

Maintenance to mitigate
environmental concerns

Unintentionally created microplastic
fragments caused by yarn breaking
down in service



ESTC CONGRESS 2024

Changing the Narrative

19-21 March , Porto, Portugal

Maintenance to mitigate environmental concerns

Background

- Why yarns in artificial turf breakdown
- Early studies on this issue
- Field observations
- Maintenance is the key
- Keeping things in perspective
- Potential outcome of studies
- What is likely to come from Europe

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Background

How does Europe define secondary microplastics when it relates to artificial turf fibres?

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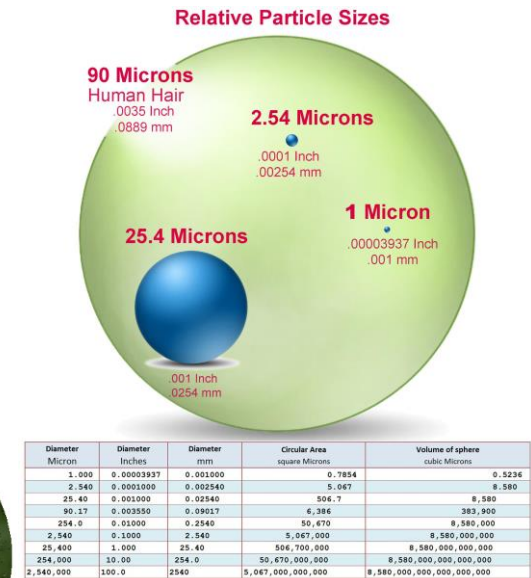
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Some definitions

Microplastic:

A material consisting of synthetic polymer containing particles or fibres, to which additives or other substances may have been added, and where $\geq 1\%$ w/w of particles or fibres have:

- a. For particles all dimensions between $0.1 \mu\text{m} \leq x \leq 5\text{mm}$
- b. for fibres, a length of between $3\text{nm} \leq x \leq 15\text{mm}$ and length to diameter ratio of >3



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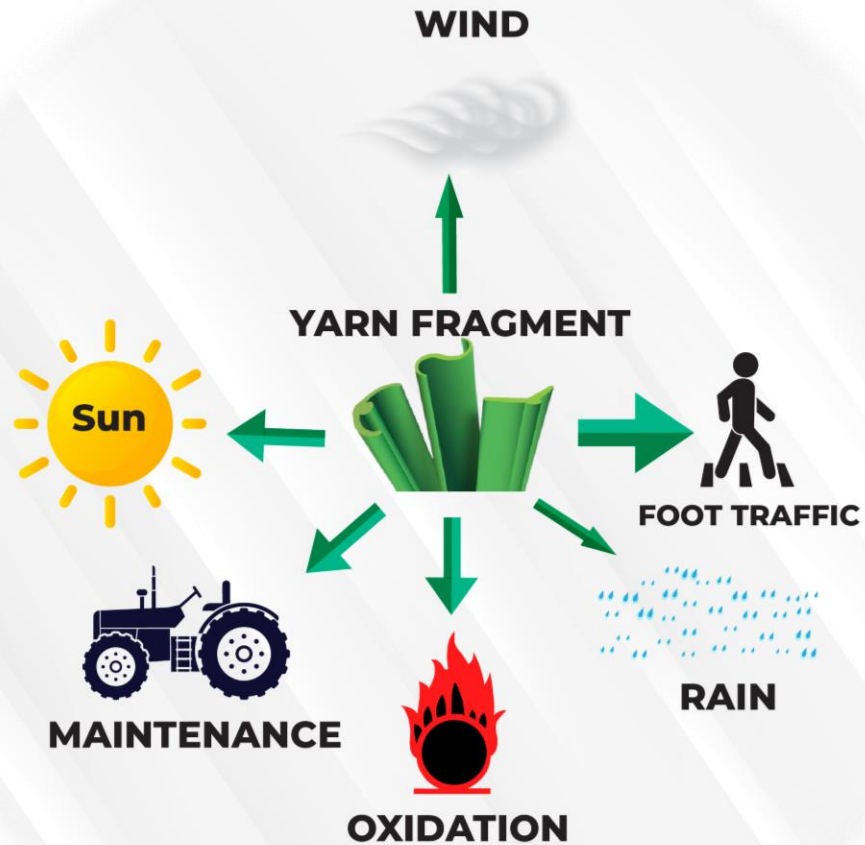


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Mechanisms for yarn breakdown in artificial turf

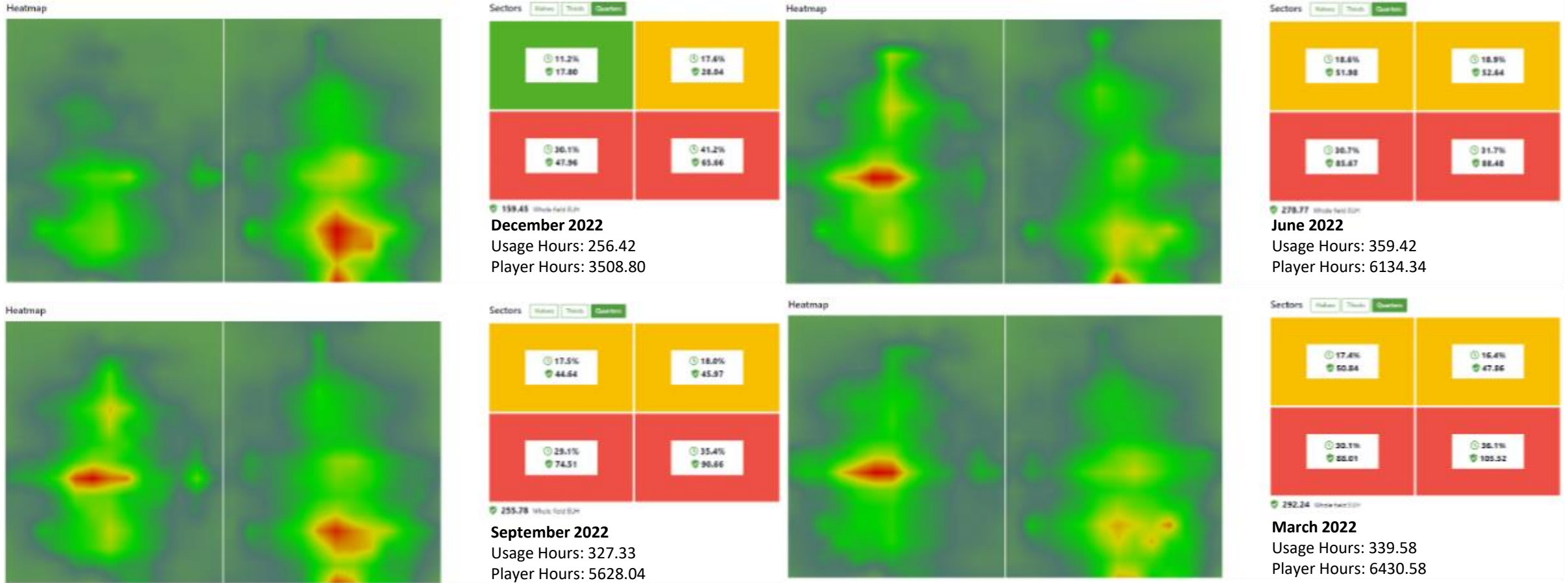
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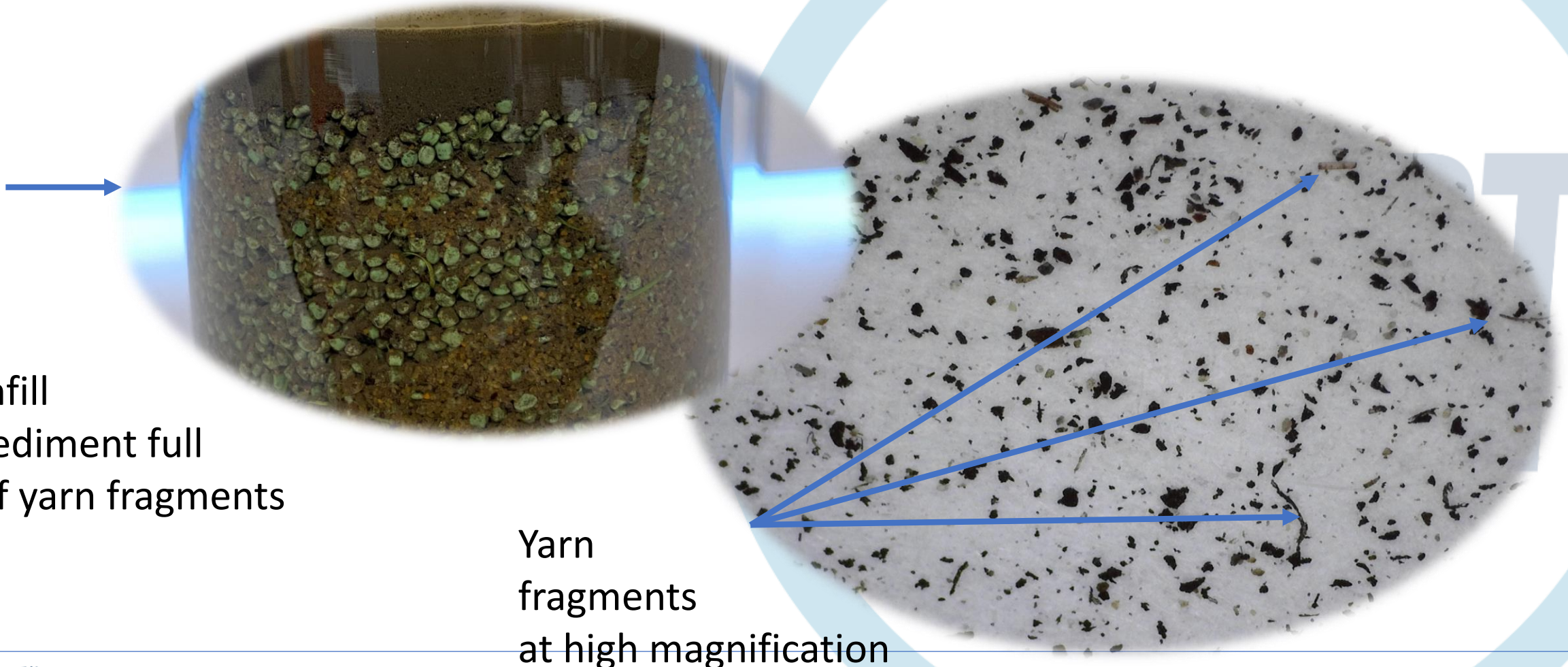


- Mechanisms for yarn breakdown in artificial turf
 - Hours/type of use/amount of foot traffic
 - Environmental factors
 - Quality of product installed
 - Maintenance
 - Type of infill used

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Infill sediment full of yarn fragments

Yarn fragments at high magnification

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Early studies on the durability of yarns

Modified Lisport XL work

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WEAR PROJECT



YARN BREAKDOWN

 SAMPLES OF SITE OBTAINED
SAMPLES 7 TO 8 YEARS OLD



Centre Spot
John Cumming Stadium
(2011)



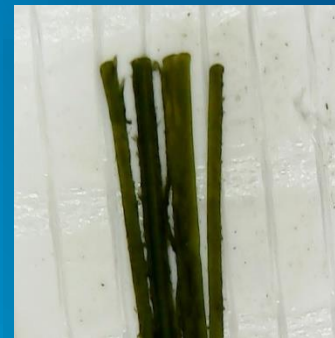
Penalty Spot
John Cumming Stadium
(2011)



Penalty Spot
Broadwood
(2012)



Goalmouth
Broadwood
(2012)



Centre Spot
Glasgow Green
(2015)



Goal Mouth
Glasgow Green
(2015)

WEAR PROJECT



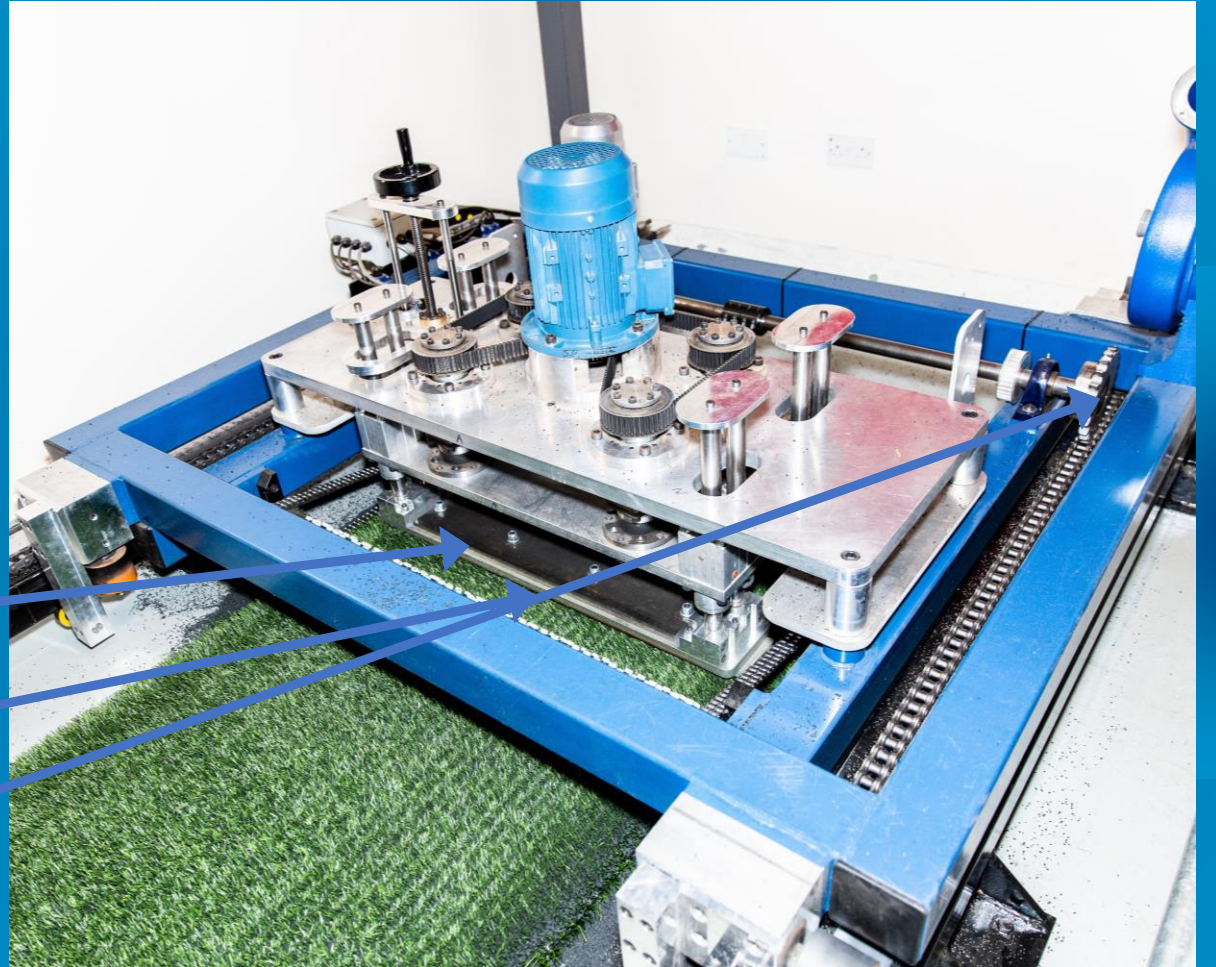
RESEARCH LISPORT XL SET UP

HEAVY WEIGHT PLATES, GRIT SOLE MATERIALS, GEARING ADDED

HEAVY PLATES ADDED

GRIT IMPREGNATED SOLE MATERIALS ADDED

GEARING ADDED TO SLOW ROLLER BY 40%



RESEARCH LISPORT XL

WEAR PROJECT



NEW PRODUCT APPEARANCE FOLLOWING
6000 CYCLES IN RESEARCH LISPORT XL

THIS SAMPLE WAS EVALUATED IN
THE LABORATORY



POST TESTED SAMPLE LOOKS LIKE WORN TURF

WEAR PROJECT



EXTENT OF YARN FRAGMENTATION
FOLLOWING 6000 CYCLES IN LISPORT XL.
MAY INDICATE YARNS PRONE TO
GENERATING MICROPLASTICS PARTICLES

TESTING PERFORMED ON A NEW
TURF SAMPLE



SMALL FRAGMENTS OF YARN

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Field observations

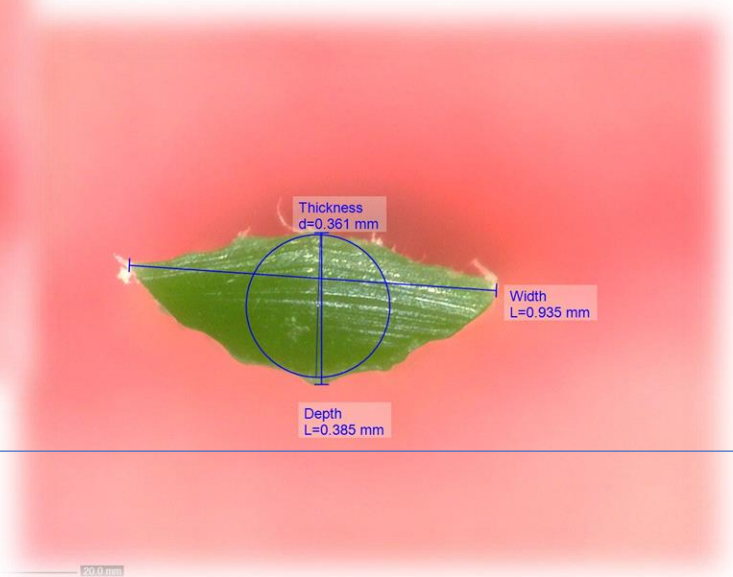
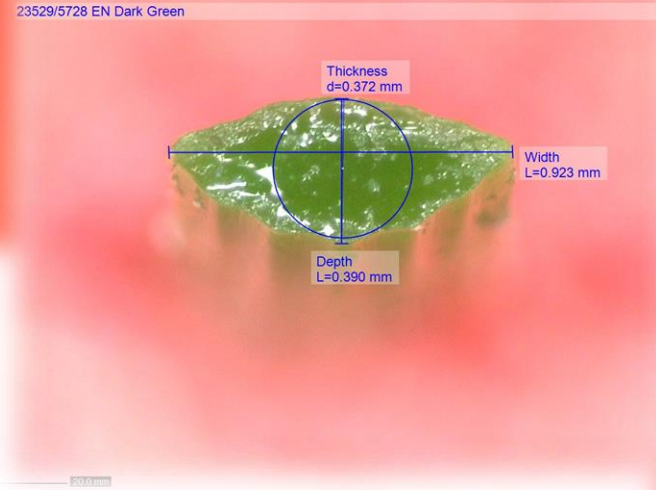
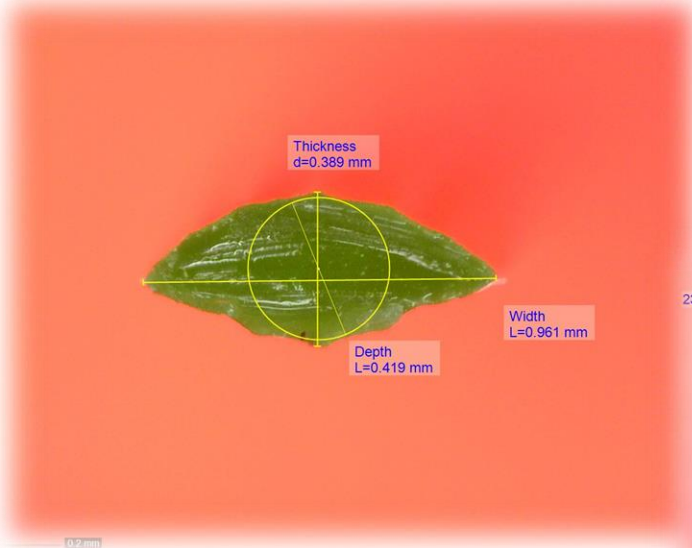
- Sampling and testing fields – example; Community use with heavy use of between 40 and 80 hours per week.

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Dtex Result		Difference	Results of mass loss are below:	High use area	Low use area
Initial Test (No use)	5671	+1%			
4 Years later (High Use)	5809				
Dtex Result		Difference	Manufacturer's Declared Values	945 g/m2 (mono) 626 g/m2 (fib) 6824 tufts /m2	945 g/m2 (mono) 626 g/m2 (fib) 6824 tufts /m2
Initial Test (No use)	5671	+3%			
4 Years later (Low Use)	5850				
Thickness Result		Difference	Initial Field Test Results	869 g/m2 (mono) 579 g/m2 (fib) 6696 tufts /m2	869 g/m2 (mono) 579 g/m2 (fib) 6696 tufts /m2
Initial Test (No use)	0.389mm	-4%			
4 Years later (High Use)	0.372mm				
Thickness Result		Difference	Pile weight /m2	771 g/m2 (mono) 506 g/m2 (fib)	779 g/m2 (mono) 559 g/m2 (fib)
Initial Test (No use)	0.389mm	-7%			
4 Years later (Low Use)	0.361mm				
Depth Result		Difference	% loss from initial field sample result	- 11.3 % (mono) - 12.6 % (fib)	- 10.4 % (mono) - 3.8 % (fib)
Initial Test (No use)	0.419mm	-8%			
4 Years later (High Use)	0.390mm				

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Initial Field Test Pile weight = **1448 g/m²**

Mean Pile weight (high+low-use areas) = **1308 g/m²**

Mass loss /m² = **140 g/m²**

Mass loss per 7000 /m² = **980,000 g/m²**

= **Potentially 245 kg per annum for this field based on 7000**

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Putting microplastic pollution from turf into perspective....

- Synthetic fibres – 35% of total volume [between 200,000 and 500,000 tonnes]
- Car tyres – 28% [>200,000 tonnes]
- Plastic pellets – 0.3% [2000 tonnes]

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Equipment requirements

- A rotating brush
- A means of push/pulling extracted materials through a filter
- Potentially a filtration system which will collect microparticles as small as 1.6 microns
- This equipment is potentially available

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Maintenance is the key

- Trial of maintenance equipment at an indoor artificial pitch 6 years old in Edinburgh, Scotland.

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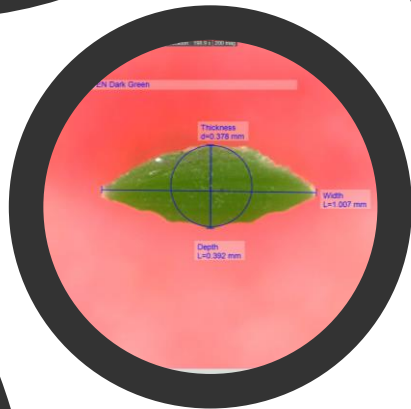
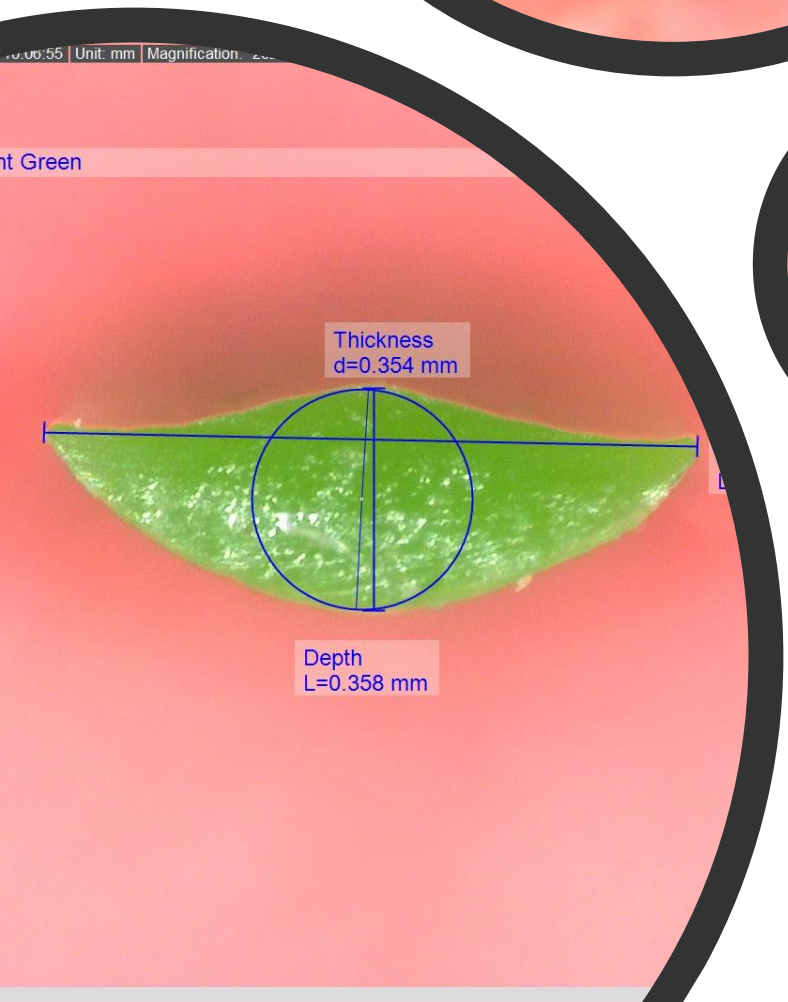
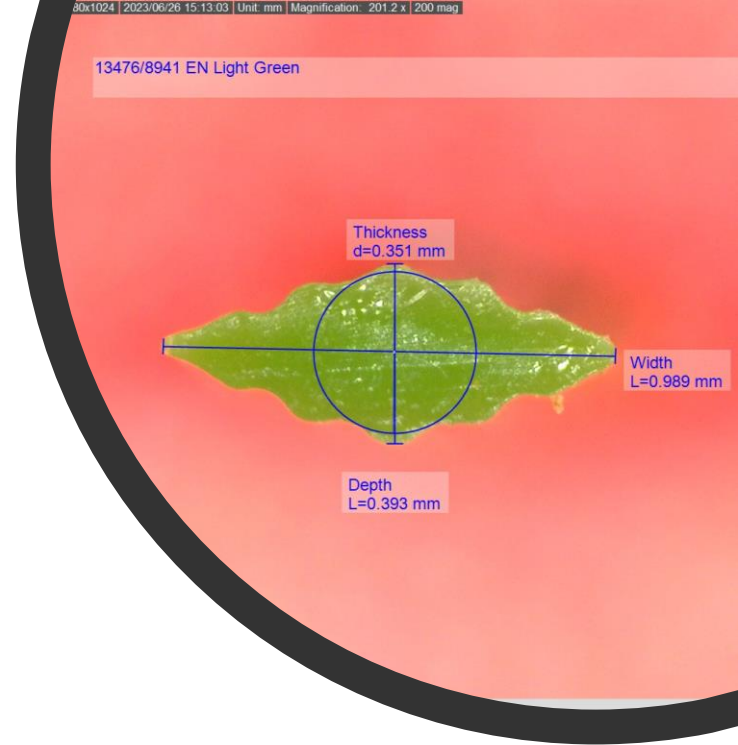
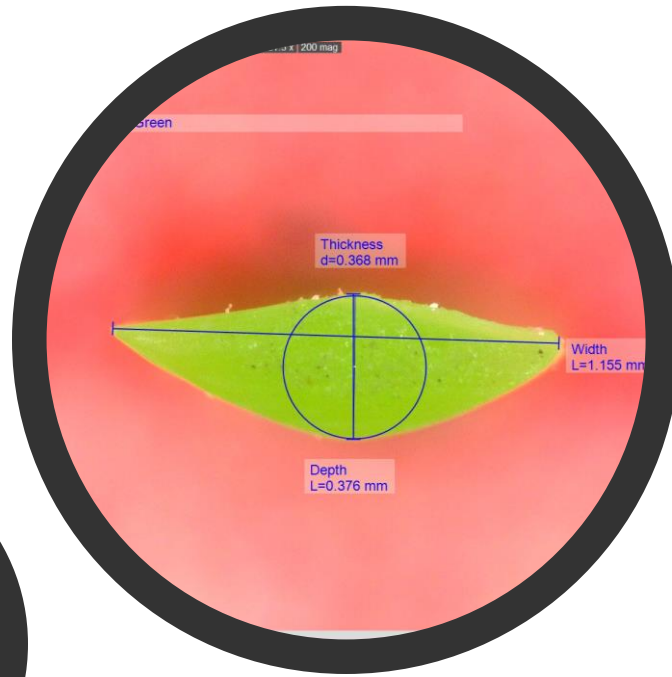
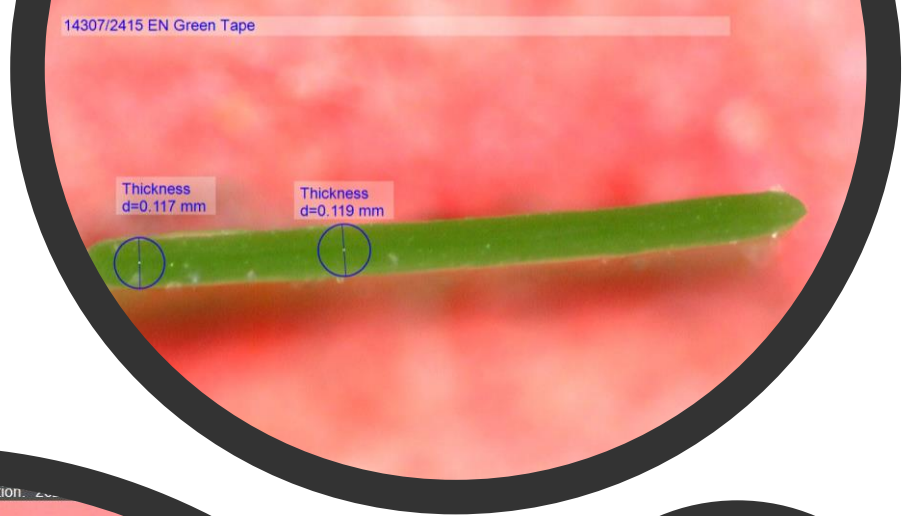


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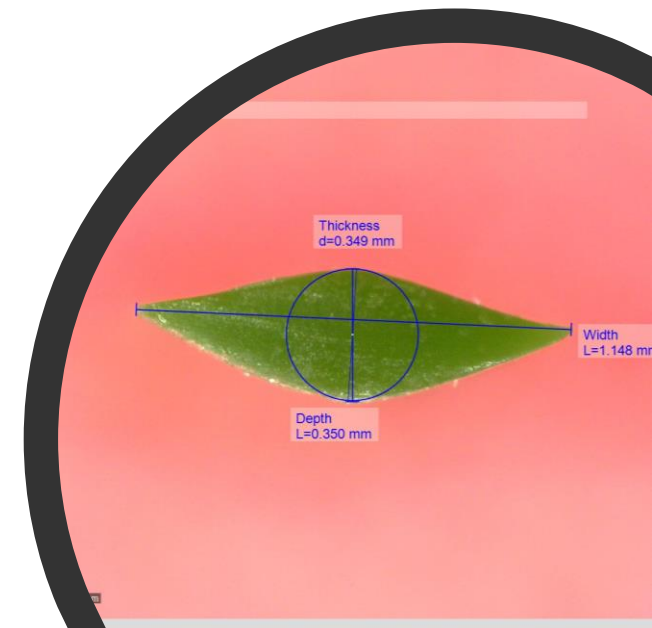
Keeping things in perspective

- Simplified shapes, thicker yarns
- More awareness and use of maintenance
- Better data about containment = better outcome
- Hockey surfaces may need more attention

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Likely outcome of studies

- The data will be carefully considered
- Indicative predicted low values from field study

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What will ECHA do about this?

- Whilst still on the radar it is a low priority at this time
- We strike first with data to be ahead of the curve
- We need to use the time we have effectively and be agile enough to redirect our focus if needed based on Turf moving up the list of priorities

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A few topics to be concerned about

- A large stock of aging pitches
- Identifying the pathways where microfibres actually end up? Potential research on this?
- Calibrating the effectiveness of maintenance equipment where clearly maintenance can be very effective in dealing with this issue
- Potentially further legislative manoeuvring from Europe

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Want further information?

[Sports turf final report](#)

[Landscape turf final report](#)

[Summary report](#)

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