

AstroTurf.

TRIONIC PLUS



AstroTurf's Wonder Fiber and
"The Synthetic Turf Council's 2019 Innovation of the Year"

Just Got Better !

Sanitized™
Antimicrobial Technology

DualChill™
IR Reflective Technology

StatBlock™
Anti-Static Component

Entanglement Technology
Superior Strength

Sharkskin Technology
Friction Reduction

Softer, Stronger... Lasts Longer

FINALLY... MOLECULAR FUSION OF
NYLON AND POLYETHYLENE.

INTRODUCING THE TRIONIC PLUS 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.

AstroTurf® Reinvents PE

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...***





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AstroTurf is now Introducing the **TRIONIC PLUS** fiber. This development is a feat of chemical engineering never before achieved in the history of our industry.

TRIONIC PLUS combines player-friendly PE with ultra-durable nylon using specialized molecular compatibilizers. The result is the ultimate fiber.

– making it
Softer,
Stronger,
TRIONIC PLUS

The molecular fusion of **Nylon and Polyethylene.**

SOFTER, STRONGER, LASTS LONGER.

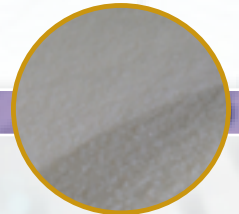
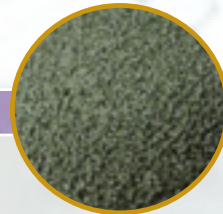
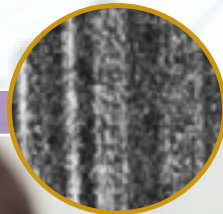
SO HOW DID WE DO IT?

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.

WHAT MAKES TRIONIC PLUS SO DIFFERENT?

While some core systems may use two polyethylene compounds as a cost saving shortcut, **TRIONIC PLUS** fibers are a totally different technology. To produce **TRIONIC PLUS**, 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 PLUS Fiber via an electron microscope

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.

| Non-Polar | ← → | Polar |
|-----------|---------|-------|
| Oil | ← → | Water |
| PE | ← → | Nylon |

PE and nylon repel each other.

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

TRIONIC PLUS now offers these amazing technological advancement



SANITIZED[®] Silver-based technology

Sanitized[®] silver-based antimicrobial technology helps eliminate odors and provides long-lasting protection. It reduces bacterial odors by diminishing the ability of microbes to proliferate and migrate on AstroTurf face fibers.

DUALCHILL[™] Thermal shield

Therma Shield inhibits the fiber's ability to absorb infrared radiation. This allows the fiber to heat up slower. Test results done on the same fiber package, with and without DualChill shows that there is an average of up to 42% improvement in IR reflectivity.

STATBLOCK[™] Anti-static component

New carbon-based anti-static ingredient molecularly bound into the face fiber that inhibits the buildup of static electricity. Anti-static components are used in the industry but AstroTurf brings the first DNA level addition. Testing shows up to a 17x reduction in static levels when StatBlock[™] is introduced into the synthetic turf fibers.

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SANITIZED

DUALCHILL

STATBLOCK

H₂C

NH

HO



Trionic Plus technology goes even further...



ENTANGLEMENT

Our **TRIONIC PLUS** 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.

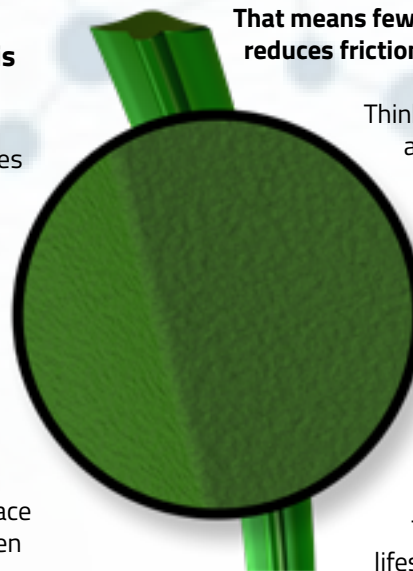
Sharkskin SOFTER, STRONGER, LASTS LONGER.

TRIONIC PLUS, 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.

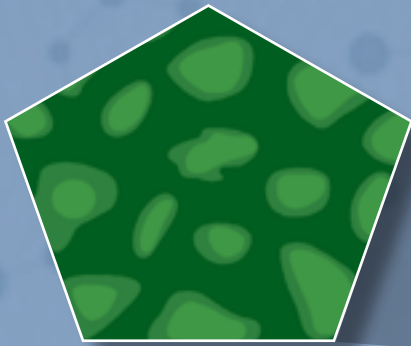
That means fewer contact points, which reduces friction on the skin.




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.

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TRIONIC PLUS



-  Nylon
-  Compatibilizer
-  PE

Compatibilizers bridge the gap between Nylon and Polyethylene allowing the creation of the **TRIONIC PLUS** co-polymer. Nylon reinforces PE, like rebar in concrete.

REAL WORLD RESULTS **= 50% MORE WEAR RESISTANCE**

Our **TRIONIC PLUS** Fiber delivers a massive improvement in resistance to wear!

See for yourself.

Accelerated wear tests show that **TRIONIC PLUS** 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 PLUS monofilament @ 150,000 cycles






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