

<b>UTC Project Information</b>	
Project Title	MPC 419 – Experimental and Numerical Study for the Debonding Interface Between an Existing Pavement and New Concrete Overlay
University	University of Utah
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Funding Agencies	USDOT, Research and Innovative Technology Administration
Agency ID or Contract Number	DTRT12-G-UTC08, Modification No. 1
Project Cost	\$68,418
Start and End Dates	January 1, 2014 – August 31, 2015
Project Duration	20 Months
Brief Description of Research Project	<p>Most pavement projects today are a rehabilitation or rejuvenation of existing and distressed pavements. We often add more overlay layers or mill out patches for repair material rather than reconstruct the entire roadway. Concrete overlays can serve as cost-effective maintenance and rehabilitation for almost any combinations of existing pavement. Fiber reinforced concrete (FRC) has been used in bonded resurfacing. The principal reason for incorporating fibers is to increase the “toughness” of the concrete, as well as improve its cracking and deformation characteristics. However, scientific investigations about the bond concrete-concrete and asphalt-concrete are scarce.</p> <p><b>Research Objectives:</b></p> <p>In this study, different pretreatments of milled concrete are investigated by means of the wedge splitting test and shear test, which allows determination of mechanical and fracture mechanical properties. The effect of fiber on debonding behavior is investigated. The following explain the objectives of this study:</p> <ol style="list-style-type: none"> <li>1. Investigate the factors on the mechanical properties of the bond by means of a wedge splitting test and a shear bonding test.</li> <li>2. Investigate and characterize the effect of fiber on debonding behavior with experimental tests.</li> <li>3. Develop finite element model which predict effects of debonding through shear or lift-off using ABAQUS user defined element (UEL) subroutine</li> </ol>

<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<p>Experimental tests found that the tensile interfacial energy increased with fiber-reinforcement. Also bond tests indicated that interfacial fracture occurred through the overlay mixture and was proportional to the number of fibers which intersected the fracture path near this interface. The finite element analysis verified that crack width, vertical lift off, and debonding length all decrease as the fracture energy across a joint increases or as the interfacial tensile bond increases.</p>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>Through this project, a series of testing systems were designed and built at the University of Utah lab to evaluate shear and liftoff performance of two-layer pavement systems. These can be used by future university, DOT, and other contracted projects for research and quality control measurements. The finalized testing systems and any limitations of using them can be found in the report. The user element subroutine with the finite element modeling can be also similarly reproduced for future projects to improve validation and characterization of alternative pavement layer systems without extensive experimental testing always needed.</p>
<p>Web Links</p> <ul style="list-style-type: none"> <li>• Reports</li> <li>• Project Website</li> </ul>	<p><a href="http://www.ugpti.org/resources/reports/details.php?id=872">http://www.ugpti.org/resources/reports/details.php?id=872</a></p>