SUPERPAVE for Senior Managers

Participant Manual
FOREWORD

These course materials were developed for the National Highway Institute by the National Asphalt Training Center II of the Federal Highway Administration. The NATC II, under contract to the Office of Technology Applications, resides at the Asphalt Institute's Research Center in Lexington, Kentucky.

The objective of this educational program is to briefly discuss the Superpave Mix Design System and how it is being implemented. It is intended to highlight the main issues for senior management personnel.

This manual contains copies of the slides to be used as reference throughout the two hours of discussion.

This manual was co-authored by:

Dr. Richard W. May  
Director of Technical Services  
Asphalt Institute

Mr. Robert B. McGennis  
Project Manager  
South Central Superpave Center

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Superpave: For the Senior Manager

Federal Highway Administration

Intended Audience

- State & Local
- Industry
- Federal

Decision
Not meant to be technical!

Fatigue curve

Just tell me what I need to know!

Gyratory Angle

Minimum VMA

Boss
What You Need to Know

What was SHRP?
- ...Why did it happen?
What did SHRP produce?
What is happening lately?
What are the concerns?

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The need for Superpave
Strategic Highway Research Program

- 5 Years, $150 million
  - asphalt
  - cement and concrete
  - long term pavement performance
  - maintenance effectiveness
  - bridge protection
  - snow and ice control

SHRP Asphalt Research

Why?
No Ruts!

Fatigue Problems

Low Temperature Problems
Is asphalt as good as it used to be?

The goodies are missing !!!

“We need a chemical spec for asphalt cement...”
"We need a more robust asphalt cement..."

"Don't forget about mix design and construction..."
What was SHRP?
...Why did it happen?

What did SHRP produce?

What is happening lately?

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The birth of Superpave

Superpave

Superior Performing Asphalt Pavements
Integrated System

- Asphalt Binder Specification
  - binder test methods & equipment

- Mixture Design
  - component requirements
  - volumetric proportioning
  - new compaction equipment

- Mixture Analysis
  - mixture performance testing

- Software
Superpave Asphalt Binders

- Grading System and Selection Based Primarily on Climate

PG 58-22

- Performance Grade
- Average 7-day max pavement design temp
- Min pavement design temp
Superpave Asphalt Binders

- Binder Selection Also Based on
  - traffic speed
  - amount of traffic

Two Key Features of Mix Design

Rigorous Material Selection

Volumetric Design by Superpave Gyratory Compactor
Aggregate Properties

- **Consensus Properties - required**
  - coarse aggregate angularity (CAA)
  - fine aggregate angularity (FAA)
  - flat, elongated particles (F & E)
  - clay content (SE)

- **Source Properties - agency option**
  - toughness
  - soundness
  - deleterious materials

Superpave Aggregate Gradation

- **Use 0.45 Power Chart**
- **Blend Size Definitions**
  - maximum size
  - nominal maximum size
- **Gradation Limits**
  - control points
  - restricted zone
**No Gradation Bands**

- **Percent Passing**
- **Sieve Size (mm) Raised to 0.45 Power**
- **max density line**
- **restricted zone**
- **control point**
- nom
  - max size
- max size

**Evaluate Different Blends**

- **Percent Passing**
- **Sieve Size (mm) Raised to 0.45 Power**
- Various curves representing different blends
Selection of Aggregate Blend

Goals of Superpave Compaction

- Simulates field densification
  - traffic
  - climate
- Accommodate large aggregates
- Measure compactability
- Conducive to Quality Control
Superpave Gyratory Compactor

- Pressure
- Mold
- RPM
- Angle
SGC Densification Curve

This info is used to select the proper blend & binder content
Moisture Sensitivity Evaluation
AASHTO T 283

- Measured on Proposed Mixture

![Diagram showing moisture sensitivity evaluation process]

3 Conditioned Specimens

3 Dry Specimens

Tensile Strength Ratio

80% minimum

Mix Analysis Testing

Superpave Shear Tester

Purpose:
- rutting and fatigue cracking

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Mix Analysis Testing

Superpave
Indirect Tensile tester

Purpose:
fatigue cracking and low temp cracking

Superpave Mix Analysis Concept

Laboratory Test → Data → Superpave

Rut Depth vs. ESAL
Performance Prediction
What was SHRP?
...Why did it happen?
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The implementation of Superpave

Implementing Superpave

- FHWA/State/Industry Partnership
  - pooled-fund equipment purchase
  - AASHTO specifications
  - LTPP continues
  - NATC
  - Superpave Centers
  - Lead States
  - many others!
Methods and Specs

Draft SHRP Test Method

AASHTO Standard Test Method

Follow-up Efforts

LTPP-SPS

Supervane

Alternate PG

Modeling/Software Project

Mobile Laboratories
Controlled Superpave Test Sections

NATC II

- Continue binder & mix training
- Develop other training courses
- SST & IDT Ruggedness Experiments
- Laboratory testing
- Field Assistance
Superpave Regional Centers

- West Lafayette, IN
- State College, PA
- Auburn, AL
- Austin, TX
- Reno, NV

Host state works with Local University

NCHRP
National Cooperative Highway Research Program

Superpave Research Studies

- 9-14, Restricted Zone Evaluation
- 9-13, Evaluation of T 283
- 9-12, Incorporation of RAP
- 9-10, Protocols for Modified Binders
- 9-9, Refinement of SGC Procedure
- 9-7, Field Procedures and Equipment
What was SHRP?
...Why did it happen?
What did SHRP produce?
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The refining of Superpave

"Our Current Mixes and Materials Won’t Meet Superpave Specifications."

Maybe they shouldn’t! How do you know... have you tried?

Could you build a better "mousetrap" with Superpave?
“What If We Have a Failure?”

We have failures now... will a Superpave failure be any worse?

Experience to Date

Very few failures
Very little rutting
Some construction difficulties
  -- Usually overcome by
  ● minor changes to current paving practice
  ● building a test strip first
"All You're Doing is Increasing the Cost of Mixes."

Maybe... or maybe not.

Depends on:
binder selection strategy,
current mix design practice,
time and familiarity of industry,
and many other factors.

In some cases, the cost is less.
Extending paving life saves money!
What is the cost of a PG?

*Binder is 5 - 6 % wt. of mix*

*PG 64-22* - Likely AC-20 (say $1)

*PG 70-22* - Maybe modified AC-20 (?)

*PG 76-22* - Likely modified AC-20 ($2-3)

“Superpave Will Require Training of My Staff.”

Yes it will!
"Superpave Isn’t Perfect Yet!"

"Some don’t like... how it handles RAP, how it is used with QC/QA, how I can’t use as much cheap sand, the restricted zone, gyratory won’t fit through the door, it changed the weather, it ruined my golf swing, instant replay..."

General Experience

- Superpave mixes
  - perform better (rutting, cracking, moisture, aging)
  - will compact
  - do not segregate
  - usually cost about the same

Just give it a chance!
Those Who Say “Not Yet”

- Never be perfect
- Always one more “rock”
- Don’t want it to work
- Have vested interest
  - product
  - equipment
  - services

Expert Task Groups

- Binder
- Mix
- Models

Addressing the issues based on real data!
Final Payoff

The End

Questions??