

Laboratory Tests

- Chemical Residue Removal Effectiveness

Considerations:

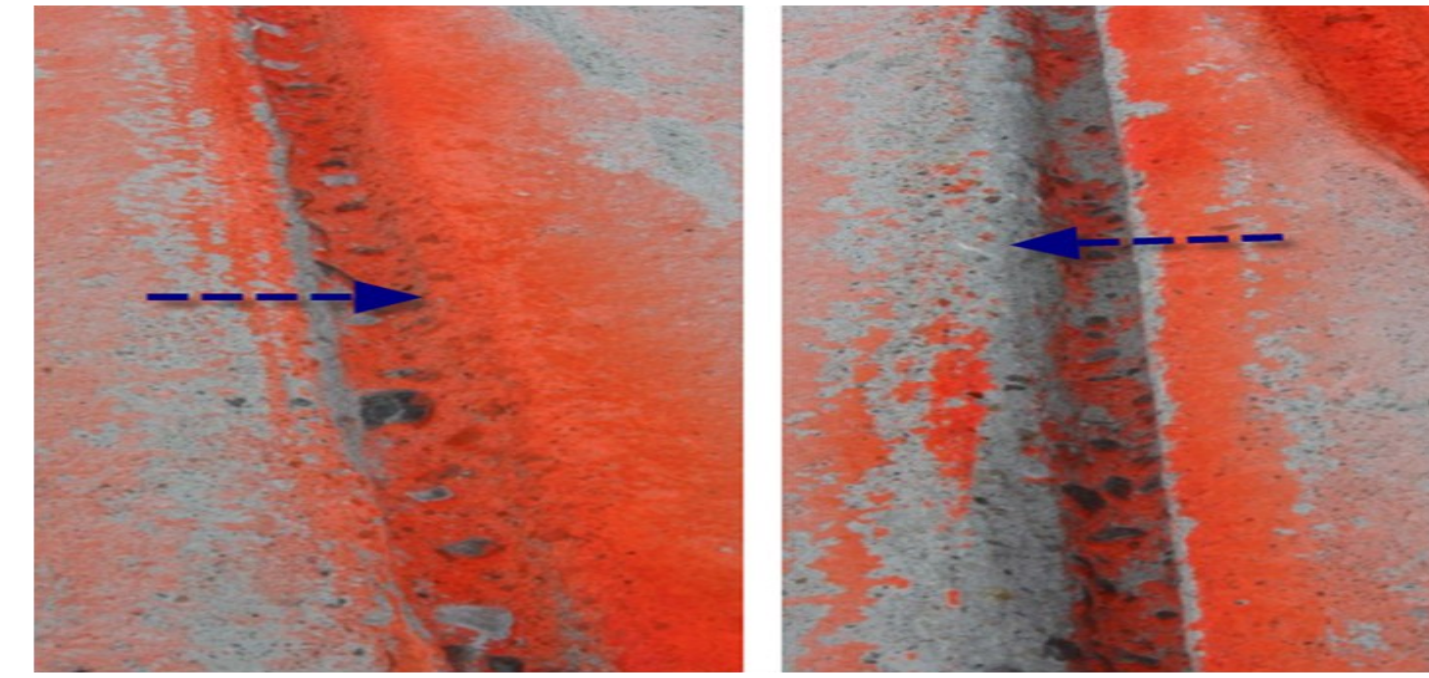
- Chemical removal is the primary objective of device's development
- Aerosol paint was used as simulated de-icing chemical due to its fine mist application and the porous nature of hot mix asphalt.
- Bright colored paint allowed for a straightforward visual analysis of the crack cleaner's effectiveness at removing de-icing chemicals.

Findings :

- Single pass from 3/8" wire brush in 1/2" crack utilizing the crack cleaning device left the side walls of the crack 85%-90% cleaner than air blasting.
- Two passes from the device would likely be needed to ensure both side walls of a wide crack (1/2" >) are prepared to an acceptable level



The test bed before testing (left) and after testing (right).



Crack wall prior to testing (left) and crack wall after testing (right)

- Previously Sealed Crack

The Problem

Broken bonds between sealant and pavement necessitates the sealant's removal and replacement

The Need

The removal of sealant is made difficult by patchy bonding and warm weather

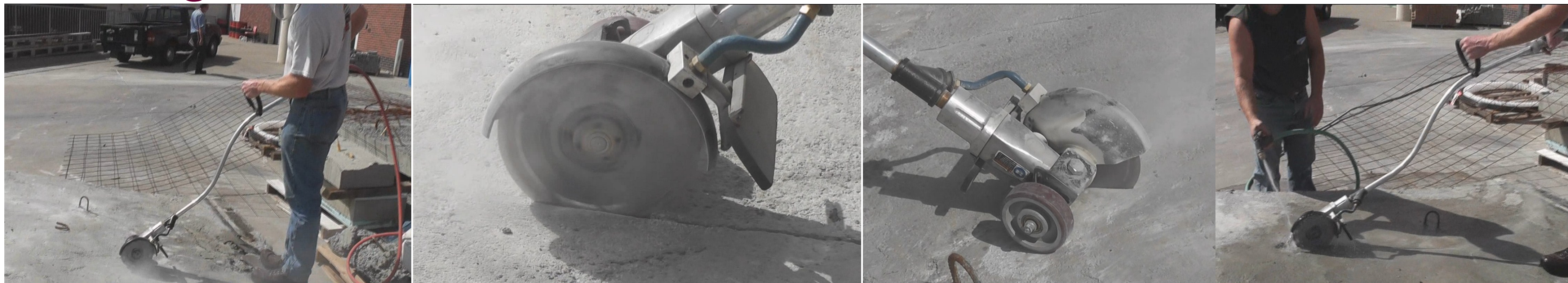
The Solution

Rotary wire brushing effectively removes worn sealant from pavement voids



Effective preparation of previously sealed crack, with sealant residue buildup being shown on the device

- Cutting Concrete Test



Easily cutting an area of pothole by replacing a rotary wire brush with a masonry cutting blade

- Multi-function Test



Versatile functions provided by a single pneumatic powered device developed in this project

Acknowledgments

- A very special thanks to the NCHRP-IDEA program without their funding this project would not have been possible. (NCHRP-IDEA 148)
- Technical input and feed back from the Nebraska Department of Roads (NDOR) and City of Omaha have been invaluable throughout development of this device.

Field Tests and Industry Feedback

1. First Field Test with Nebraska Department of Road (NDOR)

On June 8, 2010, the first field test was conducted at an actual crack sealing site with the NDOR highway maintenance crews in District 2.



NDOR crews using a conventional hot air blaster (left) and the new device (middle and right)

Comments:

1. Easy to learn how to use.
2. Powerful enough to clean typical cracks.
3. Easily maneuvered with the aid of wheel.
4. Would not slow down the crack cleaning process if incorporated into state procedures.

Suggested Improvements:

1. Adding a heat lance to the device may benefit the District 2 group to reduce additional tasks.
2. A second handle should be added to the device for the hand not pulling the trigger.
3. The shield needs to be improved to reduce flying debris.

2. Second Field Test with Nebraska Department of Road (NDOR)

On July 28, 2010 the research team traveled to Norfolk, Nebraska to meet with the NDOR Regional Panel that was selected to assist in supporting the development of the crack cleaner.



First regional panel field test and demonstration (Left and Middle) and Second regional panel field test (Right)

Comments:

1. Excited about the device's light weight and nimble design
2. Significantly reduce physical strain on the current crack cleaning crew .
3. Pleased with the effectiveness of the device at cleaning

4. and preparing cracks for sealant
4. Efficiently clean/prepare previously sealed damaged joints

Suggested Improvements:

1. An increased debris guard
2. An angle-adjustable air nozzle

3. Field Test with City of Omaha Urban Maintenance Crew

The final field test was conducted on March 4, 2011 with the City of Omaha roads maintenance group.



City of Omaha Field Test

Comments:

1. High flexibility
2. Effective at preparing pavement cracks .
3. Easily cutting an area of pothole by replacing a rotary wire brush with a masonry cutting blade

Suggested Improvements:

1. An increased debris guard
2. An angle-adjustable air nozzle