

Investigation of the Behavior of Asphalt Tack Coat Interface Layer

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Principal Investigator:
Dr. Louay Mohammad
LTRC

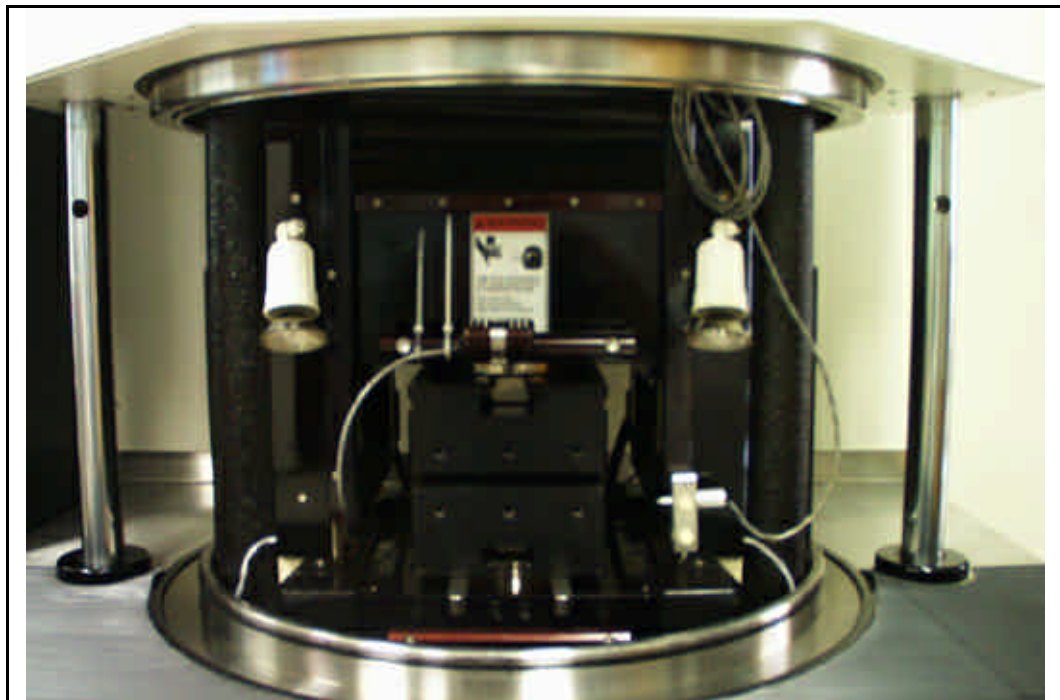
LTRC Contacts:
Administrative:
Harold "Skip" Paul, P.E.
Assoc. Director, Research
(225)767-9102

Technical:
Chris Abadie, P.E.
Materials Research Admin.
(225)767-9109

Problem

Asphalt tack coat is a film of bituminous binder that is used to achieve adhesion between an existing pavement layer and a new bituminous or portland cement concrete layer. Normally hot asphalt cement, cutback asphalt, or emulsified asphalt is used as tack coat material. In Louisiana, tack coat material must conform to requirements of section 1002 of the Louisiana Standard Specifications for Roads and Bridges.

Tack coat provides adhesion between pavement layers resulting in a monolithic system intended to withstand traffic and environmental loads. Studies conducted on asphalt pavement interface strength have shown that a strong tack coat binding between pavement layers is critical to transfer radial tensile and shear stresses into the entire pavement structure. On the other hand, insufficient bond between pavement layers may result in slippage. Insufficient bond may also



Shearing Mold Assembly inside the Superpave Shear Tester



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4101 Gourrier Avenue
Baton Rouge, LA 70808-4443

cause tensile stresses to be concentrated at the bottom of the upper pavement layer. Such concentrated stresses may accelerate fatigue cracking and lead to total pavement failure.

Objective

The objective of the proposed research is to evaluate the current practice of applying tack coats through controlled laboratory shear tests. Tests will be carried out using tack coat materials at varying temperatures, application rates, and normal stress levels. Specific objectives of this research are: (1) evaluate the influence of tack coat types, application rates, and test temperatures on the interface shear strength, (2) recommend optimum tack coat type and application rate, and (3) evaluate the influence of vertical stress levels on the interface bonding strength.

Description

Adhesion between pavement layers is extremely important if stresses are to be properly distributed. This research will evaluate the pavement layer interface strength using different types of tack coat materials and application rates through controlled laboratory shear tests.

Recommendations for appropriate tack coat materials and application rates will be provided based on test results.

Research will be conducted as follows:

- 1) Conduct a literature review.
- 2) Design and fabricate a shearing device to conduct tack coat shear tests.
- 3) Develop test factorial and select mix design.
- 4) Fabricate specimens for shear tests.
- 5) Conduct laboratory shear tests.
- 6) Perform data analysis.
- 7) Prepare draft of final report.

Implementation

This study will provide a comparative performance evaluation for different types of tack coat materials. It will identify an optimum type and application rate. The study will also provide an estimate of the interface shear strength that can be achieved by using tack coats of various types in a multilayered pavement. The research will help to improve pavement performance and minimize failure due to slippage.



Superpave Shear Tester