Available online at www.sciencedirect.com

ScienceDirect

International Journal of Pavement Research and Technology 9 (2016) 313–320

www.elsevier.com/locate/IJPRT

Field investigation of skid resistance degradation of asphalt pavement during early service

Yinghao Miao [a,*], Juan Li [a,1], Xiaoheng Zheng [a,1], Linbing Wang [b]

[a] College of Metropolitan Transportation, Beijing University of Technology, 100 Pingleyuan, Chaoyang District, Beijing 100124, China
[b] Department of Civil and Environmental Engineering, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061, USA

Received 6 April 2016; received in revised form 9 August 2016; accepted 9 August 2016
Available online 13 August 2016

Abstract

This paper documents a field investigation into the skid resistance degradation of asphalt pavement during early service. Field tests were conducted 7 times during more than 2 years. There are 2 highway sections included in the field tests, which cover 4 asphalt surface types, i.e., dense asphalt concrete (DAC), rubber asphalt concrete (RAC), stone matrix asphalt (SMA), and ultra-thin wearing course (UTWC). Macrotexture and friction data were collected using the sand patch method and the dynamic friction tester respectively. The degradation of the mean texture depth (MTD) and the friction coefficient at slip speed of 60 km/h (DFT60) were analyzed. The international friction index (IFI) was also calculated using the friction coefficient at slip speed of 20 km/h (DFT20) with MTD to evaluate the skid resistance degradation. The UTWC has relatively good skid resistance even after 7.4×10^6 standard vehicle passes. The SMA has very stable friction performance which maintains almost the same friction level after 4.61×10^6 standard vehicle passes. The DAC and RAC have relatively poor friction performance while the RAC has better macrotexture. The changing trends of skid resistance with traffic wear can be fitted by a logarithmic model for all surface types. The SMA and UTWC have relatively clear relationship between DFT20 and MTD, while the RAC and the DAC show more complex.

Keywords: Asphalt pavement; Skid resistance; Degradation; International friction index

1. Introduction

Skid resistance is an important surface function of pavement, which is involved in driving safety [1,2]. It is usually evaluated using a friction coefficient accompanied by a texture measurement, usually a macrotexture measurement [3–5]. During service life, pavement skid resistance could degrade due to traffic wear. Good and durable skid resistance is pursued by researchers and practitioners. There were many researches performed to understand pavement skid resistance and its evolution during service.

Ech et al. [6] captured the evolution of pavement macrotexture by the Abbott curve through simulating traffic wear in laboratory. Ahammed and Tighe [7] analyzed the early-life, long-term, and seasonal variations of pavement skid resistance using the data collected in the long term pavement performance (LTPP) program. They also discussed the potential impacting factors of pavement skid resistance. Kane et al. [8] investigated the polish of pavement surface using an indoor simulating test and established a model describing the polishing phenomenon observed in the tests. Kane et al. [9] proposed a skid resistance evolution model with consideration of the effects of aging, polishing, and

* Corresponding author. Fax: +86 10 6739 1509.
E-mail addresses: miaoyinghao@bjut.edu.cn (Y. Miao), 1161702900@qq.com (J. Li), 282875739@qq.com (X. Zheng), wangl@vt.edu (L. Wang).
[1] Fax: +86 10 6739 1509.
Peer review under responsibility of Chinese Society of Pavement Engineering.

http://dx.doi.org/10.1016/j.ijprt.2016.08.005