

Modern approaches to studying the accuracy of determination of deformation values in geodesic monitoring of crane equipment

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Abstract The purpose of the research, the materials of which are presented in this paper, is to reveal modern approaches to combat the deformation of geometric parameters in the construction of electric overhead cranes. This issue is quite relevant in terms of compliance with safety requirements at work. To solve this issue, it is proposed to use the improved technique of geodetic monitoring of geometric parameters of constructions of overhead and electric gantry cranes. The paper describes a laser-mirror system for controlling geometric parameters, which allows considering fairly strict requirements. This method, as demonstrated by experimental data, is one of the most reliable and accurate. The authors developed and used the installations of the “Laser beam – mirror” system, which shall meet clear methodological requirements. It is shown that the deviation from the correct installation of the mirror in the vertical plane leads to an increase in measurement errors. The research was carried out with the help of a laser mirror device. As a result of the research and using the procedure developed by the authors, a rectangular scale for fixing the laser beam was proposed. The implementation of the results obtained by the authors will allow establishing the accuracy of measurements within the limits of permissible values. In addition, the existing permissible deviations of the geometric parameters of the constructions of overhead cranes at industrial enterprises were analysed. The authors identified the shortcomings of modern existing methods and proposed new geodetic equipment and methods of their implementation. The paper examines the accuracy of the developed methods that can ensure and increase the guarantee of safe operation of overhead cranes.

Keywords: overhead crane; gantry crane; tower crane safety; measurement method; geodetic control; geometric parameters.