Florida Department of Transportation Research

Macrotexture Assessment of Florida Pavements

December 2021

Project Number
BE711

Project Managers
Guangming Wang
FDOT Materials Office

Principal Investigator
James Fletcher
University of North Florida

Current Situation

Macrotexture is defined as pavement surface profile features with a wavelength between 0.5 and 50 millimeters. Pavement macrotexture provides the pathways for water to drain, which allows for the necessary grip between tire and pavement. As a pavement ages, the macrotexture of a pavement can change and pose hazardous conditions for the traveling public, especially in wet weather conditions. Traditionally, vehicle-mounted point-laser devices have been used by the Florida Department of Transportation (FDOT) State Materials Office to measure network-level macrotexture in accordance with the ASTM E1845 test standard. These point-laser systems are capable of accurately measuring macrotexture on asphalt pavement; however, the point-laser system fails to completely capture anisotropic (measurements in different directions produce different values) texturing of rigid pavement, such as longitudinally diamond-ground (LDG) concrete pavement.

Tining, or adding groves to concrete pavement, improves traction but makes measuring macrotexture difficult.

Research Objectives

To overcome the limitation of the point laser, University of North Florida researchers evaluated a new type of line-laser system capable of producing a nearly continuous three-dimensional (3-D) texture profile along the surface of a roadway. Researchers tested this new type of line-laser system in hopes of producing mean profile depth (MPD) values that can be used to accurately characterize the surface of both asphalt and concrete pavements on a network-level base.

Project Activities

Line-laser systems were installed on two of FDOT's friction-testing vehicles. Initially, the devices had shown poor correlation with accepted MPD values on both asphalt and concrete pavement. To address this, the research team developed and executed a research program to configure the line-laser system to accurately assess pavement macrotexture. This was accomplished by optimizing the line-laser system settings through a series of static and dynamic tests on inactive roadways. Once it was determined that the line-laser could accurately capture MPD in a controlled setting, the precision and accuracy of the system were further validated in a macrotexture assessment on both asphalt and concrete pavements in a multicounty region of North and North-Central Florida.

The updated line-laser system produces MPD values that are highly correlated with accepted reference values on asphalt and concrete pavement in a repeatable and reproducible manner. As a result, the research team recommends implementing this line-laser system.

Project Benefits

Utilizing the updated line-laser system will allow FDOT to assess the condition of the macrotexture of both asphalt and concrete pavements more accurately, and thus better address the wet weather characteristics and safety of Florida's roadways.

For more information, please see www.fdot.gov/research/.