The Use of Terrestrial TLS Laser Scanning to Control Deformation of Tanks for Liquid Substances

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SUMMARY

Control measurements of prototypes of molds and production devices as well as technological lines are an important stage in the design process. Verification of the predictions of the behavior of objects under a simulated load is often performed to select materials and geometric conditions of the objects. The observational method, provided that appropriate measurement techniques are selected, provides the data necessary for the evaluation of the prototype and its subsequent implementation. The article proposes a methodology for determining the deformation of the bottoms of the prototype tank for liquids based on data from TLS ground laser scanning. The test tank intended for underground storage with a diameter of 2 m with ribbed bottoms made of polypropylene of various properties was subjected to simulated loads by the planned depth of use and the degree of its filling. Laser scanning was performed with the Z + F Imager 5006h instrument with the scanning resolution in the High mode: 6.2mm / 10m distance from the center of the stage. The work proposes, inter alia, ways of external orientation, noise reduction, and data filtration. The results of the comparison of point clouds recorded in successive periods are described and the deformations in the signaled characteristic points and the continuous deformations of the model in the control sections were determined. The maps of deformations between the individual states of both bottoms were made. The advantages and disadvantages of the applied solution were compared.

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