

## Electrical Resistance Measurements Quantify Asphalt Emulsion Curing Times

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**Categories:**

- Civil Engineering
- Materials and Manufacturing

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- Safety
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According to the National Asphalt Pavement Association, the United States has more than 2.7 million miles of the paved roads and highways; asphalt-surfaced roads account for 94 percent of the roads. In addition, many concrete pavements have asphalt overlays to compensate for deteriorating concrete. Chip sealing typically consists of covering a pavement surface with asphalt emulsion with embedded aggregate chips. The asphalt emulsion cures through the evaporation of water, thus providing mechanical strength to adhere to the pavement while keeping the aggregate chips in place. To maximize the mechanical strength of emulsified asphalt, the curing time is critical. Many factors affect the curing time for the chip seal, including the asphalt emulsion and aggregate types, aggregate moisture content, emulsion and aggregate application rates, and environmental conditions, such as temperature, wind speed, relative humidity, and solar radiation. Currently, there are no field techniques available to determine the achievement of sufficient mechanical strength to allow the return of traffic or brooming to remove surplus aggregate. Field personnel determine the sufficient curing of emulsified asphalts based on their experience. Subjective determination of sufficient curing may shorten the pavement service life, or lead to windshield breakage and possible accidents. There is a need for the quantitative measurement of curing emulsified asphalts.

Researchers at Purdue University have developed a method and equipment to measure the curing of emulsified asphalts quantitatively. This technology uses electrical resistance measurements to measure the optimum curing time for asphalt emulsions. The timing and frequency of measurements are without limit. Field tests indicate that chip seal systems gain significant mechanical strength when the initial electrical resistance measurement increases by a factor of 10. The test equipment features portability and low cost.

Advantages:

- Quantitative measurement
- Increases safety
- Increases service life
- Portable
- Inexpensive
- Saves time

Potential Applications:

- State, federal, and local departments of transportation
- Paving contractors

**People:**

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**Intellectual Property:**

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