8th National Congress on Civil Engineering, 7-8 May 2014
BabolNoshirvani University of Technology, Babol, Iran

Investigation of Laser Systems Used in Pavement Management Systems (PMS)

Seyed Ali Sahhaf[1], Shahriar Rahimi[2]

1- Civil Department, Engineering Faculty, Ferdowsi University of Mashhad, Iran
2- Civil Department, International Campus, Ferdowsi University of Mashhad, Iran

Shahriar.Rahimi2002@gmail.com

Abstract

The surface layer of road pavement has a particular importance in relation to the satisfaction of the primary demands of locomotion, such as security and eco-compatibility. In order to reduce road maintenance and rehabilitation costs and optimize the service condition of road networks, pavement management systems (PMS) need reliable and detailed data on the status of the highway network. Laser scanners can be used in an innovative way to obtain information on a real surface layer through a single measurement, with data representativeness and homogeneity. With the advancement of 3D sensors and information technology, high-resolution, high-speed 3D line laser imaging devices has become available for pavement surface condition data collection. This paper presents some of the key developments in recent years for laser systems automating pavement distress measurement and evaluation. These new systems are described in terms of their potential and applicability.

Keywords: PMS, Road Maintenance, Data Collection, High Speed 3D Laser, LCMS.

1. INTRODUCTION

Pavement-management systems (PMS) can work effectively only when they are constructed by organically combining all activities concerned with road pavement (planning, design, construction, maintenance, rehabilitation, evaluation, economic analysis, and research) and the database [1]. Then, the most important features are the establishment of a serviceability index, which defines pavement quality, and a prediction of performance, which is represented by the relation between the index and time (and/or traffic). Pavement quality includes two primary parameters: skid resistance and riding quality. The factors influencing riding quality are roughness and/or pavement distress. Three major factors of pavement distress are cracking, rutting, and longitudinal profile [2].

Pavement surface texture has significant effecton tire-pavement friction. Vehicle maneuvers such as cornering and braking need sufficient skid resistance to maintain vehicle stability. Furthermore, pavement skid resistance have influence on tire wear, road noise, discomfort, rolling resistance, and wear in vehicles (ISO, 1997). There are two categories of pavement textures related to skid resistance, i.e. micro texture and macro texture. The classification is generally based on specific texture wavelength range and typical peak–peak amplitude. In particular, micro texture refers to surface texture with wavelength range less than 0.5 mm and typical peak–peak amplitude less than 0.2 mm, while the corresponding ranges for macro texture are 0.5–50 mm and 0.2–10 mm.

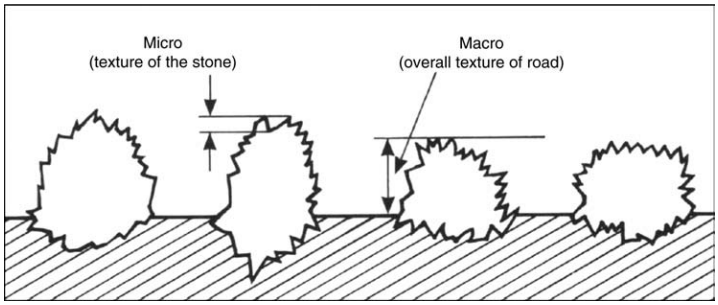

Figure 1. Micro and macro texture[3]