U.S. Department of Transportation
Federal Highway Administration

MATC
MOBILE ASPHALT TECHNOLOGY CENTER

Spotlight on Pavement Safety:

Implementing Macrotexture in Asphalt Mixture Design

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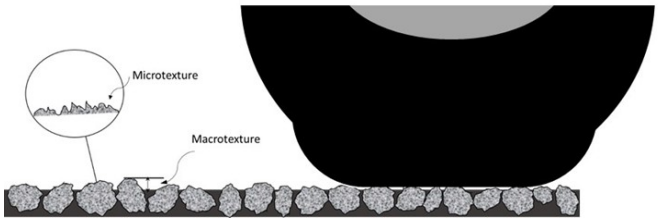
For more information on macrotexture and related technology, contact Andy Mergenmeier, Senior Pavements & Materials Engineer, FHWA Resource Center, andy.mergenmeier@dot.gov

Texture scanning equipment is available for loan by the MATC. Learn more at https://www.fhwa.dot.gov/pavement/asphalt/matc/equipment-loan-program.cfm

The Nondestructive Field Technologies for Asphalt Pavements series shares information on experiences with various nondestructive pavement technologies. To access the full series, visit https://www.fhwa.dot.gov/pavement/asphalt/matc/technical-documents.cfm

Background



Macrotexture is generally provided in asphalt pavement through aggregate gradation in the surface layer that provides voids or channels for water on the pavement to drain. For years, the focus on dense-graded asphalt (DGA) surface mixes in particular has been on durability, which has the potential to result in less surface macrotexture than in the past. While macrotexture has been widely addressed through the use of open-graded friction courses in parts of the United States, the impacts of climate change (more intense and frequent rainfall events) have highlighted the need for enhanced pavement friction in more of the country. Further, challenges with efficient construction project delivery can result in longer work zone durations, which in turn can leave temporary pavement surfaces not designed with macrotexture in mind to be open to traffic much longer than intended.

Measuring Macrotexture

There are several macrotexture measurements that can be used in safety analysis models, and the mean profile depth (MPD) is a common method used in the United States. Higher MPD values indicate coarser macrotexture.

Advantages of providing adequate macrotexture can include:

- Reduced crash rates in wet weather, especially on high-speed roads (50 mph or more). Adds friction on wet pavement to prevent hydroplaning.
- Better safety in dry weather. Increases friction on dry pavement, particularly in work zones and intersections where braking and unusual vehicle movements are common.
- Changes in macrotexture can help identify mixture non-uniformity or segregation. These non-uniform areas may be more susceptible to raveling and cracking.

Certain tools and associated procedures have shown effectiveness for collecting and interpreting pavement macrotexture profiles from asphalt roadway surfaces. These include the Circular Track Meter (CTM), Laser Texture Scanner (LTS), and Sand Patch Test.

From left: Circular Track Meter, Laser Texture Scanner, and Sand Patch Test. *FHWA is the source for all images.*

Considering Macrotexture?

Training, demonstrations, and macrotexture equipment for loan are available to the asphalt pavement community from the Federal Highway Administration (FHWA) Mobile Asphalt Technology Center (MATC). The MATC has one Circular Track Meter and three Laser Texture Scanners. State transportation agencies that already have received demonstrations or equipment loans from the MATC include Arizona, California, Florida, Illinois, Kentucky, Mississippi, North Carolina, North Dakota, Ohio, South Carolina, Tennessee, and Vermont.

Additional field project data is being collected to refine a test protocol to measure macrotexture in the laboratory during mixture design.