Ohio Department of Transportation Research Project Fact Sheet

District Highway Maintenance Research On-Call (ROC)-Task 1: Evaluation of the Use of Robotic System for Improving Crack Sealing Process

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The Problem

Although crack sealing is one of the common tasks that maintenance crews at ODOT county garages frequently conduct, it can often be challenging as it is weather-dependent, slow-paced, and labor intensive. In addition, frequent breakdowns of equipment can cause significant downtimes. Crack sealing maintenance crews are also exposed to many hazards including traffic and hot asphalt sealing materials. These challenges can lead to delayed response times in crack sealing, which negatively impacts the pavement and can adversely affect the safety of the workforce and traveling public.

Research Approach

A survey was conducted to collect information from ODOT district and county garages on their current practices for crack sealing installation. In addition, a synthesis of best practices for crack sealing installation used or researched by other state DOTs was prepared through a comprehensive literature review as well as a national survey. New equipment that uses robotic technology to help improve the efficiency and safety of ODOT's crack sealing process and reduce the response time of ODOT county garages to perform crack sealing was identified. Finally, cost analysis was conducted to evaluate the cost-effectiveness of using the identified new equipment.

Findings

- The results of literature review and the national survey indicated that crack preparation (cleaning and drying) is the most important step to ensure good performance of the installed crack sealant.
- Equipment failure was reported as one of the major issues encountered by ODOT during cracking sealing. Therefore, in recent years, many ODOT counties resorted to renting crack sealing equipment instead of owning their own equipment.
- Robotic Maintenance Vehicle (RMV) was identified as an equipment that might help improve the efficiency of crack sealing operation and workers safety. However, currently there is not enough information or experience with using this equipment to validate its capabilities or benefits.
- Feedback obtained through the national survey as well as interviews with selected agencies indicated that the RMV needs further development to be deemed a good option.
- The results of the cost analysis conducted in this study indicated that RMV may result in reducing the cost of crack sealing for ODOT. However, the estimated RMV cost savings depended on several assumptions made that could not be validated at the current time. Therefore, all assumptions made need to be verified before making final conclusions on the RMV cost effectiveness and its benefits to ODOT.

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This research was sponsored by the Ohio Department of Transportation and the Federal Highway Administration.

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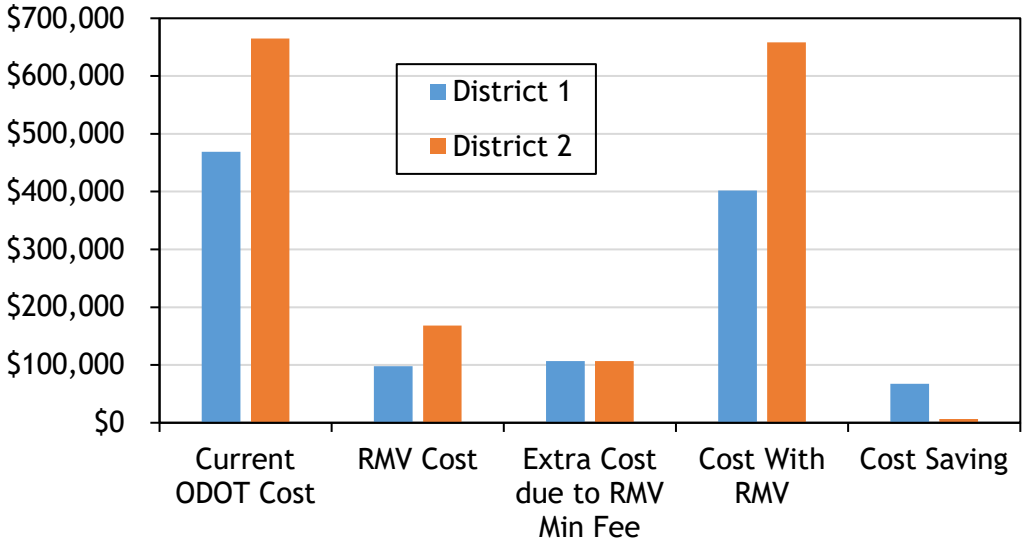

It is noted that the cost analysis included several assumptions about the RMV that could not be verified at the current time.

Recommendations

Based on the results of the of this study, it is recommended that ODOT:

- Consider renting the equipment for crack sealing rather than buying it.
- Evaluate the use of hot air lance rather than conventional air compressors; particularly when crack sealing is performed at colder temperatures.
- Obtain/verify the following information about RMV through a pilot study:
  - Average RMV productivity (miles that can be sealed in a day)
  - RMV downtime
  - RMV ability to accurately detect all cracks in roadways and properly seal them
  - Amount of crack sealant material used by RMV as compared to traditional manual crack sealing methods.
  - Performance of crack sealed installed using RMV compared to those installed using traditional manual crack sealing methods.

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