Static and Dynamic Measurements of the Historic Wooden Church Building in Domachowo

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SUMMARY

The history of medieval construction in Poland does not have many material heritage resources. At that time, building structures were largely wooden structures, and these, in turn, did not survive the test of time as a result of numerous fires, war conflagrations or damage caused by reckless exploitation.

One of the preserved objects with traces of medieval architecture is the parish church in Domachowo in southern Greater Poland. The architectural and historical research conducted in recent years indicates not only a change in the dating of the building but also a number of potential operational problems. Due to its numerous reconstructions and modernizations, it is now a complex structure with clear symptoms of the damaged original geometry. For this reason, a project was created to control the stability of the church structure, especially under the influence of extreme external factors - mainly wind gusts and uneven sun illumination. The implementation of the project required the simultaneous taking of two methods of measurement - static, at fixed time intervals, and dynamic, recorded on an ongoing basis during the operation of variable loads. Both types of measurements were made based on the experience of geodetic structural monitoring. For the purposes of static measurements, 9 reflective targets were installed, which are measured with the precision Total Station Leica TCRP 1201+ in relation to two fixed reference points. On the other hand, dynamic measurements are performed using two sets of inclinometers - two sensors POSITAL CANopen ASG15 and four WF-WM400 BWSENSING WiFi Wireless High-Speed High Accuracy Inclinometer Sensors. A CCL Electronics W100 weather station was also installed, allowing for ongoing monitoring of the external working conditions of the structure. The research conducted so far shows the stability of the church structure against long-term loads and at the same time relatively high vibrations and operation of the structure due to the pressure of violent gusts of wind - up to about +/-15 mm at the ceiling level. The subject of this publication is the presentation

of the methodology of the conducted static-dynamic tests and the interpretation of their results, mainly in the context of the assessment of accuracy, stability of long-term readings with inertial sensors, and basic structural and building assessment.