Advanced Tool for Accurate Pavement Distress Measurement and Evaluations

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Abstract

Pavement distress information is needed to assess maintenance requirements. Many traditional systems adopted time consuming manual operations to evaluate pavement surface distresses. To improve this method, a small network of about 73 km was prepared for a selected region of Mumbai city, India using global positioning system. From this selected study area twenty-eight sections are chosen for data collection. Terrestrial laser scanner (TLS) has been chosen over visual survey method to accurately measure surface area of distresses such as: pothole, alligator cracking, patching and ravelling. TLS is a high definition-surveying instrument that works on the principle of Laser Scanning. Scans were conducted on the selected sections using a Leica ScanStation C10 to capture the images of the above mentioned surface distresses, point density, number and layout of targets, and survey method for establishing control points. The Scan Station C10 quickly digitizes a scene in 3D forever using both panoramic photography and 3D laser scanning, where millions of data point digitising accurately in a few minutes. Typical target arrangements were not found to greatly affect the resulting scan data for the equipment used in the study. The scan images of individual distress are processed in Cyclone software, readily available within the instrument, and measured surface area of these distresses after cleaning registered point cloud. Straight edge has been used to measure rutting. In this paper surface area of these distresses were analysed using subjective rating method called road condition index (RCI). A road condition index is the weighted average of all urgency indexes, product of degree and extent of distress. RCI represents in terms of number that indicates the overall performance of the study area which consists of number of distresses such as: patching, rutting, ravelling, potholes and cracks. The value of RCI varies between 1 for a new pavement with no distress to 25 for a failed pavement. Rating approach method in RCI is used to facilitate the prioritization for all 28 sections. Finally ranking for each section is determined based on the obtained priority rating values of each section.

Keywords: Terrestrial laser scanner; Leica ScanStation C10; Cyclone software; Road condition index; Rating and ranking

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