Improving Airfield Longitudinal Joints: VRAM and RPE Evaluation

Airport Asphalt Pavement Technology Program

Research Team: National Center for Asphalt Technology, Applied Pavement Technology, and Iowa State University **Sponsored by:** AAPTP, in partnership with FAA and NAPA

Longitudinal joints in asphalt pavements often deteriorate faster than the surrounding mat due to lower density causing increased permeability. This can lead to cracking, raveling, and increased risk of foreign object debris on airfields. While current Federal Aviation Administration (FAA) specifications require cutting back longitudinal joints and applying a tack coat to the vertical face, these measures have not fully solved the problem.

This Airport Asphalt Pavement Technology Program (AAPTP) research project evaluated two emerging technologies—void-reducing asphalt membranes (VRAM) and rapid-penetrating emulsions (RPE)—to determine their potential to reduce air voids and permeability and improve joint performance. While both materials have shown promise in highway applications, their effectiveness in airfield pavements remains largely undocumented.

Project Benefits

- Evaluates emerging materials with potential to improve joint density and longevity.
- Expands industry understanding of VRAM and RPE performance in airfield environments.
- Identifies current data and testing limitations that need to be addressed.
- Establishes new long-term test sections to support future research and performance monitoring.
- Lays the groundwork for FAA consideration of new joint treatment technologies.

Approach

The research team reviewed available field data and conducted inspections of highway and airfield projects where VRAM and RPE had been applied. Their study included highway projects in Illinois and Iowa, some over 20 years old, and a limited number of airfield pavements with only a few years of service. Each site was evaluated for visible cracking, raveling, and permeability, with treated joints compared against untreated control sections.

Because the available field data were limited and many sections had been subsequently maintained, these sites were not sufficient to support formal recommendations. To address this gap, the team monitored construction of new test sections at Moton Field Municipal Airport in Tuskegee, AL, and other regional airports. These sections incorporate different combinations of VRAM and RPE on both cutback and butt joints, enabling controlled, side-by-side performance comparisons under similar conditions in future research.

Results

The field evaluations provided useful insights but were not conclusive enough to support replacing FAA's standard cutback joint method. At highway sites, subsequent maintenance and resurfacing activities made it difficult to isolate the effects of VRAM and RPE. On the airport projects, most pavements were too new to provide meaningful long-term performance data.

Source: Asphalt Materials, Inc.

VRAM application on a runway.

Visual inspections indicated that VRAM-treated joints on highway pavements remained tighter and exhibited fewer signs of secondary cracking compared to control sections built with the butt-joint technique commonly used for highways, though the differences were modest. Data from Iowa and Illinois suggested potential benefits in reduced permeability, but variability in samples, and the presence of subsequent sealing treatments, prevented the ability to draw clear conclusions.

Source: National Center for Asphalt Technology

RPE application on the butt joint of a crossover taxiway.

To address these data gaps, the team developed controlled test sections with multiple joint types and treatment combinations. These new sections will enable researchers to track performance over time, quantify air void reduction, and more accurately assess the benefits of each material.

Implementation

Evaluation results indicate that both VRAM and RPE show promise for improving airfield joint durability, but additional time and data are needed to fully confirm their effectiveness. The newly constructed test sections will serve as long-term reference sites for future research within AAPTP and FAA broader pavement studies.

Airports and engineers interested in evaluating these materials can use guidance from this research to design experimental sections through the FAA-approved modifications of standards process. As performance data accumulate, these findings will help inform future updates to FAA specifications and support potential inclusion of VRAM and RPE as accepted options for airfield joint construction and maintenance.

Inspections of Existing and New Projects with Different Longitudinal Joint Construction Techniques is free to download at: go.asphaltpavement.org/air-005.

Additional Resources

For more details, visit: airportasphalt.com

Watch a 3-minute AAPTP longitudinal joints video: bit.ly/LongJoints.

For more information, contact:

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About AAPTP

The Airport Asphalt Pavement Technology Program (AAPTP) is a cooperative agreement effort between the National Asphalt Pavement Association (NAPA) and the Federal Aviation Administration (FAA) to advance asphalt pavements and pavement materials. The AAPTP advances solutions for asphalt pavement design, construction, and materials deemed important to airfield reliability, efficiency, and safety. The program leverages NAPA's unique technology implementation capabilities with assistance from the FAA and industry to advance deployment and adoption of innovative asphalt material technologies.

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