



USE of MODIFIED ASPHALTS in FLORIDA

Gale Page

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Florida's Past History

- ➡ No Extensive Use of Polymer Modifiers
- ➡ FL Response to Rutting Crisis of the 1980's
 - Monitor Air Voids of Plant Produced HMA
 - Control P200 of Plant Produced HMA
 - Some Limited SBR, Gilsonite, etc
- ➡ Use of SBR in OGFC in Late 1980's
 - Increased Binder Content for Improved Durability

Eyeopener - Testing with the HVS



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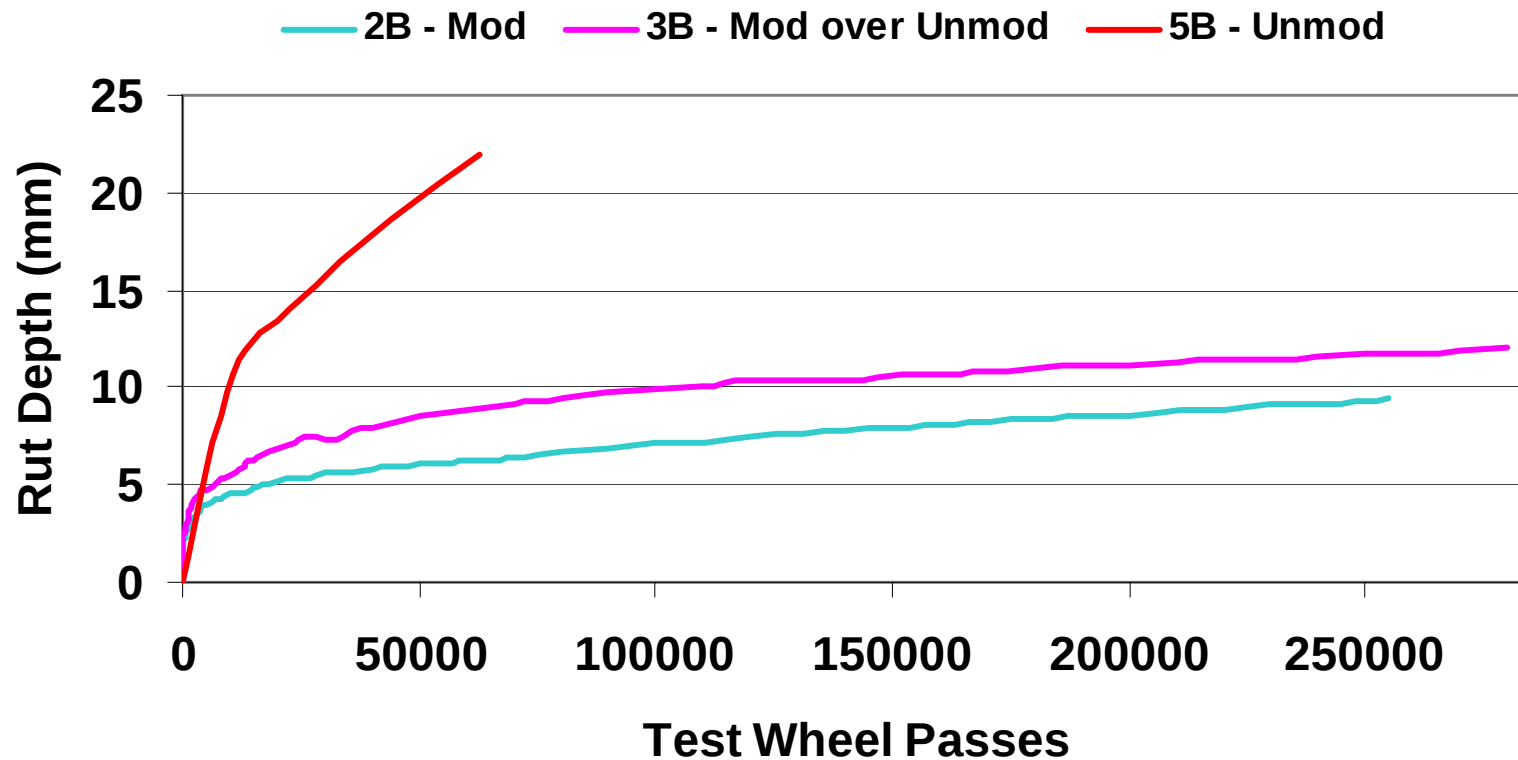
- ⇒ First Tests with Florida's HVS
- ⇒ Compare Mix with/without Polymer Modifier
- ⇒ Superpave 12.5 Fine 10-30M EASL's
- ⇒ 3 Test Sections (4-inch)
 - 2 Lifts Unmodified
 - 2 Lifts Polymer Modified
 - 1 Lift Polymer Modified above 1 Lift Unmodified

Results of Florida HVS Testing

- ⇒ Polymer Modifier Improved Rut Resistance
- ⇒ Significant Impact in Top Layer
- ⇒ Results Confirmed by NCAT Test Track
 - Florida Did Not Evaluate Effect of Modifier

Results of Florida HVS Testing

Rut Depth -- Modified vs. Unmodified -- Controlled
Temperature (50 C at 50 mm)



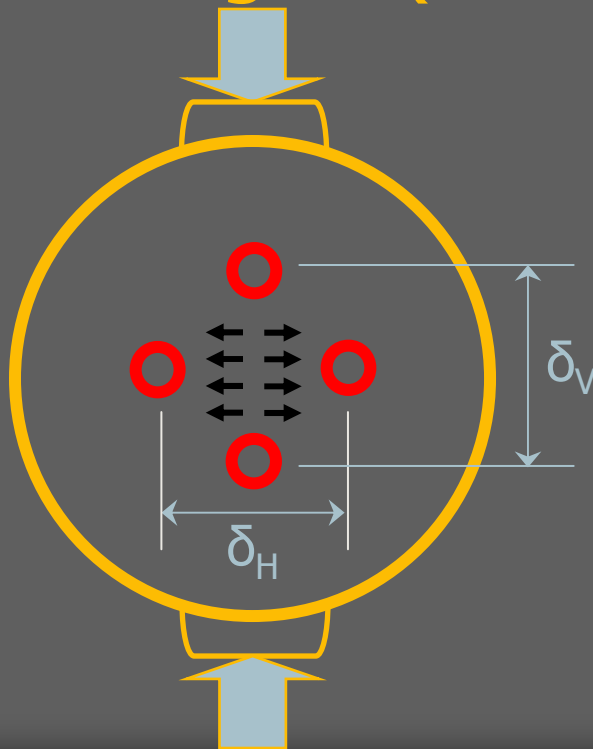
University of Florida Research

- ⇒ Basic Material Property of HMA Related to Top Down Cracking (The Holy Grail)
- ⇒ Energy Ratio using DCSE
- ⇒ Polymer Modification Improves
 - Resistance to Cracking (TRB 2003 paper)
 - Resistance to Rutting (other research)

Mixture Properties

Superpave Indirect Tensile Test:

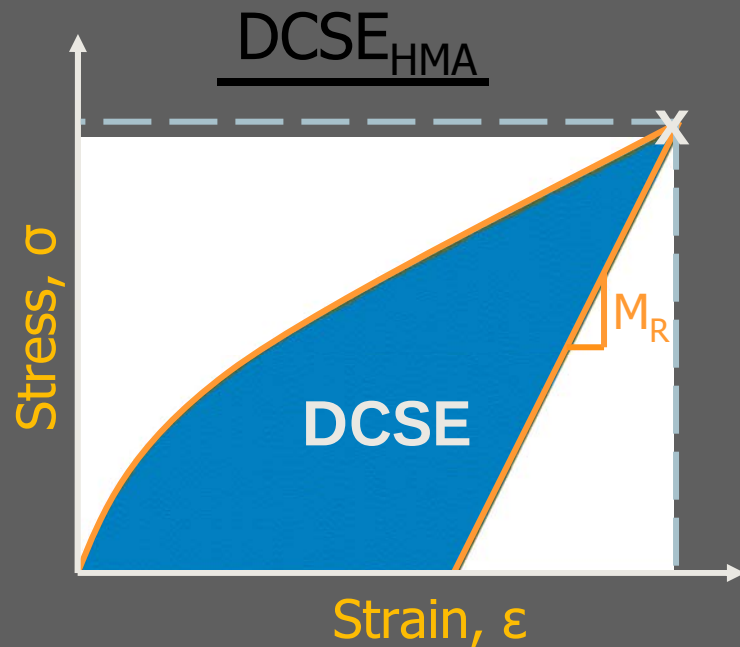
1. Resilient Modulus (cyclic loading)
2. Creep (constant load with time)
3. Strength (increase load until fracture)



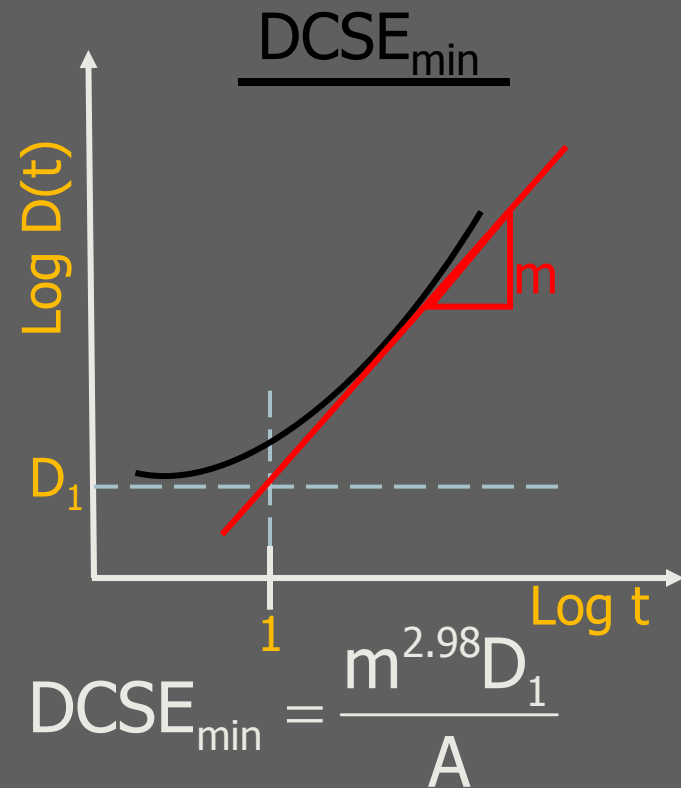
- ➡ Apply vertical load
- ➡ Measure vertical & horizontal deformations

Energy Ratio Concept

➔ The $DCSE_{HMA}$ has to be greater than the $DCSE_{min}$ for good cracking performance:

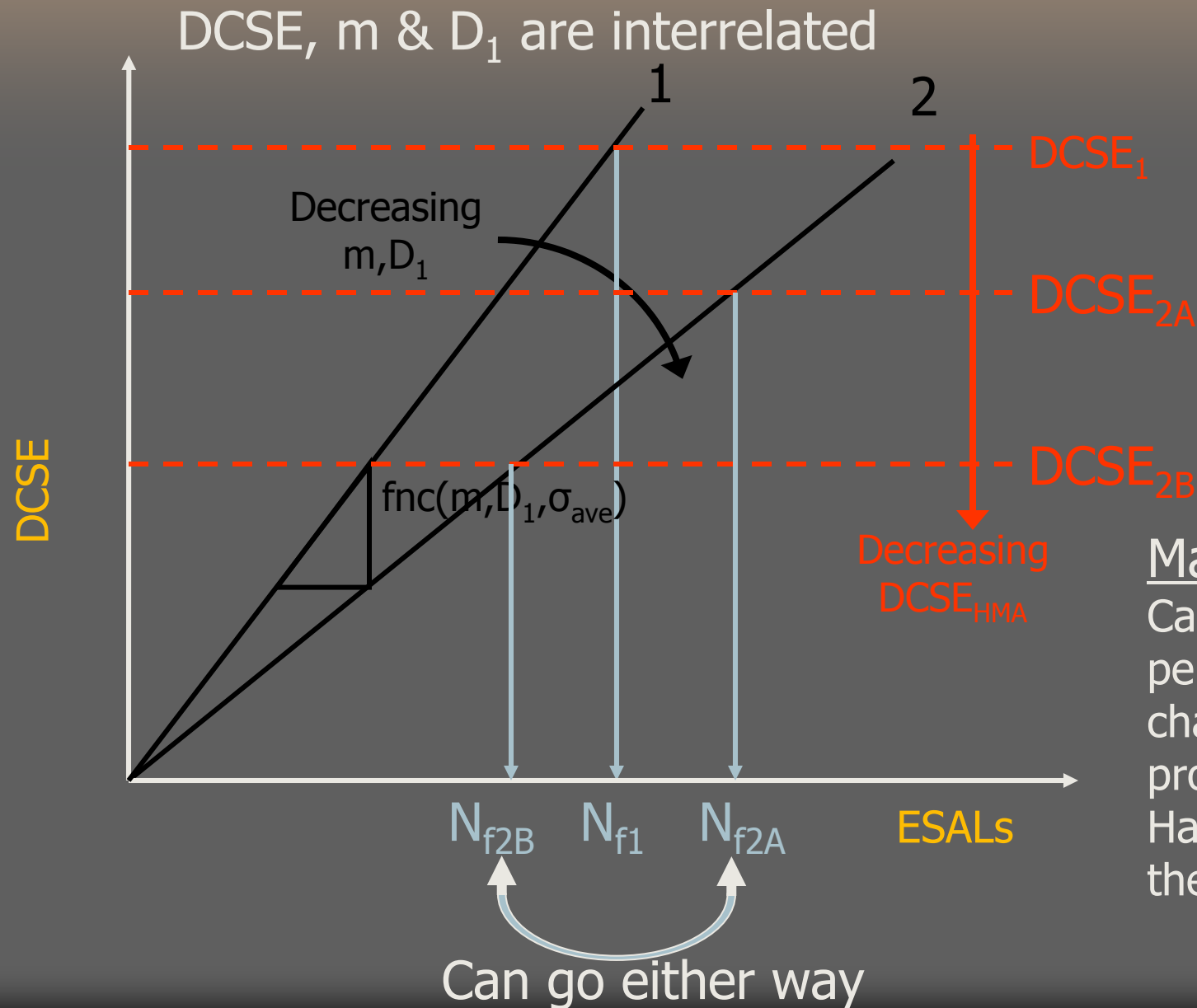


– $DCSE_{HMA} = \text{AREA}$



$$\text{ENERGY RATIO} = \frac{DCSE_{HMA}}{DCSE_{min}} > 1$$

HMA Fracture Model

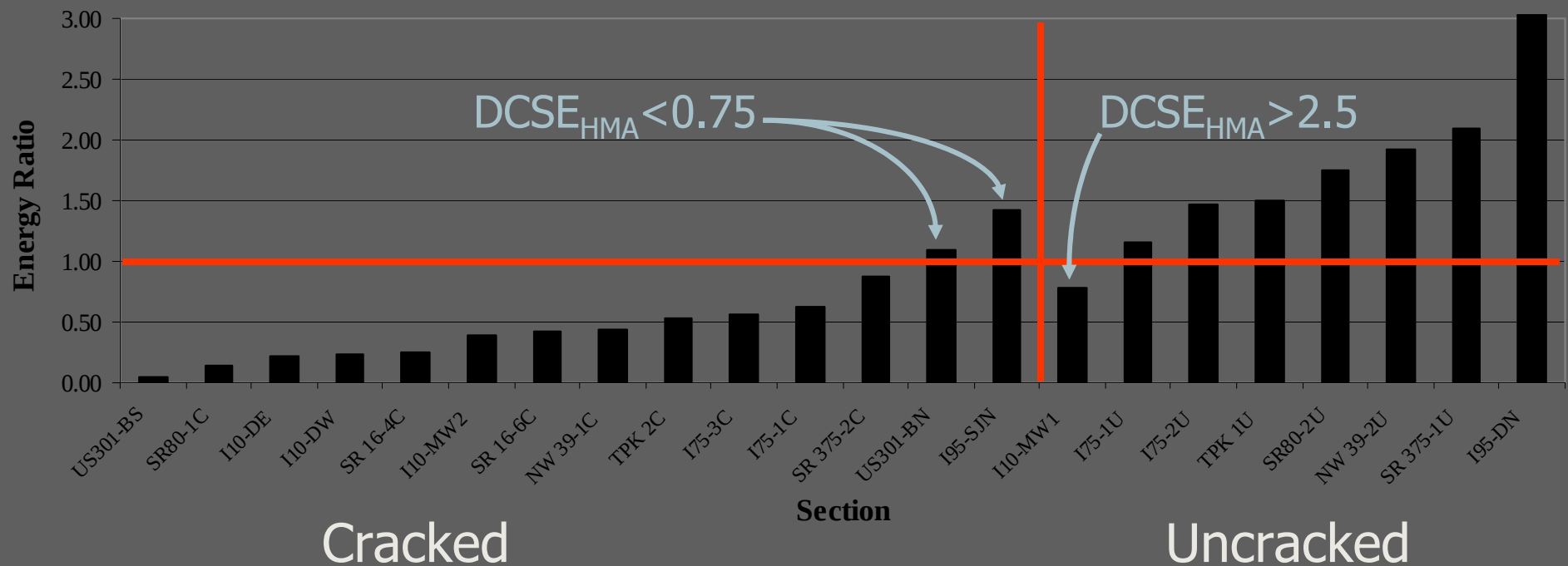


Main Idea:

Can not improve performance by changing a single property.
Have to consider the entire system.

Energy Ratio Results

- ➡ Examined all sections
- ➡ Performance criteria: $ER > 1$; $DCSE_{HMA} > 0.75$



FL DOT Concerns on Modifier Use

- ⇒ Increased Cost of HMA with Polymer Modifier
- ⇒ Impact of Current Use of Asphalt Rubber
- ⇒ Actual Field Performance of Modified Mixes
- ⇒ Some Construction Problems Experienced
 - Bleeding, Drain-down, Fat Spots,
 - High Mix Temperatures (+330F)
 - Workability

Current FL DOT Modifier “Policy”

- ⇒ Last Layer Structural + OGFC (10-30M ESAL's)
- ⇒ Last 2 Layers Structural + OGFC (+30M ESAL's)
- ⇒ Use on Projects with Current Rutting Problems
- ⇒ Alternate for all FC (surface) Mixes (using AR)
 - Small Quantities Only

Personal Modifier Vision & Payoff

- ➡ Require for FC12.5 & FC9.5
 - Dense Uniformly Graded
 - Surface Course Used Primarily in Urban Areas
 - Currently Using Asphalt Rubber (5% GTR)
- ➡ Research into Hybrid Binders (Polymer + GTR)
 - Need to Have Equal Performance to Polymer
 - Good Stewards: performance, money, environment

So Why Polymer Modified HMA ?

(How to Sell the Product)

- ➡ If Polymer Modified HMA Solves a Problem
 - Cost Is Usually Secondary
 - It Becomes Standard Practice
- ➡ If Polymer Modified HMA Will Improve Performance
 - This Approach Takes Time
 - Cost Is a Concern
 - Need Convincing Data

Process of Modifier Acceptance

- ➡ Find a “Believer” Inside
- ➡ “Show Me the Money”
 - Examples of Performance and Cost
- ➡ Construct Demonstration Projects
 - Keep Costs Realistic and Representative
 - Do Not Screw Up
- ➡ Be Patient



Thank-you...Questions?