

"Building Archaeology" with Laser Scanning: Geometry-Based Architectural Analysis of the Franciscan Church of Szeged-Alsóváros

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Abstract:

In this article, we present our laser-scanning-based geometric analysis of the Franciscan Church of Szeged-Alsóváros (HU). The periodisation and building history of the church has been the topic of scientific debate: the chronological order of the construction of the vaults of the nave, apse and sacristy is not yet decided, and the dating of the nave's vault is highly uncertain. This building is also a great example by which to study the logic behind the designing and raising of such structures in the Gothic era. Based on the exact data we gathered by laser scanning the church, we analyse the layout of the walls, as well as the net (and stellar) vaults of the nave, apse, sacristy and the ground floor of the tower. Knowing the exact geometry, we propose a potential way of constructing the floor plan of the polygonal apse as well as other details. We also address the probable reasons for the plan alteration resulting in a significant difference between the shape of the lower and upper regions of the polygonal apse. Regarding the vaults, we highlight the geometric differences in the connections between the webbings and rib systems, the global geometry of the rib systems and the shaping of the individual ribs. Based on these descriptions, we discuss the probable construction strategies and building methods of the vaults and attempt the theoretical reconstruction of the building processes. The outcome of our research presented in this article is a description of possible methods and applied proportions for drafting medieval structures and a contribution to the periodisation of the Franciscan Church of Szeged-Alsóváros. In addition, the methodology and building archaeology strategies we applied during our work hallmark the new possibilities of non-destructive research methods opened up by laser scanning technology.

Keywords: *building archaeology, Gothic construction principles, Gothic building methods, laser scanning, geometry-based architectural analysis*