SHRP2 SOLUTIONS
TOOLS FOR THE ROAD AHEAD

Advanced Methods to Identify Pavement Delamination (R06D)

Nondestructive testing technologies that can detect delamination in hot-mix asphalt (HMA), operate at reasonable travel speed, and cover full lane width



Challenge

Delamination between asphalt layers can contribute to several types of pavement surface distresses, such as cracking in the wheel paths and tearing in the surface, which are detrimental to the longevity of pavement performance. Delamination is primarily due to layer debonding or stripping that cannot be detected by visual inspection, particularly in the early stages of the problem. Manual destructive methods for evaluating the pavement structure for severity and extent of discontinuities can be time consuming and expensive. Agencies need a method of detecting the location and severity of delamination before the pavement deficiency causes visible pavement distress.

Solution

Developed through the second Strategic Highway Research Program (SHRP2), three new technologies make advances in the detection of subsurface discontinuity of asphalt pavement. Ground-penetrating radar (GPR) uses a lane-width multi-antenna array with a frequency sweep that can be operated at speeds up to 40 miles per hour. Multiple pairs of hardware reduce the number of passes required to cover the lane width. GPR also has an automated test frequency (every six inches) that accelerates the ability to acquire data. The impact echo (IE), combined with seismic analysis of surface waves (SASW) system completes data collection in less than 1 percent of the time required by manual point testing. The software uses real-time display to monitor the quality of the data collection. The IE software can provide immediate results in identifying suspect pavement variations, which significantly reduces the time and safety issues associated with current manual testing of a surveyed grid within a lane closure.

Who can use these tools?

Highway agencies might consider the use of GPR and IE/SASW, or both, for identifying project-level pavement delamination and debonding. While these technologies are currently available, highway agencies play a vital role in further developing them into readily implementable products. Proof of concept pilot projects are needed to not only validate the results, but also to encourage equipment manufacturers to advance the technology, hardware, and data analysis software; the ultimate goal being real-time reliable results that would be valuable not only for project-level quality control and forensics, but also network-level pavement assessment.

Save Lives

Single-pass and full-lane coverage improve safety by minimizing the time technicians are exposed to traffic.

Save Money

Single-pass operation minimizes data collection costs. Full-lane coverage increases testing efficiency and reduces data-collection costs.

Save Time

Full-lane coverage and single-pass operations reduce the time to collect field data.

RENEWAL

One of four SHRP2 focus areas, Renewal products help transportation organizations rapidly build and restore highway infrastructure that lasts longer while minimizing user disruption and delay.

Continued on next page.

Visit: www.fhwa.dot.gov/GoSHRP2
Learn more about products, case studies, and implementation assistance.

Benefits

GPR and IE/SASW can be valuable project-level tools used independently or in a series to assist the engineer in identifying pavement discontinuity. Enhanced GPR technology is a significant step forward. This technology, which comes with a lane-width, multi-antenna array to provide an accurate full-lane measurement, is an improvement over the current one- and two-antenna systems, which need several passes across a lane to obtain a complete measurement. This translates into time savings and improved safety. The improved technology allows the engineer or technician to narrow the manual analysis to identified locations where the GPR signal changed—isolating the depth of discontinuity, identifying variations in the pavement, and providing a relative degree of severity. As the NDT industry continues to improve both hardware and software, these NDT tools should become more effective tools for pavement evaluation. Presently none of the NDT technologies can conclusively distinguish between types of pavement discontinuities or why the change occurred. Coring will still be required to confirm the nature of the discontinuity.

The Implementation Assistance Program

Implementation assistance is available to help State departments of transportation (DOTs), metropolitan planning organizations (MPOs), and other interested organizations deploy SHRP2 Solutions. A range of opportunities is available to raise awareness of SHRP2 Solutions and to encourage early adoption of these products. Application periods are offered approximately twice per year. Each product selected for implementation assistance has the potential to deliver more efficient, cost-effective programs to meet the complex challenges facing transportation today.

How can you learn more?

Visit: www.fhwa.dot.gov/GoSHRP2

- Additional product information
- Information about how this product is being used in the field
- Contact information for peers who are familiar with this product
- Links to research reports

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About SHRP2 Implementation

The second Strategic Highway Research Program (SHRP2) is a partnership of the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO), and the Transportation Research Board (TRB). TRB completed the research, and now FHWA and AASHTO are jointly implementing the resulting SHRP2 Solutions that will help the transportation community enhance productivity, boost efficiency, increase safety, and improve the reliability of the Nation's highway system.