



PROJECT TITLE: CHARACTERIZATION OF FATIGUE PROPERTIES OF BINDERS AND MASTICS AT INTERMEDIATE TEMPERATURES USING DYNAMIC SHEAR RHEOMETER

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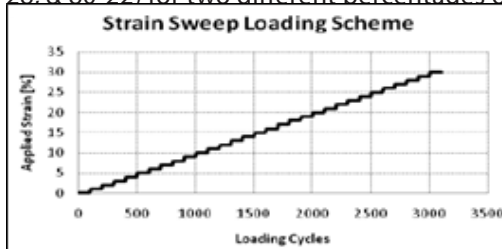
Purpose: Analyze the effect of different dust to binder ratios with different types of binders on the fatigue life.



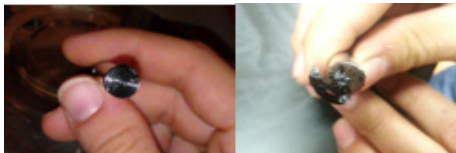
New Jersey dust used to make mastics (particles passing No. 200 sieve).

Background: $G^* \sin(\delta)$ is the SuperPAVE binder specification for fatigue. This number has been studied in recent times and has been found to be an inaccurate measurement. Tests to determine a more appropriate test for fatigue were conducted, leading to the Dissipated Energy Ratio (DER) and the recent Linear Amplitude Sweep (LAS) tests.

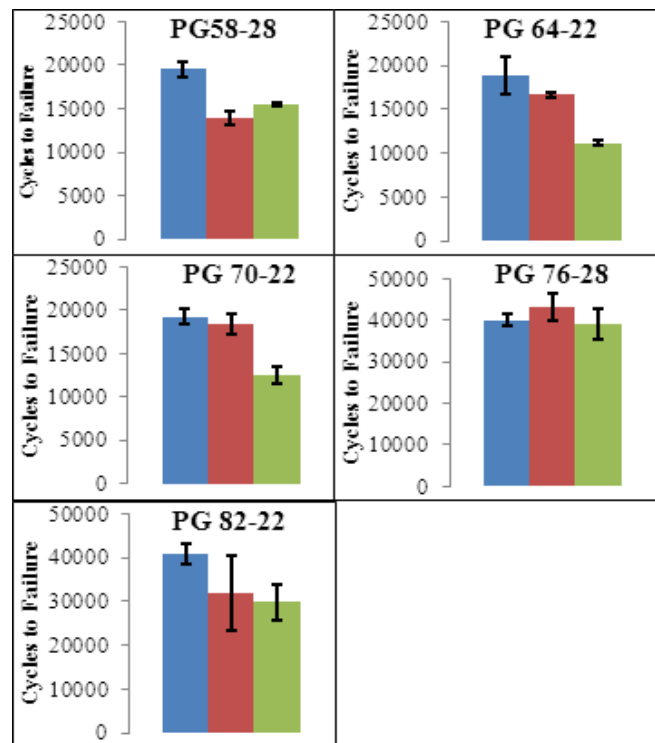
Approach: Tests were conducted on five different performance grade binders (PG 58-28, 64-22, 70-22, 76-28, & 80-22) for two different percentages of binder by mass



6-hour DSR test re. Cycles were taken as the end. A frequency cted to perform



Two types of failure were observed, shear and tension failure. Most of the DER tests resulted in shear failure. When the LAS test was conducted, some samples failed in tension. It was the contrast between tests while conducting the LAS test that allowed for the distinction to be made. Tension failure is taken to represent fatigue, so the results from the DER tests are not detailed in this brief.



Conclusion:

Based on the DER and 50% Drop Methods, adding a small amount of dust to modified samples can increase the cycles to failure by approximately 345%.

Based on the LAS Method, the addition of dust to the binder decreases the fatigue life of binders at the temperature range between high and low PG grade of 86 degrees. However, as the difference between the high and low PG grade increases, the decrease in fatigue life is much lower and even increases at lower percentages of dust.

Recommendations:

Further studies must be performed to determine what causes the two different failure types (mode I and mode II). Overall, the binders with higher range in PG grade appear to be less sensitive to addition of dust.