

Monitoring Systems

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KEY WORDS: Interdisciplinary Approaches for the Design and Analysis of Deformation Measurements
Monitoring Concepts for Static and Dynamic Deformations of Engineering and Geotechnical Structures
Automation of Monitoring Measurements and Interpretation

ABSTRACT:

Automated system of monitoring of buildings and constructions engineering status is developed. The system permits to control the load bearing structures of a building in a real time mode. The system of sensors and equipment for monitoring system permits to register and analyze different parameters of constructions (strained deformation, inclinations, deflections etc.). Special software for monitoring system is created. The program permits to analyze and process the data, to demonstrate the results of monitoring, to get info about real engineering status of a building (seismic strength, stability, service life, durability) and to determine the terms of management and recommendations for efficient exploitation. There are typical instruments for math modeling of an object for making complex engineering calculations to determine possible denial scripts and parameters of stress-strain state of constructions of an object. The model determines the most critical components of a load bearing structure according to the different conditions (seismic, wind, snow etc.). Each object is accompanied with its individual model in accordance with constructive defects of its construction or declines (exceptions) in the design, service life, load changes and other parameters. The model is set up when the building or construction is being built to control its constructive parameters, and to analyze the results of monitoring and forecast of destructions – when the building operates. The system compares the designed parameters of the model with the real data in real time mode and permits to get true info about the engineering status of the building or construction, its health, to provide the dispatch system with results demonstrated by simple semaphore signals: yellow, green, red. The system's data is interfaced with the operative control service of the city. This permits to reduce the risk of emergencies drastic consequences. Thus, the system permits to rate all the potential risks, to determine the critical structures and requirements to them, monitoring and forecast of an engineering status of a building or construction. The System (SMES) of monitoring of engineering services is created. SMES allows to control the functioning of life support systems of the building and to provide the building operating service or the municipal control service with the support when the system gets any divergencies info. SMES allows to get the coordinated cooperation of the engineering services of a building in the crunch (also caused by terroristic acts) and provides with all the necessary information about emergency (or pre-emergency) situation to make management decisions operatively. To determine the range of allowable values of the parameters which are controlled the math model is created. Using the math model there may be determined the engineering services (heating system, ventilation, conditioning, gas distribution) operating modes, their parameters, the possible sites of foreign objects locations (explosion stability calculations, hazardous chemicals). System of structural monitoring and SMES are adopted in such

important building projects as: Sochi 2014 projects (venues) (Large ice hockey rink, Central Olympic stadium, Ice arena for figure skating, Roofed skating center, Ski-Jump complex), football stadiums 2018, high-rise buildings in Moscow and others. The typical tools for Antiterrorist safety system allow to determine possible threats an terrorist acts risks, to simulate different ways of possible crunches and terroristic threats. The simulated acts are created with modern math tools and computer modeling to determine possible consequences. Based on the calculations the experts compose safety requirements for an object and technical standards for safeguards, including requirements to SMES and to cooperation with municipal control and dispatch services.