

Maintenance

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Project Title:
Research To Support Crack
Cleaning Operations In Moving
Lane Closures

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Crack Cleaning Support In Moving Lane Closures

Elevating worker safety and operation efficiency of longitudinal crack cleaning by developing new equipment for use in moving lane closures.

WHAT IS THE NEED?

Concrete highways account for approximately 33% of California's highways (over 16,000 miles), which correlates to roughly 10,000 miles of longitudinal pavement edge joint cracks that the California Department of Transportation (Caltrans) is responsible for maintaining. Sealing these longitudinal cracks takes priority over other types of pavement cracks due to the importance of preventing water and debris from entering the pavement along these edges.

Caltrans seals these cracks with hot-applied sealants. When properly applied, the sealants yield great cost savings by reducing concrete spalling and extending the interval between major shoulder rehabilitation projects. The most effective joint seal with a 5-year minimum expectancy requires proper cleaning and removal of vegetation and debris from joint cracks before sealing.

Caltrans' common crack cleaning practices of using compressed air and wire wheels fail to remove packed debris or rooted vegetation. Cutting methods such as routing provides extraordinary crack cleaning results, but they are labor-intensive and slow. In addition, Caltrans' current crack cleaning practices expose workers to highway traffic. Caltrans Maintenance team expressed a need for safer, more effective and efficient methods to thoroughly prepare longitudinal pavement edge Asphalt Concrete (AC)/ Portland Concrete Cement (PCC) joints, and lane to lane PCC/PCC joints prior to conducting sealing operations on mainline highways.



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WHAT ARE WE DOING?

This research involves identifying and examining innovative longitudinal pavement edge joint preparation equipment and methods for use in crack sealing operations within moving lane closures. The first task involves conducting a detailed search of current pavement crack cleaning equipment and effective methods successfully employed by highway maintenance agencies and private industry contractors. The detailed search results and the customers' input will lead to the development of functional requirements for a crack cleaning system and process for improving crack cleaning practices.

The research team from the Advanced Highway Maintenance and Construction Technology (AHMCT) Research Center will establish and present conceptual designs and methods to the project panel for review and evaluation, with a focus on incorporating commercially available and customizable equipment.

With a consensus on the conceptual designs, AHMCT anticipates developing detailed specifications and a design documentation for the mechanical component of the crack cleaning equipment and suggested usage method(s). AHMCT plans to develop the guidance and control system design and the proof of concept equipment, upon Caltrans' acceptance of the mechanical component design. The designs will include deployment implementation and operational plans, with a strong consideration on moving lane closure functionality that complements the Sealzall crack sealing machine.

WHAT IS OUR GOAL?

The research goal includes conceptual development of a truck-mounted crack cleaning machine capable of operating in moving lane closure operations, thus enabling it to work in tandem with the Sealzall machine to clean and seal longitudinal joint cracks along highway shoulders. Ultimately, the research strives to improve the safety, efficiency, and quality of joint crack cleaning methods and tools available to Caltrans.

WHAT IS THE BENEFIT?

Development and implementation of truck-mounted crack cleaning equipment will support Caltrans by enhancing worker safety and reducing worker injuries from current manual crack cleaning practices. It will also significantly improve operational efficiency, potentially saving millions of dollars annually through reduced labor costs and increased durations between shoulder rehabilitation projects.

Although Caltrans receives the immediate benefits of the research, any organization involved in crack cleaning operations could adopt the research developments into their roadway crack cleaning practices to receive the improved safety and efficiency benefits afforded.

WHAT IS THE PROGRESS TO DATE?

The research team developed a viable design and successfully tested the proof of concept. In addition, the research team made recommendations for the next step in development. The researchers completed the research, and now the research task is in the official closeout process.