

Airport Pavement Crack Measurement Systems and Crack Density for Pavement Evaluation

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Abstract : This paper reviews the status of existing practice and research related to measuring pavement cracking and using crack density as a pavement surface evaluation protocol. Crack density for pavement evaluation is currently not widely used within the airport community and its use by the highway community is limited. However, surface cracking is a distress that is closely monitored by airport staff and significantly influences the development of maintenance, rehabilitation and reconstruction plans for airport pavements. Therefore crack density has the potential to become an important indicator of pavement condition if the type, severity and extent of surface cracking can be accurately measured. A pavement distress survey is an essential component of any pavement assessment. Manual crack surveying has been widely used for decades to measure pavement performance. However, the accuracy and precision of manual surveys can vary depending upon the surveyor and performing surveys may disrupt normal operations. Given the variability of manual surveys, this method has shown inconsistencies in distress classification and measurement. This can potentially impact the planning for pavement maintenance, rehabilitation and reconstruction and the associated funding strategies. A substantial effort has been devoted for the past 20 years to reduce the human intervention and the error associated with it by moving toward automated distress collection methods. The automated methods refer to the systems that identify, classify and quantify pavement distresses through processes that require no or very minimal human intervention. This principally involves the use of a digital recognition software to analyze and characterize pavement distresses. The lack of established protocols for measurement and classification of pavement cracks captured using digital images is a challenge to developing a reliable automated system for distress assessment. Variations in types and severity of distresses, different pavement surface textures and colors and presence of pavement joints and edges all complicate automated image processing and crack measurement and classification. This paper summarizes the commercially available systems and technologies for automated pavement distress evaluation. A comprehensive automated pavement distress survey involves collection, interpretation, and processing of the surface images to identify the type, quantity and severity of the surface distresses. The outputs can be used to quantitatively calculate the crack density. The systems for automated distress survey using digital images reviewed in this paper can assist the airport industry in the development of a pavement evaluation protocol based on crack density. Analysis of automated distress survey data can lead to a crack density index. This index can be used as a means of assessing pavement condition and to predict pavement performance. This can be used by airport owners to determine the type of pavement maintenance and rehabilitation in a more consistent way.

Keywords : airport pavement management, crack density, pavement evaluation, pavement management

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