

Getting a Correct Geometrical Information from TLS Data for Building Constructions Control Surveying

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SUMMARY

Control surveys are an important part of geodetic works in construction. The main task of the control survey is to obtain actual deviations of structure from the project. Today, the most common methods of performing such surveys are total station and photogrammetric surveying. However, in recent years to carry out control surveys widely applied method of terrestrial laser scanning (TLS). A special feature of this method is the presentation of the survey results in several versions: point cloud, solid model and geometric model from geometric primitives. Each of these models allows to extract different types of data. Which of these models are used to compare with the project? At first glance, it is obvious to use point cloud after preliminary processing (cleaning, filtering etc.), because the cloud corresponds to the actual position of the structure. However, discreteness of point cloud often makes it impossible to fix the position of individual structure elements. The solid model allow to determine the position of all the elements, but its accuracy depends on the mathematical modeling algorithm. The same can be said about the geometric model, which is more approximate, but geometrically rigorous, that is, in theory, the most appropriate to the project. In this paper, on the example of the TLS data processing the accuracy analysis of the deviations determination was held. The deviations were obtained like a difference between project and real structure position using different types of models. As the object of study chosen religious structure, which contains a large number of geometric elements. The elements of this structure can be described by rigorous mathematical models. The methodic of quality evaluation of different models has been developed. The comparison of point clouds, the solid model and geometric model with the results of the total station surveying have been performed. These four types of data were then compared with the project model. As a result were obtained the deviations, which can be analyzed to determine an optimal model for the control surveying. The results are preliminary estimates. They require further investigation. It is necessary to investigate the influence of the point cloud density and mathematical algorithms for the models constructing on the quality and accuracy of control survey.

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We also must remember that different models are source of different information. For example, a solid model allows to determine deviations in sections, while the geometric model allows to compare mathematical models of elements.

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