

# **Tenth Annual Pennsylvania Concrete Conference**

## **Poster Presentation**

### **Majestic Foyer/Grande Ballroom**

#### **Evaluating MEPDG-Predicted JPCP Performance Using Results from the S.R. 22 Smart Pavement Study**

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This poster presents the evaluation of the accuracy of the calculated stress in the fatigue model of the MEPDG and the accuracy of the calculated deflection in the faulting model of the MEPDG. Fatigue and faulting damage are accumulated over the entire pavement life due to the combined effects of environmental and traffic loads.

To evaluate the fatigue cracking and faulting models, the MEPDG is used to predict damage for an unrestrained 12-in thick jointed plain concrete pavement over a 20-year design life. The model is based on the pavement structure properties of the Smart Pavement, SR-22. Since damage takes into account the combined effects of environmental and traffic loads, and to facilitate the evaluation of this model, constant climatic conditions are used in this model. This will help isolate the effect of traffic loading alone on a concrete slab with a constant temperature and moisture profile through it. In addition, to simplify the analysis of the models and the evaluation of concrete stress and deflection, one type of traffic loading is applied on the pavement during the 20-year design life.

Moreover, the same pavement structure, subjected to the same temperature and moisture conditions and the same traffic loading is then analyzed using the finite element program, to determine the resulting stresses and deflections in the concrete. The stress and deflection are evaluated based on the base properties and stiffness of the underlying layers that are estimated by the MEPDG. The resulting fatigue damage, slab cracking and slab faulting based on both sets of data are compared and the critical stress to cause slab failure is estimated.

The poster begins with an overview of the SR-22 structure and properties, traffic and climatic data used in the model. Then the inputs used to model the pavement structure in the MEPDG are presented, and finally, the results of the model evaluation are presented.