HUB SURFACE SYSTEMS

GAF standard

GAF Pavement Solutions

StreetBond Slows Asphalt Aging

Represented in Canada by: https://www.hubss.com info@hubss.com

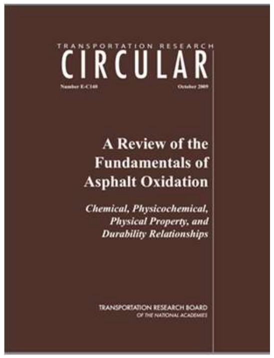
StreetBond Slows Asphalt Aging…

- **Supporting Research**
  - Per Transportation Research Board
  - Arizona State University

Asphalt Aging - Key research findings

Transportation Research Board

Circular E-C140: A Review of the Fundamentals of Asphalt Oxidation



(page 57) Ref "Coons and Wright (111)"

> "It is apparent, as might be expected, that oxidation proceeds from the surface down through the pavement as a function of time…."

(page 59) Ref "Coons and Wright (111)"

> "It is readily apparent that the average viscosity of the asphalt in the top 1⁄4 in. of pavement after only 4 months of service was essentially the same as that found in the top 1⁄4 in. after many years of service."

111. Coons, R. F., and P. H. Wright. An Investigation of the Hardening of Asphalt Recovered from Pavements of Various Ages. Proc., Association of Asphalt Paving Technologists, Vol. 37, 1967, pp. 510–528.

(page 56)

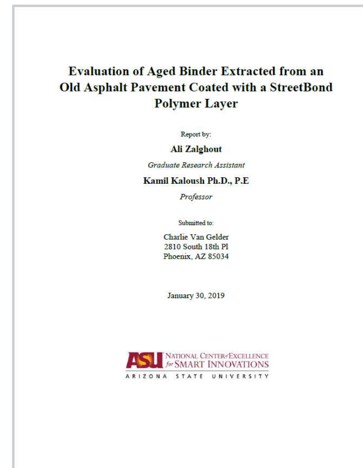
> "...underscore the pragmatic importance of the conclusion reached earlier during the SHRP research (63) that the maximum temperature, not the average temperature, that a pavement experiences in service is the major determinant of the ultimate level of oxidative age hardening that the pavement will experience in service."

Asphalt Aging - Key research findings

Arizona State University - Kamil Kaloush Ph.D., P.E & Ali Zalghout

"Evaluation of Aged Binder Extracted from an Old Asphalt Pavement Coated with a StreetBond Polymer Layer"

- Samples of pavements of similar age and source were selected, including asphalt pavement that had been coated with StreetBond coating
- A comparison of the extracted binders was made to determine whether there was a difference between pavements that had been coated with StreetBond and pavements that had not been coated.



Evaluation of Aged Binder Extracted from an Old Asphalt Pavement Coated with a StreetBond Polymer Layer

Report by:

Ali Zalghout

Graduate Research Assistant

Kamil Kaloush Ph.D., P.E

Professor

Submitted to:

Charlie Van Gelder
2810 South 18th Pl
Phoenix, AZ 85034

January 30, 2019

ASU National Center of Excellence for Smart Innovations
Arizona State University

Methodology: "The high temperature Performance-Grade (PG) was used as an indicator to compare the aging level" since a higher PG temperature indicates a stiffer binder and aging causes increased binder stiffness. Therefore a recovered binder that shows a higher PG temperature has experienced more aging than a recovered showed a lower PG temperature after use assuming both binders were the same when installed.

The research followed ASTM D2172 and ASTM D5404 to extract the binder and AASHTO M 320 "Standard Specification for Performance-Graded Asphalt Binder" procedure to determine $G^*/\sin\delta$ for initial and post aging condition. The $G^*/\sin\delta$ values are then used to determine the PG value. By definition the high temperature PG of a binder is defined in AASHTO M 320 "Standard Specification for Performance-Graded Asphalt Binder" as the highest possible temperature in which $G^*/\sin\delta$ at the original binder condition is greater than 1 KPa, and at the same time the parameter $G^*/\sin\delta$ at the RTFO condition is greater than 2.2 KPa.

Asphalt Aging - Key research findings

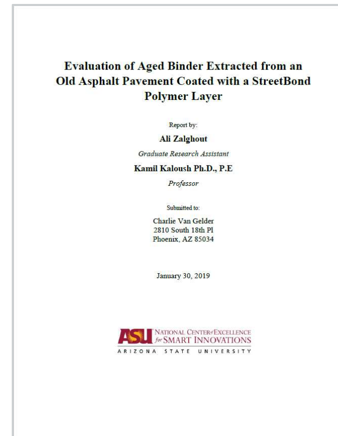
Arizona State University - Kamil Kaloush Ph.D., P.E & Ali Zalghout
"Evaluation of Aged Binder Extracted from an Old Asphalt Pavement Coated with a StreetBond Polymer Layer"

(Summary) "The results indicated that ***the StreetBond Polymer-Coated binder had the lowest degree of aging*** when compared to other binders extracted from various RAP binders.

(page 7) "…the binder that was recovered from the ***StreetBond Polymer-Coated pavement*** has the lowest high-temperature PG, which indicates that it ***was the least aged*** (about 20% less)…"

(page 7) "***Less aging in general means less cracking and longer service life.***"

IMPORTANT NOTE: This study effectively compares the full depth of the pavement whereas the UV impact will be most dramatic near the surface where UV aging-driven cracking starts. Hence this report very likely understates the actual effect.



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Asphalt Aging - Key research findings

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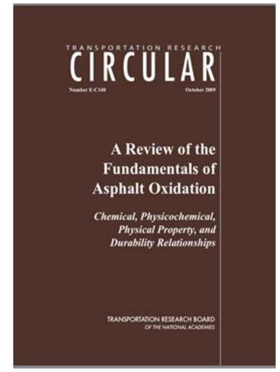
Circular E-C140: A Review of the Fundamentals of Asphalt Oxidation


TRANSPORTATION RESEARCH
CIRCULAR
Number E-C140 October 2009
A Review of the Fundamentals of Asphalt Oxidation
Chemical, Physicochemical, Physical Property, and Durability Relationships
TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

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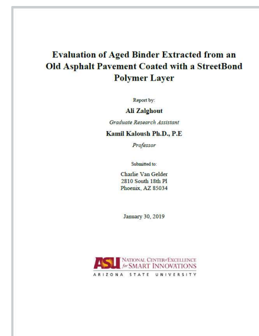
"Evaluation of Aged Binder Extracted from an Old Asphalt Pavement Coated with a StreetBond Polymer Layer"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Conclusions:

1. ***Protect the surface*** from oxidation ***to extend*** the ***asphalt life***.
2. ***Apply the protective layer as soon as possible*** after the installation of the asphalt pavement as much of the oxidation in the top layer occurs in the first four months.
3. ***Reducing*** the maximum ***temperature*** of the asphalt ***extends asphalt life*** so the use of coatings with solar reflectance to cool the surface benefits asphalt life.
4. ***StreetBond slows*** the ***aging*** of the asphalt binder.