

SEAUPG 2004 Conference - Baton Rouge

QC/ QA Automation: New Products

Randy West - NCAT

Automated QC & Real-Time Testing

Utilization of Automation and Real-Time Testing to Improve QC/QA Procedures For Hot Mix Asphalt



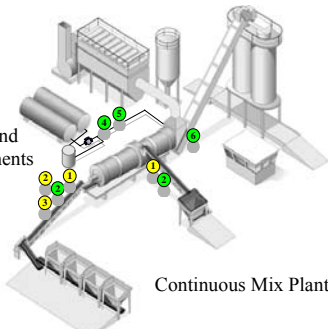
QC/QA State of Practice

- Most HMA requirements for QC are quite **complex**.
- QC focus has shifted to the end product and **away from controlling the process**.
- Due to the time lag between production and results, hundreds of tons are likely to have been produced, creating a **high risk** if mix is out of tolerance.



Automated QC Technologies

1. Belt Sampling
2. Moisture Content
3. Gradation
4. Binder Viscosity
5. Binder Flow Meter and Belt Scale Measurements
6. HMA Temperature



Possible Advantages of Automated QC

- Faster results
- More frequent data
- More consistent data
- All will lead to better decision making and higher quality HMA



Study Objectives

- Assist with set up of the automated equipment and data collection
- Compare automated results to standard QC sampling & testing
- Evaluate function and feasibility of technologies
- Determine best place to sample HMA for verification tests



Automated Asphalt Content Using a Plant's Controls



We already measure binder flow rate (gal./min. → tons/hr) with a flow meter or non-powered, positive-displacement pump.



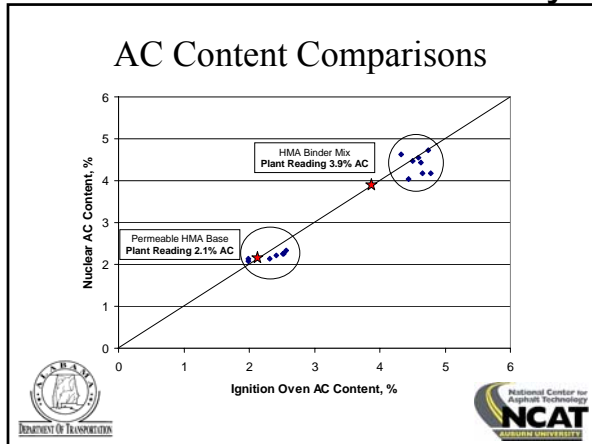
And we measure feed rates of aggregates and RAP (tons/hr) with belt scales, tachometers and a computer integrator.



SEAUPG 2004 Conference - Baton Rouge

QC/ QA Automation: New Products

Randy West - NCAT



Belt Scale Calibration

- Proper calibration of belt scales using material over the weigh bridge and diverted to a tared truck.
- Need better training on this.

Logos for the Louisiana State University Department of Transportation and the National Center for Asphalt Technology (NCAT) are present at the bottom.

Asphalt Meter Calibration

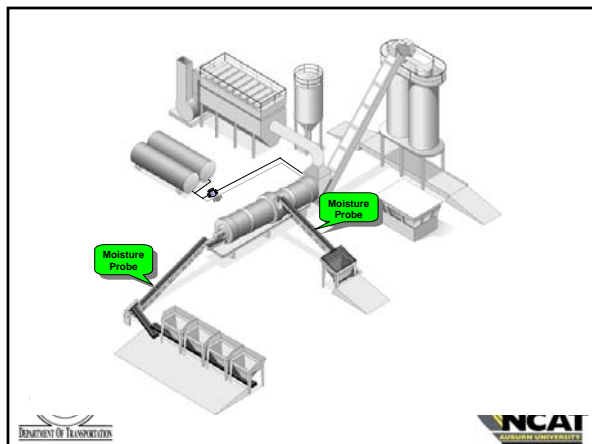
- Calibration Tank used to calibrate and check the asphalt meter
- Hands-free, therefore safer, faster, and more accurate

Logos for the Louisiana State University Department of Transportation and the National Center for Asphalt Technology (NCAT) are present at the bottom.

Moisture Content Probes

- Measure moisture content of aggregate on belt or in a bin using microwave technology.
- Requires calibration for each different material.
- Data is used to adjust weight reading of the belt scale.

Logos for the Louisiana State University Department of Transportation and the National Center for Asphalt Technology (NCAT) are present at the bottom.



Belt Sampling Devices

- a.k.a. – belt sweeper
- Removes a sample of aggregate while the plant is running.
- Belt sampler on the aggregate incline conveyor and the RAP conveyor

Logos for the Louisiana State University Department of Transportation and the National Center for Asphalt Technology (NCAT) are present at the bottom.

SEAUPG 2004 Conference - Baton Rouge

QC/ QA Automation: New Products

Randy West - NCAT

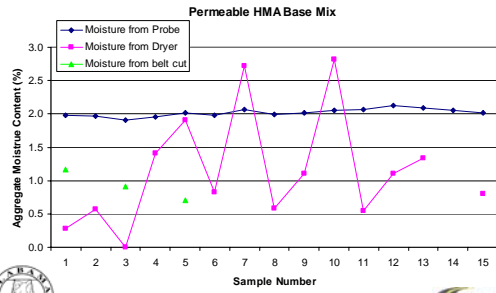
Aggregate Sample Drier



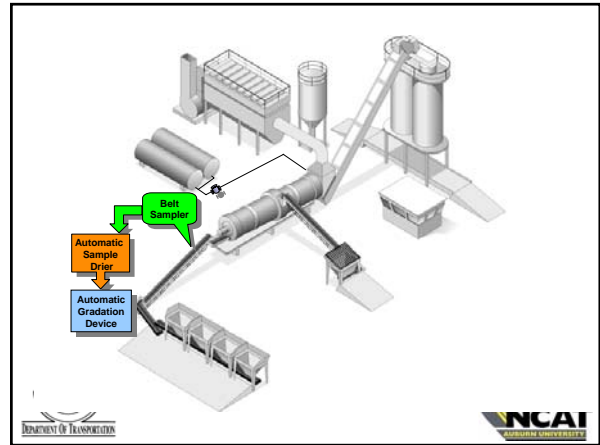
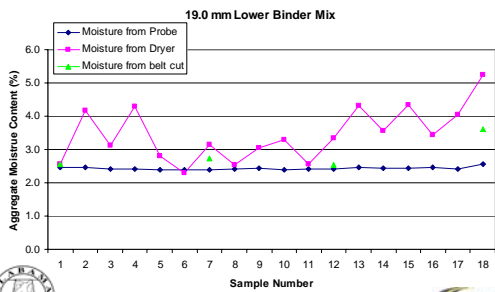
- Receives aggregate or RAP sample from belt sampler and dries it before the automated gradation device.
- Programmable sample size



Comparison of Moisture Contents



Comparison of Moisture Contents

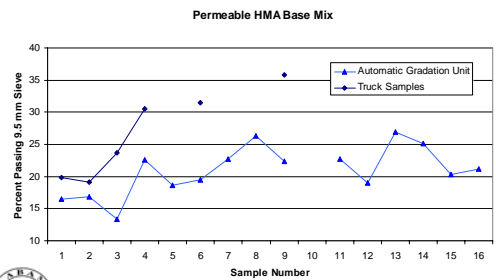


Automatic Gradation Unit

- Sieves and weighs aggregate to produce a gradation.
 - 12.5 mm
 - 9.5 mm
 - 4.75 mm
 - 2.36 mm
 - 0.60 mm
 - 0.075 mm



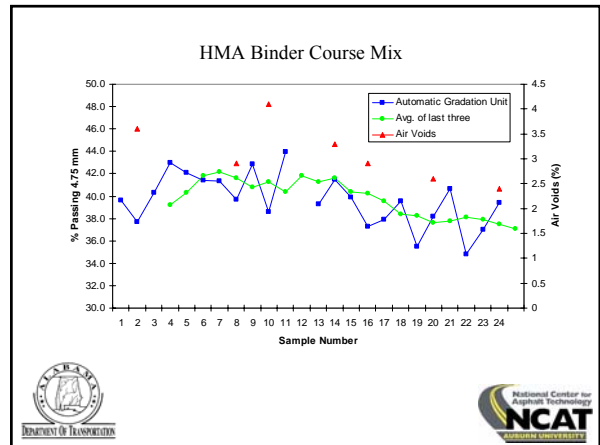
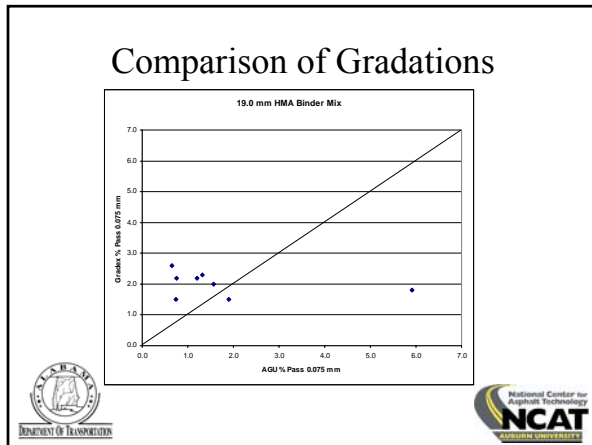
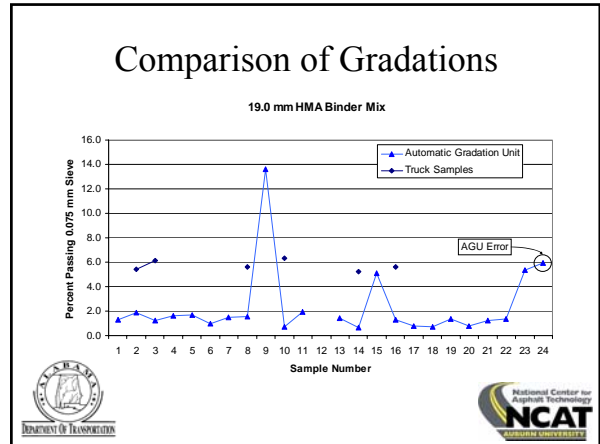
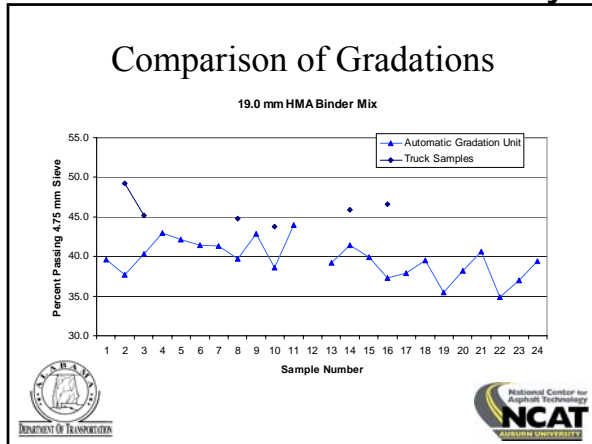
Comparison of Gradations



SEAUPG 2004 Conference - Baton Rouge

QC/ QA Automation: New Products

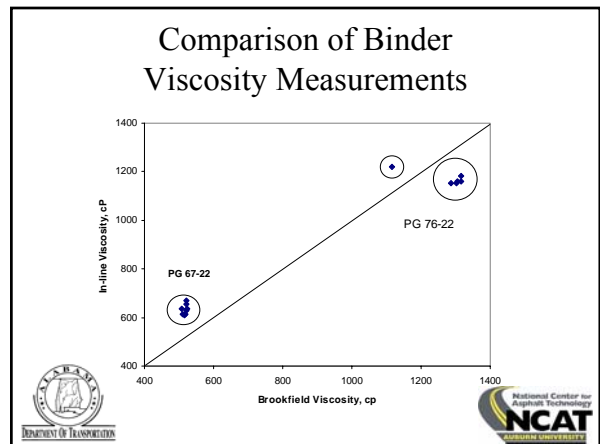
Randy West - NCAT



In-Line Viscometer & Temperature System

- Measures the viscosity & temperature of the binder.
- Mounts in line from AC tank to injection point.

Logos: Louisiana State University, Department of Transportation, NCAT National Center for Asphalt Technology



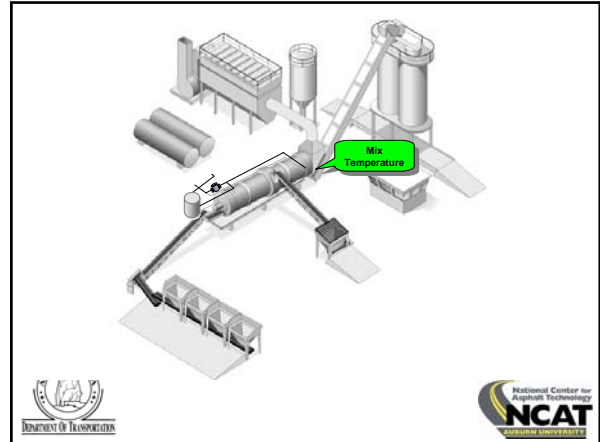
SEAUPG 2004 Conference - Baton Rouge

QC/ QA Automation: New Products

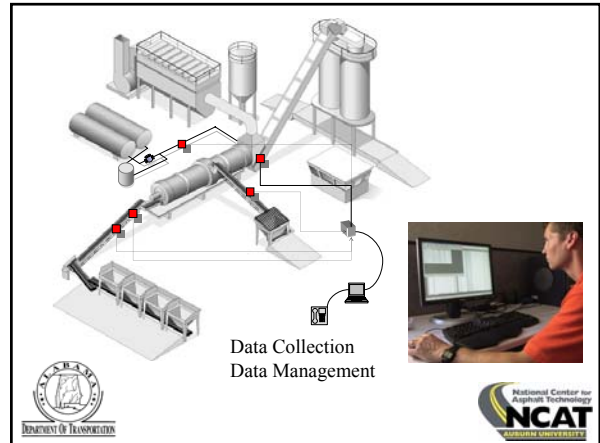
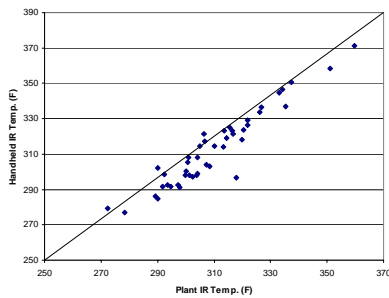
Randy West - NCAT

Mix Temperature Gauge

- Mix temperature is often monitored by the plant operator, usually at the point of discharge from the mixer.



Mix Temperature Comparisons



Type	Unit	Target %	Threshold	Start %	Start % (Dry)	Target % (Dry)	Unit	Start %	Start % (Dry)
Hot Mix	0.075	10.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hot Mix	0.075	10.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hot Mix	0.075	10.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hot Mix	0.075	10.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hot Mix	0.075	10.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hot Mix	0.075	10.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hot Mix	0.075	10.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hot Mix	0.075	10.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hot Mix	0.075	10.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hot Mix	0.075	10.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000

SEAUPG 2004 Conference - Baton Rouge

QC/ QA Automation: New Products

Randy West - NCAT



What about?

- How will the contractor use the automated data?
- Will agencies accept the automated data for determining pay of HMA?
- How should agencies verify quality?



Project Summary

- Equipment & installation – \$236,000
- Compare standard methods of QC to the automated QC data for rest of this paving season.
- Determine if samples taken at the paving site or after construction can be used to validate mix quality.



Project Status

- Equipment delays resulted in a late start.
- Sampling and testing will continue through the rest of this year.
- Analysis and report to be completed early 2005.

