

# **ANALYSIS OF THE POSSIBILITY OF USING LASER SCANNING AND UAV PHOTOGRAMMETRY TO BUILD A 3D MODEL OF A HISTORIC CHURCH**

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The dynamic development of technology, which has been observed for several decades, results in the increasing availability of advanced measurement techniques. Terrestrial laser scanning (TLS) is increasingly used in architecture, archaeology, construction and geodesy. The transition from analogue to digital imagery has resulted in the development of computational algorithms used in photogrammetry. The widespread availability of unmanned aerial vehicles (UAV) has increased the area of their application. However, each measurement technique has certain limitations, which can be minimized by skilfully integrating various methods of 3D data acquisition. This makes it possible to create detailed three-dimensional geometric models, so important in the growing demand for the “digital twins”.

The aim of this work is to analyse the possibility of using laser scanning and UAV photogrammetry to build a 3D model of the church of the Assumption of the Blessed Virgin Mary in Biórków Wielki. Laser scanning was performed with a Leica P40 scanner, and photogrammetric flight with the use of a DJI Mavic Air 2S drone. Both the shape of the church building, the material from which it is built, the objects in the immediate vicinity and the fact that the building was under conservation protection posed a challenge to the measurement techniques used. On the basis of the acquired point clouds, partial models were made, which were analysed and compared with each other, and then used during the integration of measurement data. This allowed to empirically verify the scope of usefulness of the tested measurement techniques, as well as to assess the effects of their integration. The result of the work was a realistic 3D model of the historic church.