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The Meissen Fountain Project: Restoration in the age of digital reproduction

On 4 February 1748 Sir Charles Hanbury Williams, the British envoy at the court at Dresden, wrote a letter home recounting his impressions of a lavish dinner party that he was invited to. Central to this enthusiastic impression of his evening was a porcelain table fountain:

I was once at a Dinner where we sat down at one table two hundred and six People (twas at Count Brühl's) when the Desert was set on, I thought it was the most wonderful thing I ever beheld. I fancyd myself either in a Garden or at an Opera, But I could not imagine that I was at Dinner. In the middle of the Table was the Fountain of the Piazza Navona at Rome, at least eight foot high, which ran all the while with Rose-water, and tis said that Piece alone cost six thousand Dollars. (Gleeson 1999)

In 1870 the Victoria and Albert Museum in London acquired a large number of porcelain objects. Amongst this hoard of objects in a fragmentary and 'much shattered' state, with no accompanying information, was the table fountain that Hanbury Williams described: Von Bruhl's fountain, made by Meissen only around thirty years after they had invented European porcelain.

With no clear vision of how this group should be configured, it has been displayed since this time in the Jones Galleries using only the main figural pieces. While the fountain has been included over the years in some specialist publications, with its original provenance lost and little information available, the fountain has been only mentioned in a cursory manner.

Rethinking the restoration and representation of the fountain

As part of the Museum's constant renewal plans the display of ceramics has undergone large changes in recent years, with the Ceramics Galleries being entirely restructured four years ago. One of the current major renewal projects is the European

Galleries 1600–1800, where the Meissen fountain will be displayed. It is Reino Liefkes' vision that the fountain, which at 1.5 × 4 m is the largest single Meissen porcelain figure group in existence, should be restored to the position of prominence that it deserves and will be a central part of the New European Galleries when they open in 2014. Reino's challenge has been to try to restore the fountain as faithfully as possible to the original that Von Brühl commissioned in 1745. With very little extant information this has involved extensive multi-disciplinary research in order to evaluate just what that original fountain looked like.

In this article I shall discuss some of the new methods, issues and much discussed approach that has been applied to this restoration, in the context of the age of digital reproduction and in the search for new types of authenticity.

Reino began by inspecting the additional objects from the original acquisition, held in the V&A stores, and it soon became very clear that there were many more fragments amongst various other Meissen groups that belong to the fountain. But making decisions as to how these sections fit into the larger plan was problematic and he needed to gather more information and generate a better understanding of the original construction. There had been some research that gave the inspiration of the porcelain group as a monumental fountain in the grounds of Von Brühl's pleasure palace. A recent publication was found relating to the restoration of what is known as the Mattielli fountain, after the original architect, alongside architectural plans of how this would look. Having found visual information to relate to, it was clear to Reino that there were a number of fragments in the V&A stores that could be utilized in the reconstruction, but that this would still leave a large number of pieces missing, mostly from the main central section.

The next step was for Reino to visit Dresden to see if there was any further information that could be gleaned by observing the monumental fountain, or talking to experts at the Meissen factory or in the archives held at the Dresden Museum. He was shown a number of architectural drawings made over 150 years relating to the building of Von Brühl's garden fountain, which it was now clear was indeed the inspiration for the table objects. Knowing that the large fountain in the palace grounds was the key to understanding the V&A objects, Reino brought with him specialist photographic equipment and Carlos Jimenez to provide specialist support in recording every detail of the fountain.

Whilst visiting the store-rooms of the Dresden Museum another major discovery allowed the project to leap forward as Reino was shown a nineteenth-century fountain which, apart from also being incomplete and finished with polychrome painting, was the exact copy of the original. This smaller edited group of objects was produced from the original moulds from the mid eighteenth century and, as fortune would have it, this copy had almost all of the parts missing from the original at the V&A.

Reino now had very good visual guidance relating to the overall composition of the fountain and he also had the possibility of accessing all the missing parts, either from the V&A store of fragments or from the stores of the museum at Dresden. The information was tantalizingly to hand to make the fountain complete again. Conservation could restore the broken fragments from the V&A stores and the exact missing parts made from the same original moulds were in the Dresden stores. But the question was: how could these parts play a role in the restored version?

Reino began to formulate a new plan to restore the fountain, and he made a second visit to Dresden with Carlos. On this occasion they brought with them a high-end 3D scanner to visually capture the missing objects. With the newly discovered information and the help of new technology, Reino decided to attempt a complete restoration of the fountain as close to its original state as possible. This meant a conventional restoration of the fragmented parts and reproduction of the missing objects using the 3D files. On his return to London Reino contacted Professor Martin Smith, who heads up the Ceramics and Glass programme at the RCA, and proposed to work with us to recreate the missing elements.

Curation, conservation and creativity: Searching for the authentic copy

This is a very new approach for the museum to take in the restoration and display of an exhibit, and a new approach inevitably provokes discussions concerned with making the most appropriate decisions. The many discussions that I have had at each of the stages in realising the project have been three-way between Reino Liefkes, curator, Hanneke Ramakers, conservator, and myself as maker. The aim of these discussions is to arrive at a consensus of opinion relating to the methodological direction of the restoration project.

These discussions inevitably relate to authenticity: there are old parts and we aim to make new parts, but how do these new versions fit into a museum collection? A display of partial elements, such as the fountain, has often in the past taken the approach of just hinting at what is missing. A neutral shape or coloured space is used in place of absent elements and hangs back from the original objects, asking the viewer to complete the exhibit in their mind. The relationship between 'authentic' element and the mere suggestion of what fills the gap is clear. What we are trying to do with the fountain is far more radical in museum terms and possibly closer to the restoration of historic buildings where it is standard practice to attempt a full renovation in the materials and spirit of the original.

Within a museum full of objects, this approach presents many issues around the notion of authenticity. Conservation has strict guidelines governing any actions that they are involved in, and which Hanneke has been trained to consider at all times. For example, the new pieces should look close to the old ones but not so close that they fool the public into thinking that they are one of the early Meissen pieces. This guidance can become even more specific in some cases, and the advice for predominantly white objects like our fountain is that the new parts should be slightly darker or duller than the originals in order that they do not draw the eye from the historic objects. Reino as curator also wants to show the public the 'truth' of the fountain, but he wants to present it to them in a way that brings back the original spectacle of the piece. This requires new methods that get as close as possible to the idea of the authenticity of the original display.

What information exists?

A major defining factor in making informed decisions about the fountain is the available information. We have the following:

- Original architectural plans of the monumental fountain in Von Brühl's palace grounds made by Mattielli
- Newly made survey plans of the Mattielli fountain produced for that fountain's restoration
- Photographs and measurements of the Mattielli fountain
- Photographs and measurements of all the Dresden elements
- Photographs and measurements of the V&A fountain elements
- 3D scans of all the Dresden Museum elements
- 3D scans of all the V&A elements

Using this information, we have arrived at an overall plan of how the fountain should look and the composition of the group.

One of the questions that we asked ourselves at the beginning of the restoration is: what can 3D scanning and 3D printing technologies bring to the fountain project that is different to conventional restoration? The most straightforward answer is the reason that Reino instigated the 3D scanning in the first place: that it would allow the missing pieces to be reproduced. But was this the most appropriate way to achieve our aim of authenticity? What other approaches could we take?

The Museum at Dresden offered to take moulds of their objects, but this would have left us with a problem of scale. Whoever it was decided would make the models and moulds would need to scale them up to allow for the substantial shrinkage of porcelain when fired to a mature state. The Dresden offer would not allow this change of scale and therefore the objects would have had to be cast in a material such as resin.

Meissen said that their approach, which was not offered to us, would be to have Uwe Marsehner remodel the missing parts by eye as oversized parts. Meissen are currently doing this to remake missing parts (candlesticks) for their famous 'Swan Service'. This would allow for the change in scale and would come with some authenticity of being made by the original company.

Would the parts remade by the company who made the original be more authentic than the 3D scans? Would casts of objects made from the original moulds and made in a different material be more authentic?

Considering all the options, Reino decided to use the 'impartial "truth" of the scanner'. He felt that the authenticity of the fountain lay with the original 'hands' from the eighteenth century, not with a contemporary approximation, albeit from Meissen. The scans allow us to access the Meissen of 1745 and there, in our opinion, lies the authenticity of this project.

As well as capturing information from the past production, the technology has some very practical benefits for the project. Using the 3D scans it would be a simple matter to oversize the scanned information and have the models output to allow for the shrinkage. Using the 3D scanner has also allowed us to recreate two pieces that were missing from the original in the V&A collection. There are two sloping walls on either side of the construction. For some reason Meissen did not remake these elements when they recast in the nineteenth century and chose instead to make an edited down version, and so they are also missing from the Dresden Museum group. The two from the right-hand side of the V&A original version were found in fragments in the storeroom and were able to be fully restored by conservation. This involved the pieces being laboriously cleaned with specialist materials and processes and then bonded strongly but temporarily (in accordance with current practice) back together. The two right-hand sloping walls were then scanned and a straightforward mirroring of the scans 'brought back' the missing right-hand objects.

Issues of using the 3D scanner

One issue that concerned us about using the scanned information was whether we would lose a lot of the subtleties of detailing because the original scanned object was glazed. This was a major concern when it came to look at the larger of the sloping wall pieces, which has very detailed modelling on its front section. Usually when taking 3D scans of objects that have a reflective surface or some translucency the surface is prepared in some way by painting it or dusting it with powder. Conservation issues prevented us from doing this and our worry was that there would be some information lost as we only pick up the very top glazed surface. This would be worsened when we came to glaze the new versions and the fear was that our glaze layer would obscure this detail even further.

We decided to focus our initial trials on a section of this large sloping wall. The section included some of the 'dripping fern' or 'icicle' detailing that is used throughout the fountain and we hoped that this would allow us to evaluate the pooling of the glaze better. A small section was 'cropped' from the scanned file, cleaned up and output by stereolithography as a 3D print in resin. When we compared the section with the original we were extremely pleased to find that there was no discernible loss of details. In fact it would appear that the scanner had penetrated the surface to some small degree and, in the case of these details at least, presented us with information closer to an unglazed version. Once more the technology enabled us to get a little closer to the original information that we were seeking.

Choosing and costing technology

We were far less pleased, however, with the price of using this particular technology. One of my tasks at the beginning of the project was to review the budget that had been allocated to the production aspect of the project. It became immediately clear with the price of the test section that this particular technology would be prohibitive for making the models. The objects range in size but there are a number of very large ones, and with the oversizing factored into the price the cost of producing them by any kind of RP technology would come in at least twice what the museum would be prepared to pay, even after we managed to raise the production budget.

We looked into a number of different methods for outputting the objects before deciding upon CNC machining. This procedure proved to be the most cost effective for a number of large objects, produced in a very robust material that moulds can be taken straight from. The choice was also appropriate to produce the simple level of topographic detail that most of the larger parts have. Some of the objects have large areas that are quite plain and do not require the sophisticated print resolution of RP technology.

There were concerns, however, that where there are details, such as the front of the sloping wall, would the machining approach be able to produce it accurately enough. We considered a hybrid approach to produce these objects, having the two different technologies make the models and then join them together. But a comparative sample of the same sloping wall section convinced us that the machining could handle the detail. By incrementally going down through tool head sizes to the most appropriate

scale, CNC machining accommodates the production of areas with both sparse and fine detail.

Two of the parts, the wheel hub and one spoke, are very much smaller than the other parts and they will be 3D printed and slip-cast to enable us to produce multiples that can be pieced together to form the two missing wheels. Two other objects that have multiple parts are the small border elements seen in the lower part of this image, and these can be sledged using traditional techniques, making further savings.

Truth to materials?

With the methods for making our models established, we turned to working on the aesthetic qualities of the objects themselves, but how close could we get to the originals in terms of materials and processes?

Some of the broken V&A elements enabled us to make detailed micro-observations of the cross-sections of the glazed ceramic body. This showed us that the glaze was clear and that the 'colour' of the white came from the clay alone. The invention of European porcelain provided the foundation of Meissen in the early eighteenth century and our early tests in clay quickly revealed that to get anything approaching the incredible visual qualities of the early Meissen objects we would also need to use porcelain.

It was clear from the start that we would not be recreating the actual clay and glaze formulations. It would also be impossible to recreate the conditions of once firing the work in a wood-fired reduction atmosphere to temperatures over 1,300 degrees. We decided getting the porcelain to have as close an aesthetic quality to the original material would be as far as we could go within the constraints of the project. With this in mind I trialled every commercial porcelain that I could access, adding almost homeopathic amounts of blue colorants to both the clay and glaze in order to move away from the slight creamy white of most porcelains and get closer to the blue-white tinge of the Meissen reduced ceramic.

Accurately identifying the shrinkage of our clay recipe has been the most crucial measurement of the project. If this is wrong then the parts will not align properly. One of the details that we had to double-check was to compare the true scales of the scanned objects that both collections have. Our concern was that in the intervening one hundred years between making the two groups, Meissen had developed a slightly different formula for their clay with a different

shrinkage. We checked this by comparing footprints of the seahorse base owned by both the V&A and Dresden Museums – reassuringly, the scans were the same size.

Having inched closer to the original aesthetic with our clay body and glaze we decided to focus on producing one piece, the seahorse base. Because we now have the moulds for this object, I am able to make as many attempts to realize the piece as is necessary. I initially trialled three versions of the seahorse base without adding any sprigged details. The aim was to pin down the final miniscule amounts of cobalt-derived colorants in the clay body and glaze. I also made a quick attempt at replicating the original surface tooling so we could see how the glaze pooled.

Another issue that we have discussed at length is the patina, dirt, and discolouration of the original pieces, and which you can see on the original to the right of this image. How far does conservation go in removing this, and do we address this aesthetic aspect in making the new works? With the aim to return the fountain to its former glory, some cleaning is appropriate and conservation has strategies for removing dirt and leaving patina. What remains is a much cleaner object but the important evidence of use remains, such as where the minerals in the water from the running fountain have left their trace, as illustrated in this image. As we can see, the new pieces have none of this discolouration, and it was decided that adding any would be too theatrical and diminish the nature of them as replacement parts, that the patina would be fake and this would reduce them to being props. The original Meissen objects would have looked like our versions when new and so there is some precedent for their cleaner condition. At the same time, from a conservation point of view, perhaps this is the most appropriate visual sign of them being newly replaced parts and testimony that we're not trying to deceive the public into thinking of them as the early versions.

Returning to the issue of the hand-tooling marks that are on the surface of the originals, it was obvious in making these first three full-sized tests that these surface marks were completely wrong. If I were to get closer to the originals it would be better if I could work on them while observing the original small section of this object. This is quite tricky to arrange as it is one of the 1745 pieces and needs to be escorted from the museum to my studio and back. But it has allowed me to be much closer in replicating the surface marks and hand-modelled sprigs.

I am currently a little over half way through the project and on target in meeting our aims; we have established the approach, the budget, methodology and aesthetic aims for the project, and the specific methods for realizing the objects. What remains now is for me to produce all the missing objects, still a large challenge, which will take me up to March 2014.

New edition? definitive state?

The original fountain was intended to be a one-off piece of spectacle. If we consider the original production of the fountain back in 1745, the objects could have been produced through unique hand-modelled elements. Transposing the objects into cast elements, however, was a more effective approach for Meissen to take for a number of reasons: Taking a mould from the model and press moulding a copy was a more practical approach than having to consider the practicalities of firing whilst hand-forming a unique piece.

If the piece went wrong during its production then it would be simple enough to produce another. In addition to this, any subsequent breakages could be easily replaced; this was after all a very large group of ceramic objects that would be regularly set out and put away by Von Brühl's staff. By physically 'capturing and storing' the information of the fountain in mould form as a means of production, Meissen adopted from the beginning a methodology of reproduction. This means that the notion of what is 'original' and what is 'authentic' becomes hard to pin down.

We start to get into a similar area that fine art printmaking occupies in terms of determining the differing degrees of authenticity in different editions of a work. We could consider the fountain restoration project from the perspective of the reproduction of printed editions. In this context Kaendler produced the original autographic information, making the models by hand based on the monumental fountain in Von Brühl's pleasure gardens. This information would have then been transposed into a series of piece moulds by other technical staff who would have run off the 'artist's proof' or 'first edition' that was marvelled at in Hanbury Williams' letter home.

We know that breakages occurred during subsequent use of the fountain, and that the broken elements were replaced by new 'editions' of individual elements. Much later on an entirely new edition was produced from the same master moulds. But with the loss of some information as to how the different elements would be displayed, and no knowledge of

certain finishing details, this 'edition', in print terms, went through a change in 'state'. This resulted in a much edited hand-coloured edition, the one that exists in the Meissen stores.

Through a great deal of historical and analytical research, the V&A restoration project has amassed a large amount of information, allowing us to build a much better informed opinion of how the 'original edition' looked. New technology has allowed us to access the necessary lost 'master' information, which had been locked into the moulds, and we are finally able to produce a new authentic edition of Kaendler's great work.

I'd like to briefly reiterate some of the transformations that this project has had:

- Initial concept and hand-drawn plans for a grand outdoor fountain realized in stone
- Clay models cast in plaster and then made in porcelain
- Fired and displayed
- Broken and replaced
- Lost
- Restored once in the nineteenth century
- Some broken parts found in the store rooms and restored at the V&A
- Some parts digitally scanned and manipulated, CNC machined in composite materials and remade in porcelain
- Original and replacement parts redisplayed together at the V&A

In the light of this amazing journey, who is to say what is 'the' most authentic information? What we can be absolutely sure of when the latest rendering of this truly zeitgeist object is displayed in the New European Galleries 1600–1800 next year is that it will be the most definitive state of the original fountain since Von Brühl first gazed at it in 1745.

References

Gleeson, J. (1999) *The Arcanum*. London: Bantam, p. 216.

All other information courtesy of the Victoria and Albert Museum, London, UK.