

Introducing hybrid and reinforced surfaces

The following document aims to give an overview of different surfaces types available in football today. As a general rule all the below are approved for use provided they meet the requirements set out in Law 1 of the Laws of the Game. The content of this document are non-binding and for guidance only.

Summary

In the surge for ever-better performing surfaces in times where stadiums are used multiple times a week and offer difficult conditions for the growing of natural grass, a number of innovations have entered the market. Besides traditional natural turf and the established third generation of artificial turf¹, a new generation of playing surfaces is growing in popularity: What is often simply being referred to as hybrid systems in fact encompasses various different combinations of materials and construction types. This document offers a generic overview of the various sport surface types used in football with some guidelines on technical aspects and performance.

Surface type classification

With many different terms being used to qualify surfaces as ‘hybrid’, ‘reinforced’, ‘mixed’, the following table aims to give a clearer overview of the different categories by including them on the natural – synthetic continuum. The table should be understood as a generalisation taking into account current products. As innovations and technologies change over time, the classifications may need to be updated.

Fully Natural	Synthetic material added to the natural turf	Natural turf grown in a synthetic turf product	Natural materials added to the synthetic turf	Fully synthetic
Traditional construction for natural turf using only natural material including sand	Synthetic elements added to the rootzone profile of the natural turf to provide reinforcement	Synthetic fibres encompassing both stitched and carpet-based systems combined with natural turf grown within the fibres	Primarily synthetic with natural component parts, typically infills. Much higher volume of synthetic fibres compared to natural hybrids	Traditional synthetic Football Turf construction. All elements are synthetic
Classification				
1	2	3	4	5
Natural	Reinforced	Hybrid natural*	Hybrid synthetic	Synthetic
Natural			Synthetic	

*can further be split between “in situ hybrid” and “carpet hybrid”

¹ See www.fifa.com/quality for details on the FIFA Quality Programme for Football Turf

The differentiation is done along the lines of the organic/inorganic nature of the materials use, the impact of the materials on the final product as well as the typical maintenance required for each category. Natural turf is a living organism that has the ability to grow and regenerate while synthetic turf does not.

The category “Natural turf” encompasses all grown or laid grass surfaces that include no further materials.

“Reinforced surfaces” include additional support in the construction for the root zone aiming at strengthening the hold of the grass. To a user, the surface does not look any different as it is de facto only natural grass.

“Hybrid natural surfaces” are the most commonly referred to when using the term “hybrid”. These surfaces are natural surfaces grown within a base of synthetic fibres. The synthetic fibres are visible but normally constitute below 5% of the total grass coverage which is why these surfaces are classified as “natural”.

“Hybrid synthetic surfaces” are based on an artificial turf carpet with sand but may use organic materials as the so-called performance infill (typically instead of rubber infill). This category is deemed a synthetic turf as it requires essentially the maintenance of an artificial turf field.

“Synthetic surfaces” consist of artificial (man-made or produced) materials, typically an artificial turf carpet, sand infill and rubber infill with a possible addition of an elastic shock pad.

Typical playing characteristics

Sports surfaces are complex structures comprising several layers of construction and many different materials, all of which contribute to their composite behaviour. Therefore, the mechanical response of the surface to interactions from players and balls are difficult to assess. These interactions simulate how players and balls would react to a specific surface which in turn may impact technique and tactics.

It has been postulated based on anecdotal evidence that reinforced and hybrid surfaces have different characteristics to natural and synthetic turf, particularly in relation to ‘hardness’. Simple agronomic tests have identified this trend but it has not been validated with equipment of methods with biomechanical accuracy. Using test methods from the FIFA Quality Programme for Football Turf, data was collected over several years on thousands of sports surfaces including natural, reinforced, hybrid and synthetic. The key aggregated findings are summarised below. Once again, these numbers should be understood as an indicator and may not be reflective of every system within a particular category. A large spread in the results, such as for natural turf, reflects the wide range of systems and combinations available meaning particular care should be paid to each individual context if judgement should be made. All figures below were collected using Labosport ScorePlay©.

Type of surface	Shock Absorbency									
	Very Soft		Soft		Medium		Hard		Very Hard	
Natural Turf										
Reinforced/Hybrid Turf										
Synthetic Turf										

Vertical Deformation										
Type of surface	Very Low		Low		Medium		High		Very High	
Natural Turf	Green	Green	Green	Green	Green	Green	Green	Green	White	White
Reinforced/Hybrid Turf	White	Yellow	Yellow	Yellow	Yellow	White	White	White	White	White
Synthetic Turf	White	White	White	White	White	Blue	Blue	Blue	Blue	Blue

Rotational Resistance										
Type of surface	Very Low		Low		Medium		High		Very High	
Natural Turf	White	Green	Green	Green	Green	Green	Green	Green	Green	White
Reinforced/Hybrid Turf	White	White	White	White	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Synthetic Turf	White	White	Blue	Blue	Blue	Blue	Blue	White	White	White

Vertical Ball Rebound										
Type of surface	Very Low		Low		Medium		High		Very High	
Natural Turf	White	Green	Green	Green	Green	Green	Green	Green	Green	White
Reinforced/Hybrid Turf	White	White	White	White	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Synthetic Turf	White	White	Blue	Blue	Blue	Blue	Blue	White	White	White

Ball Roll Distance										
Type of surface	Very Short		Short		Medium		Long		Very Long	
Natural Turf	Green	Green	Green	Green	Green	Green	Green	White	White	White
Reinforced/Hybrid Turf	White	White	White	White	Yellow	Yellow	Yellow	Yellow	White	White
Synthetic Turf	White	White	White	White	Blue	Blue	Blue	Blue	Blue	Blue

To avoid any oversimplified generalisations, no attempt at categorically associating a surface with a particular set of playing characteristics should be attempted as the inherent variability of natural materials and the difference in quality of synthetic products can mean a significant difference between two similar surfaces or even the same surface over time.

The main reasons for looking at various alternatives can be related to the performance as listed above, but may more realistically depend on requirements such as usage time, climatic conditions, natural light inside stadiums and the requirements by the tournament organiser.

The marketplace

At the time of writing, more than 15 known providers of reinforced or hybrid turf are operating on the market with reference installations included in the above numbers. Based on a market assessment carried out to establish the number of reinforced/hybrid pitches in stadiums worldwide, approximately 1150 surfaces were identified with the majority in Europe². It is estimated that an average of 100 new reinforced/hybrid pitches are being built per year with a conservative anticipation that this will grow to 130 by 2020.

The cost of a reinforced/hybrid system is complex to calculate and cannot simply be indicated with a single figure. In particular comparing with other options (natural or synthetic), the construction of a sub-surface design, the local environment, stadium layout and availability of materials will have a huge impact on the given cost of a particular project.

² Figures from a study carried out by Labosport/PSD in 2017.