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Capabilities of Different Laser Scanners and Corresponding Data Processing Software Systems

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Abstract

Frequent, complete and accurate assessment of the status of work-in-place, identifying critical geometric deviations is necessary for active project control during construction and assessment the status of structures during the service life. Recent advances in generating 3D environments using laser scanning technologies demonstrates the viability of using such technologies for frequently gathering complete and accurate three-dimensional as-built information during construction and service life of a facility. The current trends in having 3D information-rich design models of facilities also enable the usage of such models as the basis in identifying major geometric deviations and defects of facilities. Currently, the research team is involved in two major research projects utilizing laser scanners in acquiring 3D data during construction phase of a facility or after a major event (such as a truck collision) during the life cycle of an infrastructure to assess whether the structure is being constructed in compliance with the design drawings and whether the structure can be safely utilized after an event during its service life. The proposed research builds on the findings of the current research projects and focuses on the assessment of the capabilities of laser scanning technologies and corresponding software systems for determining whether stringent quality requirements associated with running surfaces or guideway structures are met. The research team has access to two different types of laser scanners; a phase-based laser scanner and a time-of-flight based laser scanner and two different types of data processing systems. It is proposed that the team will identify the functional requirements (both in terms of process and technical, such as accuracy requirements) of an approach for supporting quality control within the people-mover domain and perform a variety of experiments using these scanners and systems to assess how they support those functional requirements. In addition, they will utilize and test the previous formalisms developed for automated defect detection under the context of this research.