

UTC Project Information

Project Title	Investigation of the Relationship between Fuel Consumption, Dynamic Load, and Roughness of Pavement Preservation Treatments
University	Michigan State University
Principal Investigator	Imen Zaabar, Ph.D. Karim Chatti, Ph.D.
PI Contact Information	Department of Civil and Environmental Engineering 3546 Engineering Building, East Lansing, MI 48824 Tel: (517) 355-4747, zaabarim@egr.msu.edu
Funding Source(s) and Amounts Provided (by each agency or organization)	\$58,741 USDOT \$15,861 MSU
Total Project Cost	\$74,602
Agency ID or Contract Number	DTRT13-G-UTC44
Start and End Dates	January 31, 2017 to January 30, 2018
Brief Description of Research Project	Understanding the costs of highway construction, highway maintenance and vehicle operation is essential to sound planning and management of highway investments, especially under increasing infrastructure demands and declining budget resources. Pavement preservation has recently gained wide acceptance amongst the highway agencies because of its cost effectiveness and ability to enhance pavement performance and reduce environmental impacts. However, these benefits are not well quantified. Reduction in vehicle fuel consumption is one of the main benefits considered in technical and economic evaluations of road improvements considering its significance. Analysis of the effects of pavement rolling resistance on vehicle fuel economy and emissions needs to consider the total system of the pavement, road geometry, vehicles and their operation, and climate. The pavement characteristics influencing rolling resistance and vehicle fuel economy are: roughness, texture, and structural response. This project investigates the increase in vehicle energy consumption due to pavement structural response caused by the increase in roughness induced dynamic loading.

Describe Implementation of Research Outcomes (or why not implemented)

N/A

Place Any Photos Here

The work has immediate implications in pavement management. The project is about quantifying the effects of preservation treatments on vehicle fuel use. If successful, this will provide better estimates of the benefits of pavement preservation for road users, as opposed to a large focus in most pavement preservation research on benefits to road owners. Once successful, the project will deliver a user friendly tool that can be easily used by state highway agencies.

Impacts/Benefits of Implementation (actual, not anticipated)

The proposed research relies solely on the validity of simulation models to establish a result with heavy financial implications. The research team agrees that physical nuances of energy dissipation in a heavy truck suspension are very complicated (e.g., shock absorber behavior at various stroke rates, component friction), as are the potential differences in pavement material types and their sensitivity to load and loading rate. The engineering outcome of this work may come under intense scrutiny, given the possibility of the difference in energy consumption between material types. The researchers will be as thoughtful as possible about parametric values for the vehicle and pavement material simulation, and will carefully document the potential limitations of key modeling assumptions. The engineering outcome of this work may come under intense scrutiny, given the possibility of the difference in energy consumption between material types. This will lead to an immediate call for experimental validation.

Web Links

<www.chpp.egr.msu.edu>

- Reports
- Project website