Synthetic Turf Fiber Wear Test – Progress Report

November 2011
Lisport wear testing was conducted at Penn State’s Center for Sports Surface Research, University Park, PA. All samples were exposed to a total of 30,000 cycles on a Lisport wear tester.

**Testing Methods**

Fiber wear tests were conducted using a Lisport wear tester (pictured below). The Lisport wear tester consists of two cylinders outfitted with studs (cleats) that simulate field use. Different sprocket sizes on each cylinder allows for a sliding movement of one of the cylinders. The model used in this testing also included a sample tray that produced movement transverse to the linear movement of the cylinders, allowing for even wear across the entire sample. Each cycle is roughly equivalent to one hour of field use by users wearing cleated shoes. The method used is considered a modified version of both the European standard for Surfaces for Outdoor Sports Areas - Exposure of Synthetic Turf to Simulated Wear (EN 15306) and the FIFA Quality Concept for Football Turf – Handbook of Test Methods (May, 2009 edition) as our machine includes plastic cleats with metal tips instead cleats made of 100% plastic. Each sample was filled with crumb rubber to a depth based on manufacturer specifications. Random fibers were removed after every 10,000 cycles for evaluation.
Fiber Evaluation

Each fiber was classified into one of four categories based on appearance:

Samples used in testing were obtained from athletic field managers, installers, and directly from turf manufacturers. If you would like to participate in our testing program, please visit our website for more details: http://cropsoil.psu.edu/ssrc/fibertest. This report will be updated regularly as more samples are tested. Be sure to check back often for the most current results.
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AstroTurf GameDay Grass 3D60H

Fiber classifications for each 10,000 cycle interval from 10 random fibers removed from sample.

<table>
<thead>
<tr>
<th># of cycles</th>
<th>Good</th>
<th>Hair-Splitting</th>
<th>Fractured</th>
<th>Complete Splitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10,000 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20,000 cycles</td>
<td>6</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>30,000 cycles</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>2</td>
</tr>
</tbody>
</table>

Tested April 2011

Cross section of AstroTurf GameDay Grass 3D fiber from sample tested.
AstroTurf
GameDay Grass 3D60H
0 Cycles
AstroTurf
GameDay Grass 3D60H
10,000 Cycles
AstroTurf
GameDay Grass 3D60H
20,000 Cycles
AstroTurf
GameDay Grass 3D60H
30,000 Cycles
AstroTurf GameDay Grass 3D 60H after 30,000 cycles
AstroTurf GameDay Grass 3D with Astroflect

Fiber classifications for each 10,000 cycle interval from 10 random fibers removed from sample.

<table>
<thead>
<tr>
<th># of cycles</th>
<th>Good</th>
<th>Hair-Splitting</th>
<th>Fractured</th>
<th>Complete Splitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10,000 cycles</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>20,000 cycles</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>30,000 cycles</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>7</td>
</tr>
</tbody>
</table>

Tested May 2011

Cross section of AstroTurf GamedayGrass 3D with Astroflect fiber from sample tested.
AstroTurf Gameday Grass 3D with Astroflect
0 Cycles
AstroTurf GameDay Grass 3D with Astroflect 10,000 Cycles
AstroTurf GameDay Grass 3D
with Astroflect
20,000 Cycles
AstroTurf GameDay Grass 3D
with Astroflect
30,000 Cycles
AstroTurf GameDay Grass 3D with AstroFlect after 30,000 cycles
ATG Sports RamTurf

<table>
<thead>
<tr>
<th># of cycles</th>
<th>Good</th>
<th>Hair-Splitting*</th>
<th>Fractured</th>
<th>Complete Splitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10,000 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20,000 cycles</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30,000 cycles</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Hairsplitting on edges of fibers only

Tested August 2011

Cross section of ATG Sports RamTurf fiber from sample tested.
ATG Sports
RamTurf
0 Cycles
ATG Sports
RamTurf
10,000 Cycles
ATG Sports RamTurf after 30,000 cycles
# FieldTurf Duraspine Pro

<table>
<thead>
<tr>
<th># of cycles</th>
<th>Good</th>
<th>Hair-Splitting</th>
<th>Fractured</th>
<th>Complete Splitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10,000 cycles</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20,000 cycles</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>30,000 cycles</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

Tested June 2011

Cross section of FieldTurf Duraspine Pro fiber from sample tested.
FieldTurf Duraspine Pro
0 Cycles
FieldTurf Duraspine Pro
20,000 Cycles
FieldTurf Duraspine Pro
30,000 Cycles
FieldTurf Revolution

Fiber classifications for each 10,000 cycle interval from 10 random fibers removed from sample.

<table>
<thead>
<tr>
<th># of cycles</th>
<th>Good</th>
<th>Hair-Splitting*</th>
<th>Fractured</th>
<th>Complete Splitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10,000 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20,000 cycles</td>
<td>9</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30,000 cycles</td>
<td>7</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Hairsplitting on edges of fibers only

Tested April 2011

Cross section of FieldTurf Revolution fiber from sample tested.
FieldTurf Revolution
10,000 Cycles
FieldTurf Revolution
20,000 Cycles
FieldTurf Revolution
30,000 Cycles
FieldTurf Revolution after 30,000 cycles
# Hellas Matrix

<table>
<thead>
<tr>
<th># of cycles</th>
<th>Good</th>
<th>Hair-Splitting*</th>
<th>Fractured*</th>
<th>Complete Splitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10,000 cycles</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>20,000 cycles</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30,000 cycles</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

*Hairsplitting and fracturing on edges of fibers only

Tested June 2011

Cross section of Hellas Matrix fiber from sample tested.
Hellas Matrix
10,000 Cycles
Hellas Matrix
30,000 Cycles
Hellas Matrix after 30,000 cycles
Buildup of fiber “debris” from Hellas Matrix after 30,000 cycles. This was not observed on any other product tested.
# Mondo Monofibre 3NX

Fiber classifications for each 10,000 cycle interval from 10 random fibers removed from sample.

<table>
<thead>
<tr>
<th># of cycles</th>
<th>Good</th>
<th>Hair-Splitting</th>
<th>Fractured</th>
<th>Complete Splitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10,000 cycles</td>
<td>9</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20,000 cycles</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>30,000 cycles</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

Tested May 2011

[Cross section of Mondo Monofibre 3NX fiber from sample tested.]
Mondo Monofibre 3NX
0 Cycles
Mondo Monofibre 3NX
10,000 Cycles
Mondo Monofibre 3NX
20,000 Cycles
Mondo Monofibre 3NX
30,000 Cycles
Mondo Monofibre 3NX after 30,000 cycles
**Shaw Sportexe PowerBlade HP+**

<table>
<thead>
<tr>
<th># of cycles</th>
<th>Good</th>
<th>Hair-Splitting*</th>
<th>Fractured*</th>
<th>Complete Splitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10,000 cycles</td>
<td>8</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20,000 cycles</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30,000 cycles</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

*Hair-splitting and fracturing on edges of fibers only*

Tested June 2011

Cross section of Shaw Sportexe PowerBlade HP+ fiber from sample tested.
Shaw Sportexe
PowerBlade HP+
0 Cycles
Shaw Sportexe PowerBlade HP+
10,000 Cycles
Shaw Sportexe
Power Blade HP+
20,000 Cycles
Shaw Sportexe PowerBlade HP+
30,000 Cycles
### Sportexe Powerblade (1st Generation)

Fiber classifications for each 10,000 cycle interval from 10 random fibers removed from sample.

<table>
<thead>
<tr>
<th># of cycles</th>
<th>Good</th>
<th>Hair-Splitting</th>
<th>Fractured</th>
<th>Complete Splitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10,000 cycles</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>20,000 cycles</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>30,000 cycles</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Tested April 2011

Cross section of Sportexe Powerblade (1st generation) fiber from sample tested.
Sportexe Powerblade
0 Cycles
Sportexe Powerblade
10,000 Cycles
Sportexe Powerblade
20,000 Cycles
Sportexe Powerblade
30,000 Cycles
Sportexe PowerBlade after 30,000 cycles
**Sprinturf Ultrablade DF***

<table>
<thead>
<tr>
<th># of cycles</th>
<th>Good</th>
<th>Hair-Splitting</th>
<th>Fractured</th>
<th>Complete Splitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10,000 cycles</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>20,000 cycles</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>30,000 cycles</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

*Sprinturf Ultrablade contains both parallel-fibrilated (slit-film) fibers and monofilament fibers. In this test, only monofilament fibers were removed for evaluation.

Tested October 2011

Cross section of Sprinturf Ultrablade DF monofilament fiber from sample tested.
Sprinturf
Ultrablade DF
(monofilament fibers only)
0 Cycles
Sprinturf
Ultrablade DF
(monofilament fibers only)
10,000 Cycles
Sprinturf
Ultrablade DF
(monofilament fibers only)
20,000 Cycles
Sprinturf
Ultrablade DF
30,000 Cycles
(monofilament fibers only)
Sprinturf Ultrablade DF after 30,000 cycles
# UBU Sports Balance MN69

<table>
<thead>
<tr>
<th># of cycles</th>
<th>Good</th>
<th>Hair-Splitting</th>
<th>Fractured</th>
<th>Complete Splitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10,000 cycles</td>
<td>7</td>
<td>3*</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20,000 cycles</td>
<td>6</td>
<td>4*</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30,000 cycles</td>
<td>4</td>
<td>4**</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

*Hairsplitting on edges of fibers only

**3 fibers with hairsplitting on edges, 1 fiber with hairsplitting down center

Tested June 2011

Cross section of UBU Sports Balance MN69 fiber from sample tested.
UBU Sports
Balance MN69
0 Cycles
UBU Sports
Balance MN69
10,000 Cycles
UBU Sports
Balance MN69
20,000 Cycles
UBU Sports
Balance MN69
30,000 Cycles
UBU Sports Balance MN69 after 30,000 cycles
## UBU Sports Speed M4-M

<table>
<thead>
<tr>
<th># of cycles</th>
<th>Good</th>
<th>Hair-Splitting*</th>
<th>Fractured</th>
<th>Complete Splitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10,000 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20,000 cycles</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30,000 cycles</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Hairsplitting on edges of fibers only

Tested June 2011

Cross section of UBU Sports Speed M4-M fiber from sample tested.
UBU Sports
Speed M4-M
0 Cycles
UBU Sports
Speed M4-M
10,000 Cycles
UBU Sports
Speed M4-M
30,000 Cycles
UBU Sports Speed M4-M after 30,000 cycles
UBU Sports Speed M6-M

<table>
<thead>
<tr>
<th># of cycles</th>
<th>Good</th>
<th>Hair-Splitting*</th>
<th>Fractured</th>
<th>Complete Splitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 cycles</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10,000 cycles</td>
<td>9</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20,000 cycles</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30,000 cycles</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Hairsplitting on edges of fibers only

Tested July 2011

Cross section of UBU Sports Speed M6-M fiber from sample tested.
UBU Sports Speed M6-M 0 Cycles
UBU Sports
Speed M6-M
10,000 Cycles
UBU Sports
Speed M6-M
20,000 Cycles
UBU Sports
Speed M6-M
30,000 Cycles