The Asphalt Pavement Alliance Presents:
A Five-Part Webinar Series On Mechanistic Empirical Pavement Design Guide (MEPDG) Implementation Specific to Asphalt Pavements

• Today’s Webinar: Part-2
  Local Calibration

• Speaker:
  Kevin Hall, PhD., P.E.
  Professor and Head of the Department of Civil Engineering at the University of Arkansas

• Moderator:
  Mike Kvach, APA

Webinar Protocol:

• Audio Quality
  • Headset Recommended
  • External Speakers May Cause an Echo / Feedback

• Questions & Answers
  • Chat Box – Make sure to change the drop-down menu to “Organizer Only”

• Recorded Webinars
  • www.asphaltfacts.com/webinars/
  • Click on: “Five-Part Series on MEPDG Implementation Specific to Asphalt Pavements”
The Asphalt Pavement Alliance Presents:
A Five-Part Webinar Series On Mechanistic Empirical Pavement Design Guide (MEPDG) Implementation Specific to Asphalt Pavements

Part 1: Pavement Design, Where We’ve Come From and What We’re Trying to Accomplish
Part 2: Local Calibration
Part 3: Individual Distress Models
Part 4: Major Inputs – Where Do They Come From & How Do We Get Them?
Part 5: Moving Beyond Data Input (Advanced)

Part 2: Local Calibration

Speaker:
Kevin Hall, Ph.D., P.E.
Professor and Head of the Department of Civil Engineering at the University of Arkansas

Local Calibration of Pavement-METM

Kevin D. Hall, Ph.D., P.E.
Professor and Head, Dept. of Civil Engineering
21st Century Leadership Chair in Civil Engineering

Dave Newcomb, Ph.D., P.E.
Senior Research Engineer
TTI / Texas A&M University

Pavement-METM Webinar Series
Presentation #2
Asphalt Pavement Alliance
September 5, 2013
The calibration and validation of the performance prediction model is a mandatory step to establish confidence in the design and analysis procedure and facilitate its acceptance and use.

**Calibration:** the mathematical process through which total (residual) error – the difference between observed and predicted values of distress – is minimized.

**Validation:** the process to confirm that the calibrated model can produce robust and accurate predictions for cases other than those used for model calibration.
Calibration Concept

National Calibration of the MEPDG

Primarily LTPP; some WesTrack and MnRoad
1. Select Hierarchical Input Level for Each Input Parameter
2. Develop Experimental Design and Matrix
3. Estimate Sample Size for Each Distress Model
4. Select Roadway Segments
5. Extract and Evaluate Roadway Segment/Test Section Data
6. Conduct Field Investigations of Test Sections to Define Missing Data
7. Assess Bias for the Experimental Matrix
8. Determine Local Calibration Coefficient to Eliminate Bias of Transfer Function
9. Assess Standard Error for Transfer Function
10. Improve Precision of Model: modify coefficients and exponents of transfer functions
11. Interpretation of Results: decide on adequacy of calibration coefficients

Local Calibration: Items to Note

Selecting Calibration Sections

- Sample size (minimum)
  - Distortion (total rutting or faulting) 20 roadway segments
  - Load-related cracking 30 roadway segments
  - Non-load-related cracking 26 roadway segments
  - Reflection cracking (HMA only) 26 roadway segments

- Roadway Segment / Condition Surveys
  - At least 3 condition surveys available for a roadway segment
  - Condition surveys cover at least 10 years
  - Increased number of surveys for higher levels of distress
  - Range of distress magnitudes - minor to “close to” design criteria
  - Distress definitions/measurements consistent with MEPDG (Data Collection Guide for Long-Term Pavement Performance)

- Use Existing Roadways IF POSSIBLE
  - If data unavailable, shift to new construction; begin monitoring plan

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Arkansas Calibration

38 Sections
- 18 LTPP
- 20 PMS

Arkansas Calibration

<table>
<thead>
<tr>
<th>Base Type</th>
<th>HMA Thickness</th>
<th>No. of Sections</th>
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<tbody>
<tr>
<td>Unbound</td>
<td>Thin (&lt;4&quot;)</td>
<td>Intermediate</td>
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<tr>
<td></td>
<td>0113, 0114, 0804</td>
<td>0113, 070254, 070610</td>
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<td>Asphalt Treated Base</td>
<td>0803</td>
<td>0815, 0116, 0117</td>
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<td>070601</td>
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<td>Cement Treated Base</td>
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<tr>
<td>Total Sections</td>
<td>1</td>
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</table>

Underlined sections randomly selected for validation;
"G" = good; "A" = average; "P" = poor;

KEY: Good Data!

Manual Distress Surveys:
- what is a longitudinal crack?
- what is an alligator (fatigue) crack - especially in its early form?
- do you KNOW what is under your pavement?

TRAFFIC!
KEY: Good Data!

Where does this rutting occur?
-- asphalt surface only?
-- all asphalt layers?
-- base layers?
-- subgrade?
-- ALL?

How do you know???
Arkansas: Rutting

MEPDG default Initial IRI: 63 in/mile
Arkansas Initial IRI (LTPP and Top 25): 70 in/mile

Arkansas: Total Rutting

Arkansas: Smoothness (IRI)
Local Calibration: Arkansas

<table>
<thead>
<tr>
<th>Calibration Factor</th>
<th>Default</th>
<th>MEPDG (2011)</th>
<th>Pavement-ME™</th>
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<td>Alligator cracking</td>
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<td>AC rutting</td>
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<tr>
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<td>Subgrade rutting</td>
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</tbody>
</table>

Case Study: Bella Vista Bypass, Bella Vista, Arkansas

General Specifications:
- Future 1–49 (interstate stds)
- 18.9 miles
- 4–12 ft lanes
- 60 ft depressed median
- 4 ft inside shoulders
- 10 ft outside shoulders
- Average elevation 1263 ft above sea level

Case Study

Using Local Calibration

Using National Calibration
Let’s take a quick peek at

AC Fatigue
AC Rutting
Subgrade Rutting
SUMMARY:
“The calibration and validation of the performance prediction model is a mandatory step to establish confidence in the design and analysis procedure and facilitate its acceptance and use.”

QUESTIONS?

Thank You!
Next Webinar: Thursday, September 5th
Part 3: Individual Distress Models
Register at: www.asphaltfacts.com/webinars/