

3G DEGRADATION & MAINTENANCE MODEL

Degradation Factors

Foreign Detritus

e.g. Litter, Leaves, Tree Sap, Soil, Airborne Pollutants

Mechanical Wear

e.g. Player/Boot Loading, Maintenance Plant, Social Events

Weathering

e.g. UV, Temperature, Water, Chemicals

Mechanisms of Degradation

Infill Compaction

System Contamination

Fibre and Infill Fracture / Abrasion and Losses

Fibre Splitting / Fibrillation

Fibre Bending and Flattening

Shockpad Fatigue

System Performance Affected	Pitch Maintenance Intervention - 3G Rubber Infilled Systems				
	Drag Brushing (Regular)	Powerbrush & Decompaction (Several Times / Year)	Deep Clean (Every 1-2 Years)	Infill Top-Up (Every 1-2 Years)	Deep Decompaction (Regular)
Drainage Rainfall Removal Surface Infiltration Rate	Removes large debris; such as leave, litter and loose fibres	Powerbrushing removes debris and fines (~5mm), while decompaction loosens infill to reduce density and improve drainage	Penetrates deeper into the surface (around 15mm) with similar effects to P&D	Decompaction before top up loosens the infill, reducing density and increasing void spaces and porosity	Loosens the infill, reducing density and increasing porosity. Penetrates deep into the infill (to within 5-10mm of the carpet backing)
Ball & User Friction Ball Roll Distance Traction Safety Rotational Resistance	Lifts carpet fibres to create more resistance to ball roll	Powerbrushing lifts fibres to increase ball resistance, while decompaction reduces infill density for easier stud movement	Lifts carpet pile to create more resistance to a ball roll	Higher infill supports fibres, increasing ball resistance; reduced density lowers resistance to stud penetration and movement	Loosens infill to reduce stud resistance; increases fibre support for greater ball resistance
Ball & User Hardness Vertical Ball Rebound (VBR) Hardness - Shock Absorbency & Vertical Deformation	Distributes infill more evenly across the surface; improving consistency of hardness	Powerbrushing evens infill for consistent hardness; decompaction loosens infill to reduce hardness and VBR	Redistributes infill evenly across the surface, reducing and improving consistency of hardness	Increases infill depth to reduce surface hardness, with greater effect on systems without a shockpad	Loosens the infill, reducing density of the surface
Synthetic Turf State Free Pile Height (fibres upright) Carpet Lifespan	Lifts carpet pile, helping to avoid fibre flattening	Lifts carpet pile, helping to avoid fibre flattening	Lifts carpet pile, helping to avoid fibre flattening.	Increases support to the fibres, helping avoid fibre flattening and protecting more carpet fibre against premature wear	Looser infill increases infill depth and support to the fibres, helping avoid fibre flattening

Note: This conceptual diagram is adapted from the fuller diagram in the paper, which also presents the evidence of the effectiveness of the maintenance interventions.