

FORTA-FI[®]

High Tensile Strength Synthetic Fiber Reinforcement
for Asphalt Pavement

Value Engineering using Reinforcing
Fibers for Micro Surfacing



TOGETHER WE'RE STRONGER

FORTA 
CONCRETE FIBER



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FORTA 
ASPHALT FIBER



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ARISFOR 
COATINGS & SEALERS



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FORTA 
DELIVERY SYSTEMS



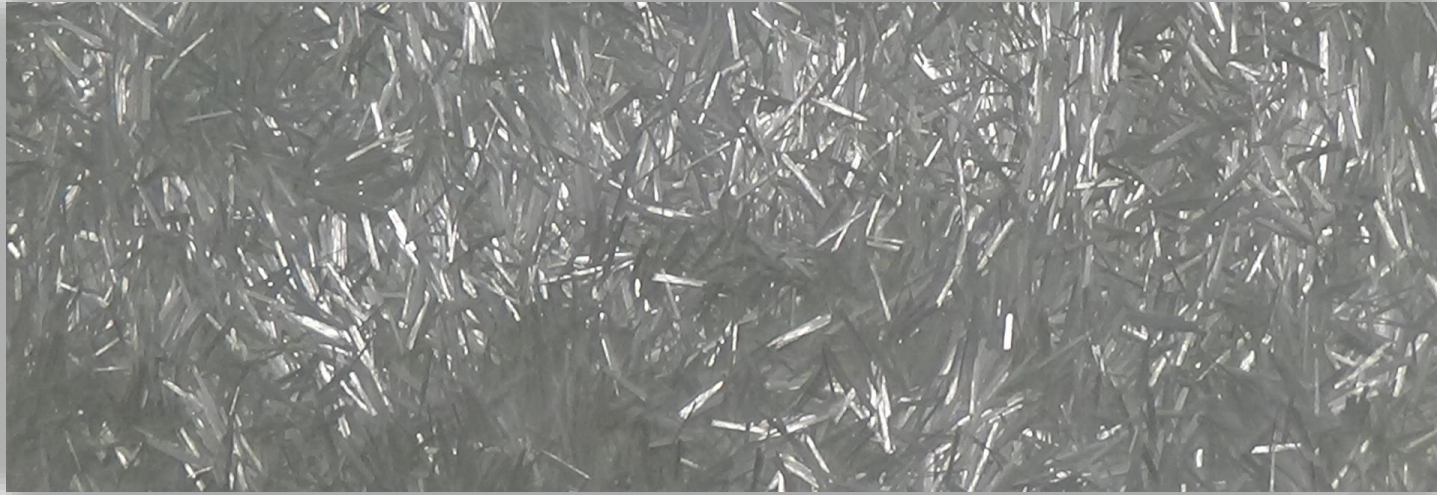
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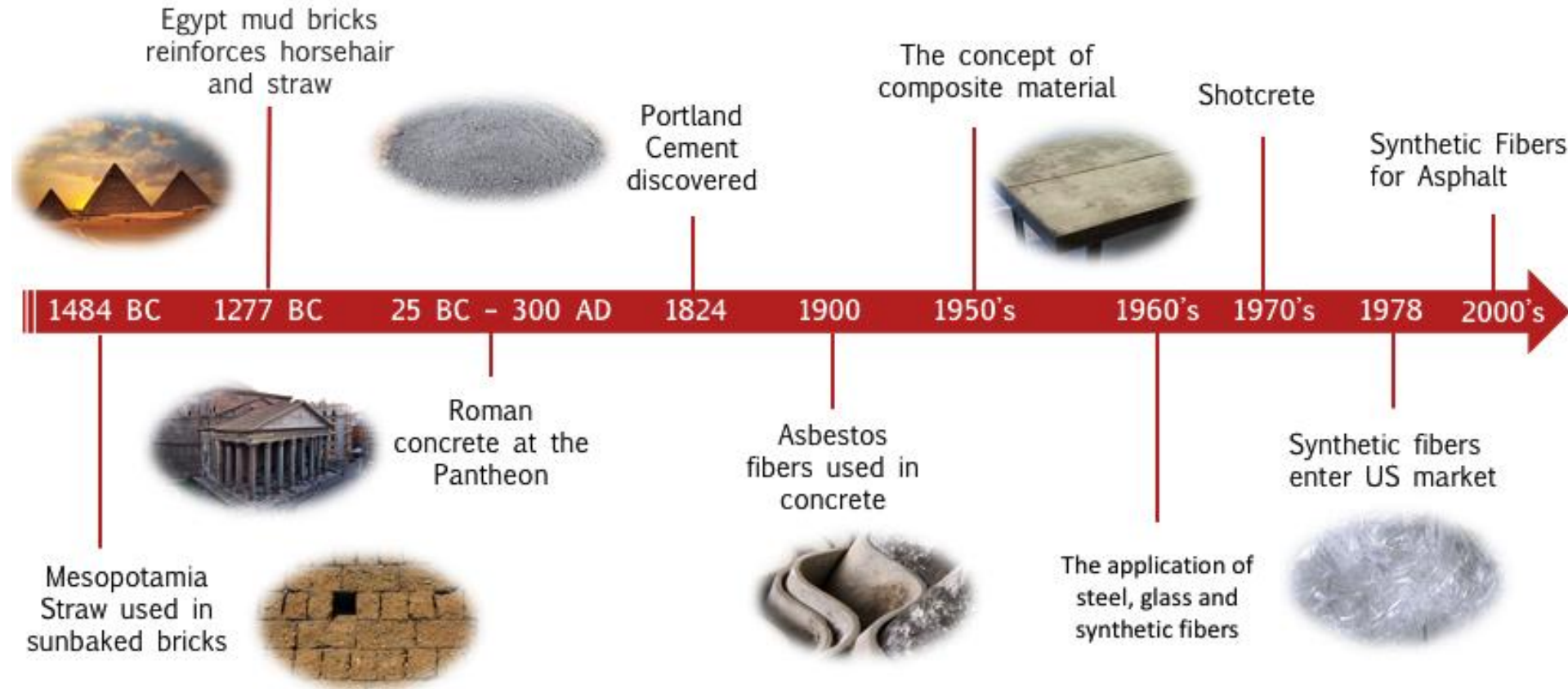
**Let me introduce you to another
type of fiber...**



***Fiber for Reinforcing Micro
Surfacing & Slurry Seal***



Why Not?





SLURRY SEAL

Invented in Germany in the early 1930s. Helps replace the fines in the existing surface that have raveled out over time and adds a new skid resistant driving surface. When applied, slurry seal has a brownish color and is easy to spread into tight corners. After smoothed, it is left to cure for up to 24 hours before available for traffic.



Slurry Seal

**Micro Surfacing**

MICRO SURFACING

A second generation of slurries created to correct moderate to severe raveling and filling voids. Has added capabilities thanks to the use of high-quality, carefully monitored materials, including advanced polymers and other modern additives – such as fibers. This allows for a more durable skid resistant surface that is traffic ready in less than 1 hour.



Another Tool...

Thin pavement preservation treatments consisting of a mixture of asphalt emulsion, aggregate, mineral filler, and water which dries to a hard black finish.

Also, a cost-effective method to renew the road surface and seal minor cracks and other irregularities.

Used as a preventative maintenance tool.



Why use Reinforcing Fiber in MicroSurfacing?

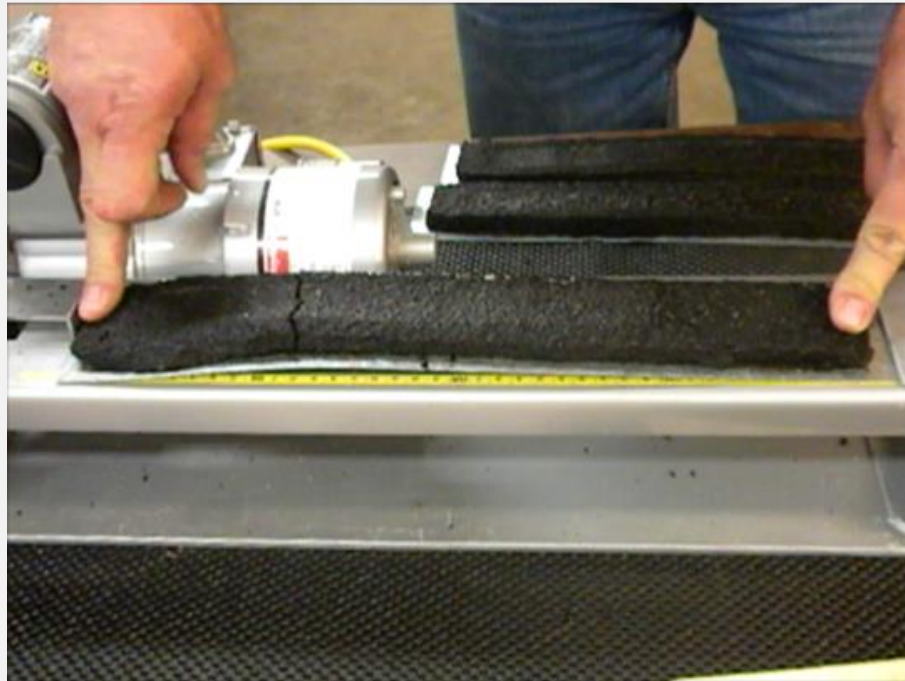
Fiber has shown:

- **Increased Pavement Durability***
- **Reduced Surfacing Cracking***
- **Increased Pavement Flexibility***
- **Reduced Setup and Cure Time***
- **Reduced Mineral Requirement***

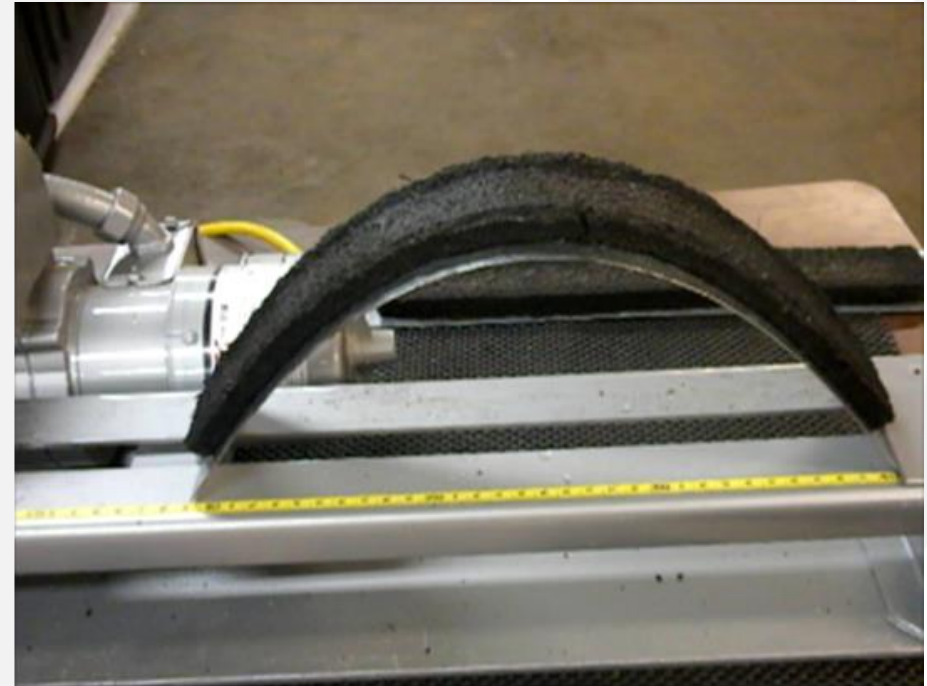
*** BASED ON LAB & FIELD TESTS OF AR GLASS FIBER**



Flexural Tension Test (ISSA TB-146)



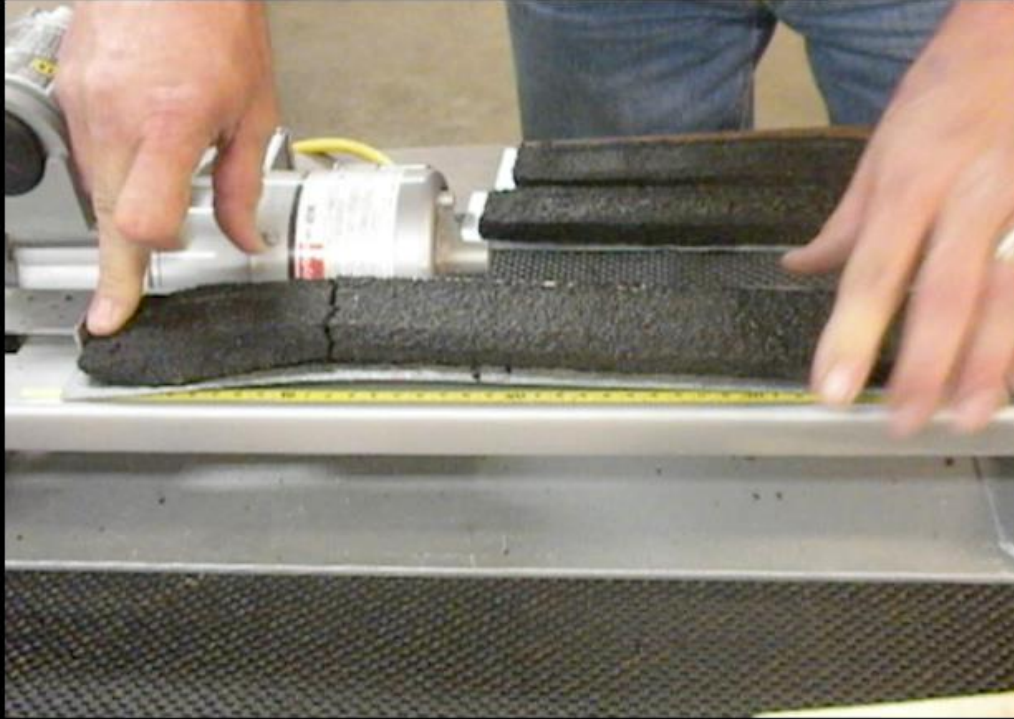
NO FIBER



0.2% FIBER



Surface-EXT™ Flexural Tension Test



No Fiber



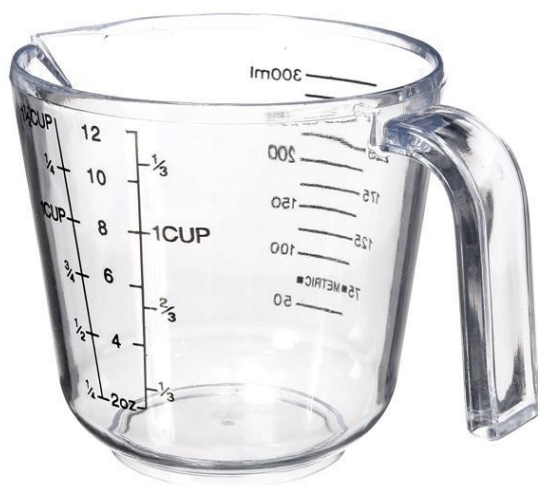
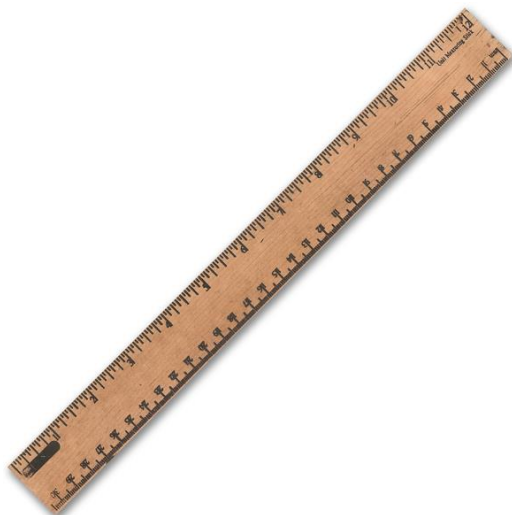
.2% Surface-EXT



Fiber vs No Fiber

Micro surfacing with fiber demonstrated better resistance to cracking under flexural tension than without fiber.

Test Sample	Average Flexural Bend (mm)	Range (mm)
Micro Surfacing	9	5-15
Micro Surfacing w/ fiber	54.5	34-95



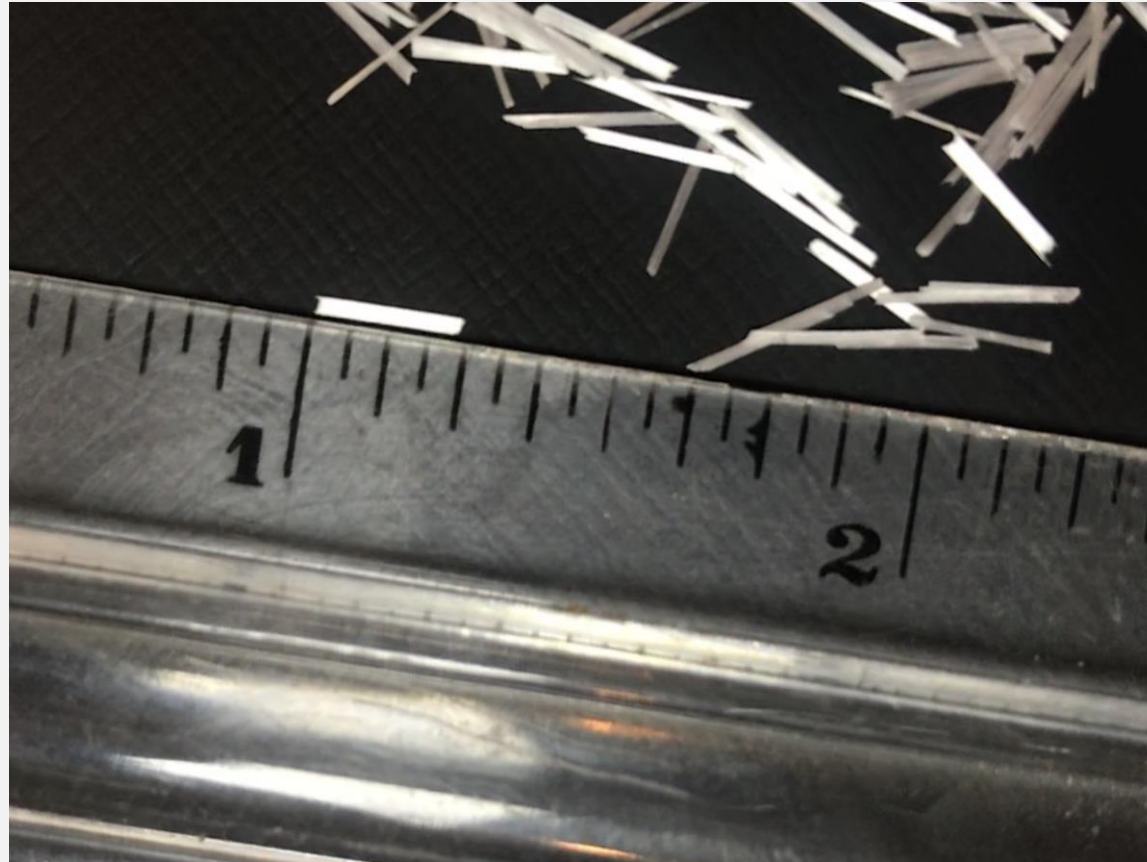
THE PERIODIC TABLE OF ELEMENTS

1 H																	2 He
3 Li	4 Be							5 B	6 C	7 N	8 O	9 F	10 Ne				
11 Na	12 Mg							13 Al	14 Si	15 P	16 S	17 Cl	18 Ar				
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57-71 -	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89-103 -	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo

57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr



Length





Dosage



0.2% - 0.4% of the Dry Aggregate Weight



Chemistry

A ¼" pre-chopped AR glass fiber used in MicroSurfacing and Slurry Seal to improve flexibility and fatigue.

less cracking = longer life



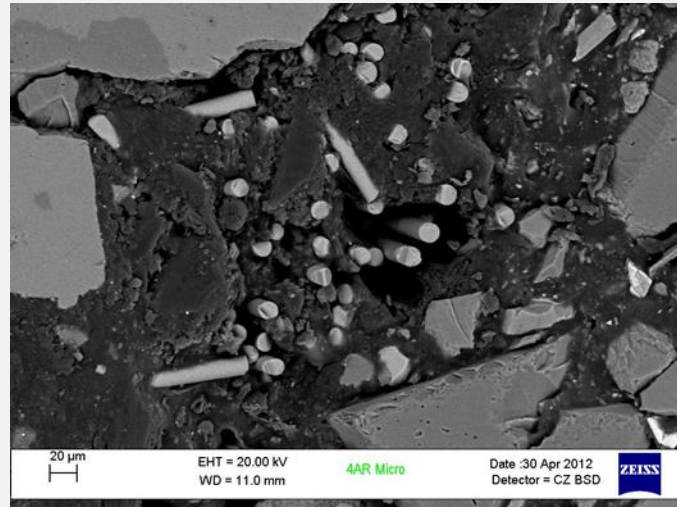
Surface-EXT



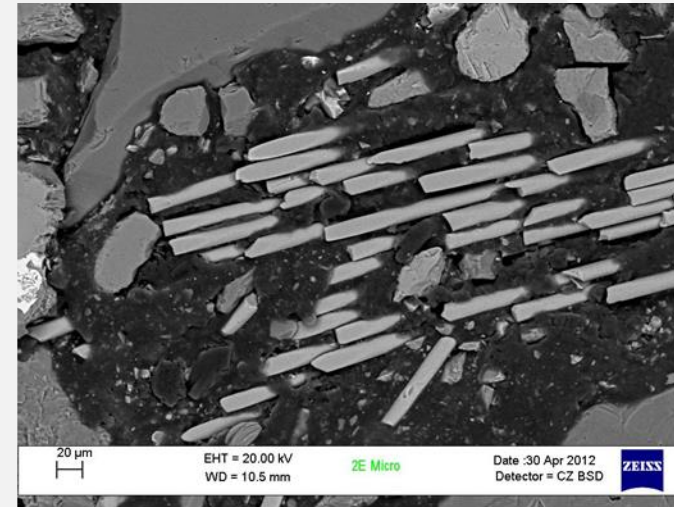
Selecting the Correct Fiber

Is the fiber affected by the chemistry of any of the additives or the emulsion?

Alkali vs Non-Alkali



Alkali Resistant Glass Fiber
Fiber intact – No deterioration



Non-Alkali Resistant Fiber
Deterioration starts after a few hours.



Closer View

Is the fiber visible on the pavement surface?





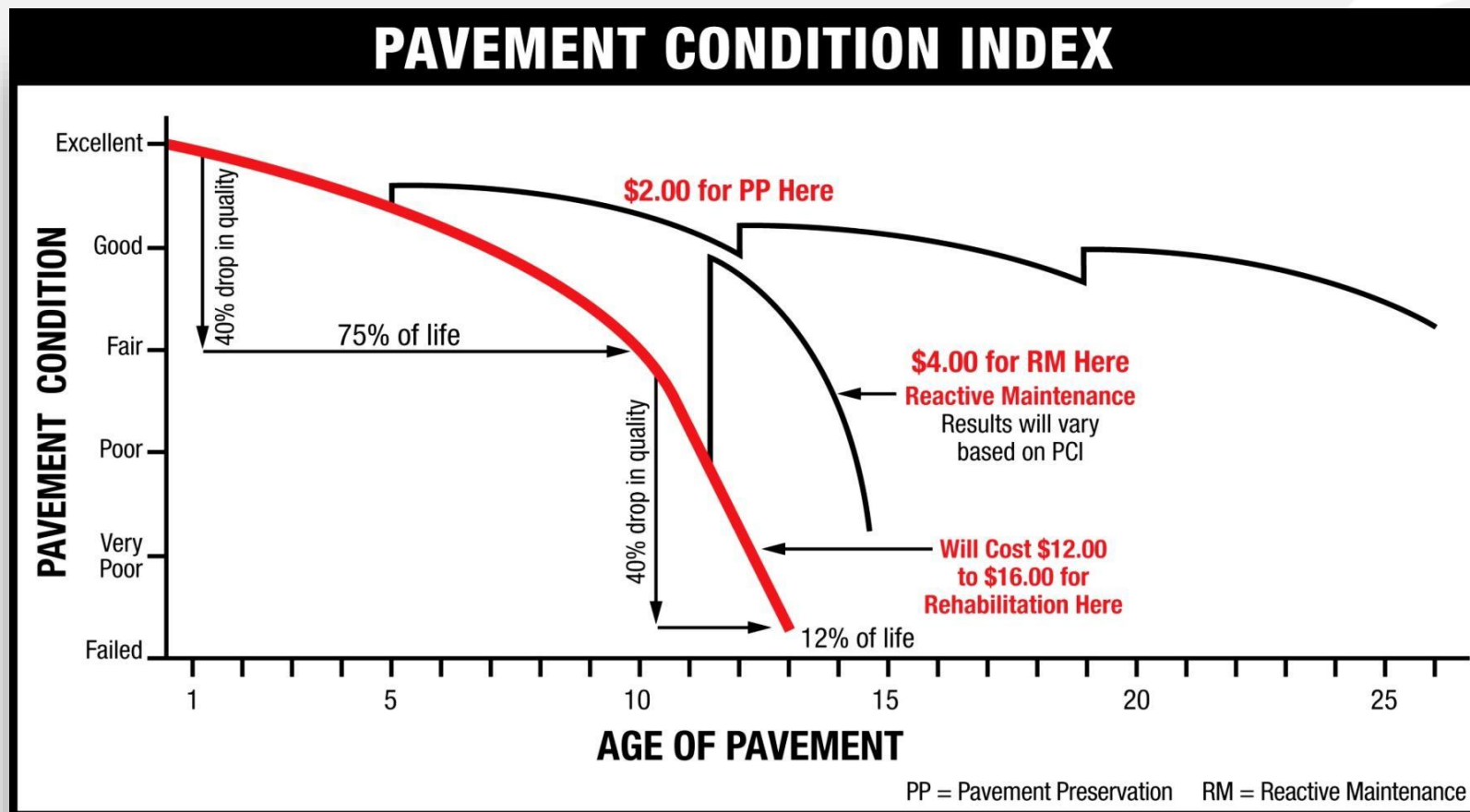
Surface Texture Uniformity (High Friction Surface)





Pavement Condition Index

“Right Treatment – Right Road – Right Time”



Cost data from national averages compiled by ISSA.



Typical Fiber Reinforced Slurry Surfacing Project

5-1-13



BEFORE



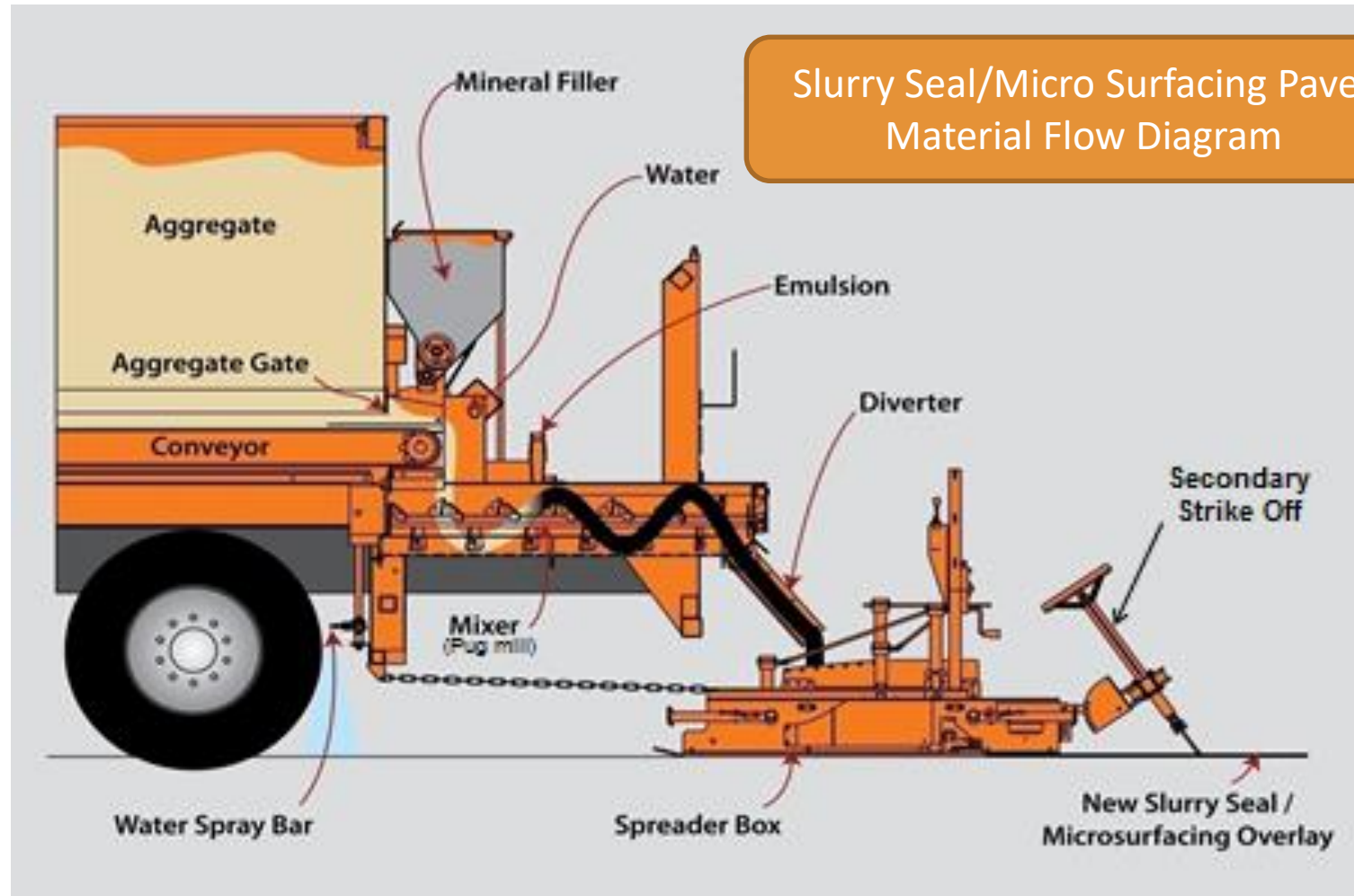
Typical Fiber Reinforced Slurry Surfacing Project 1-3-17



AFTER



Application Equipment





Selecting the Correct Feeding System

Select a dispenser that is:

- **Easy to use**
- **Dispenses and distributes your fiber evenly**
- **Can produce your desired application rates**
- **Works well with your equipment**



Selecting the Correct Feeder

Volumetric Feeder – dispenses pre-chopped

The solution for automatic disbursement of pre-chopped fibers into slurry pavers. Its proven accuracy saves you both time and money while taking the guesswork out of fiber usage.

▪





Ranger



- Accuracy Saves Money
- Easy Installation gets you up-and-running quickly
- De-clumping eliminates waste
- Loading is simple
- Low maintenance
- Easy to use



EASY INSTALLATION

- Compact in size, making it easy to maneuver
- 2 brackets, 1 connection to a 12 VDC power source and 3 hydraulic hoses are all you need
- Easily attaches to trucks & pavers
- Available in 24" and 36"
- Does not hinder the paving process





Application Equipment



Truck Mounted Unit



Continuous Run Machine





EASY LOADING

- Drum holds 80 lbs.
- The Ranger has a window so operators can instantly recognize when its time to add additional fibers
- Optional extension can be added to increase the drum's capacity
- Available in 40 lb bags of pre-chopped $\frac{1}{4}$ " length fibers

Play Video 





Fibers Directly into Pugmill





MicroSurfacing & Slurry Seal





Main Uses

- Sealing pavement against water, oxidation
- Filling cracks, raveling
- Surface texture improvement
- Re-profiling and rut-filling
- Color
- Fast – Open to traffic less than 1 hour
- Increase friction resistance
- Lower cost than mill & fill
- No need to raise drains, covers, curbs
- Improves pavement durability and extends life

Where to Use

- Roadways
- Parking Lots
- Airport areas
- Interstates
- Shoulders





PARKING LOT TEST SECTION

ISSA - LAS VEGAS, NV

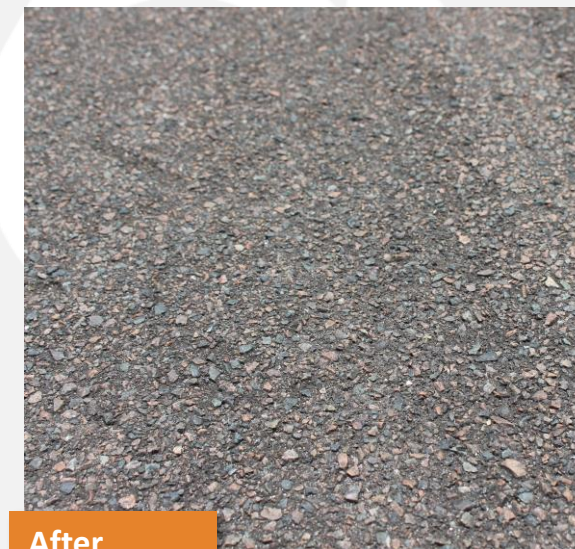
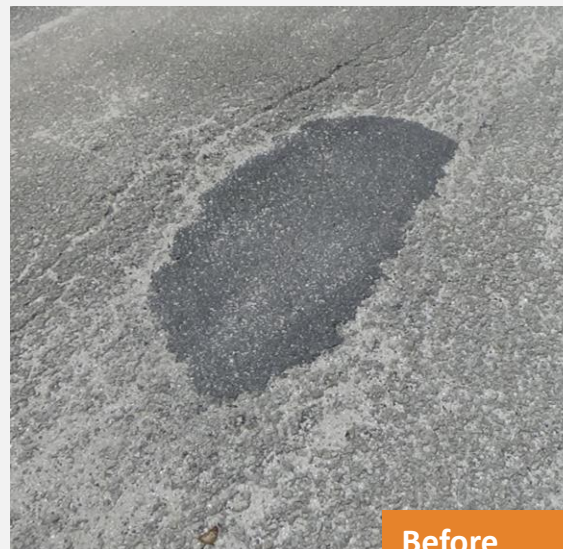
- 2017 & 2018
- Micro Surfacing project
- Surface-EXT™



BOLEYN ROAD

FLORIDA

- Micro Surfacing project
- Surface-EXT™





Average Cost of Maintenance

- **1 1/2" HMAC w/Milling** **\$118,500.00 - \$143,500.00**
- **Slurry Seal** **\$19,500.00 - \$23,500.00**
- **Micro Surfacing (single)** **\$24,000.00 - \$27,000.00**
- **Micro Surfacing (double)** **\$48,000.00 - \$54,000.00**

Per mile 20' wide



Fiber vs Non Fiber



With Fiber

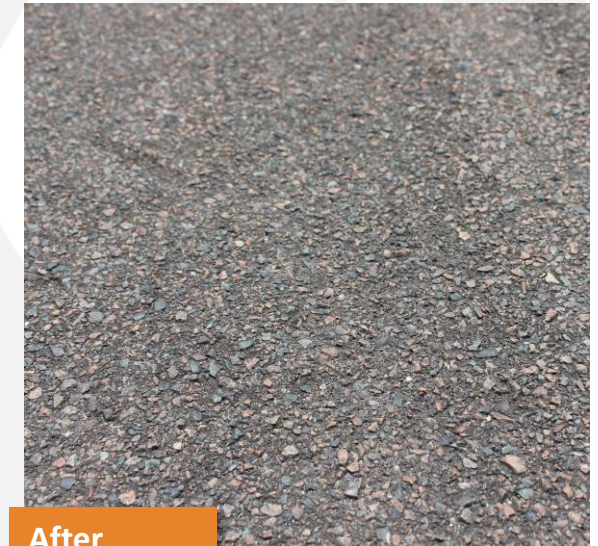
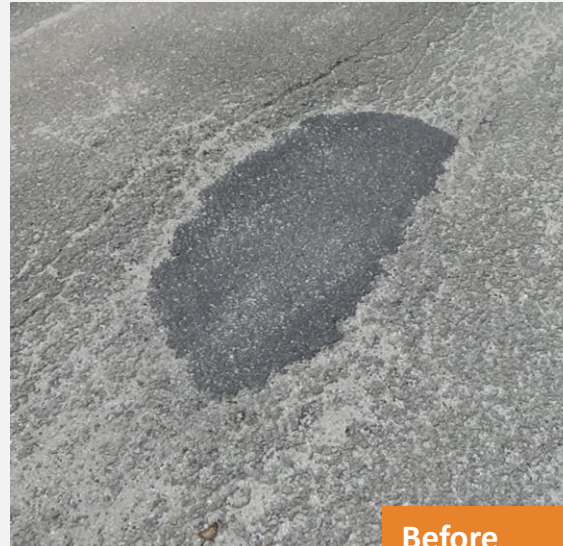


Without Fiber



Use as a Tack

- Micro Surfacing project
- Fiber Tack Coat





Review...

- Another Tool in the Tool Box
- Adds Durability & Extends Life
- Mitigates Cracking
- No Changes to Mix Design
- Easily Fed and Distributed
- Low Cost
- Aesthetically Pleasing





FORTA

ASPHALT FIBER

STRONGER LASTING™

Surface-EXT®

FIBER REINFORCEMENT FOR
MICRO SURFACING & SLURRY SEAL

- IMPROVES PAVEMENT FLEXIBILITY
- ADDS LONG-TERM DURABILITY
- REDUCES SETUP & CURE TIME
- MITIGATES REFLECTIVE CRACKING
- EXCELLENT WORKABILITY

THANK YOU

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June 18-19 | GCC Daniel Technology Center
Culpeper, VA

2019

VIRGINIA PAVEMENT RESEARCH & INNOVATION SYMPOSIUM

