stressed above, the wood used for this clock case is beyond rare. Where the rather crudely-done repair on the base has disrupted the surrounding old finish, one can see a glimmer of the incredible impact this bookmatched wavy mahogany once had (Fig. 9). From the point of view which emphasizes original intent, the surface of value has been lost.

In March, 2006, at Winterthur's annual Furniture Forum, the Stretch clock was a hotly debated topic. At one point, curator Wendy Cooper asked the audience of collectors, scholars, conservators, dealers, and curators what *they* would do if they owned it. The overwhelming majority said they would treat it in some way so as to improve the appearance of the finish. In fact, Winterthur's woodies were attracted to the clock not for its "fine old finish," but for the over-the-top, rare combination of carving and wood. If anything, the state of the finish was a deterrent.

Say it was decided to treat the surface. In this case, a new question would arise: How far should treatment go? In other words, can we find an ethical compromise between original appearance and current expectations of how an antique like this should look? Naturally, there are a number of options. A stylized depiction of the finish can be used to describe the choices with which we are faced. It is important to keep in mind that no matter which approach or combination thereof were chosen, a patch of untreated finish would be left to preserve evidence of the full history.

The most minimal action that could be taken, of course, would be none at all. The clock could be left completely as is, albeit in the best possible environment. Evidently, the interpretation of the object would remain as compromised as before. The next possibility would be the addition to the current surface of a thin saturating layer, perhaps of wax. However, while this treatment might be

completely appropriate for another piece in better condition, it is unlikely that much improvement would be effected in this case. Perhaps the texture of the surface might be addressed in a *more* additive manner: the losses might be filled with a resin, natural or synthetic, directly over the current surface. Because of the oily, waxy polish layers, this treatment would theoretically be reversible. The end result might be a smoother, more coherent surface, but the danger exists that this treatment could lead to a plasticky and lifeless appearance.

So far, nothing that has been suggested is really controversial, in that no existing material has been removed. But what if we were to reduce or eliminate the upper, opaque layers to restore transparency to the surface? Even if actual finish were affected, there is such a thick layer of overfinish that the *earliest* layers would remain protected. In fact, reducing some of the thickness of the varnish might be a good idea, since in one fell swoop both conditions of darkness and excessive topography would be much improved. A thin coating of synthetic resin could then serve to protect and resaturate the surface.

There *is* precedent for this type of treatment within Winterthur. The stunning Empire suite, acquired in 1989, arrived with surface problems quite similar to those of the Stretch clock. The opacity and crazing of the finish was extremely distracting. The particular method chosen for this treatment was to mechanically reduce the upper layers of a thick, insoluble overvarnish, and then thinly spray the surface with B-72 in a solvent that would not affect the finish. The result was amazing, and today, more than ten years later, this suite is still in wonderful condition. Clearly, this treatment is not appropriate for every object, but in this case, it was hugely successful.



Figure 10. Photoshop restoration of "original" finish.

Yet another possibility, which is not treatment-oriented, but could be combined with a preventive approach, is to completely take the burden of interpretation off the object. Perhaps a reproduction could be made, although I do not envy anyone given the task of finding matching mahogany. Or, Photoshop, our favorite software, could be used to approximate the original look of the clock. This image could then be displayed alongside the untreated object. With my limited Photoshop skills and a little bit of help, I have actually attempted to do just that (*Fig. 10*). Of course, I could not find any images of wavy mahogany, so I made do with a photograph of a door frame from Winterthur's curatorial offices. It is made of wavy birch, a much more common wood with a similar figure. Several chewed fingernails later, I came up with an image of a restored clock, closer to how it might once have looked. While this doctored photograph may be a far cry from reality, if one stretches one's imagination, one can begin to understand how much this object might benefit from treatment.

In the end, there is no one right answer, and whatever happens to this clock will leave *somebody* unhappy. I would hope, though, that through this study, I have been able to contribute a piece to the treatment puzzle that will aid Winterthur's conservators and curators in making the most informed choice possible. I feel that I have given some sort of representation to the silent but central party in this discussion—the clock itself. I have tried to show just how important appearance is to the interpretation of this incomparable object. To throw in my *own* opinion—I feel that we cannot, in good conscience, deny this masterpiece its full expression. The clock deserves it.

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