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Lightning talk: *A shot in the dark: How collaborative efforts illuminated an archaeological firearm*

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ABSTRACT

A highly corroded and incomplete late 19th to early 20th century firearm in Heritage Victoria's historical archaeological collection required conservation treatment and stabilisation. The firearm was excavated from an archaeological site in Melbourne's CBD and displays extensive iron-based corrosion related deterioration that appears to have contributed to structural losses, surface delamination and the formation of heavy soil and amorphous ferrous corrosion products. Important archaeological cataloguing and interpretation information, as well as conservation condition information are completely concealed due to the thick, iron-based, corrosion matter encasing the firearm. There are several analytical techniques available to conservators to assist in assessing the condition of corroded metal artefacts and reveal archaeological information (such as XRF, X-ray and CT scanning). In researching these techniques, the idea to acquire a complete three-dimensional rendering of the corrosion encased firearm with the intention to 3D-print the remaining internal object, was pursued by the author.

Contacting various institutions and creating connections with professionals within various scientific fields resulted in an email introduction to an instrument scientist at the Australian Nuclear Science and Technology Organisation (ANSTO). In collaboration with ANSTO, neutron tomography was performed on the firearm - a non-destructive imaging technique capable of distinguishing between materials of a similar density to a high degree of accuracy and contrast resolution. A comprehensive three-dimensional imaging result was attained and the internal structure of the firearm is clearly visible. Furthermore, the images indicate the firearm is possibly loaded with one round of ammunition. This important information was previously inaccessible due to the condition of the firearm and opens several avenues for possible future research, allowing further building of cross-professional relationships and collaborations. At the time of writing, this research is in progress and ultimately it is hoped this case study will offer an alternative method of documenting highly corroded iron-based artefacts, providing otherwise inaccessible and invaluable information to better inform conservators, archaeologists and other relevant cultural heritage professionals.

BIOGRAPHIES

Lauren Keating is a self-employed objects conservator based in Melbourne, with special interest and experience in historical archaeological conservation. Lauren was previously employed as an object conservator at the Heritage Victoria Conservation Laboratory and was the recipient of the Alexander Copland Award for her Masters of Cultural Materials Conservation minor thesis in 2011.

Dr Filomena Floriana Salvemini is an instrument scientist on the neutron imaging instrument DINGO at ANSTO, with expertise in neutron imaging and diffraction for the investigation of cultural heritage, physical metallurgy and archaeometallurgy. Filomena was a Ph.D. research fellow at the University of Florence, conducting her investigations at the Institute for Complex Systems.