SIR DENIS MAHON GRANT SUMMARY

MA by Johannes Wagenknecht, Conservation of 3-Dimensional objects and decorated surfaces. City and Guilds of London Art School 2020-2021

"Dog of Alcibiades" by Austin and Seeley, 1832

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Aim of the project

Nomenclature

Cement: hydraulic mineral binder that hardens through a chemical reaction with water. After the initial set it can be put under water where it will continue to harden.

Concrete: composite material of cement, water and gravel

As stated in my application – the aim of this project was to investigate in detail an early form of Portland cement and its use in historical artificial stone casts. This field of conservation is still in need of further research and understanding as many concrete structures exhibit deterioration phenomena that are not always easily understood by conservators as the composite material can undergo complex changes leading to deterioration. Here an emphasis was put on investigating this historical material from a conservation perspective and trying to find appropriate treatment methods. The contemporary concrete industry employs highly scientific control measures to develop new products or examine failures in concrete structures. This is mostly related to civil engineering and building works and the methods employed do not necessarily lend themselves to conservation

approaches. For conservation practitioners this field is challenging as methods of examination and treatment need to be carefully considered before they can be employed on historical objects and buildings.

Influence of the Grant on the MA project

The grant allowed for this project to operate close to conservation standards regarding historical concrete conservation. It was even possible to add new information about this historical material to the current research. Notable mercury intrusion porosimetry and scanning electron microscopy data are not easily accessible and will support other practitioners in future projects as reference. These techniques are very valuable but not always employed as time and financial limits govern conservation projects.

Early concrete cast by Austin and Seely

Background History of the object

The "Dog of Alcibiades" was a very popular garden sculpture in 18th and 19th century Britain. It is based on a Roman Marble sculpture from the 2nd century ACE which is currently in the British Museum. Austin and Seeley produced these dogs in an early form of Portland cement and Roman cement. These casts can be found around England but their location is not always well documented. The company employed a casting technique that involved earlier forms of cement, i.e. roman cement, and the more recently discovered Portland cement. They produced chimney pots, planters, fountains, sun dials and a variety of sculptural garden decorations based on classical motives. The company was in business from the 1830s until 1877.

The "Dog of Alcibiades"

The 2nd century CE roman version of the dog was the model for Austin's cast dog from the 19th century. The British Museum acquired the roman marble sculpture in 2001 and it is currently on display in room G22. This sculpture is also called "Jennings Dog" after his former owner, Henry Constantine Jennings, who bought it in Rome between 1753-1756 and consequently brought it to England. Jennings apparently titled the sculpture "Dog of Alcibiades" , after the famous 5th century BCE Athenian general Alcibiades, who is said to have cut off his dog's tail to give the public something to talk about apart from himself.

Felix Austin presumably made a copy of the dog in the 1830s or earlier and sculpted another one facing the other way. He then was able to produce multiple casts of the dog in his novel artificial stone. The cast from Chatsworth House has experienced several restoration campaigns and as a consequence did collapse at least two times. Figure 2 shows the state of the cast before treatment started. At the end it was decided to remove detrimental fill materials and disassemble the individual fragments to secure them for storage.

Figure 1 Roman marble sculpture currently displayed at the British Museum

Figure 2 "Dog of Alcibiades" from Chatsworth house after collapse

Examination techniques made possible through the grant

Mercury intrusion Porosimetry (MIP)

This technique introduces mercury under pressure into samples which can be as small as 5 cubic centimetres. This method is especially useful for inorganic porous materials like concrete, natural stone or types of plaster.

The mercury gets introduced with pressure into a sample chamber and the amount and pressure is measured. The data can then be plotted which helps to classify the porous character of the sample. Results of this technique can inform practioners about the porous structure of the original materials which can then help to find appropriate repair materials that are compatible with the characteristics of the historical substrate.

Thin section petrography

This technique is commonly employed in concrete science to evaluate the quality in concrete designs. This method was originally employed in the field of geology to examine rock specimens. However, over time it has become a powerful tool in the concrete science industry. Concrete petrography is a complex topic on its own which needs considerable knowledge and experience to develop necessary skills to evaluate a sample. When properly used and understood it is a very useful tool which can provide information about:

- The type of binder
- The type of aggregate
- The ratio of binder to aggregate
- The water to cement ratio
- Inherent problems or defects
- Estimation of porosity

This list is not exhaustive and the depth of examination through petrography can not be understated. Like any analytical technique it has limitations. The most important from a conservation perspective is the sampling method which can be difficult to justify as samples need to be large enough to yield the desired information. Sampling from objects with high cultural significance might therefore not be possible or even desirable.

Scanning Electron Microscopy (SEM)

This technique is commonly employed in conservation science and other scientific fields. It goes beyond optical microscopy with higher magnification and even possible identification of certain atomical structures present in the sample. It is especially useful in concrete examination as binder identification can be reliably performed through this method.

Results

MIP and SEM examination helped to characterise this early form of Portland cement binder. MIP showed that the historical binder has a similar porosity to a strongly hydraulic lime or a natural cement. However, it is not quite as non-porous as contemporary Portland cement. This is of significance as repairs should therefore not be carried out with any form of Portland cement but alternatives have to be used by conservators.

SEM confirmed the presence of roman cement on the interior of the cast and identified blast furnace slag additions in the binder matrix of the early Portland cement. This blast furnace slag or commonly referred to in the concrete industry as GGBS (ground granulated blast furnace slag) is a standard addition in Portland cement nowadays. The presence of this material from cement of the 1830s is interesting and needs further investigation. Was this deliberately added or was it only a convenient contamination which improved the product properties?

Surprisingly the examination also showed that the artificial stone itself is in a good condition and stable. This confirmed that the main reason for the collapsing of the cast was primarily related to the inherent structural difficulties of the object, namely being a hollow cast object with insufficient load distribution. Furthermore, the inappropriate repair interventions by previous restorers, notable a large and heavy Portland cement fill in the head, accelerated this problem. This large cement fill caused stresses to the lower sections and ultimately lead to the collapse of the object.

Conclusion

The Sir Denis Mohan sculptural grant allowed for this MA project to employ scientific examination techniques which helped to characterise the historical materials and added to the conservation research in this field. These results will help conservators in the future to approach these and similar objects with appropriate treatment methods and materials.

Please feel free to contact me regarding this project and I will be happy to send you more detailed information on specific topics. I will complete the written work for the MA at the beginning of October and will make sure to send a digital copy to the Sir Denis Mohan grant committee. Thank you again very much for the support!

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