



Preservation and Recycling Processes: NCAT-MnROAD Review

Adriana Vargas, PhD

Why Pavement Preservation?



Costeffectiveness

Sustainability

Condition improvement



The Big Question

- Q: How long does a ______ treatment last?
- A:





The Big Question

• NCAT has been studying "it depends" for 10+ years





What is the PG Study?

- Pavement Preservation Group (PG) Study is a long-term pooled fund research effort
 - Currently in Phase II
 - TPF-5(375)
 - Led by MnDOT
- Objective is to quantify the life-extending benefits of various treatments



PG Study Timeline



70th Street

North cold recycled treatments placed on 70th Street in Albertville/Otsego, MN







2015 NCAT estat

NCAT-MnROAD

NCAT-MnROAD partnership is established.

Test sections placed on highvolume road (US-280) near Opelika, AL



Northern Sections

North Treatments placed on CSAH 8 and US 169 in Pease, MN



2016



2012



Lee Road 159

First test sections placed on lowvolume county road in Auburn, AL

Sponsors

MnRQAD





Test Locations

Roadway	LR-159	US-280	CSAH-8	US-169	70 th St
Traffic volume	Low	High	Low	High	High
Avg. thickness, in	5.5	9.9	7.0	6.5	4.0
Section length, ft	100	528	528	528	500
No. Treated sections	23	34	22	21	16
Years in service	10	7	6	6	3



Current Status



145 Test

Sections





~90 lane mileyears worth of



~13 lane miles

Test Sections

CRACK SEALING

CHIP SEALS

- Single layer
- Double layer
- Triple layer
- Single layers with crack sealing
- Fibermat
- Scrub seals*

MICRO SURFACES

- Single layer
- Double layer
- Single layers with crack sealing
- Fibers
- HiMA

FOG SEALS

- Conventional
- Rejuvenating



Test Sections

THIN OVERLAYS

- Virgin materials
- RAP/RAS
- Polymer modified binder
- HiMA
- UTBWC
- OGFC

COLD RECYCLING

- Cold In-Place
- Cold Central Plant
- Full Depth Reclamation

COMBINATIONS



Data Collection

- Crack mapping
- Roughness (IRI)
- Rutting
- Macrotexture
- FWD
- Surface friction
- Permeability
- Moisture*

- 3 Performance indicators help us see the "big picture"
- MAP-21 criteria

Category	% Cracking	Rutting, mm	IRI, in/mi
Good	< 5	< 5	< 95
Fair	5 – 20	5 – 10	95 – 170
Poor	> 20	> 10	> 170



Performance

- Different traffic and climate conditions allow identifying potential differences in performance
- Mode of deterioration
 - Warm climate cracking (wheel path)
 - Cold climate cracking (thermal) and roughness











Highlights

What are some of the lessons learned and takeaways?

Crack Sealing

Effective as stand-alone or in combination with chip seal, micro surfacing

- Route & seal better as stand-alone
- Overband seal better in combination
- Slow down crack deterioration
- No sealant failures

Some sealed cracks have re-cracked

Stand-alone

Chip seal

Micro surfacing



Rout & seal + micro surfacing

Standalone overband seal

Fog Seals

Can delay deterioration (cracking), especially for pavements in good condition Application timeline Re-application

May experience friction reduction, restored within months



Chip Seals

Can delay deterioration, especially for pavements in good condition

PRESERVING

PRESERVING

Cracking

Roughness progression Susceptible to snow plow damage Multiple layers may exhibit flushing Friction measurements still safe





FIBERMAT CHIP SEAL

LOW TRAFFIC

HIGH TRAFFIC





SOUTH

TRIPLE CHIP SEAL

LOW TRAFFIC

HIGH TRAFFIC





NORTH

Micro Surfacing



Improved IRI and rutting performance Some sections >20% cracking but still functional Friction performance above warning threshold Caution – limestone aggregate Can withstand significant traffic when project is selected appropriately

SINGLE MICRO SURFACE

LOW TRAFFIC

HIGH TRAFFIC





DOUBLE MICRO SURFACE

LOW TRAFFIC

HIGH TRAFFIC





Thinlays

Improved IRI and rutting performance Some sections >20% cracking but still functional BMD allowed using recycled materials with better performance Friction performance above warning threshold

RLSON

VIRGIN THINLAY

LOW TRAFFIC

HIGH TRAFFIC



MACROTEXTURE

FRICTION

Combinations

Conference of the state of the

Durable option, especially for low traffic pavements Combines crack mitigation properties from chip seal with nicer surface finish from micro surface/thinlay

Cold Recycling

130

Can withstand high/heavy traffic with only a thin overlay surface

- Structural coefficients in 0.25 0.35 range
- More susceptible to rutting, roughness

USDOT 83092

Foamed CCPR on low volume road Surface is ¾" thinlay 11+ years in service

How do we quantify this benefit?

Benefits

- Life-extending and condition-improving benefits
 - Compare treated pavement performance vs. untreated pavement
 - Account for existing condition
 - Difference in time to reach a threshold, performance indicator

at AUBURN UNIVERSITY

• More information: <u>www.ncat.us</u>

Test Track

Pavement Preservation

Construction Data

Observed Performance

Sponsors (2012-2020)

Pavement Preservation Group Study Resources

Pavement Preservation

The Moving Ahead for Progress in the 21st Century Act (MAP-21) defines pavement preservation as programs and activities employing a network level, longterm strategy that enhances pavement performance by using an integrated, cost-effective set of practices that extend pavement life, improve safety, and meet road user expectations.

About

NCAT

Test

Track

Pavement

Preservation

When the right treatment is applied to the right road at the right time, roads can be kept in good condition instead of performing costly rehabilitation and reconstruction alternatives later in the pavement's life when the structure has deteriorated.

Pavement Preservation Group Study

The pavement preservation group study is quantifying the life-extending and condition-improving benefits of different pavement preservation treatments and treatment combinations on low-volume and high-volume roadways in both northern and southern climates. By determining the field performance of treatments applied at various stages of pavement life and decay, historically broad performance expectations for various preservation options will be discretely quantified to allow agencies to make objective decisions regarding treatment selection. A second focus of the study is to develop specifications and recommended guidelines for quality assurance testing and inspection of pavement preservation treatments.

Southern Test Locations

Education

& Training

Our Research

aub.ie/PG-tool

aub.ie/PG-webinars

NCAT & MnROAD

presents

PG Study Findings Webinar Series

Chip Seal Webinar

Q

In Summary...

- Pavement preservation is an effective strategy with sustainability benefits
- Understand the effect of different variables
 - Pre-treatment condition is critical
- Evaluate in terms or relevant parameters
 - What are we trying to address?

Thank You

adriana.vargas@auburn.edu

