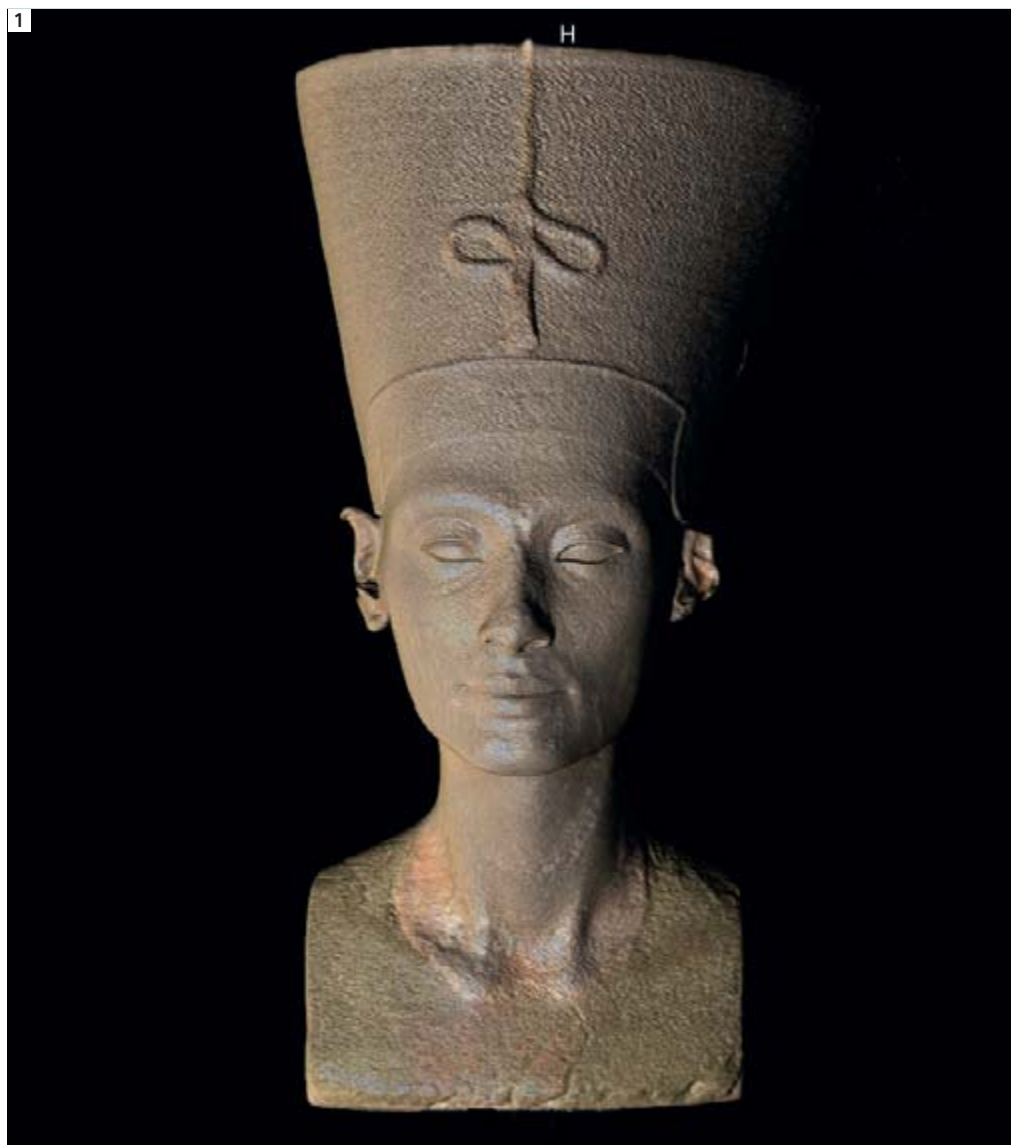


## Nefertiti's Bust – An Inside View

For decades, Nefertiti's beauty has captivated museum visitors. But what is behind the perfect surface? Modern CT technology increasingly becomes interesting for historical, non-destructive investigations. So plaster layers and the limestone core of the world-famous bust can now easily be virtually separated and evaluated.

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The name of the Egyptian queen means exactly what the bust shows: "the beautiful one has arrived." And she has arrived – or much better said, under extreme safety precautions has been brought – in the true sense of the word, to the Imaging Science Institute (ISI) at Siemens Medical Solutions in Berlin in order to be scanned by the SOMATOM® Sensation 64-slice computed tomography (CT) scanner. The examination was part of a research for documentation by the broadcaster, National Geographic, in cooperation with Prof. Dietrich Wildung, Director of the Egyptian Museum in Berlin. Thanks to modern CT technology, the researchers could make many inner details visible. Because CT technology has realized such tremendous advances since 1992 (when the bust was last scanned) the researchers expected a much more detailed separation of the limestone core and plaster surface of the bust revealing much more detail due to the improved image quality with 0,24 mm isotropic resolution of the SOMATOM Sensation 64. The state of the art volume rendering technique which was used created 1660 thin axial cuts of the bust. This enormous number of slices have been put together to display a 3 dimensional object. This method is typically used to view objects from all viewing angles to get a 3D impression of the object. By adjusting the Hounsfield scale according to the scanned material it is possible to show and hide the plaster layer over the limestone and vice versa. In addition it is possible to assign certain Hounsfield values to colors for easy differentiation between the displayed layers. Therefore with help of CT software, it was possible to virtually "remove" the plaster layer and



**1** CT-image from a SOMATOM Sensation 64 showing the pristine surface of the bust of Nefertete (without painting).

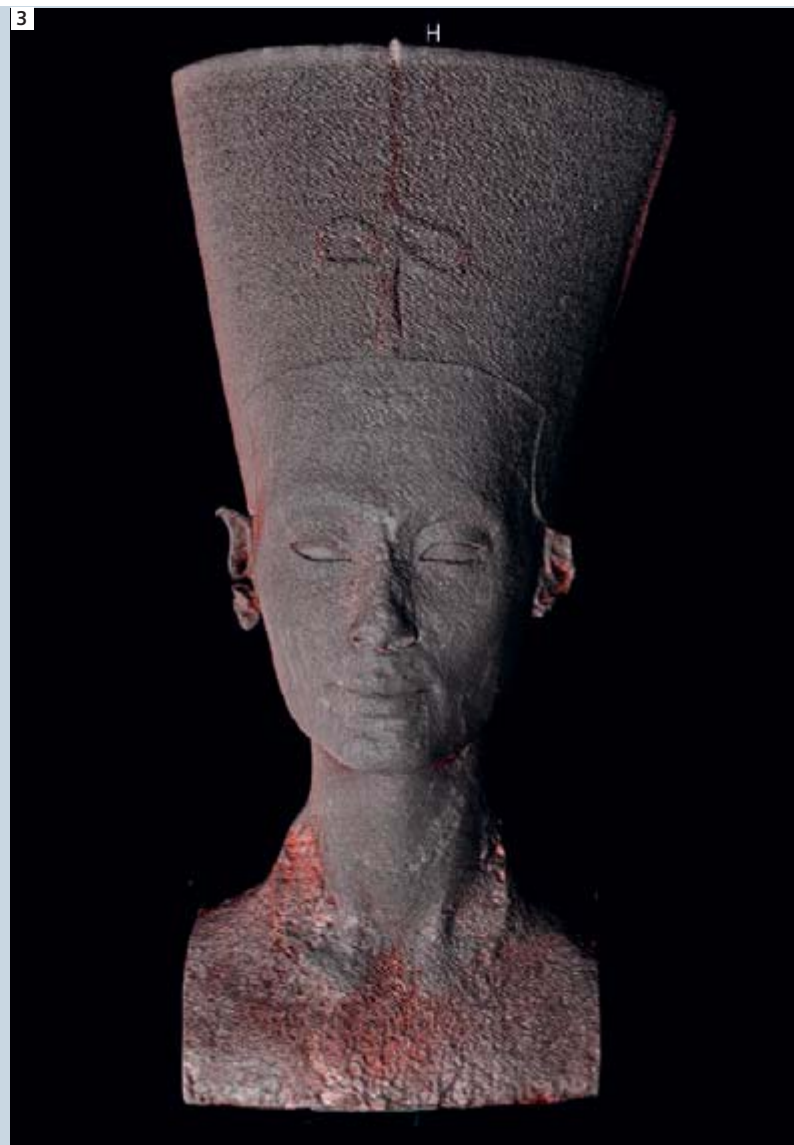
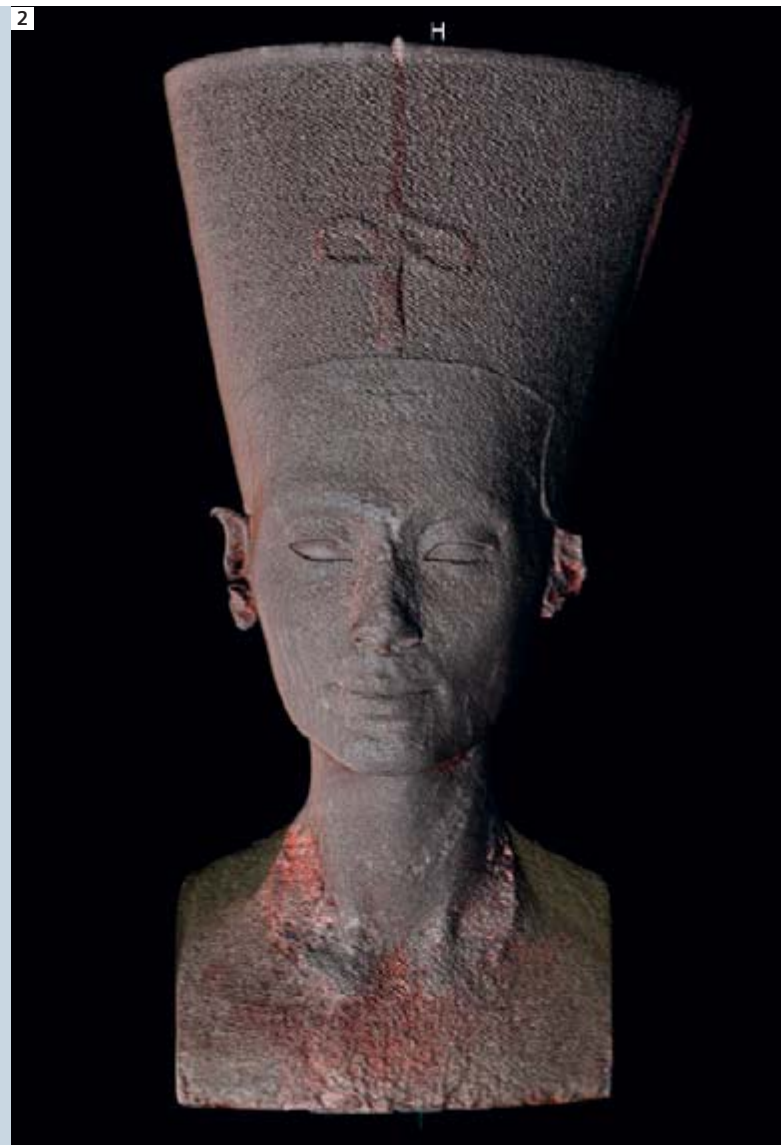
then, step by step, dissect the limestone core. The procedure revealed, in amazingly fine resolution, the rough limestone core showing slanting, asymmetric shoulders and a thin throat (Figs. 2 and 3). Discovering and establishing the practice of non-damaging examinations of Egyptian antiques has been described by Dietrich Wildung in 1992.<sup>1</sup> He conducted research according to the then-modern archeological standards. Quite an unusual idea at the time: spectacular findings were then seldom thoroughly investigated by fine arts experts to the different

composition of the materials. The research with CT scans firmly established that the composition consisted of a sculptured limestone core layered with plaster. Plaster was used here and in other details to modify the sculpture to the familiar form known today. Nofretete's bust was discovered in 1912 at the Egyptian desert village of Tell el-Amarna. Thanks to this world famous work by the sculptor Thutmosis, the queen enjoys worldwide recognition, not only by art experts, but also by the general public. As wife of Pharaoh Echnaton, she and her

husband, in their function as priests, represented the important God, Aton. During their rule, the royal couple often allowed various portrayals of themselves with their children. Results and interpretations about the CT-scan of Nefertiti's bust will soon appear in appropriate scientific publications.

Reference:

<sup>1</sup>Dietrich Wildung, "Einblicke – Zerstörungsfreie Untersuchungen an altägyptischen Objekten", 1992, p 133–156.



**2** This image shows the plaster layer over the shoulder area of the limestone sculpture of the queen.

**3** The limestone core of the bust, without plaster covering.