

**Arkansas State Highway and Transportation Department
Transportation Research Committee**

RESEARCH PROBLEM STATEMENT

DATE: 09/10/2016	PROJECT AREA: Pavements
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TITLE: Utilizing Intelligent Compaction as a Construction Tool to Make Durable pavements in Arkansas

PROBLEM STATEMENT:

Asphalt compaction is temperature and time dependent, where conventional compaction process is largely dependent on the expertise level of the roller operator who from his/her experience try to achieve maximum compaction level of an hot mix asphalt (HMA) pavement layer. Intelligent compaction (IC) is a relatively new technology where with the help of modern technology, the guesswork involved with the compaction process is eliminated and proper scientific data is incorporated with expertise to achieve optimum compaction. The primary difference between a conventional and IC roller is the mechanism added with it to enable detecting roller location, measuring or controlling the compaction process and displaying or documenting the level of compaction. Moreover, the cost increment of an IC equipped roller is very negligible to a conventional roller. A GPS detects the movement of the roller, whereas an accelerometer calculates the downward deflection of the roller and finally a color coded map of the compacted pavement is showed on the display to help the roller operator understand the number of passes, stiffness, temperature, frequency, amplitude and roller speed. However, understanding how to use IC for construction jobs in Arkansas and determining which parameters indicates proper compaction and optimum density is vital before using IC technology. This proposed proof-of-concept study will provide real time IC data to help improve the compaction process. This technique will use historical field and laboratory compaction data to develop statistical and/or neural network based models, which will provide real time feedback to the roller operator to take immediate measures to achieve adequate compaction in the field during the compaction process. The proposed study will enable the agency in constructing durable HMA pavements in the state of Arkansas.

OBJECTIVES:

1. Find the best IC practices around the world, specially focus of IC initiatives in the neighboring states such as Oklahoma and Texas.
2. Develop mathematical models (statistical and neural network) to predict HMA field compaction by using historical environmental, compaction, materials and mix design data.
3. Leverage the developed HMA models for compaction of base/sub-base materials and sugrade soils in Arkansas
4. Execute a field compaction plan in collaboration with an industry partner

FORM OF RESEARCH IMPLEMENTATION:

1. A report containing the findings of best intelligent compaction (IC) practices, developed mathematical models, and results from field compaction.
2. A technology transfer workshop on IC processes for contractors and construction engineers

REVIEWER: Bryan Signorelli **Estimated Project Duration:** 24 mo.
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Standing Subcommittee
Ranking

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Ranking

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