

A child is riding a bicycle on a paved street. To the left is a concrete wall, and to the right is a grassy area with trees. The sun is low in the sky, creating a warm, golden glow. A large green rectangular overlay covers the left and center portions of the image, containing white text.

# Optimizing Rubberized Asphalt with Evotherm and Evoflex® RMA

Trey Wurst

VPRIS

Tuesday, 19 June, 2019

**ingevity**

# Evotherm is the industry's leading warm mix paving solution.

## Comprehensive additive package

## Optimized to deliver

- Mixing
- Coating
- Workability
- Compaction
- Adhesion

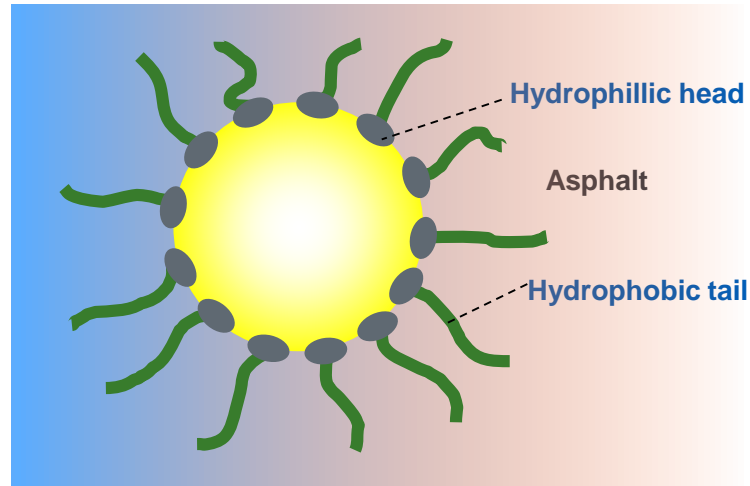


# Evotherm uses natural chemicals derived from pine trees

Additives are comprised of specialty surfactants derived from pine trees

Specifically developed for use in asphalt applications

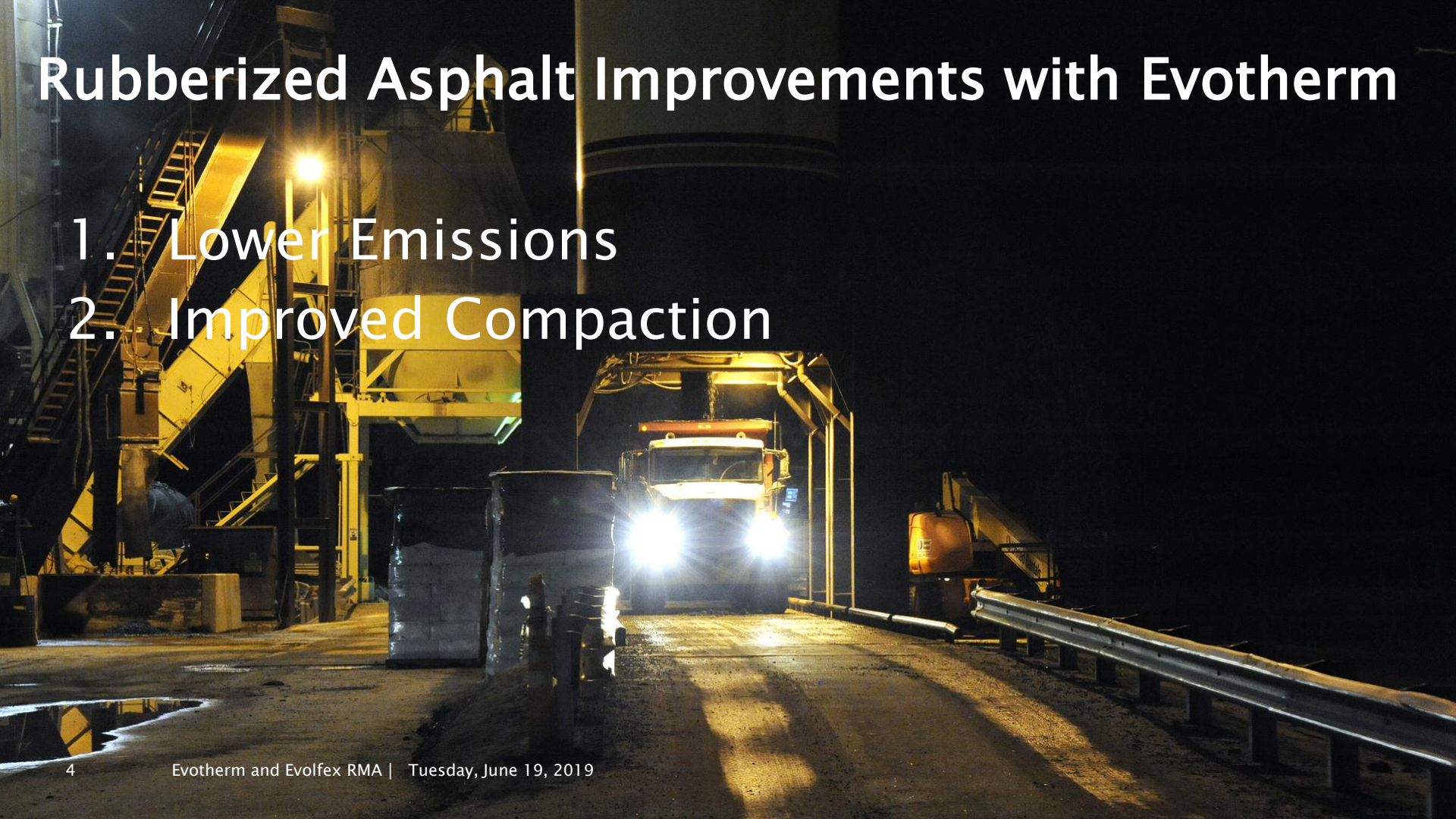
- Heat stable
- High flash point
- Low odor





# Rubberized Asphalt Improvements with Evotherm

1. Lower Emissions
2. Improved Compaction



# Lower emissions

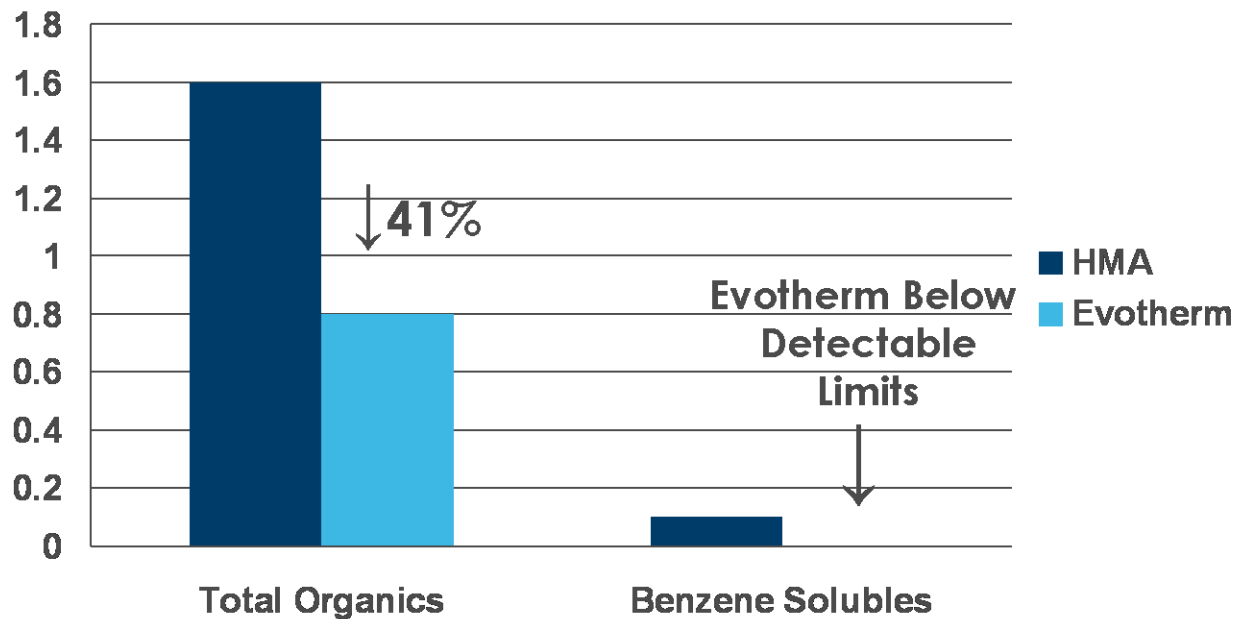


**Hot mix**

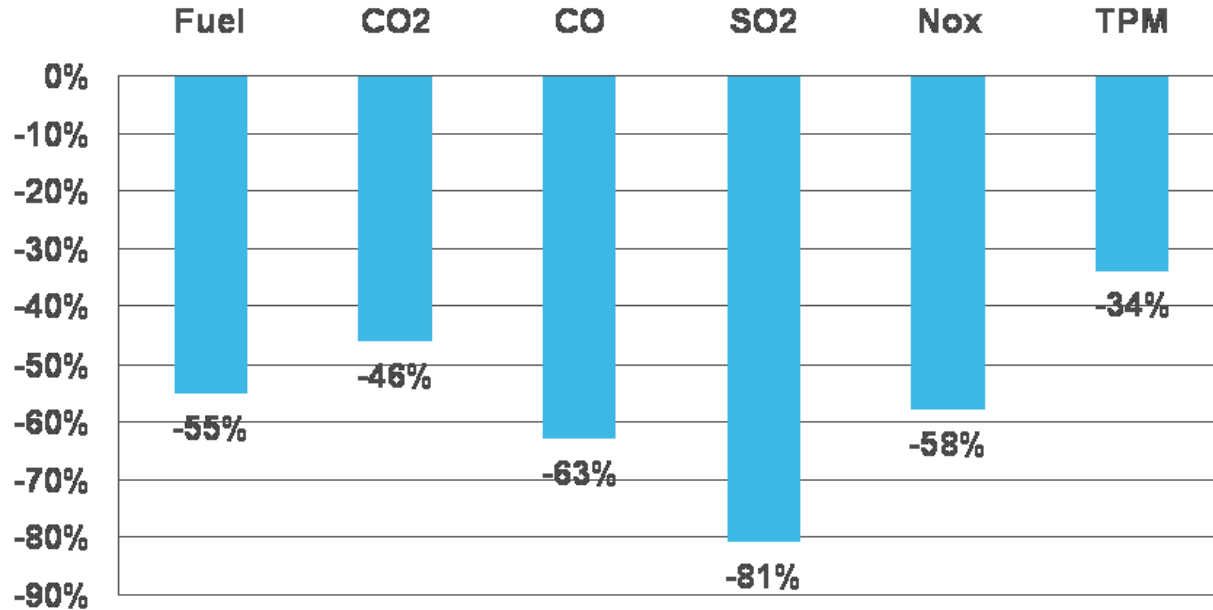


**Evotherm**

# Fume exposure compared to HMA



# Lower stack emissions with Evotherm compared to HMA



250 °F Evotherm, 310°F HMA control



# Improved Rubberized Mix Compaction with Evotherm





# Improved Rubberized Asphalt Compaction with Evotherm

Table 8: Production and rolling temperatures (LA County: Gorman – Newhall)

MIX	Production Temp. (F)	Temp. behind Screed (F)	Breakdown Rolling Temp. (F)	Intermediate Rolling Temp. (F)	Finish Rolling Temp. (F)
HMA	325	290	280	250	200
WMA	290	250	240	180	135

Table 9: Rolling pattern and densities (LA County: Gorman – Newhall)

MIX	Avg Density (%Gmm)	Breakdown Rolling Pattern	Intermediate Rolling Pattern
HMA	93.2	4V	4V
WMA	94.1	2V	4V

Table 10: Production and rolling temperatures (I-405)

MIX	Production Temp. (F)	Temp. behind Screed (F)	Breakdown Rolling Temp. (F)	Intermediate Rolling Temp. (F)	Finish Rolling Temp. (F)
HMA	325	295	290	250	200
WMA	275	240	235	190	135

Table 11: Rolling pattern and densities (I-405)

MIX	Avg Density (%Gmm)	Breakdown Rolling Pattern	Intermediate Rolling Pattern	Finish Rolling Pattern
HMA	93	4V	4V	2V
WMA	94	2V	4V	2S

# Product Development Efforts Evoflex RMA



# Florida DOT Specification

- 1993 inception
- Politics versus performance
- 7% minimum mandate
- 2014 binder specification update (PG 76-22 Hybrid ARB)
- Separation specification

**ingevity**

# Hybrid pellets

## GTR, SBS and chemical additives

- Solubilize SBS polymer and disperse within GTR matrix
- Pre-disperse polymer, improves networking efficiency
- Flexible formulation components (custom compound options)
- Additive interaction improves storage stability





# How easy is it?

- Easy drop in to existing SBS systems
- 8mm pellet can be pneumatically conveyed





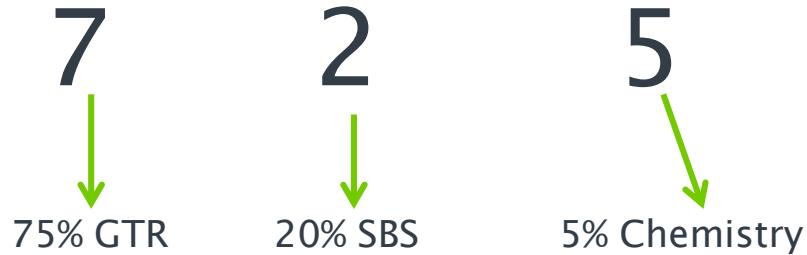
# How is asphalt modified?

- Terminal blend using a Siefer mill
- Plant blend with GTR blend unit



# Product Designation Meaning

- Evoflex RMA name designation is created based on ingredient content
- Evoflex RMA 725 for example



# Storage Stability

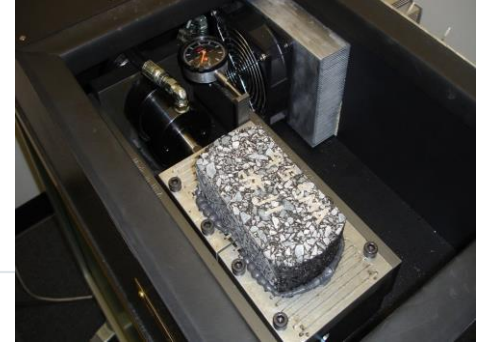
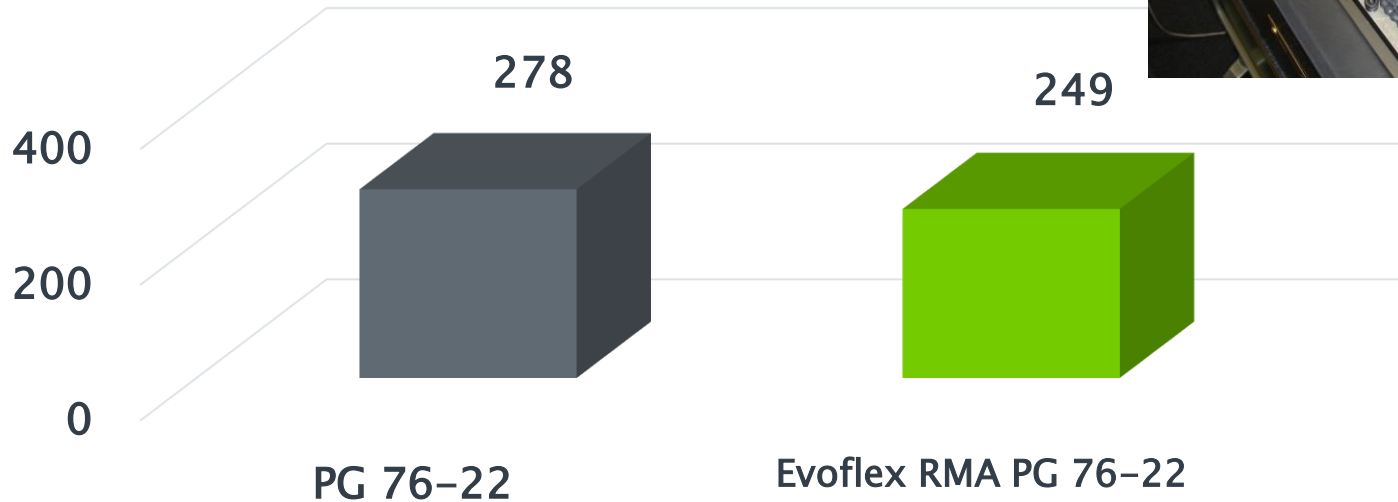
## • Elite Binder Properties

Certifi	AASHTO T315	ODSR Test Temperature	76	°C	
		G*/sin delta	1.73	kPa	Min 1.00
		ODSR Test Temperature	82	°C	
		G*/sin delta	0.95	kPa	Min 1.00
		ODSR Fail Temperature	81.50	°C	
	AASHTO T315	RTFO Aged Binder			
	AASHTO T240	Mass Change	-0.422	Wt%	Max +/- 1.0
	AASHTO T315	RDSR Test Temperature	76	°C	
		G*/sin delta	4.43	kPa	Min 2.20
Metl	AASHTO T315	RDSR Test Temperature	82	°C	
		G*/sin delta	2.48	kPa	Min 2.20
	AASHTO T315	RDSR Fail Temperature	83.30	°C	
Unage	ASTM D6084	Elastic Recovery; RTFO Residue	84.00	%	
AASHT	AASHTO T315	High End True Grade	81.50	°C	
	PAV Aged Binder				
	AASHTO T315	PDSR Test Temperature	22	°C	
AASHT		G*/sin delta	4870	kPa	Max 5000
	AASHTO T315	PDSR Test Temperature	19	°C	
		G*/sin delta	6800	kPa	Max 5000
AASHT	AASHTO T315	Intermediate True Grade	21.8	°C	
	AASHTO T313	BBR Test Temperature	-12	°C	
		Creep Stiffness @ 60 sec	142	MPa	Max 300
AASHT		m-value @ 60 sec	0.334		Min 0.300
	AASHTO T313	BBR Test Temperature	-18	°C	
		Creep Stiffness @ 60 sec	307	MPa	Max 300
AASHT		m-value @ 60 sec	0.297		Min 0.300
	AASHTO T313	Low Temperature True Grade	-17.50	°C	



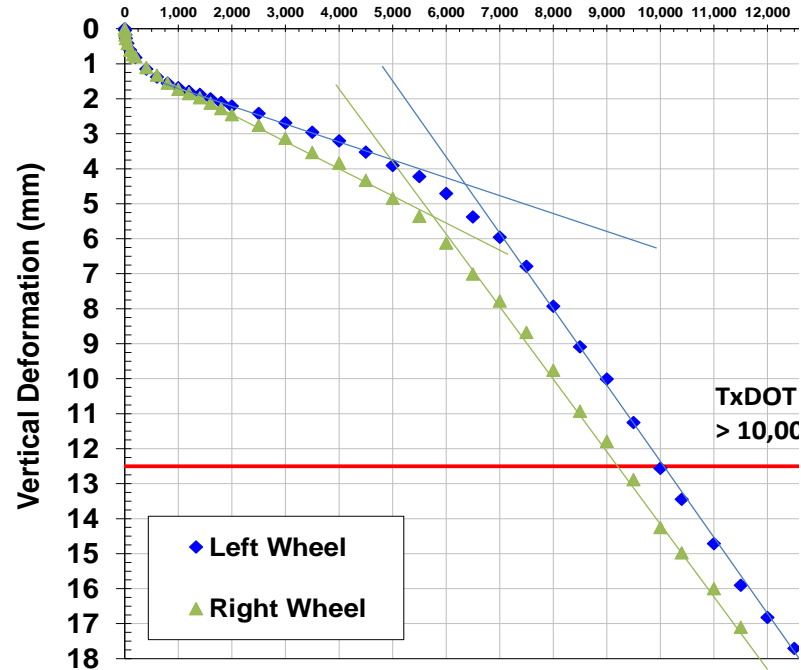
# Evoflex RMA Fatigue Performance

Texas Overlay Test, cycles

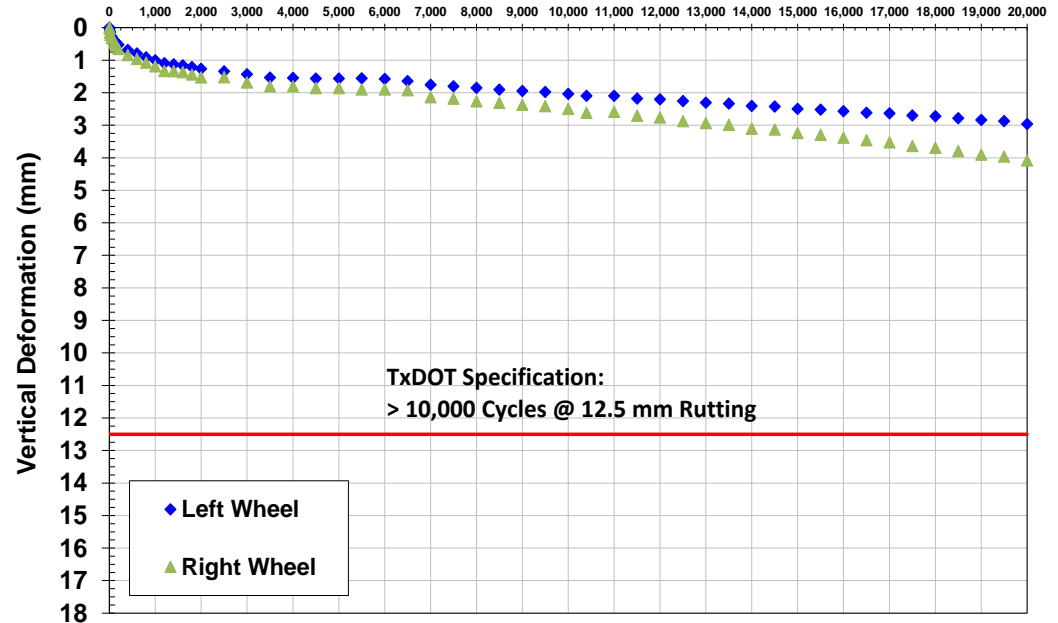


# Evoflex RMA – Rutting Performance

PG 76-22 PMA

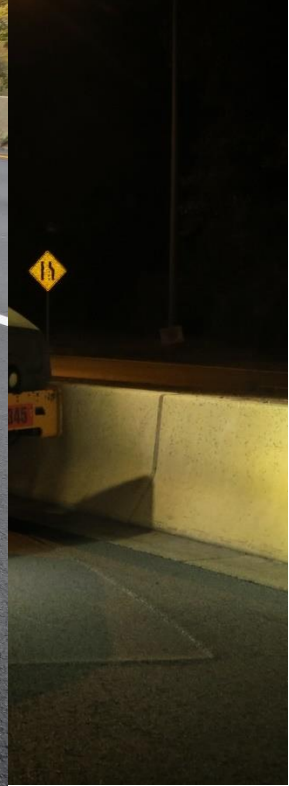


Evoflex RMA PG 76-22





# Field Performance

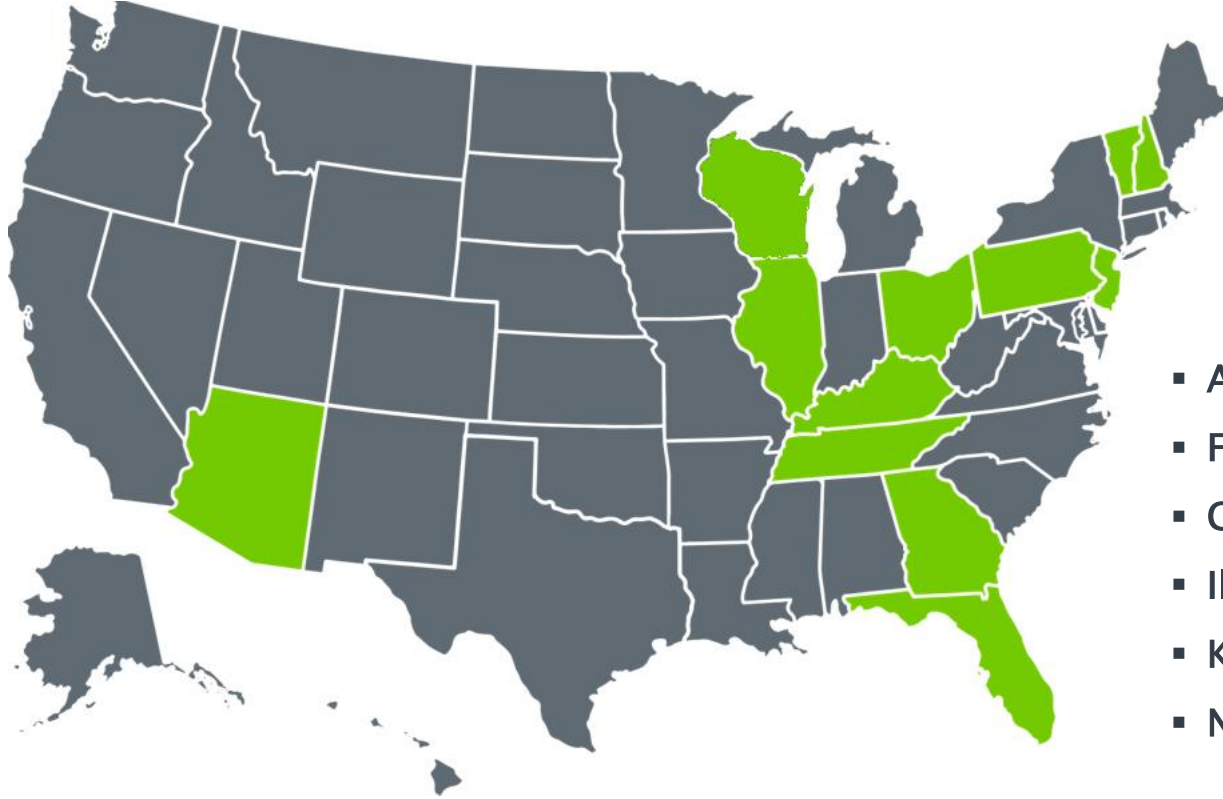


# Wisconsin GTR Trial – June 2019





# Where has Evoflex RMA been utilized?



- Arizona
- Florida
- Georgia
- Illinois
- Kentucky
- New Hampshire
- New Jersey
- Ohio
- Pennsylvania
- Tennessee
- Vermont
- Wisconsin



Come over to the booth with Questions  
Thanks for your time!