IICCTG 2017
ICT – Past and Future

MONITORING THERMAL SEGREGATION

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IICCTG.org
THERMAL SEGREGATION

• WHAT IS THERMAL SEGREGATION?
• WHAT CAUSES IT?
• WHAT CAN BE THE RESULTS OF THERMAL SEGREGATION?
• HOW DO WE REMEDY?
THERMAL SEGREGATION:

“is defined as temperature differences in the hot mix asphalt (HMA) mat as it is placed and is a potential cause of premature failure in asphalt roads. It can cause a significant reduction in pavement life due to low density from cold spots in the HMA mat.”

John Davis, Asphalt Magazine
THERMAL SEGREGATION

What does it look like when your laying asphalt?
CURRENT METHODS FOR READING TEMPERATURES OR DETECTING THERMAL SEGREGATION
CURRENT METHODS (DRAWBACKS)

FULL TIME RESOURCE

LIMITED CAPABILITIES,
DOCUMENTATION
NIGHTMARE
CURRENT METHODS (DRAWBACKS)

NOT AUTOMATED, BRINGING DISTRACTIONS INTO PLAY
MAKING THERMAL SEGREGATION VISIBLE
MAKING THERMAL SEGREGATION VISIBLE
CAUSES OF THERMAL SEGREGATION

LOADING & TRUCKING

Courtesy of Jeff Uhlmeyer, WSDOT
TRUCK EXCHANGE INTRODUCES COOL ASPHALT WHICH IS FED THROUGH THE PAVER AND AUGERED OUT TO THE EDGES IN A TYPICAL “V” PATTERN

Courtesy of Jeff Uhlmeyer, WSDOT
WINDROW DUMPING

Courtesy of Jeff Uhlmeyer, WSDOT
ENSURE WINDROWS ARE ADEQUATELY OVERLAPPED AND NOT EXTENDED TOO FAR IN FRONT OF PAVER
MONITOR TRUCKING TO SEE IF PATTERN OF COOL LOADS EXISTS
STATIONARY REPEATING SEGREGATION (STREAKING)

Generally caused by something mechanical:
Auger height, flow gates, kick-back paddles & auger extensions

* > 268.1°F

* < 68.0°F

Courtesy of Jeff Uhlmeyer, WSDOT
RESULTS OF THERMAL SEGREGATION
“is defined as temperature differences in the hot mix asphalt (HMA) mat as it is placed and is a potential cause of premature failure in asphalt roads. It can cause a significant reduction in pavement life due to low density from cold spots in the HMA mat.”  

John Davis, Asphalt Magazine
6 PASSES = 95% DENSITY

6 PASSES = 89%, 90%, 91%??
EFFECT OF REDUCED COMPACTION DUE TO LOWER MAT TEMPERATURES OR INADEQUATE ROLLING
HOW DO WE REMEDY?

BY
MAKING QUALITY
VISIBLE WITH
NEW
TECHNOLOGIES

MOBA
MOBILE AUTOMATION

PAVE-IR
EQUALS

VISIBLE INFORMATION

that can be proactively used by the operators to remedy or lessen the amount of thermal segregation present in the placed mat.
HOW IT WORKS:

THERMAL DATA IS COLLECTED AND DISPLAYED TO THE OPERATORS
HOW IT WORKS:

PROGRAMS RUNNING IN THE BACKGROUND CALCULATE THE AMOUNT OF THERMAL SEGREGATION PRESENT

VARIABLES IN THE ALGORITHMS AND CALCULATIONS CAN BE TAILORED TO FIT THE NEEDS OF AGENCIES OR CONTRACTORS WANTING TO USE FOR THEIR OWN QUALITY MEASURES
MORE THAN JUST THERMAL DATA

PAVER SPEED

PAVER STOPS

GPS LOCATION

STATION LOCATION

OPTIONAL WEATHER DATA

OPTIONAL ADDITIONAL SENSOR FUNCTIONS
THE AGE OF DATA ACCESS FROM ANYWHERE!!!
PULLING DATA FROM THE SERVER
POST PROCESSING
TECHNOLOGIES TO ENHANCE QUALITY CONTROL ON ASPHALT PAVEMENTS (R06C)

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Real-time, high-speed nondestructive testing (NDT) of asphalt pavements during construction can greatly improve quality, durability, and performance, stretching highway dollars and extending service life. *Technologies to Enhance Quality Control on Asphalt Pavements (R06C)* offers products aimed at providing real-time testing of potentially 100 percent of the pavement area, providing much more inspection coverage than existing methods in hot- or warm-mix construction. R06C includes two products:

• An infrared (IR) scanner system, which measures thermal segregation

• The Ground-Penetrating Radar (GPR) system, which measures density

Through an equipment purchase and demonstration program, showcase, and targeted workshops, selected states are receiving hands-on experience using these technologies under varying conditions.
Current states using the R06C IR technology through the Implementation Assistance Program:

WORK DONE THROUGH THE IMPLEMENTATION PROGRAM

2 year schedule to complete demonstrations and workshops for 10 agencies.

Photos Courtesy of Applied Research Associates, SHRP2 Implementation Program
WORKSHOPS & NATIONAL INFRARED SHOWCASE
CONFERENCE AND ON-SITE VISIT WITH PRODUCT DEMONSTRATION

Photos Courtesy of Applied Research Associates, SHRP2 Implementation Program
WORKSHOPS & NATIONAL INFRARED SHOWCASE

HANDS ON TIME WITH EQUIPMENT

Photo Courtesy of Applied Research Associates, SHRP2 Implementation Program
VISIT TO TEST LAB

Photos Courtesy of Applied Research Associates, SHRP2 Implementation Program
"For the Missouri Department of Transportation and the Contractor, the Infrared Scanner provides an excellent Quality Control Technology.

Real-time data allows the contractor to monitor the operation from the back of the paver and at the plant location, allowing the plant manager to update operations such as speed of paver and scheduling the arrival and number of trucks delivering asphalt. These improvements in operations and adjustments to asphalt temperatures through the use of this technology will reduce asphalt segregation and ultimately result in better quality long-term pavements for the public."

[Bill Stone, Research Administrator, Missouri DOT]
THANK YOU!

“Quality is never an accident. It is always the result of intelligent effort.”

John Ruskin