





ME Design

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Coming Soon to Pavement ME Designs

- National Update
- User survey results
- Major findings from implementation efforts
- Software and model enhancements

ME Design Inputs

- How DOT's are implementing
- Calibration




AASHTOWare Pavement ME Design Product Task Force

Judy Corley-Lay, Chair - North Carolina DOT
 Bill Barstis - Mississippi DOT
John Donahue - Missouri DOT
 Jay Goldbaum - Colorado DOT
 Marta Juhász - Alberta Transportation
 Mehdi Parvini - California DOT

Liaisons:
 Gary Crawford, FHWA
 Said Kass, Manitoba Infrastructure and Transportation - TAC

Vicki Schofield
 AASHTO Project Manager
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www.aashtoware.org



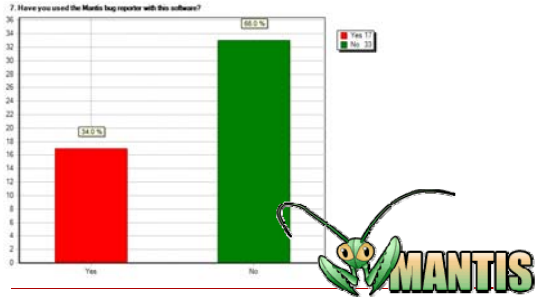

www.me-design.com



- Software
 - Release notes
- Climate Data
- Bug reporting
- Web training
- Survey




Reporting Issues



7. Have you used the Mantis bug reporter with this software?

Response	Percentage
Yes	16.5%
No	83.5%



Source: 2013 AASHTO Customer feedback survey (www.me-design.com)

Educational/Evaluation Version

- Now Available (7/2013)
- Free
- Limited design types—new asphalt and concrete, AC/AC overlays, AC/JPCP Overlays, Unbonded PCC overlays.
- Only 8 climate files
- No batch mode and sensitivity analysis.
- No access to intermediate output files.

Agencies Licensing Software as of January 2013

4 Canadian Provinces

Other Licensee's:
 FHWA
 Contractors
 Industry Associations
 25+ Consultants
 20+ Universities
 Foreign Governments

Source: AASHTO

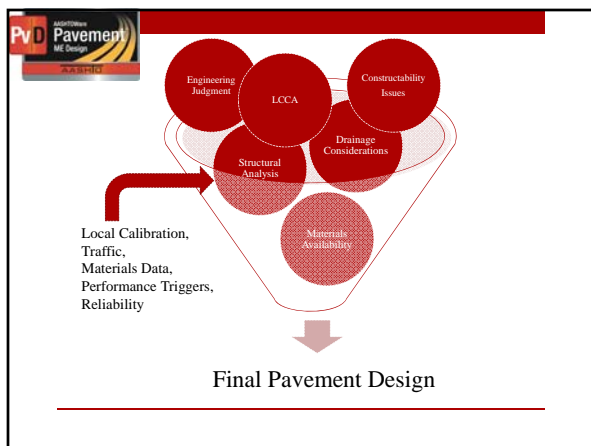
■ No plans to implement
■ Implemented
■ < 3 years
■ > 3 years

Source: NCHRP Synthesis 20-05/Topic 44-06 : Implementation of AASHTO MEPDG and Software

Improved Design?

15. Backup: To what extent is this software an improvement over your preceding pavement design method?

Improvement Category	Percentage
Significant improvement	63.3%
Slight improvement	11.3%
No change	3.3%
Worse method	3.3%
Do not know yet	18.3%



Asphalt Characterization

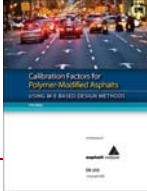
- Data library of Level 1 asphalt material inputs with agency-specific mixtures
- Acceptable for mixtures with conventional binders, significant deviations were observed for binders with higher PG grades.
- Use of measured binder test data in Witczak model has greatly improved the accuracy of dynamic modulus predictions.
- Fewer studies of **non-conventional** mixtures

Source: FHWA Summary of ME Implementation and GDOT Lit Review

Pv D Pavement ME Design

What is conventional Asphalt?

- FHWA project for use of GTR and High Recycled mixes
- LTTP Warm Mix Asphalt test sections
- Asphalt Institute ER-235 Polymer Modified Mixes
- Rutting calibration coefficients by layer




Calibration Factors for Polymer-Modified Aggregates
Volume 1: Aggregate and Mix Design

Pv D Pavement ME Design

PCC Characterization

- Convention strength characterization catalogs
- Focus on CTE values
- ME Design has not been corrected for updated AASHTO T336 procedure



<http://www.fhwa.dot.gov/pavement/concrete/pubs/hif09015/hif09015.pdf>

Pv D Pavement ME Design

Unbound Materials

- Resilient modulus data library for aggregate base and subgrade soils.
- Developing a resilient modulus prediction model based on soil parameters.
- FWD and other non-destructive tests to determine the resilient modulus.
- **Relationship between FWD modulus and laboratory resilient modulus of unbound materials has yet to be resolved**

Pv D Pavement ME Design

Climate

- Most States using ME Design files
 - Updated files expected in 2015
- Some states expanding extent and number of files
- LTTP Climate Data
 - NASA data applied to LTTP Bind and potentially ME Design
- Suggestion: Perform QC and lock down weather files

Pv D Pavement ME Design


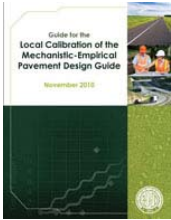
Traffic

- Quality Control on WIM data
- Develop WIM input files
- Cluster analysis in identifying homogeneous traffic patterns.
- LTTP Plug program
 - Improved default traffic files
 - Improved user derived traffic data

Pv D Pavement ME Design

Local Validation-Calibration of Transfer Functions

How close is close enough?

Guide for the Local Calibration of the Mechanistic-Empirical Pavement Design Guide
November 2010

Calibration

- Goal is to remove bias
- Use National and other DOT findings
- Read GDOT Lit review

Calibration Efforts

6. Have you gone through the local calibration process for models in the software?

Response	Percentage
Yes	17.3%
No	44.2%
In progress	38.5%

Source: 2013 AASHTO Customer feedback survey (www.me-design.com)

Consistent Findings

- **PCC national models** are reasonable
 - Exception: site factor in the IRI regression equation.
 - Exception: C4 and C5 of the joint faulting transfer function
- **Asphalt Models**
 - Over-predicts rutting in the unbound layers
 - Dynamic modulus does not explain the different in rutting between hot mix asphalt and polymer-modified asphalt mixtures.

Source: FHWA Summary of ME Implementation and GDOT Lit Review

Rutting Measured vs. Predicted

Rutting Calibration Solution

Calibration of Rutting Models for Structural and Mix Design


- Fully coordinated with software in mind
- Recorded webinar available
 - <http://www.trb.org/Highways1/Blurbs/167582.aspx>

Montana Finding

Local Calibration of Unbound Materials Rutting Model
 Finding: Model tends to over predict rutting.
Other models were adequate for design
Preventative Maintenance not directly tied to ME Design


http://www.mdt.mt.gov/other/research/external/docs/research_proj/pave_model/project_summary.pdf

Distress	Coefficient	National	MO	UT	AZ	CO**	WY**	WI	OH	OR	WA
AC Fatigue	Bf1	1	1	1	249.0087	130.3674	1	1	1	1	-3.3
	Bf2	1	1	1	1	1	1	1	1	1	-40
	Bf3	1	1	1	1.2334	1.217799	1	1	1	1	20
AC Rutting	Br1	1	1.07	0.56	0.69	1.34	1.08	1.01	0.51	1.48	0.6
	Br2	1	1	1	1	1	1	1	1	1	20.6
	Br3	1	1	1	1	1	1	1	1	1	8.9
Base Rutting:	Bs1	1	0.01	0.604	0.14	0.4	0.9475	0.01	0.32	0	
Subgrade Rutting	Bs1	1	0.4375	0.4	0.37	0.84	0.6897	0.5731	0.33	0	
IRI	C1 (Rutting)	40	17.7	40	1.2281	35	20.53	18.71	17.6		
	C2 (Fatigue)	0.4	0.975	0.4	0.1175	0.3	0.4094	0.04	1.37		
	C3 (Thermal)	0.008	0.008	0.008	0.008	0.02	0.00179	0.085	0.01		
	C4 (Site Factor)	0.015	0.01	0.015	0.028	0.019	0.015	0.0197	0.066		

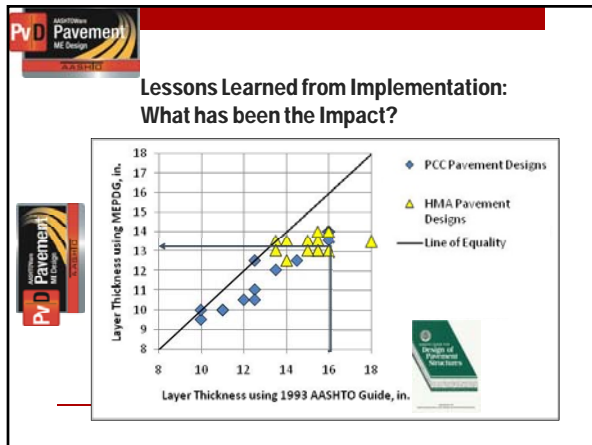



Top 3 Asphalt Design Challenges

- Calibration of the Rutting Model
- Polymer Modified Asphalt
- Resource Responsible Asphalt Mixtures (WMA, RAP, RAS, GTR)



R²AMs



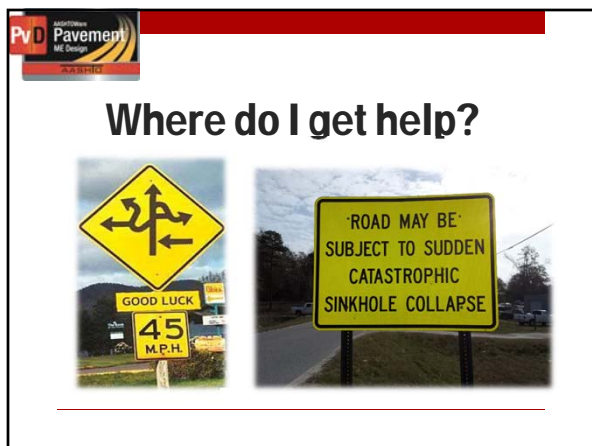
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FY 2013 Enhancements to ME Design include:

 - Layer-by-layer asphalt rutting
 - Virtual computer environments
 - Special loading analysis
 - Implementing the 1-41 Reflection Cracking Model

Next version of ME Design include:

 - Model for shrink/swell prediction
 - Frost modeling in EICM
 - Reports for batch mode FWD runs
 - Update national climate database in 2015
 - Module for design of precast or pre-stressed concrete





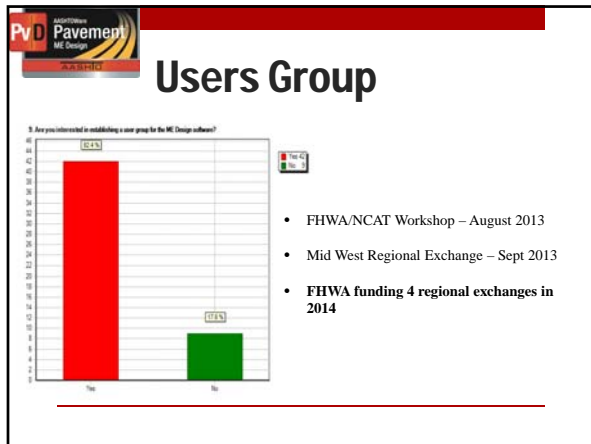
WEBINAR SERIES: Introduction

www.me-design.com

Webinar Path

- Module 1: About DARWin-Me
- Module 2: Climate Inputs
- Module 3: Traffic Inputs
- Module 4: Material and Design Inputs for New Pavement Design
- Module 5: Material and Design Inputs for Pavement Rehabilitation with Asphalt Overlays
- Module 6: Material and Design Inputs for Pavement Rehabilitation with Concrete Overlays
- Module 7: New Asphalt Pavement Structures
- Module 8: New Concrete Pavement Structures
- Module 9: Unbonded Concrete Overlays
- Module 10: Asphalt Overlays of Asphalt Pavement





Users Group

3. Are you interested in establishing a user group for the ME Design software?

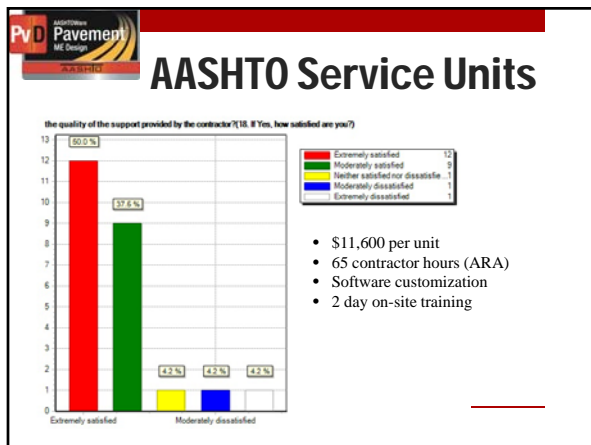
Response	Percentage
Yes	85.5%
No	14.5%

- FHWA/NCAT Workshop – August 2013
- Mid West Regional Exchange – Sept 2013
- FHWA funding 4 regional exchanges in 2014



Pooled Fund Solicitation

- Coming in 2014
- ~\$10k per agency
 - 3-5 years
 - Need 30+ participants
- 4 Regional Peer Exchanges
- 1 National AASHTO Users Group meeting
- Support Regional/National Implementation projects

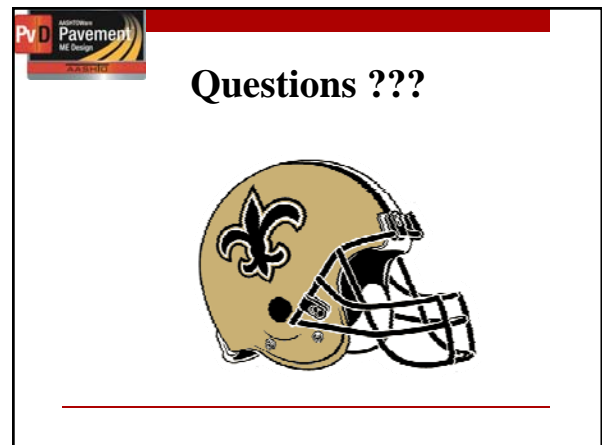


AASHTO Service Units

the quality of the support provided by the contractor? (16. If Yes, how satisfied are you?)

Satisfaction Level	Percentage
Extremely satisfied	80.0%
Moderately satisfied	17.6%
Neither satisfied nor dissatisfied	0.0%
Moderately dissatisfied	4.3%
Extremely dissatisfied	4.3%

- \$11,600 per unit
- 65 contractor hours (ARA)
- Software customization
- 2 day on-site training



Questions ???

