



FORTA-FI[®]

THE SUSTAINABILITY SOLUTION
for ASPHALT

Go Stronger... Go Longer...
Get FORTAfied![®]



FORTA-FI®

The Sustainability Solution for Asphalt

What is FORTA-FI®?

FORTA® Corporation's first patent for asphalt-reinforcing fibers was in 1982, with two additional patents in 2012, and our products have been successfully used in projects around the world. Over that time, we have continued to fund additional scientific research to optimize our products and to better quantify the value provided by these products. Our 2008 research project was conducted by Arizona State University and showed remarkable results.

The secret to reinforcing almost any construction material is historically simple: add fibers throughout the material to add strength, toughness, and durability. FORTA capitalizes on this three-dimensional certainty by providing strong and chemically-inert synthetic fibers and materials — FORTA-FI® — that mix quickly and distribute uniformly in asphalt mixtures. Once distributed, FORTA-FI fibers act as reinforcement in both conventional and modified asphalt mixtures, offering improvements to stability-related problems often occurring in unreinforced asphalt pavements.

Though the millions of distributed fibers are easily detectable in the asphalt mixture, they become virtually invisible on the pavement surface, and they require no modifications to normal lay-down and compaction practices. By controlling thermal, reflective, and fatigue cracking as well as rutting, FORTA-FI is a cost-effective way to improve the durability and longevity of a wide variety of Hot Mix Asphalt (HMA), Warm Mix Asphalt (WMA) and Hot/Cold Patch (PAT) applications. FORTA-FI family of products are proprietary blends containing aramid and polyolefin fibers and other materials known for their strength, durability, and binding properties.

Available in three proprietary blends containing aramid and polyolefin fibers and other materials packaged in polyethylene bags.

HMA Blend *for Hot Mix Asphalt*

- Designed for working temperatures of 250°F - 375°F (121°C - 190°C)
- Mixes in drum plants at any speed or batch plants
- Distributes uniformly and completely
- Available in 3/4" (19mm) fiber lengths for typical aggregate sizes



WMA Blend *for Warm Mix Asphalt*

- Designed for working temperatures of 212°F (100°C) and higher
- Mixes in drum plants at any speed or batch plants
- Distributes uniformly and completely
- Available in 3/4" (19mm) fiber lengths for typical aggregate sizes
- Formulated for all foaming methods



PAT Blend *for Hot/Cold Patch*

- Designed for any working temperature
- Formulated for high percentages of solubles
- May be added in plant or directly in rejuvenated material on site
- Available in 3/4" (19mm) fiber lengths



Add it to your mix and **SAVE!**

How FORTA-FI Works ...

FORTA*fied*® asphalt builds stronger asphalt surfaces, and **stronger roads are safer roads**. FORTA*fied* asphalt reduces maintenance, thereby reducing future costs and extending the useful life of pavement.

Asphalt reinforced with FORTA-FI has improved tensile strength and resilient modulus, and improved Marshall Stability and Flow.

Your Traditional Asphalt



As a truck stops, the force drives down into asphalt and supporting layers, causing stress and fatigue where the tires meet the road.

FORTA*fied* Asphalt



As a truck stops, the aramid fibers spread the force throughout the treated layer, reducing stress and fatigue where the tires meet the road.

FORTA-FI is available in 1-bag per ton/tonne dosages, or in bulk to accommodate all methods of introducing fibers into an asphalt plant while assuring uniform and complete distribution.



COST-EFFECTIVE

SAVE NOW:

**35% reduction
in asphalt thickness**

Your traditional
asphalt thickness

5.5 inches

FORTA*fied*™ asphalt
thickness

3.5 inches

Case study prepared using
Mechanistic Empirical Pavement Design Guide (MEPDG).

SAVE DOWN THE ROAD:

50% longer asphalt life

YOUR ASPHALT

FORTA*fied*™ ASPHALT

Case study prepared using
Mechanistic Empirical Pavement Design Guide (MEPDG).

EASY TO USE

- easily metered automatically or manually
- mixes in drum plants at any speed or batch plants
- mixes thoroughly in seconds
- distributes uniformly and completely

NO MODIFICATIONS needed to:

- your current asphalt mixture
- asphalt plant
- placement or compaction practices

TESTED AND PROVEN

**Extensively tested with
proven results!**

Go Stronger ... Go Longer ... Get FORTA*fied*!®

Extensively tested with proven results!

FORTA-FI has been involved in a considerable amount of research throughout its product history. FORTA-FI has reinforced projects all over the world ranging from highways and municipal streets and roadways, to commercial and industrial parking lots – even residential driveways. FORTA-FI continues a strong FORTA Corporation tradition by reinforcing the future of asphalt. Though substantial data has been generated in laboratory research programs from around the world, much of the most valuable information has come from actual projects and trials using FORTA-FI reinforcement.

Tests have a wide variety of research parameters and include *Binder Tests, Triaxial Shear Strength, Dynamic Modulus, Permanent Deformation, Repeated Load, Static Creep, Beam Fatigue, Indirect Tensile Strength, Static Creep/Flow Time and Fracture & Crack Propagation.*



The test results proved FORTA^{fi}ed Asphalt is far superior to non-FORTA^{fi}ed asphalt mixtures. (Actual test results are available upon request.)



Jackson Hole WY Airport



PennDOT, SR-228



ODOT, SR-13



Federal Highway Road Agency "KOLA", St. Petersburg Russia

Patent Nos. 8,142,889 B2 & 8,114,514 B1

FORTA^{fi}ed Asphalt

Asphalt reinforced with FORTA-FI
(The Sustainability Solution for Asphalt)

VS.

Non-FORTA^{fi}ed Asphalt

C Line Integral Crack Propagation Test



FORTA^{fi}ed™ Asphalt

Non-FORTA^{fi}ed™ Asphalt

These test samples from the C Line Integral Crack Propagation Test are for a visual comparison of unmodified asphalt, meaning no FORTA-FI fibers, and FORTA^{fi}ed asphalt mixtures. The test demonstrated that the more energy required and the slower the crack speed, the better the mixture will resist cracking. Fiber-reinforced asphalt controls cracking as seen by additional tests performed at Arizona State University that showed:

- Higher crack propagation resistance
- Higher fatigue life
- Higher strength (150%)
- Higher tensile strain at failure
- Higher fracture energy at failure
- Higher energies (200%)
- Lower thermal cracking, even at 14°F (-10°C)

The high fiber count in the FORTA^{fi}ed asphalt mixture resulted in much better resistance to crack initiation and much better resistance to crack propagation.



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