Case Studies - SCDOT

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SCDOT – Office of Materials and Research
Overview

- Background Information
  - SCDOT History with Full Depth Reclamation
  - Keys to a Successful Project
  - Typical Construction Sequence for SCDOT Contractors
- Case Studies / Lessons Learned
  - Failing Pavement
  - Chatter
- Moving Forward
  - Operational / Specification Changes
  - Ongoing Research
  - Training / Partnerships
SCDOT History
Keys to Success

- Compaction
- Moisture Content
- Mixing Uniformity
- Cement Content
- Curing
- Lift Thickness
- Pulverization / Gradation
Typical FDR Construction Sequence

- Spread Cement
- Single Pass
  - Pulverization
  - Mixing
- Compaction / Grading
- Curing
  - Chip Seal Single Treatment
- Surface Plane
- Overlay
Typical FDR Construction Sequence

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Case Studies
Case Study I

- Project Length
  - 5.68 miles
- Existing Road Condition
  - Fatigue Cracking
  - Several Patches
  - Asphalt Depth Ranging from 4-8”
- Traffic
  - AADT - 8000
  - Truck Traffic – 7%
- Pavement Design
  - 10 “ CMRB
  - 400# Asphalt Overlay
- FDR Mix Design
  - 9% Cement – 420 psi
  - MDD – 125.2 pcf
  - Optimum Moisture – 8.4%
- Construction
  - Started In Fall of 2015
  - Continued in Spring 2016
Case Study I

- Investigation
  - Site Visit
  - Observation of Construction Operations
  - Field Investigation
- Lessons Learned
  - Pulverization
  - Curing / Mix Uniformity / Compaction
Case Study Site Visit
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Case Study Site Visit
Case Study Site Visit
Case Study Site Visit
Case Study Construction

Observations
Case Study Construction
Observations
Case Study Construction
Observations
Investigation
Investigation
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Investigation
Case Study 1 – Final Thoughts

- Preliminary Investigation /Evaluation
- Method Specification vs Test Strip
- Inspector Training vs Contractor Quality Control
- Reinforced deeper mixing of FDR Projects
- Better Understanding of Equipment Capabilities
  - Pulverization
Lesson Learned - Pulverization
Lesson Learned Pulverization
Lesson Learned - Pulverization
The front rotor plate opens wide and is equipped with a crusher bar ...

... which can be adjusted to produce the specified particle size
Lesson Learned - Pulverization
Lesson Learned - Pulverization

<table>
<thead>
<tr>
<th>Gear ratio</th>
<th>Engine speed</th>
<th>Ø 14” (355 mm)</th>
<th>Ø 16” (400 mm)</th>
<th>Ø 16” (400 mm)</th>
<th>Ø 14” (355 mm)</th>
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<td>111 rpms</td>
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<td>129 rpms</td>
<td>164 rpms</td>
<td>184 rpms</td>
<td>203 rpms</td>
<td></td>
</tr>
</tbody>
</table>

WR 250 – twelve different speeds

Selecting the engine speed and shifting the rotor gear from the cabin...

...can be combined with repositioning of the belt pulleys to set twelve different rotor speeds.
Case Study II
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Case Study II
Case Study II – Final Thoughts

- Reducing Chatter
  - End Result
  - Tighter Inspection
- Surface Moisture
- Better Finishing Operations
Moving Forward
Operational / Specification Changes

- Preliminary Investigation
- Contractor Quality Control Plan
- Project Test Strip
Ongoing Research

- Lab Study
  - UCS / Compaction / durability relationships
  - Varies Rap percentages and Subgrade Type
- Field Performance Review
  - FWD Data
  - Cores
  - Compessive Strength Testing
Training / Partnerships

- Understanding Equipment Capabilities
  - Talk about issues with equipment suppliers
- Continued Inspector Training
  - Lessons Learned
  - Specification Changes
- Quality Improvement Committee
  - Industry Members
  - Contractors
  - Department Personnel