

Neutron imaging, a non-destructive method for the study of mobile cultural heritage. A close collaboration with the Neutra team at the PSI

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The scientific staff at the laboratory for conservation research at the Swiss National Museum performs non-destructive or minimal invasive analyses of cultural heritage by means of micro X-ray fluorescence spectrometry, atomic absorption spectrometry and infra-red and Raman spectrometry, in order to determine the composition of metal alloys, adhesives, pigments, colouring, precious and semi-precious stones, corrosion products and preservatives.

For specific studies, other methods are required to get knowledge about inner hidden structures or the state of conservation. The common approach for this kind of investigations is to use thermal X-rays and/or cold neutrons rays.

In close collaboration with the PSI we already performed studies within several projects.

The flanged axe of Thun-Renzenbühl, dated to the Early Bronze Age, is decorated with numerous inlays of a golden metal and was investigated by neutron tomography in order to obtain virtual cuts of the axe in all three dimensions. This allowed studying the casting and decoration technique [1].

The sword of Oberwil, dated to the 15th century, was excavated from the lake of Zug in 2010. This sword, remarkably preserved, made of iron with a precious elaborated wooden grip and cross-guard, was also investigated at the PSI in order to study the sword and the decoration technology.

[1] Daniel Berger, Katja Hunger, Sabine Bolliger-Schreyer, Daniel Grolimund, Stefan Hartmann, Jan Hovind, Felix Müller, Eberhard H. Lehmann, Peter Vontobel and Marie Wörle; New insights into Early Bronze Age damascene technique of the Alps. *The Antiquaries Journal*, 93, 2013, pp 1 of 29 r *The Society of Antiquaries of London*, 2013; doi:10.1017/s0003581513000012.

Summary

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