Cleaning Device to Remove Debris and Chemicals for Crack/Joint Sealing

Introduction & Problems

- Over fifty percent of the US interstate system is classified in fair or poor condition.
- Loss of adhesion causes most crack sealing failures
- Traditional air blasting is less effective in cold weather climates due to de-icing chemicals.

FHWA recommends abrasive crack cleaning methods such as water blasting or wire brushing
- The pavement surface is often ignored during crack preparation
- Labor costs of current crack cleaning/sealing processes are extremely high.

Innovative Versatile Crack Cleaning Device

Conventional Preparation Method vs. Proposed Preparation Method

<table>
<thead>
<tr>
<th>Non-Routing Comments</th>
<th>Routing Comments</th>
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<tbody>
<tr>
<td>Traditional Air blasting -&gt; sealing: Does not effectively remove de-icing chemicals and vegetation</td>
<td>Traditional Routing: Not effective for wide cracks. Also, routing cannot clean top surfaces of cracks which promotes better bonding between surface and sealant material.</td>
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<td>Proposed device Wire brushing &amp; air blasting -&gt; sealing</td>
<td>Proposed device: A brush effectively prepare top surface of cracks while air blasting cleans inside and outside of the routed crack simultaneously.</td>
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Crack Size for Sealing

- Crafco Inc. defines cracks ≥ 1/8" (about 3mm) generally require sealing.
- Materials and Procedures for Sealing and Filling Cracks in Asphalt-Surfaced Pavements (FHWA-RR-99-147) recommends crack sealing for 5 to 19 mm width of cracks.
- Unified Facilities Criteria (UFC) provides guidelines for crack preparation based on crack size as follows:

Conventional and Proposed Preparation Method Overview

- Air Flow Splitting Design
  One for running motor, the other for air blasting to clean debris

- S-shaped Shaft Design
  More comfortable to use for a prolonged period of time compared to the straight one because the s-shape of the shaft allows the operator to stand more erect while pushing down on the device

- Wire Brush
  Cleaning Cracks

- Router
  Excavate cracks

- Masonry Blade
  Pothole Repair

- Pneumatic Motor, Angle-adjustable air nozzle, and Debris Guard
  The increased debris guard was suggested not only for the safety and protection of the operator, but also for passing vehicles and pedestrians. The adjustable nozzle trajectory using a flanged was suggested to blow out debris away from the crack to the side of the roadway no matter what the direction the device is moving.

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