

CT Scan

<https://www.bmb.gmbh/pruefverfahren/computertomographie-ct/>

CT scan and TL method in the application

The phenomenon of thermoluminescence (TL) has long been known in physics and has found its widest use in its application in the context of medicine and especially in radiation protection. In the field of archaeometry, this method has now been used for about 40 years

Luminescence refers to the absorption of energy in matter and its re-emission in the form of electromagnetic radiation of the visible spectral range or in its vicinity. If this is triggered out by heat, it is called thermoluminescence (TL)

For works of art made of fired clay, the absorption of energy by particle bombardment, the so-called radiation-induced TL, is decisive.

The clay material to be examined consists of two components and is made up of two components

A: a certain percentage of TL-capable minerals, especially quartz, feldspar and some others more that are as good as radiation-free in their creation, as well as

B: the surrounding clay matrix, i.a. carrier of radioisotopes (uranium-thorium, potassium, etc.).

Quartz and feldspar as the main carrier in fired clays is able to store a certain part of the radiation energy that hits them. This effect makes use of the TL method.

There is no further detailed description of the physical fundamentals of the "TL" due to its meanwhile wide distribution. The current state of knowledge for the study of art objects is shown in detail in Aitken (1985).

The TL authenticity determination fulfills two necessary postulates of scientific dating methods (absolute dating):

It must be a process with constant speed, the reaction rate must not be dependent on external conditions or environmental influences.

The reaction must be at the time of manufacture of the object to be dated use.

For this, the "TL" method uses clay that is burned after forming into an object, over 500-700 °C, whereby the geological TL accumulated since the formation of the minerals is extinguished. - Zeroing- The extinction of the geological TL is the required response. The process of a constant speed results from the annual new inflow "annual dose" of energy to be stored up to the time of the measurement, the energy accumulated since zeroing!

The TL method thus determines the last time of heating, this is usually the time of manufacture.

Demands for a precise scientific dating of terra-cotta from collections, trade and museums are extremely rare in practical work, since the locality and its specific environmental factors and their measurement parameters for an exact age calculation can not be created!

The "authenticity test with a limited dating", the result of which mainly refers to material effects of the internal radioactivity and thus requires a greater variance of interpretation, is entirely sufficient to recognize modern work and assign work to different epochs.

2. Volume CT method in connection with the TL analysis and its possibilities of improving the statement of the overall object using the example of two objects.

The TL analysis can only give a statement about the samples taken. The sample is related to the particular location where it was taken from the object. A logical limitation of the number of sample withdrawals on an art object naturally opens the door to the non-discovery of manipulations. In the case of difficult questions and necessary demonstrations beyond the TL, the CT method presented here provides an as yet impossible view of the object to be examined.

This can be clearly illustrated by means of two following examples.

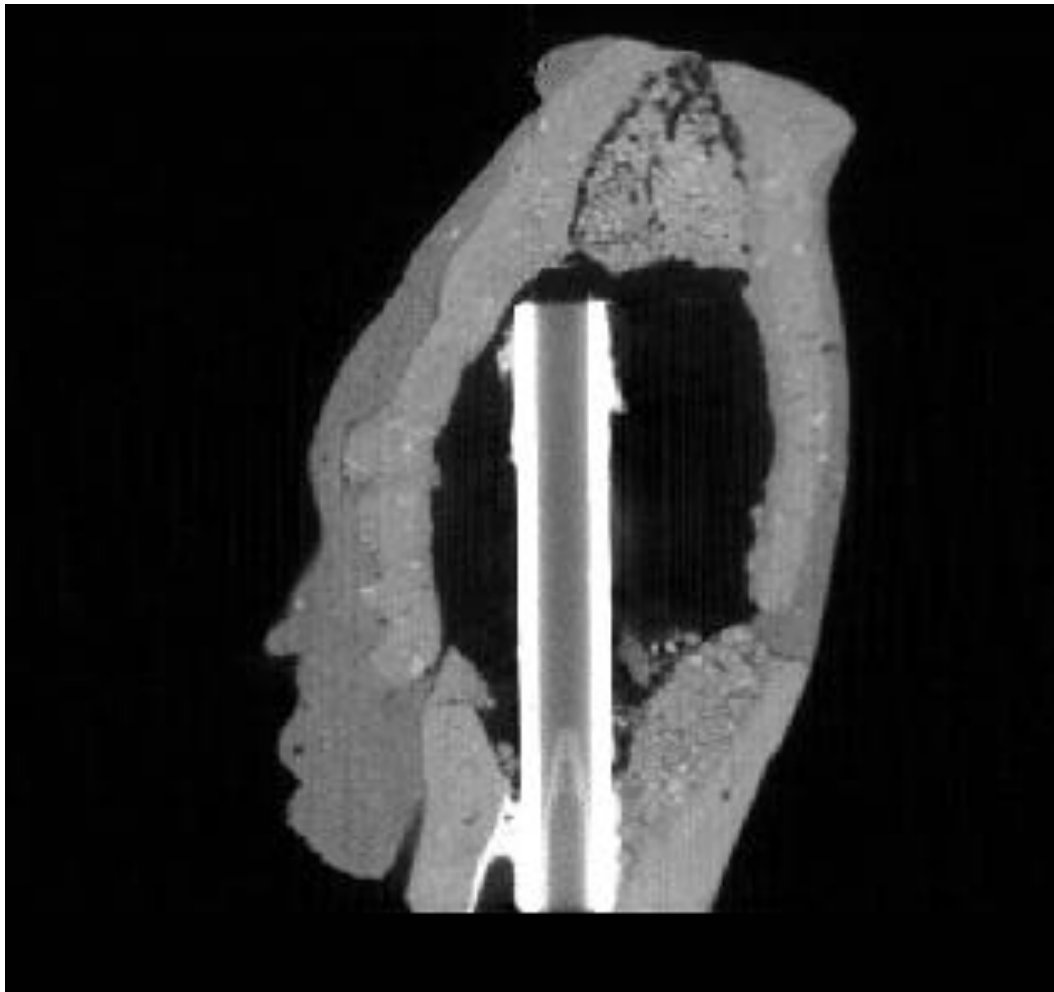
„Clay head" H: 15 cm



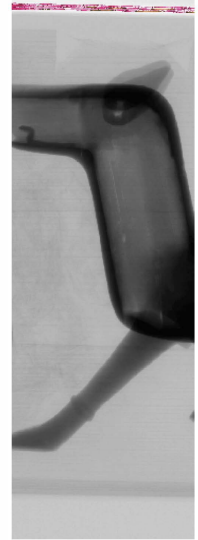
Prov. Nigeria so called Ife - culture

The TL analyzes gave no clear statements, only at a certain depth of the sampling and certain places resulted in a TL age. The overall result was "newly manufactured".

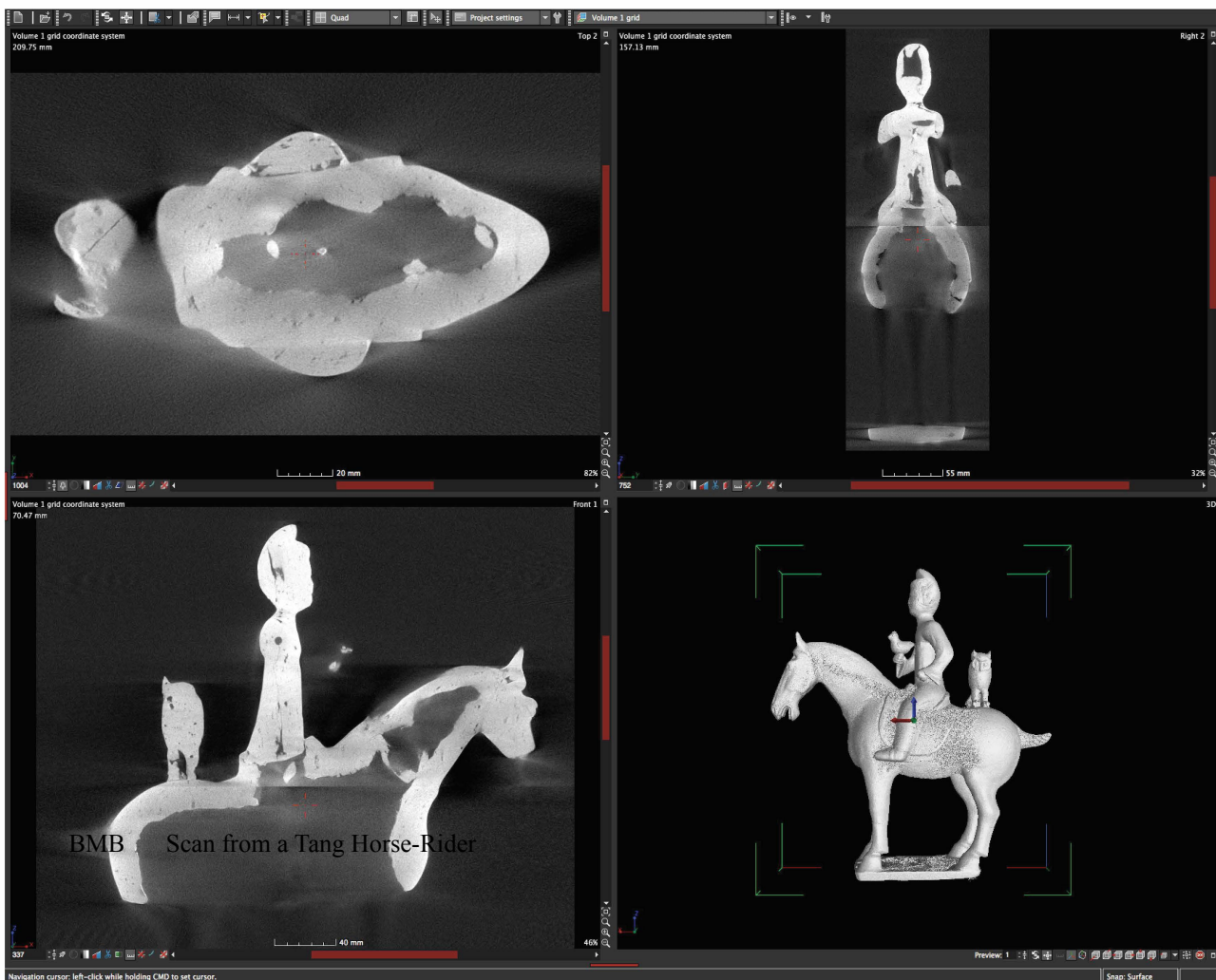
The CT scans exposed the object as a refine attempt, the TL analysis at appropriate "Happier ?!" "Sampling - places as" authentic "to place in the market. The CT clearly shows that it worked with original fragment pieces (T1 - authentic) and crushed material. The manipulation method is visualized here by CT. The TL sample of crushed material then gave newly re-fired result.



b. “Dog” fired clay H. 35 x 58 cm



CT-scan BMB Horse rider Tang



Conclusion:

The volume CT process offers the interested art market immense insight into closed objects of any design already from the outer skin. It is possible to obtain excellent information about the entire state of an object in advance of punctual analyzes. This not only rounds off the results of individual measurement and examination procedures, but also allows targeted access to avoidable vulnerabilities or to substantiate overall statements.

Literature:

Aitken M.J.

1985 Thermolumineszenz Dating , London

Chr.Goedicke , Kl. Slusallek und M.Kubelik

1985 Berliner Beiträge zur Archäometrie
Band 6 Tl-Datierungen in der Architekturgeschichte

Riederer , J.

1994 Echt und Falsch , Schätze der Vergangenheit im Museumslabor
Berlin, Heidelberg , New York



Kätzling 2 D-72401 Haigerloch / Germany

Phone +49 7474 / 9536-0 Fax +49 7474 / 9536-10

E-Mail: LabKotalla@Icloud.com Internet: www.kotalla.de