# Florida Department of Transportation Research

Investigation of Automated and Interactive Crack Measurement Systems
BD544-36

The use of imaging techniques to evaluate roadway pavements for crack damage has proven to be a safe, rapid, and cost-effective alternative to traditional highway survey techniques. The Multi-Purpose Survey Vehicle (MPSV) developed by FDOT captures digital images of the pavement surface at highway speed, and stores them in on-board computers for post-survey analysis. To evaluate the images to identify crack damage in a timely manner, FDOT needed to identify a software application that could analyze the data and quickly produce accurate and repeatable results. While several vendors were invited to participate in the study, only two vendors accepted. University of South Florida researchers evaluated the image analysis software applications those participants provided: Crackscope and Workstation.

The applications function differently: Workstation is interactive, Crackscope is fully automated. Workstation was developed by the company that manufactured the MPSV, so it possesses the advantage of system compatibility. However, its interactive nature requires a substantial amount of user involvement, making it more tedious and time-intensive to use than Crackscope.

The researchers identified four sections of highway pavement on which to run comparative cracking estimation tests: one concrete section and three Superpave asphalt sections. They compared the cracking detected by each of the software applications, using MPSV images, to the cracking estimated by the manual surveys.

Crackscope outperformed Workstation at processing the Superpave pavement images, and

*FDOT's Multi-Purpose Survey Vehicle uses image scans to evaluate highway conditions.*

Workstation outperformed Crackscope with respect to the concrete pavement images. Both applications produced repeatable results, but were not accurate to AASHTO standards. The researchers theorize that the Crackscope application may have detected more detail (e.g., hairline cracks) than the manual survey did because the latter was conducted at night (disadvantaging the human eye). However, the Crackscope program also may have misread discontinuities in pavement image pixels, interpreting them as cracks.

The researchers determined that Crackscope would need modification to include the FDOT Rigid Pavement Evaluation methodology. They also concluded that Workstation would be more suitable for project level than entire network evaluations, as project-level evaluations can be considerably shorter, involve less cracking, and require relatively less time to evaluate.

Although the Crackscope and Workstation applications both show promise, neither is ready for implementation at this time.

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