

Evaluating Laboratory Fatigue Performance of Asphalt Mixtures

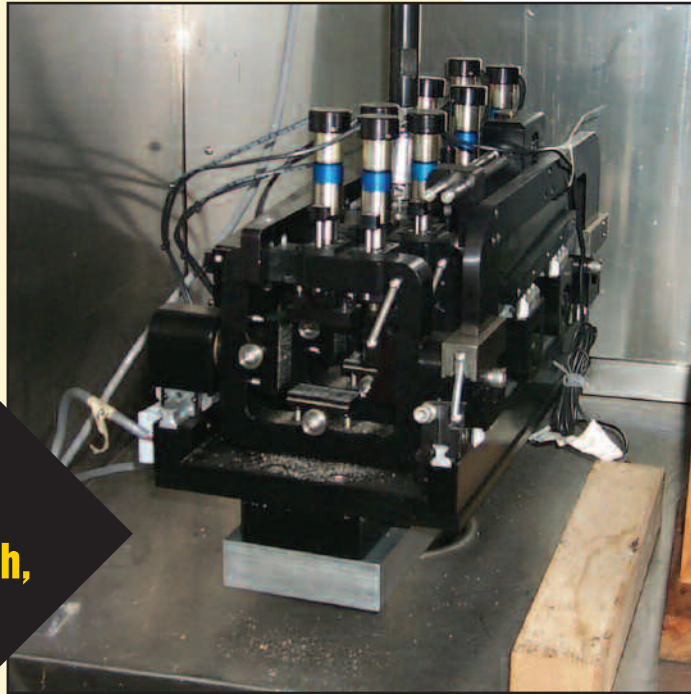


Figure 1:
Flexural Beam Fatigue Fixture

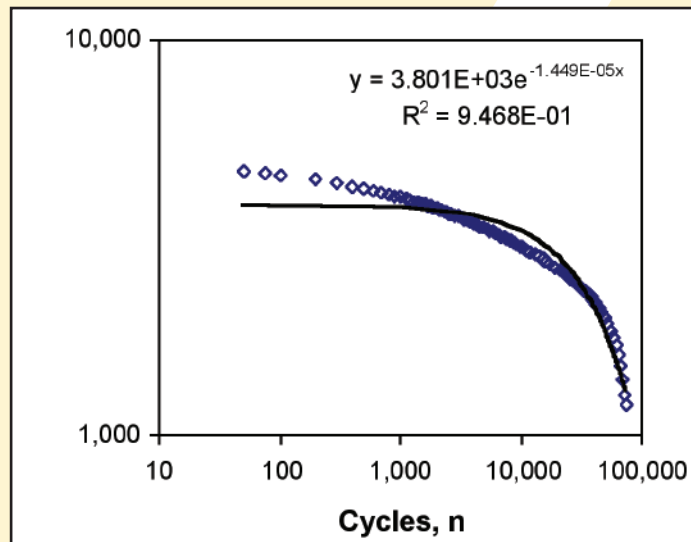


Figure 2:
Typical Beam Fatigue Data – Single Test Condition

Fatigue cracking was one of the three principal distresses identified by the Strategic Highway Research Program (SHRP) that is experienced by asphalt mixtures in service. As part of the accelerated performance testing program of SHRP, researchers at the University of California at Berkeley refined laboratory fatigue testing and analysis procedures using the four-point flexural beam fatigue fixture (Figure 1). In the test, an asphalt mixture beam specimen (2" x 2.5" x 15") is produced and tested at a specified strain level and temperature (usually 20°C) by repeatedly loading the specimen in the center of the beam. As the specimen fatigues, microcracks are formed and the stiffness of the asphalt mix specimen decreases. As the microcracks increase, the specimen stiffness decreases rapidly (Figure 2).

Flexural beam fatigue data is analyzed principally by plotting mix stiffness as a function of loading cycles. The number of cycles to failure, N_f , is defined as the loading cycle when the mixture stiffness drops to 50 percent of the original stiffness. SHRP research indicated that the cycles to failure in the flexural beam fatigue test could be related to the actual number of loading cycles required to cause fatigue cracking of asphalt pavements. In the laboratory, the fatigue test is often used to compare the expected fatigue performance of different asphalt mixtures using different aggregates, asphalt binders, and modifiers.

For more information or to get a quote on performing flexural beam fatigue testing and analysis, please contact either Mike Anderson (manderson@asphaltinstitute.org) or Gary Irvine (girvine@asphaltinstitute.org). ▲

The Asphalt Institute's lab is available to perform research, testing and training.

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