Webinar #2 – Using the Innovative Materials Within the PMED Software.

The following provides an answer or response to all questions asked during the webinar. Some of the questions were asked in the Question and Answer Box, while others were asked and answered in the Chat Box. Response to both are summarized below.

Vincent Ogunro (vogunro@uncc.edu) - 10:49 AM

Q: What is bT in the equation in slide 39?

A: It represents the effect of temperature on the plastic strain. It is also one of the kr calibration coefficients for the rutting model.

BIPAD SAHA (bipad.saha@vdot.virginia.gov) - 11:12 AM

Q: Which Version of AASHTOWare was used for the graphs specially for Top Down Crack?

A: The latest version, v2.6. As discussed or answered a previous question, the y-axis for top-down cracking in the slides should be percent total lane cracking and not ft./mi.

Haifang Wen (haifang_wen@wsu.edu) - 11:42 AM

Q: Is there a comparison, when RAP content increases, but other conditions kept constant, will bottom-up cracking predicted from PMED decrease or increase?

A: Yes, there is but it is included in the Ray Bonaquist report for the Practitioners Guide. Percent RAP does make a difference in the lab-derived properties.

JAYHYUN KWON (jkwon9@kennesaw.edu) - 11:46 AM

Q: How would you model FDR base?

A: That comes back to how it's going to be done on construction if the full depth reclamation includes more cement or higher cement content. Potentially that's a semi rigid pavement design, depending on how much cement was added. If we're adding an emulsion, depending on how much emulsion that's added or a virgin asphalt remixing it in place, if it's being designed for a dense graded mix, then that would be considered an asphalt layer. If we're only adding enough cement or emulsion or other materials to adjust to improve the material, the final material for compaction and it's not enough to get an intact core after the full depth layer has been placed, then that may need to be simulated as an unbound layer with a representative modulus material.

So I think we need to be careful because what we do in practice between different agencies can vary significantly. And we got to remember the assumptions in Pavement ME, i.e., what is a bound layer and

whether that's a cement material layer or whether it's an asphalt layer or whether it's an unbound layer. So answering these questions without knowing more, what goes into some of the assumptions just becomes very dangerous.

There are certain assumptions for these full depth reclamation or certain processes. And if you're simulating as asphalt layer, that really assumes that is a dense, graded asphalt layer. When you core it, if you don't get a testable sample, that means it's subjected to durability issues and Pavement ME does not simulate or predict durability type distresses. So, you know, I hope I've answered or gave it enough verbiage so that we've answered the question, but It'll come back to the assumptions.

BIPAD SAHA (bipad.saha@vdot.virginia.gov) - 11:46 AM

Q: We see the benefit of level 1 vs 3, however if agency does not have exclusively lab results how we can get the data for innovative materials. Is there a global database or any suggestions?

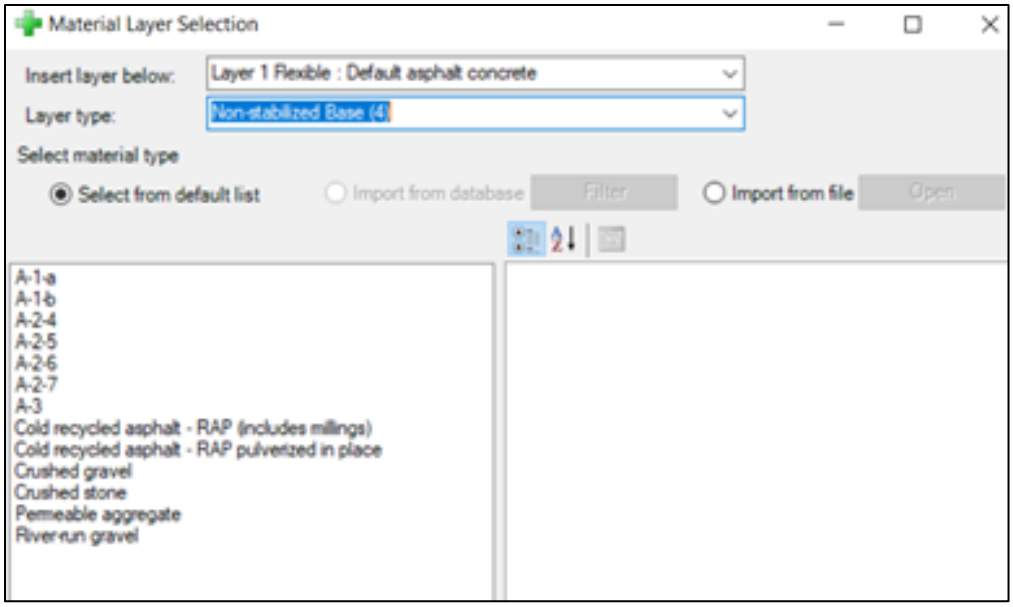
A: Yes. And this could be the case for a lot of agencies, and I should have probably expanded early on. But many agencies do not have the equipment to run the test for creep compliance, fatigue strength and a plastic strain coefficients to determine those. So what do they do? And about the only thing they can do is go through kind of like what I did is to determine some global values from my cluster database set. But you got to know how the values were measured going into the cluster data set. This is one of the items for many of the participants.

We're going to discuss this at some time in the near future with the AASHTOWare Task Force, because there's going to be a lot of innovative materials that are aren't really what I would say, innovative because there's a lot of data around. So they've been used, but we're going to discuss this with the task force to see if we, through the manual of practice, the next time it gets balloted that some recommended values with strict boundary conditions can be included in the manual of practice for like High RAP, they're used quite extensively now. Polymer modified, which are used quite extensively and even ground rubber is used by some agencies quite a bit. So we're hoping to discuss this with the task force for not so much a global database, but for like the global K1, K2, K3, for fatigue and rutting. The plastic strain coefficients, fatigue strength coefficients in the manual of practice as default values that can be used that are mix specific and based on a certain set of data.

Jared Dastrup (jdastrup@utah.gov) - 11:55 AM

Q: How would you model cold in place recycle?

A: The suggestion depends on how the CIR is mixed and placed. If the CIR has no emulsion or asphalt binder added, then simulating the CIR layer as a higher quality aggregate base is suggested. However, if emulsion or asphalt binder is added to the CIR and the amount of binder is determined by designing the mixture, then simulating the CIR layer as a dense graded asphalt mixtures should be considered. The defaults included in the Pavement ME Design software and layer simulation is under the aggregate base layer designation, but no additional emulsion or binder is added. See below.



Surendra Chowdari Gatiganti (szg0094@auburn.edu) - 11:56 AM

Q: What values are recommended for CIR/CCPR mixtures, If we model them as asphalt concrete mixtures using Level-1 mechanical properties?

A: Input level 1 properties are measured in the laboratory, so it is whatever the measured values are. See the reply to the above question. The important question: is the CIR/CCPR layer simulated as a dense-graded asphalt layer or an unbound aggregate base layer? That decision is up to the designer. A suggestion – if the CIR/CCPR layer has emulsion or asphalt binder added to the mixing process, then considering it an asphalt layer maybe appropriate. However, if no emulsion or asphalt binder is added, simulating it as an aggregate base is preferred or suggested – but that is the decision of the designer.

The default properties or input level 3 in terms of elastic modulus are noted in the PMED software and in the MEPDG Manual of Practice. The elastic modulus of these materials is obviously dependent on the quality of the material. This is a decision of the designer. The MEPDG Manual of Practice default input level 3 values assume that the CIR/CCPR layer is a higher quality aggregate base layer. In other words, no emulsion or asphalt binder is added to the material.

A point to remember, if the CIR/CCR layer is modeled or entered as a dense-graded asphalt concrete layer (either input level 1 or input level 3) and is the lower asphalt layer in the rehabilitation design, the fatigue strength of the pavement structure will be defined by the fatigue strength coefficients and dynamic modulus of that CIR/CCR layer. Low dynamic modulus values implies that the fatigue strength is low and bottom-up fatigue cracking will be initiated sooner than expected.

Naji Khoury (nkhoury@kmapc.net) - 11:09 AM

Q: How about simulating 1-inch HPTO layer, and 2-inch BRIC layer? can we simulate this in PMED.

A: The high performance thin overlay, if it's less than one inch, then no, because it has to be an inch thick. So if you were simulating a high performance thin overlay, the minimum thickness is an inch. And if that's the overlay, that's the only layer, then. You can consider it, but it's a structural overlay. Again, I want to remind everyone Pavement ME does not predict or account for more durability distresses or I'm going to say, non- structural pavement repairs. So usually for the simulations, the designer kind of has to make that decision.

For BRIC, yes, you can. Again, you're going to use because I don't know of any test results that are available, and I'm not sure by a binder rich intermediate course. I'm assuming that's a relatively thin layer. So yes, you can simulate it. It'll be simulated if it's an intermediate layer between a base and a wearing surface. It's not going to have much of an impact, it's only from a stiffness standpoint, if it's used in a rehabilitation process as a reflection cracking mitigation strategy, then yes, you can simulate it. You'd have to revise the reflection cracking coefficients that's in the transfer function. And the last webinar touched on that. For some of these proprietary materials, that would be binder rich intermediate courses that are designed as a reflection cracking mitigation strategy.