

PerRoad Pavement Design Software
SEAUPG Annual Meeting
Nashville, TN
December 13, 2005



Dr. David H. Timm, P.E.
 Auburn University / National Center for Asphalt Technology




Overview

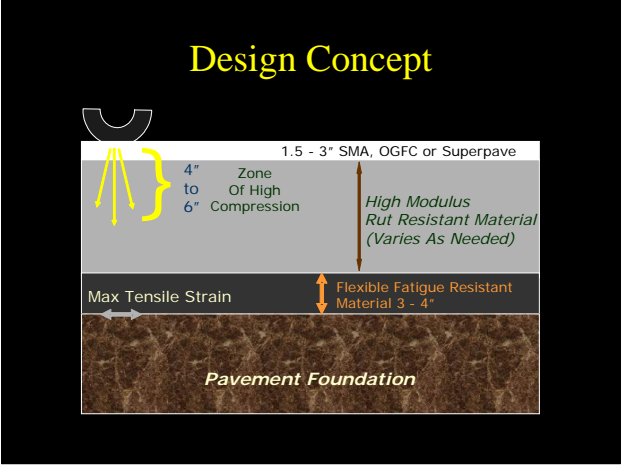
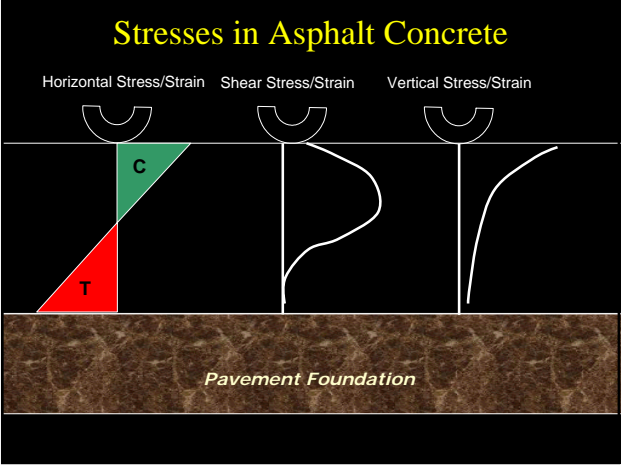
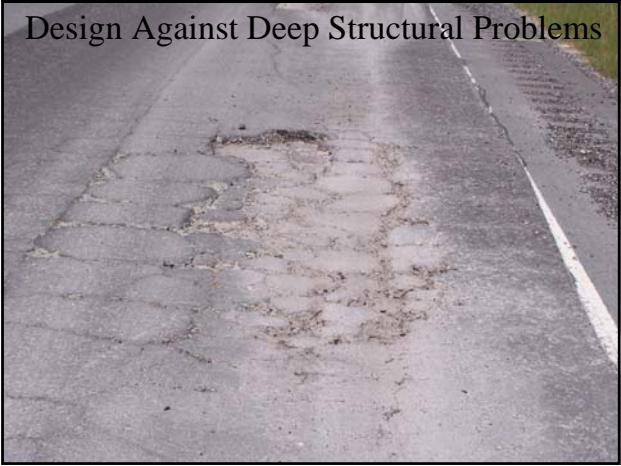
- Perpetual Pavements – Defined
- Design Principles
- Design Software – PerRoad 2.4
- Case Study
 – Bin-Bo Expressway, Shandong China

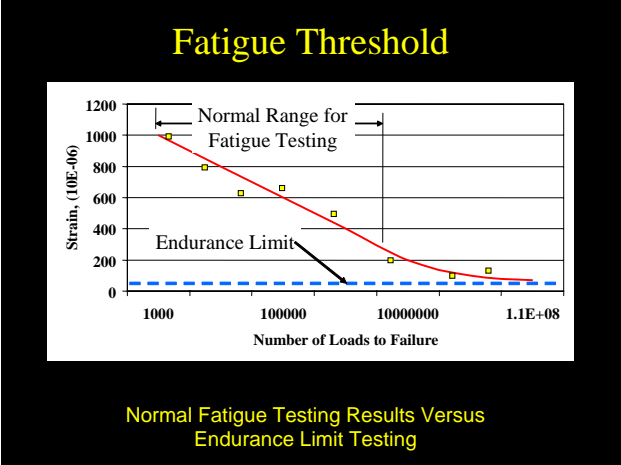
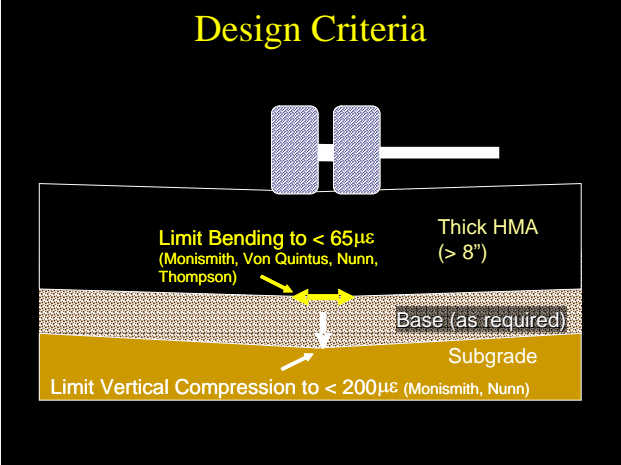


What is a Perpetual Pavement?

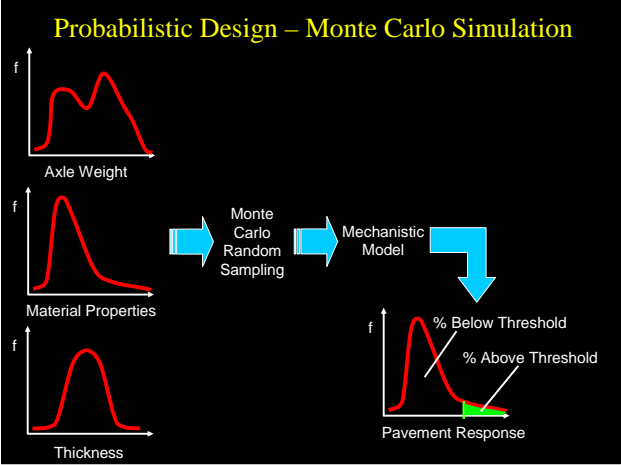
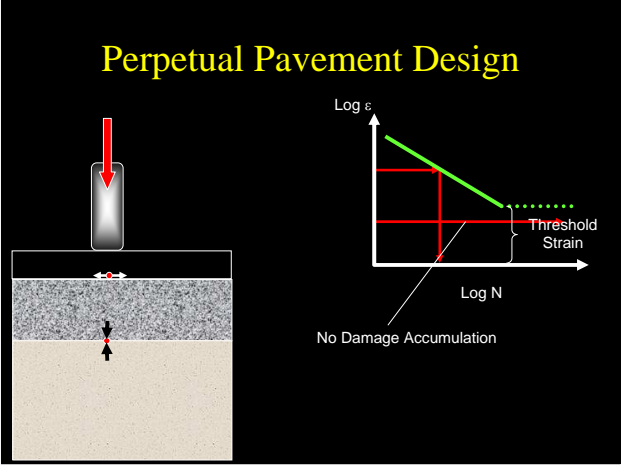
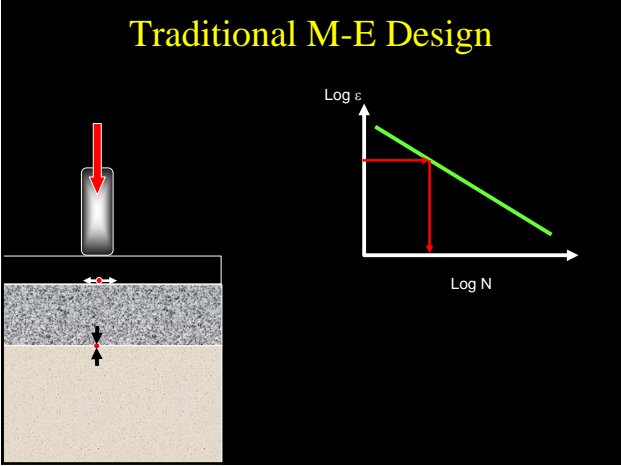
- Long – life (50+ Years)
- Minimum maintenance / rehabilitation
- Surface distresses only





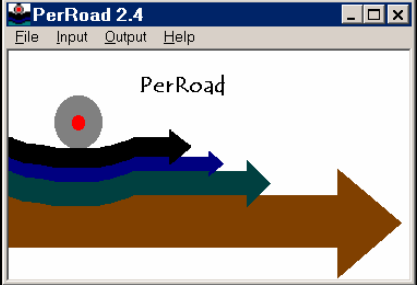


- ### Pavement Design Parameters
- Material Characterization
 - Traffic Conditions
 - Composition
 - Current volume
 - Growth
 - Environmental Conditions
 - Variability

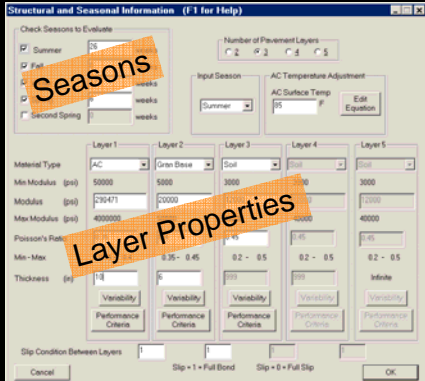


Design Software: PerRoad 2.4

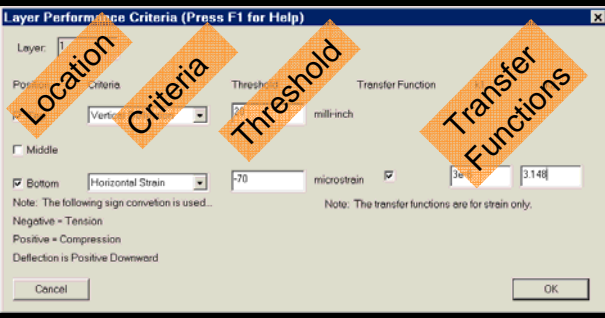
- Sponsored by APA
- Developed at Auburn University / NCAT
- M-E Perpetual Pavement Design and Analysis Tool



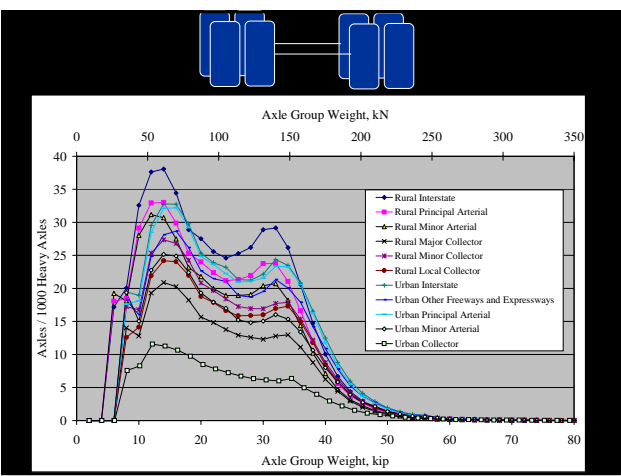
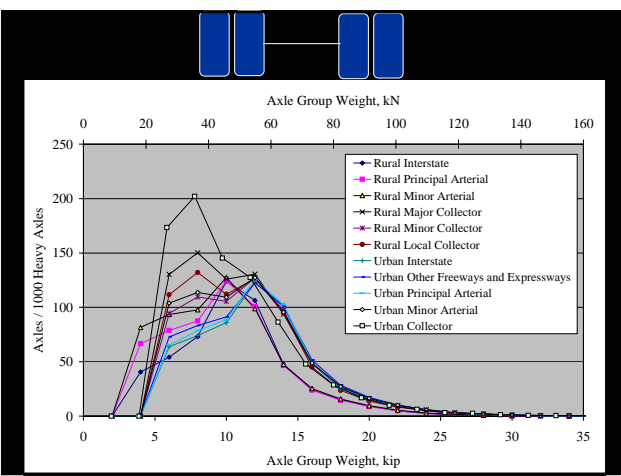
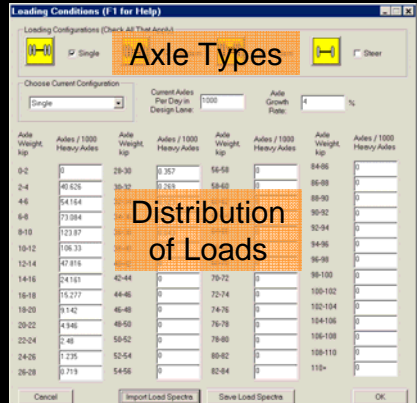
Structural Inputs

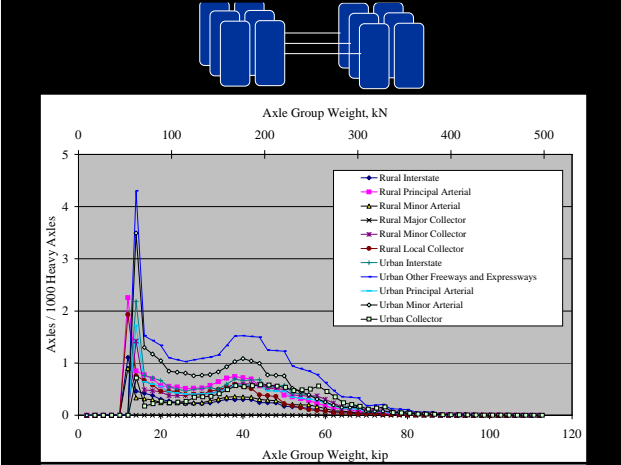


Performance Criteria



Load Spectra



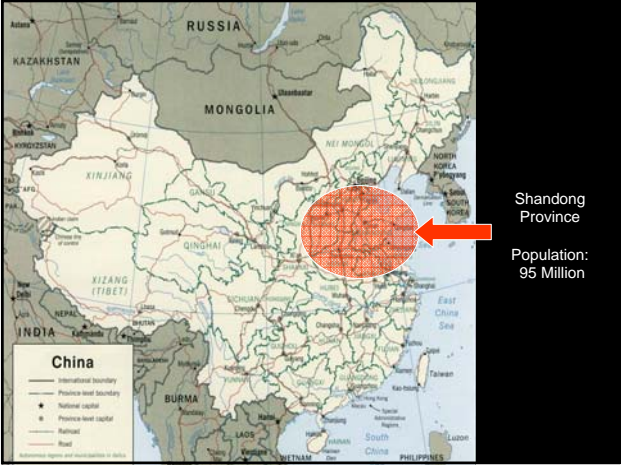


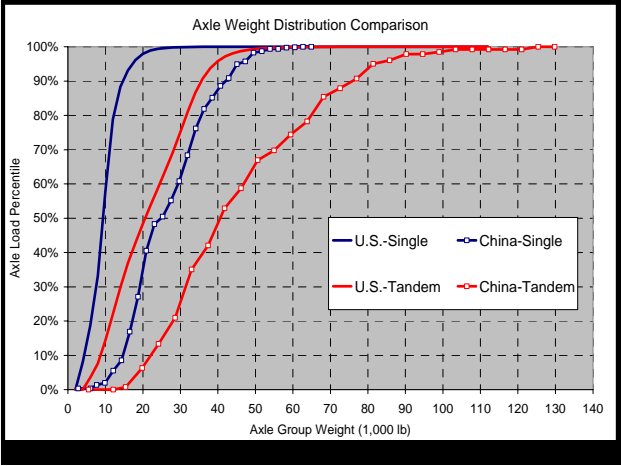
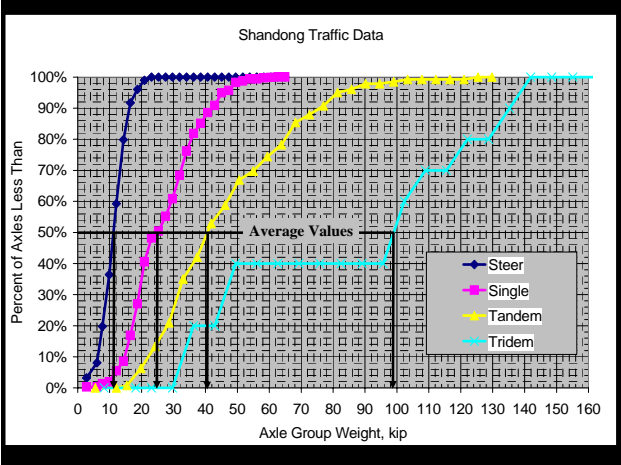
PerRoad Output

Perpetual Pavement Design Results							
Layer	Location	Criteria	Threshold	Un...	Probabi...	Damage/MESAL	Life Estimate, yrs
1	Top	Vertical Defl...	20.	mi...	100.	NA	NA
1	Bottom	Horizontal Str...	-70.	mi...	95.	7.5349e-003	42.11
3	Top	Vertical Strain	200.	mi...	99.	NA	NA



- ### Chinese Pavements - Background
- Standard design is HMA over semi-rigid base
 - Marshall mix design
 - SMA surface mixtures
 - High percentage of overloads
 - Some issues:
 - Cracking
 - Water damage
 - Rutting
 - Early pavement failures very common
 - PCC: 6 – 8 Years
 - HMA: 3 – 5 Years
 - GOAL: Design and Build a pavement that will last!

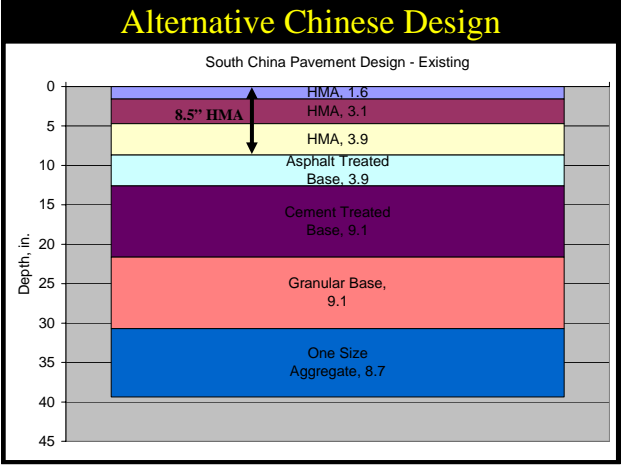
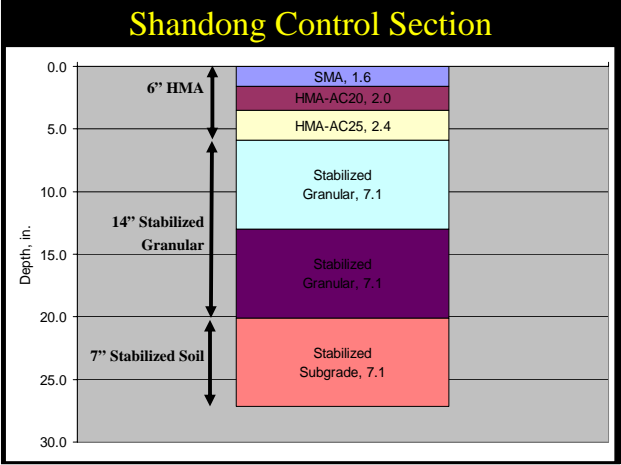


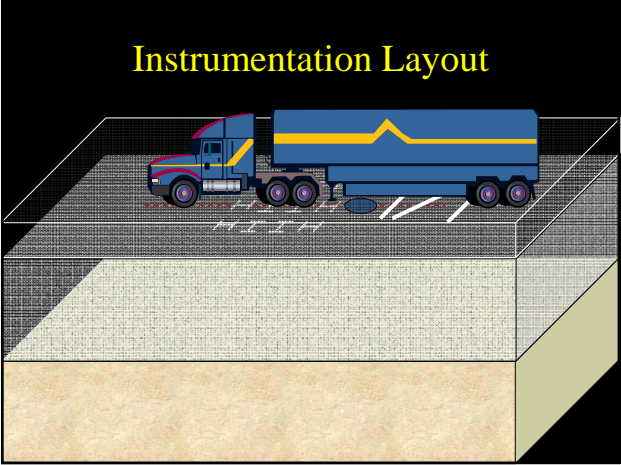
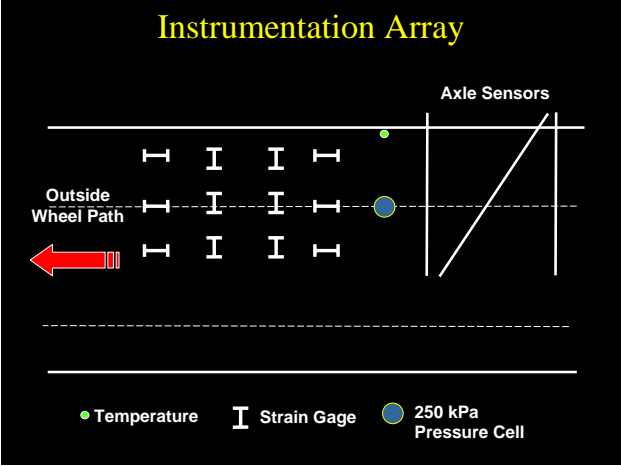
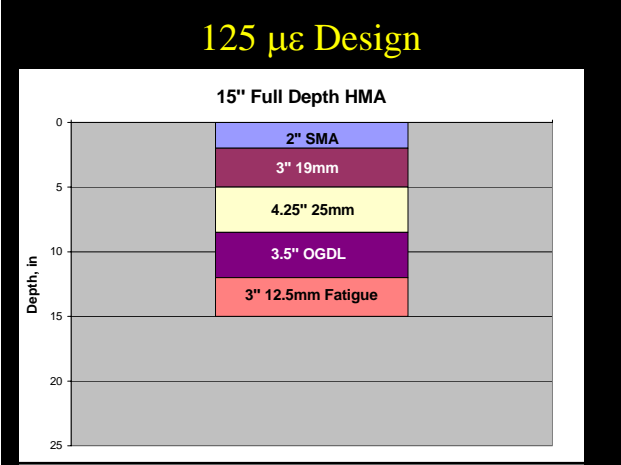
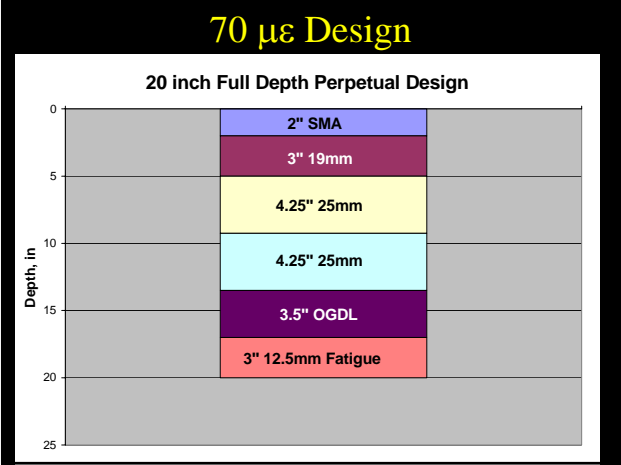


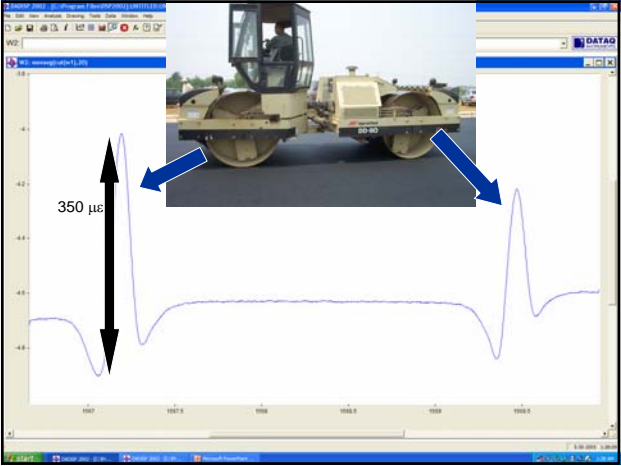
Test Sections

1. Shandong DOT control section
2. South China design control section
3. 20" full depth HMA
 - Conservative threshold of 70 $\mu\epsilon$
4. 15" full depth HMA
 - Relaxed threshold of 125 $\mu\epsilon$
5. 15" full depth HMA with higher quality materials

↑
Designed using PerRoad and Chinese Load Spectra







- U.S. Benefits
- Instrumented perpetual pavements
 - Live traffic dynamic data
 - Investigate effects of overloads on pavement response and performance
 - Evaluate variety of designs

PerRoad Update

- New version (3.0) to be released in 2006
 - Continue training seminars
- PerRoad 2.4 available at:

<http://www.eng.auburn.edu/users/timmdav/Software.html>

Thank You!