The Play Performance of Six Water Based Field Hockey Pitches: Spatial and Temporal Changes

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Overview

- Study Overview
- Methodology
- Construction Specifications
- Temporal Variation
- Spatial Variation
- Conclusions
- Future Testing
Study Overview

- FIH performance requirements

- Certificate of compliance (2 year duration)

- Manufacturer’s products only tested at the beginning of a product’s life

- Uncertainty as to how a product will perform over time and whether the performance requirements will be sustained, and to what extent.
Study Overview

- Little research into the wear and ageing of synthetic turf pitches and the influence it has on the mechanical behaviour of a pitch.

- Initial work conducted by Young (2005) on six unfilled (water-based) synthetic turf field hockey pitches over a two year period.

- A longer-term study required.

- This study provides additional data relating to the same six pitches after a further period of two years.
Methodology

- Six water based synthetic turf pitches for field hockey were chosen.

- Pitch Criteria:
  - Pitch construction specifications
  - FIH accreditation
  - Pitch age
  - Maintenance regime
  - Usage level

- The mechanical behaviour including stiffness, traction and rebound resilience of each pitch was measured.
Methodology

- Test Methods:
  - Force reduction (FIH, 1999)
  - Rotational Traction (BS 7044)
  - Ball rebound resilience (FIH, 1999)
Methodology

○ Test locations
■ FIH test locations
There existed three ‘pairs’ of pitch with similar shockpad/carpet types.

- **Pitches D and E**: in-situ and integral shockpad with a thickness of 15 mm beneath a nylon Astroturf carpet.

- **Pitches B and C**: an integral shockpad of 6 mm and 8 mm respectively beneath a nylon Astroturf carpet.

- **Pitches A and F**: an in-situ shockpad with a thickness of 15 mm beneath a polypropylene carpet.
Temporal Variation: Mean Force Reduction

The graph shows the temporal variation of mean force reduction for different pitches labeled A to F, across years 2003, 2004, and 2006.
Temporal Variation:
Mean Ball Rebound Resilience

![Graph showing the temporal variation of mean ball rebound resilience across different pitches and years. The graph compares the rebound height in cm for each pitch (A, B, C, D, E, F) across 2003, 2004, and 2006.]
Temporal Variation: Mean Rotational Traction

![Graph showing temporal variation of mean rotational traction with pitch for years 2004 and 2006. The x-axis represents pitch, the y-axis represents rotational traction in Nm, and the bars indicate the mean values with error bars for each pitch and year.]
Spatial Variation

- The FIH stipulate individual test location measurements must not deviate from the pitch average by more than a stated amount. This should ensure that a pitch provides a consistent playing surface.

- **Ball Rebound Resilience** (+/- 20% from the average)
  - All pitches met the requirements

- **Force Reduction** (+/- 5% from the average)
  - From the 25 test locations, between 1 and 19 locations per pitch fell outside the requirement in 2004 and 2006.

- **Rotational Traction** (+/- 5% for the purposes of this study)
  - From the 25 test locations, between 2 and 14 locations per pitch fell outside the requirement in 2004 and 2006.
Spatial Variation:
Rotational Traction of Pitch E
Spatial Variation: Force Reduction of Pitch C
Spatial Variation: Patterns Emerging from Pitch C

![Bar chart showing force reduction (AAB) % for different pitch areas: A, B, C, D, E. The chart indicates a decrease in force reduction as the pitch area increases.]
Conclusions

- The mechanical properties of a pitch can and do change with age and usage.

- Spatial variation findings suggest that there are significant variations in mechanical behaviour across a pitch.

- The important role of the shockpad was clearly demonstrated from the measurements and comparisons between the different designs.

- The maintenance regime and its effects are lacking from this study.

- Gaps in regard to detailed assessment of the surface at the test locations restrict these conclusions to a cautionary preliminary assessment.
Future field testing at these six pitches will permit the database to be extended and the simple wear mechanisms to be better evaluated, dependent on a more objective assessment of the field conditions at the time of testing – with regard to carpet state and ‘wetness’ of the field.
Thank You

Any Questions?