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

1. Heat Lance Unit Design
   - Operating Voltage: 110V-240V (Target 240V)
   - Power rating: 1152W @ 245VAC
   - Max output temp (expected): 1000°F (538°C)
   - Max outlet temp: 295°F (124°C)
   - Max operating pressure: 120 PSI
   - Weight: 30.5” nipple to nipple, body length: 30.5”, heating elements: 1 PSI

2. Vacuum Design
   - Specifications: Maximum suction power 7.5” HG (102” H2O); Maximum air flow 210 SCFM
   - A row of brush is added to the bottom and interior guard to sweep the floor and stop debris from moving.
   - The wide iron guard around the hose opening collects more dust and particles.
   - The suction opening is positioned directly behind the rotary attachment at certain angle such that...}

3. Ergonomic Shaft Re-design
   - Comparison of Shaft Configurations (Before-left, After-right)

4. Wheel Assembly Re-design
   - Right adjustable/ foldable

5. Air wand Re-design
   - A detachable air wand is connected to the CCD with easy connection.
   - The air wand can be used to clean cracks and pavement surface in two ways.

2. Vacuum test
   - Test results:

3. Demonstration at NDOR
   - In October, two operation and safety training sessions were given to NDOR crews.
   - Vacuum was tested to collect with CCDs.
   - All eight NDOR districts will test the units for the entire sealing season (this winter) and provide feedback to the research team.

Field Tests and Demonstration

1. Field Test with Nebraska Department of Roads (NDOR) District 2
   - On 08/02/12, the research team visited Crafco Inc. manufacturing facility to demonstrate the crack sealing unit in Chandler, Arizona.
   - The area dried was not wide enough to apply sealant to.
   - Too heavy to use continuously for more than one hour.
   - Easy to see the heat blasting at work as it dried out the pavement.
   - No dust created with vacuum attachment

2. Demonstration at Crafco Inc.
   - On 08/12/12, the research team tested the heat lance effectiveness on various different... 

Conclusions
- Very effective solution for sealing, hot air blowing, and vacuuming.
- Promising lab & field test results: hot air blowing and vacuuming.
- Positive industry feedback: lightweight, high mobility, and ease of use by the state highway maintenance crews.
- The Crafco Inc. shows high interest in commercializing this product.
- Successful demonstrations to NDOR and Crafco Inc.

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