



# TRIONIC™

FINALLY... MOLECULAR FUSION OF NYLON AND POLYETHYLENE.  
**SOFTER, STRONGER... LASTS LONGER.**

**AstroTurf®**

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## Introducing the TRIONIC™ Fiber:

Throughout the history of the synthetic turf industry, the great quest of manufacturers has been to blend polyethylene (PE) and nylon into a single fiber.

From its earliest inception until the 1990s, nylon was used nearly across the board for its superior resilience and strength. But the downside of all-nylon fibers was well known. It was abrasive. In the 1990s, PE came into vogue and became the industry standard for tall pile face fibers.

These PE fibers were much less abrasive, but they came at a cost - they sacrificed the strength that previous generations of turf fields offered.

## Until now...

## ASTROTURF® REINVENTS PE

- making it softer, stronger, TRIONIC™.

AstroTurf now offers the TRIONIC fiber. This patent-pending development is a **feat of chemical engineering** never before achieved in the history of our industry. TRIONIC combines player-friendly PE with ultra-durable nylon using specialized molecular compatibilizers. The result is the ultimate fiber. TRIONIC was selected by the Synthetic Turf Council as the Innovation of the Year.

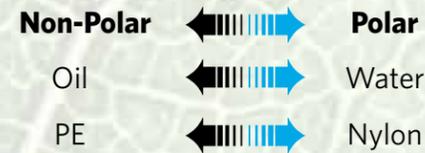
**TRIONIC** is the new **WONDERFIBER!**

# THE MOLECULAR FUSION OF NYLON AND POLYETHYLENE.

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## WHY WAS IT SO DIFFICULT?

Chemically speaking, PE and nylon are like oil and water. They do not mix. The reason has to do with polarity. PE (like oil) is non-polar, while nylon (like water) is polar.



### PE and nylon repel each other.

That's why efforts to mix the polymers into a single fiber have always failed - *until now.*

## SO HOW DID WE DO IT?

The secret is in the **compatibilizers**. These compounds encase the nylon polymers, which are suspended within the PE to reinforce the fiber. These compatibilizers have an affinity with both the PE and the nylon. They are polar on the inside, and non-polar on the outside. In essence, the compatibilizers bridge the gap.

Five years of pre-market research and development, constant testing, and continuous tweaking have enabled us to develop the optimal compatibilizers for long term integrity and durability.

## WHY IS TRIONIC UNLIKE ALL OTHERS?

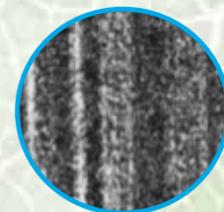
In developing the TRIONIC protocols we combined one layer of polyethylene over a core. Testing proved this to be unreliable and more prone to splitting than current monofilament fibers.

## WHAT MAKES TRIONIC SO DIFFERENT?

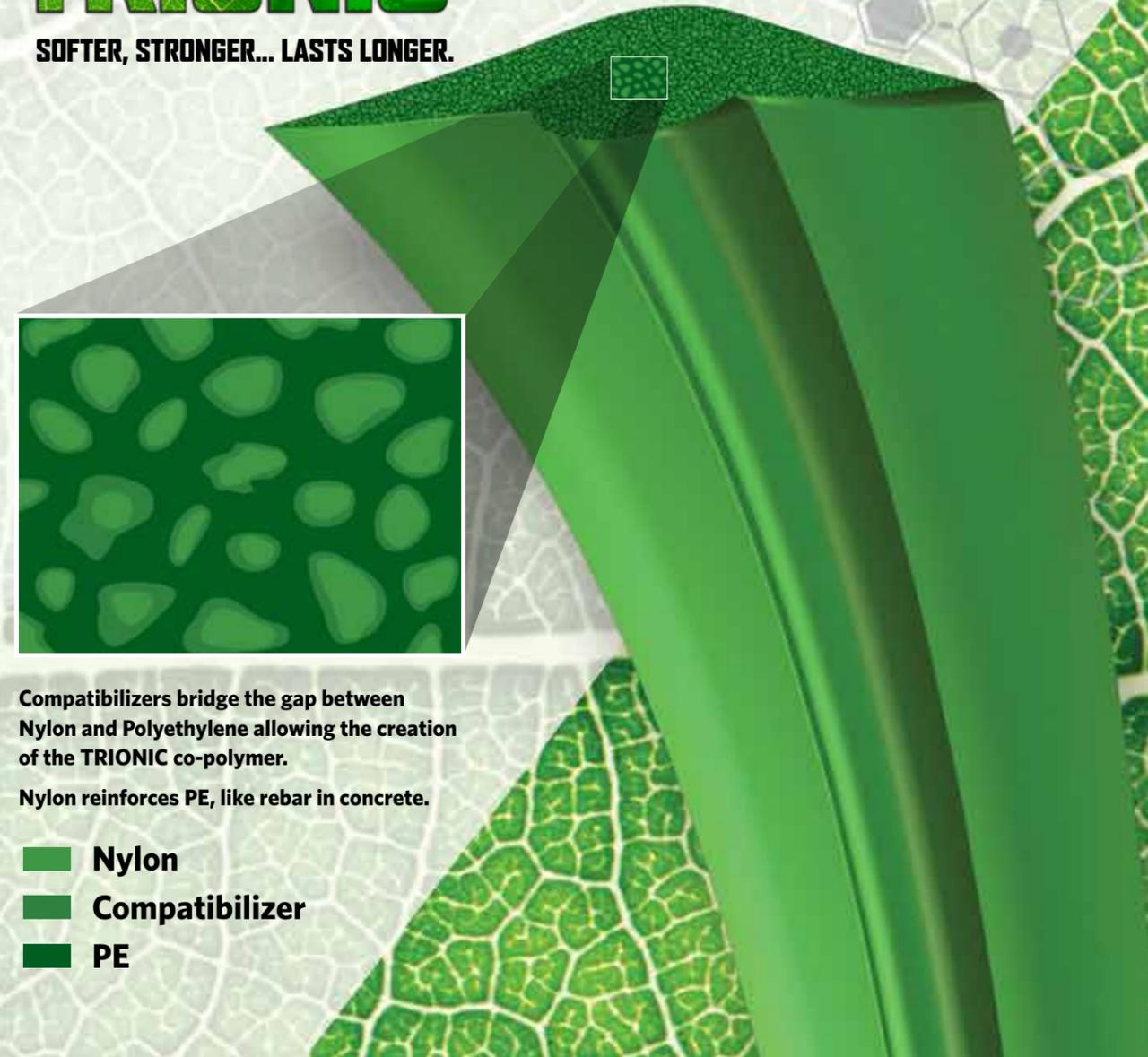
While some core systems may use two polyethylene compounds as a cost saving shortcut, TRIONIC fibers are a totally different technology.

To produce TRIONIC, polyethylene and nylon molecules are fused into a co-polymer and then extruded as a single fiber. This patent pending process chemically blends polyethylene with nylon, providing the softness of current fibers with extreme durability, strength and resilience.

### TRIONIC is the real game changer!



TRIONIC Fiber via an electron microscope



Compatibilizers bridge the gap between Nylon and Polyethylene allowing the creation of the TRIONIC co-polymer.

Nylon reinforces PE, like rebar in concrete.

- Nylon
- Compatibilizer
- PE



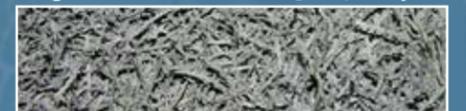
## REAL WORLD RESULTS = 50% MORE WEAR RESISTANCE

**Our TRIONIC Fiber delivers a massive improvement in resistance to wear! See for yourself.**

Accelerated wear tests show that TRIONIC performs as well at 150,000 cycles as even our own High Micron monofilament fibers at 100,000 cycles. Polyethylene fibers, regardless of how they are made, or how they may be combined, do not compare to the strength, resilience and durability of a molecularly fused Nylon and Polyethylene fiber. Period.



High Micron PE monofilament @ 100,000 cycles



Competitor PE monofilament @ 100,000 cycles



TRIONIC monofilament @ 150,000 cycles

# TRIONIC TECHNOLOGY GOES EVEN FURTHER...



# TRIONIC SHARKSKIN

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## ENTANGLEMENT

Our TRIONIC fiber features entanglement technology for superior strength. In fact we now use this same technology in all of our PE fibers.

Every polyethylene molecular structure contains a main chain, with branches of side chains. As fibers are made, the resin and masterbatch pellets are melted down, extruded and stretched.

As the newly made fiber is stretched, those main molecular chains are lengthened along the direction they are stretched. This creates long molecular chains that run parallel to one another along the length of the fiber. In most fibers, with UV exposure and use, this lends itself to splitting lengthwise down the shaft of the fiber.

### WITHOUT ENTANGLEMENT

The main molecular chains are vulnerable to splitting



### WITH ENTANGLEMENT

Cross chains reinforce the main molecular chains



To prevent splitting of the fiber, we entangle the side chains to reinforce any weak spots that would form between the main molecular chains.

TRIONIC, as well as all our extruded fibers, also utilize shark skin technology. This is what it is and how it works.

At the molecular level PE has some amorphous molecules and some crystalline molecules. Amorphous molecules are random and unstructured. Crystalline molecules are stacked and structured.

Sharkskin technology engineers the molecular structure of the PE turf fiber to increase crystallization. More and larger crystalline portions, when interspersed with smaller amorphous sections, create a rougher surface at the molecular level of the fiber that resembles the scales of a shark's skin.

Although it may seem counter-intuitive, the rougher surface at the microscopic level creates a less abrasive fiber. When a player slides across the fiber, the player is exposed to the crystalline portions and not the amorphous portions. That means fewer contact points, which reduces friction on the skin. (Think about sliding your hand across glass. The surface is so smooth that it creates significant friction).

Those molecular peaks and voids also create more space for polyurethane secondary coating to adhere, which improves tuft bind and makes it more difficult to pull out fibers! That translates to a longer lifespan for your turf field.



Artesia High School - Lakewood, CA

Rich Township - Olympia Fields, IL

Appalachian State - Boone, NC



Brenham High School - Brenham, TX

Villa Rica - Villa Rica, GA

University of Washington - Seattle, WA



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Selected as "2019 Innovation of the Year" by the Synthetic Turf Council.

## AstroTurf Corporation

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