



Hamburg Wheel Testing



A Contractor's Perspective



Region of Operation



• 16 HMA Plants

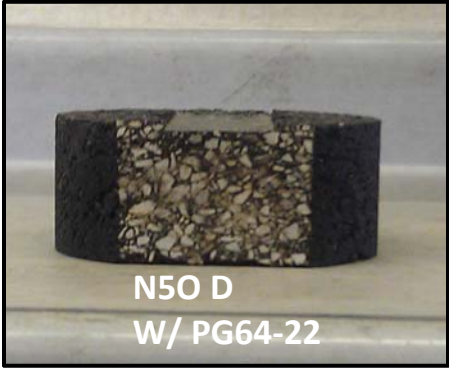
• Key Facilities

- Peoria
- Bloomington
- Springfield
- Decatur

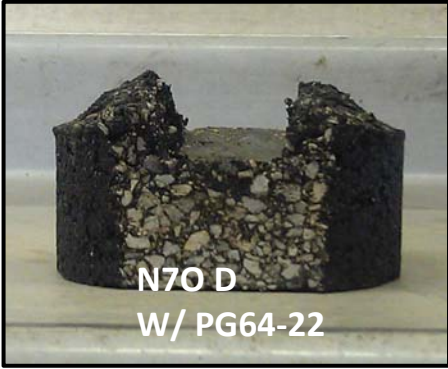
UCM
United Contractors Midwest

Purchased and Began Testing in November 2011
Distinct Mix Differences North and South

North	South
3.9mm @ 10,000 Passes	12.5mm @ 8,740 Passes



N50 D
W/ PG64-22



N70 D
W/ PG64-22

Both Mixes Used The Same Liquid Asphalt and Asphalt Content, 5.8%

UCM
United Contractors Midwest

Issue #1 – Researchers Vs. Testers

Up until this point UCM, like most other contractors, had trained technicians and set up lab facilities to test HMA. There was a direct cause and effect relationship that we dealt with, we tested for volumetrics and made changes accordingly. Outside of some plant and aggregate issues life was good.

In Order To Solve The Problem We Are Forced To Take On The Roll of Researchers

- **Training**
- **Lab Facilities**
- **TIME! (Hours Vs. Weeks)**



Issue #2 – HWT What Exactly Are We Doing?

Binder Test?
Aggregate?
Influenced by N Design?

Initially we had been lead to believe that the Hamburg Wheel Test was a binder test. Our early results showed that in our situation this was not the case. As you recall both of the bricks from the slides contained the same grade liquid, from the same supplier.

So when all else fails read the test method.



Issue #2 – What Affects Hamburg Wheel Test Results

AASHTO T324

1.3 The test method is used to determine the premature failure susceptibility of HMA due to weakness in the aggregate structure, inadequate binder stiffness, or moisture damage. This test method measures the rut depth and number of passes to failure.

- So Our Task Was to Identify What Was the Prominent Difference in the Mixes From North to South.

WEAKNESS IN AGGREGATE STRUCTURE



Issue #3 – Solve The Problem

What are the options a contractor can use to significantly improve their Hamburg results?

1. Add Anti-Strip Additive to the Mix

In a limited amount of tests we have seen no improvement and in some instances an increase in rut depth.



Issue #3 – Solve The Problem

What are the options a contractor can use to significantly improve their Hamburg results?

1. Add Anti-Strip Additive to the Mix
2. Use a Higher PG Binder Grade

This solution works but at a significant increase in mix cost.



Issue #3 – Solve The Problem

What are the options a contractor can use to significantly improve their Hamburg results?

1. Add Anti-Strip Additive to the Mix
2. Use a Higher PG Binder Grade
3. Incorporate Higher Percentages of Recycled Asphalt Pavement

We have found that higher percentages of recycled asphalt have improved test results. Mix volumetrics and plant limitations would prohibit this solution in some instances.



Issue #3 – Solve The Problem

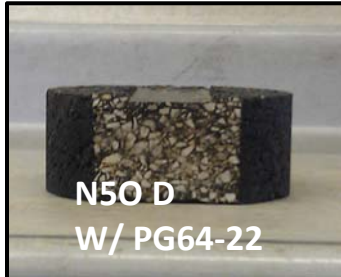
What are the options a contractor can use to significantly improve their Hamburg results?

1. Add Anti-Strip Additive to the Mix
2. Use a Higher PG Binder Grade
3. Incorporate Higher Percentages of Recycled Asphalt Pavement
4. Use a Higher Quality Aggregate

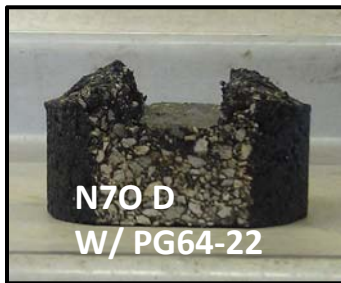


Use a Higher Quality Aggregate

Both mixes had high quality course aggregate.



Fine aggregate in this mix was an angular FM01 with 15% RAP

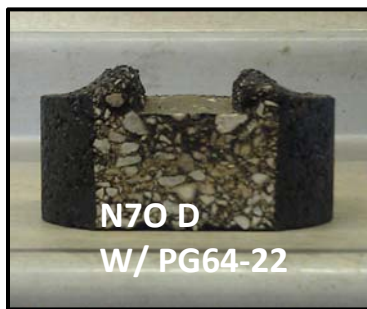


Fine aggregate in this mix was a 50/50 blend of FM22 & FM01 with 10% RAP

FM01 was a rounded river sand



Use a Higher Quality Aggregate



Replaced the 50/50 blend with the angular FM01 With 10% RAP

6.4 mm rut depth at 10,000 passes

We have only done limited trials to date but all have shown that changing to a more angular fine aggregate has worked well.

We are sure that other options will produce favorable results and we will continue to explore these possibilities as time permits.



Summary

- UCM Northern Division Only Has 2 Failures to Date (N50 & N70 9.5mm FG)
- UCM Southern Division Has 2 N50's That Have Met 7,500 Pass Criteria
- Most N70 Binder & Surface Mixes Are Passing, But With Much Higher Rut Depths Than Seen in the North
- In One Of Our Western Operating Areas We Have Not Been Able To Get ANY Mixes To Pass

We do feel that in the long run the Hamburg Wheel Test is a good measure of mix durability. Also as we continue to collect more data and use that information to improve the overall quality of our product.



Summary

One item we need to continue to improve upon is reducing the variability of the Hamburg wheel test results.

If the Hamburg wheel test has caused us to think more like researchers then that is a good thing. I am sure that there will be more and more issues in the future that the answers will not be as cut and dried as we would like them to be.

VMA 15.0
FRAP Gsb
Higher ABR
RAS
WARM MIX