Questions & Answers

FHWA PMEUG Software Training Webinar #4

| Training Topic | Question | Response  (Note: Shaded cells reflect responses given in the webinar, while unshaded cells contain responses prepared following the webinar) |
| --- | --- | --- |
| Topic #1—HMA Fatigue Cracking Models and Calculations | How can we access the recordings? | We will email all the participants with a link to where the recording is located. |
| Is this applicable for airfield design? If yes, then how does this software calculate the airfield load/fleet mix? | The form of the model would be appropriate; however, since the model was developed for highway pavements, I would expect the calibration coefficients would need to be revised for airfield loading conditions. |
| What data was used to develop the (NCHRP 1-47) sensitivity analysis? LTPP? | The LTTP data was used in the sensitivity analysis. The research team selected sites in different climatic regions and evaluated the results based of varying inputs. |
| Due to the high variability of existing pavement cross-sections and their materials, MDOT is going to conduct a research project to help us establish rehab pavement ME design protocols and inputs. | Thank you for the information. This project will be of interest to many agencies. |
| Is this model applicable to local roads? | The form of the model would be appropriate for local roads; however, as noted for airfield design, the calibration coefficients may need to be revised for local road conditions. |
| As agencies make changes in specifications and material properties (e.g., adoption of BMD principals) what would you recommend as a guideline for updating calibrations? | Establish test sections and capture needed construction (including initial IRI) and materials testing data in support of PMED inputs. Develop or populate a PMED calibration database to capture inputs. Monitor pavement section performance (i.e., distress, IRI, truck traffic loading). With sufficient historical performance data, validate, calibrate, and verify the performance models. Refer to the Local Calibration Guide for additional details. |
| Topic #2—JPC Fatigue Cracking Models and Calculations | What is the importance of "built in curl" related to damage, and how can that be measured or planned for? | The built-in curl value is a calibration coefficient in that it was selected based on the value that provided the best fit between the predicted performance and the field observations. It is not necessary to try to quantify it outside of the calibration process when performing a standard pavement design. |
| In AASHTO '93, k-value is derived by considering subgrade stiffness and aggregate base thickness and stiffness. However, in pavement ME, k-value is only related to subgrade or the layers below the aggregate base. Correct? | This is correct. The dynamic k-value is used in Pavement ME and represents the composite stiffness of all layers below the base (even if the base is an aggregate base). The base and slab are combined into one layer and modeled as a plate with an effective stiffness. |
| I've noticed one major difference between AASHTO '93 and PMED is these methods handling the transfer of traffic loads through joints. In AASHTO '93, J-values are used. However, such or similar inputs are not available in PMED. Any thoughts? | Pavement ME uses a much more rigorous approach in accounting for load transfer, as compared to the AASHTO ’93 Guide. When quantifying stresses and deflections, Pavement ME directly accounts for the contribution of the base, aggregate interlock, and dowel bar system. The increase in load transfer along the lane/shoulder joint when using a tied concrete shoulder instead of an asphalt shoulder is also considered when calculating stresses and deflections in Pavement ME. |
| Could you please elaborate more on your ML model? How did you analyze the performance of the model? How data transmissions have been done and how efficient the model performs? | The models can be assessed based on the coefficient of determination and the absolute error, but it is also necessary to perform an extensive sensitivity analysis. This allows you to ensure that over-training did not occur and that the models can be applied to inputs outside of the discrete values used in the training datasets. |
| With this model, can we develop a longitudinal cracking model? | The same framework used for the transverse cracking prediction can be used in developing a longitudinal cracking model. New artificial neural networks will need to be developed to predict the stress critical for the development of longitudinal cracking and the relationship between damage and longitudinal cracking would need to be defined through calibration. |
| Based on this model, how thin can we go in the thickness? | The Guide for Mechanistic-Empirical Design of New and Rehabilitated Pavement Structures (NCHRP 1-37A Final Report) states that the design procedure is valid for PCC pavements between 6 and 17 in thick (see Part 3-Design Analysis, Section 3.4.3.7). |
| Does anyone know if ME will include a module to design SJPCP over DGAB instead of over HMA? We are going to build SJPCP (with fibers & non-doweled) new recon over new aggregate base. | I would not recommend using the SJPCP design for slabs on aggregate bases, because all of the sections used for calibration were on asphalt. |
| We are finding that Pavement ME emphasizes faulting as the primary mechanism for design (failure mode). What's concerning to me is that I could specify a thick dowel (1.5-inch diameter) and that will allow a pavement to pass close to 6 inches in thickness. We don't think that this is practical for our major thoroughfare of I-94 near Detroit, but ME will deem it appropriate. Have you experienced this issue? Do you have any recommendations for how to handle this impracticality of ME results? | There are some limitations to the current version of the faulting model, which can sometimes result in unrealistically high faulting predictions. Increasing the slab thickness should only be performed when the pavement is failing due to fatigue cracking. Unfortunately, Pavement ME will try to increase the thickness to reduce faulting. Faulting should only be addressed by increasing the dowel diameter and not by adding thickness. |