

# Automated Pavement Condition Score

## Fact Sheet

Development of Automated Pavement Condition Score and Decision Logic	
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## The Problem

*Automating pavement ratings to leverage existing data*

The existing Pavement Condition Rating (PCR) methodology for rating pavements requires manual field surveys. ODOT has been collecting automated distress data since 2014 as part of efforts to meet federal reporting requirements but had yet to develop it into an automated rating methodology.

Of critical importance to pavement management's use of fully-automated distress detection and classification is the ability to make the same decisions using the data as were made with a manual rating approach. The goal of this research was to produce the same decision at least 90% of the time using data derived from what ODOT was already collecting for federal reporting.

## The Research

*Trying to find solutions by comparing manual and automated ratings*

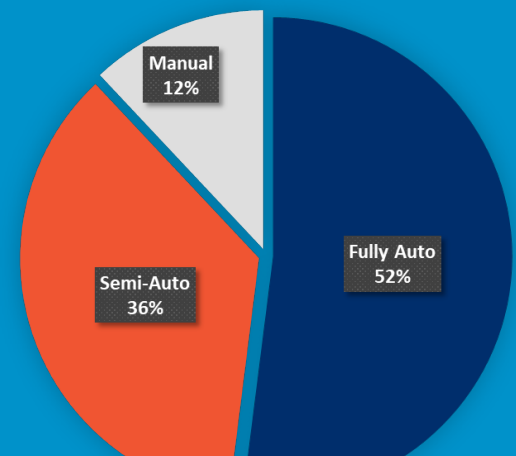
Using data from 2015 and 2016 data collection cycles, covering over 13,000 pavement management sections, researchers studied possible methodologies for automating pavement ratings. Automated results were compared to manual ratings that ODOT conducted as part of their existing pavement management process.

While various rating methodologies tested displayed promise, researchers selected a PCR-based methodology. Researchers attempted to match PCR as closely as possible using regression analysis to adjust distress deducts to fit the automated data.

By using this regression method:

- Data collection can still report PCR-based distresses
- Deterioration models from PCR may be used as a stop-gap until automated data is sufficient for new models
- Score-based checks in the decision tree require minimal adjustments

**Which method of distress identification is your agency using for PMS?**



*Of 25 agencies responding to a questionnaire, 52% report using fully-automated distress identification for their pavement management system.*

The final report includes an analysis of the automated data quality, comparisons between various ratings methodologies, and details on the complications of implementing an automated system. Research did not yield a solution that met the goal of a 90 percent match between decisions made from manual and automated ratings. Understanding of the thorough review of issues encountered in developing an automated system presented in the report may be critical to successfully implementing such a system in the future.

## The Recommendations

*Implementing an automated rating system is an ongoing process, not a turn-key operation.*

Research highlighted the difficulty of automating a system that has historically been conducted manually by trained raters. Deficiencies in distress classification limit the system's ability to rate concrete pavements with the same level of detail as manual raters. Software used to process ODOT's current collection vehicle data fails to report many distress types, leading to reduced accuracy of the automated models.

The full report includes methods for expanding the automated models should new data become available. Automated distress detection and classification is still a new, evolving technology that may well overcome the shortcomings presented in the report over time. However, the current data available to ODOT from today's technology falls short of their needs for pavement management unless accepting a loss in terms of accuracy of decisions.

### Key takeaways:

- Other research and agencies have seen inconclusive results in regard to implementing fully-automated distress data into pavement management systems, which may point towards a need for further development before widespread adoption
- Fully-automated distress identification and classification does not capture all distresses needed for ODOT's PMS and requires supplementing with manual ratings
- ODOT will have insufficient automated data for full deterioration modeling until ~2025 (using transition probabilities matrices)
- Quality control and procedures plans must be in place to ensure automated data produces consistent results
- Data processing time to convert collected data into useable distress ratings is a lengthy process
- Annual collection of field validation sites should be used to refine and validate the automated process
- Software development may be needed to integrate automated ratings into the existing workflow

