

# 3D laser scanning and digital assembly of the carven stones of Pathenon west frieze

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## ABSTRACT

For capturing the geometry and color of the Parthenon west frieze stones exhibited in the New Acropolis Museum of Athens (NAMA), digitizing by laser scanning was employed. Considering the large and heavy frieze blocks fixed in permanent positions, a portable laser scanner supported by convenient software was used. This technique is flexible in facing shadowing effects, displaying hidden superficial details and assessing immediately the recorded data. In the paper, the scanning process and efforts of exploiting the attained results are described. Considering the large size of the frieze's stones and the elevated accuracy requirements, the stone's surfaces were digitized in successive individual subareas. Via a processing of the obtained numerical results, the assembly of the subareas in a universal carven surface was enabled. In this way, a digital mapping of the exact geometry of the west frieze stones was achieved. A systematic evaluation of the obtained numerical data revealed characteristic geometrical features and common inclination of the background level of all stone's relieves. Moreover, the pleural slopes of the stones were estimated and theoretically approximated considering a uniform seams' width between neighbored blocks. Furthermore, the stones' digital geometry was imported into a virtual environment, where the mounting onto the corresponding sloped architraves was simulated. The epistyle's inclinations were determined based on published measurement's results facilitating the detection of the initial position of the stones in the Parthenon temple. The latter blocks' arrangement converges sufficiently with that one of the original stones exhibited in NAMA.

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