The invention relates to an artificial turf system which includes a backing layer having in use a top side and a bottom side; a plurality of grass yarns tufted through the backing layer to extend at the top side of the backing layer; and a polymeric foam layer arranged on the top side of the backing layer. The plurality of grass yarns extend through the polymeric foam layer. The invention also relates to a method for manufacturing an artificial turf system.
ARTIFICIAL TURF SYSTEM

CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority to European Patent Application No. 14150647.7 filed Jan. 9, 2014, which is hereby incorporated in its entirety by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention
The invention relates to an artificial turf system comprising:

2. Description of Related Art
Such a commonly known artificial turf system is typically laid on a flat base to provide a sports ground or a lawn in landscaping applications. Then an infill material is applied over the artificial turf system. This infill material is typically a base layer of sand and a top layer of particles, such as rubber particles. The infill material is positioned between the grass yarns, wherein at least part of the grass yarns extends over the infill material.

3. Description of the Invention
The infill material improves some properties of the artificial turf system, such as the damping of the mat, the energy restitution as well as grip properties. These properties are relevant when the artificial turf system is used as a sports field. Furthermore, the infill material ensures that the grass yarns stay in a substantial upright position even when the turf system is walked or played.

4. Description of the Prior Art
The infill material has however some disadvantages. For example, because of the granular structure of the infill material, the infill material is easily moved over the field during a game and taken along outside of the field. As a result, such a known artificial turf system has to be regularly maintained to ensure that the infill material is evenly distributed and is kept at a minimal level.

5. Description of the Invention
Another disadvantage is that the typically used rubber particles cause an unpleasant odor when heated by the sun. Also chemicals can be leached out from the rubber particles when subjected to rain, which chemicals will pollute the ground underneath the artificial grass turf.

US 2008292819 describes an artificial grass system wherein between the grass tufts secondary tufts with damping properties are arranged. These secondary tufts are an alternative for the known granular infill material.

According to this prior art, it is possible to provide the secondary tufts as a system with a spatial structure, such that the grass yarn tufts extend through openings of the spatial structure of the mat.

This requires that tufting of the grass yarn tufts has to be aligned with the spatial structure of the mat. Furthermore, one has to adapt the spacing of the spatial structure of the mat to the desired spacing of the grass yarn tufts.

Furthermore, the base of the grass yarns of each tuft will be at a distance of the mat due to the spatial structure of the mat. So, the mat will not be in direct contact with the grass yarns, which is the case when a granular infill material is used.

It is an object of the invention to provide an artificial turf system in which at least some of the disadvantages of the prior art are reduced or even removed.

SUMMARY OF THE INVENTION

This object is achieved according to the invention with an artificial turf system, which is characterized by a polymeric foam layer arranged on the top side of the backing layer and wherein the plurality of grass yarns extend through the polymeric foam layer.

The polymeric foam layer replaces the infill material. As the foam layer is a continuous layer the artificial turf system will require less maintenance. This is because the polymeric foam layer will stay evenly distributed over the system and it is also not possible that parts, like with the prior art granular infill material, will be moved over the field simply by walking over the system or having a game on the artificial turf system.

As the grass yarns are tufted through both the backing layer as well as through the continuous polymeric foam layer, a direct contact between the foam layer and the base of the grass yarn will exist, which resembles the granular infill material of the prior art.

A person skilled in the art will be able to set the properties of the polymeric foam layer, such that the artificial turf system will obtain the required properties for the specific application. For example, the foam layer can provide a required damping, by ensuring that the foam layer is sufficiently compressible.

In a preferred embodiment of the artificial turf system according to the invention the polymeric foam layer comprises a gel foam. Gel foams are produced by adding a gel forming agent during the polymerization process. This result in a foam, which after compression slowly returns to its original shape. The advantage of a gel foam in an artificial turf system is that the energy restitution properties can be easily set.

For example for a soccer field it is required that when a player hits the ground with his leg, not all impact energy is directly returned to the player, as this would cause a severe load on the joints. A gel foam layer arranged on top of the backing layer will delay the return of the impact energy, because the foam will slowly try to return to its original shape.

Preferred gel foams are for example ammonium acetate gel foams or sodium silicofluoride gel foams.

Ammonium acetate gel foams are typically based on a blend of natural latex and styrene-butyadiene latex, or based solely on styrene-butadiene latex filled with calcium carbonate. A gelling agent of an ammoniumacetate solution is used during polymerization of this type of foam.

Sodium silicofluoride gel foams are typically based on a blend of natural latex and styrene-butadiene latex, filled with an inert filler system. A gelling agent of an sodium fluorosilicate dispersion is used during polymerization of this type of foam.

For all gel foams a vulcanization agent is required.

In a further embodiment of the artificial turf system according to the invention the polymeric foam layer comprises embedded filler particles, such as rubber particles, fibers or plastic particles.

With filler particles it is possible to further set the properties of the polymeric foam. Especially, by adding rubber particles it is possible to provide the foam with a higher stiffness than would be possible to achieve with the foam without the particles.

By adding fibers to the foam, it is for example possible to provide a better wear resistance to the foam.
In yet another embodiment of the artificial turf system according to the invention the thickness of the polymeric foam layer is between 1 mm and 40 mm.

A further preferred embodiment of the artificial turf system according to the invention further comprising a plurality of secondary texturized or thatch fibers arranged on the top side of the backing layer.

The texturized fibers are arranged between the grass yarns and fill the spaces between the grass yarns, such that the polymeric foam layer will get less in to contact with sunlight, such that the aging process of the foam layer is slowed down and the artificial turf system will have a better durability, as well as better grip properties.

The texturized fibers have the additional advantage, that the appearance of the artificial turf system will be more natural.

Yet another embodiment of the artificial turf system according to the invention further comprising a coating layer arranged on the bottom side of the backing layer for fixing the grass yarns. This coating layer could comprise polyurethane, latex, hot melt and other adhesive like materials.

Still a further embodiment of the artificial turf system according to the invention further comprising a padding layer, such as a foam layer, arranged on the bottom side of the backing layer.

The padding layer can further contribute to the properties of the turf system, like the damping of the mat, the energy restitution.

The invention also relates to a method for manufacturing an artificial turf system according to any of the preceding claims wherein the method comprises the steps:

providing a backing layer, for example a fabric web;

providing a continuous polymeric foam layer on one side of the backing layer;

tufting grass yarns from the other side of the backing layer through the backing layer and through the continuous polymeric foam layer.

So, with the method according to the invention, both the backing layer as well as the continuous polymeric foam layer are pierced by the tufting device to push the grass yarns through the backing layer and the continuous polymeric foam layer.

In a preferred embodiment of the method according to the invention the continuous polymeric foam layer is applied in liquid state to the backing layer and subsequently polymerized.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features of the invention will be elucidated in conjunction with the accompanying drawings.

FIG. 1 shows a cross sectional view of a first embodiment of an artificial turf system according to the invention.

FIG. 2 shows a cross sectional view of a second embodiment of an artificial turf system according to the invention.

FIG. 3 shows a cross sectional view of a third embodiment of an artificial turf system according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 shows a first embodiment of an artificial grass system. This grass system has a backing layer which is typically a fabric. On the top side of the backing layer, a polymeric foam layer is arranged.

The combination of backing layer and polymeric foam layer is provided with tufts. The tufts are shown with only three grass yarns, but in typical applications a tuft comprises between 1-12 grass yarns.

The grass yarns of each tuft are wrapped around a thread, for example of the fabric of the backing layer and extend through the backing layer and the polymeric foam layer. As will be clear, the polymeric foam layer is positioned at the same location, at which infill material would be positioned in prior art grass mats. As a result, the polymeric foam layer provides the functions such as damping, energy restitution and grip enhancement, which would in the prior art be provided by the granular infill material.

FIG. 2 shows a second embodiment of an artificial grass system having a backing layer. A polymeric foam layer is arranged on the top side of the backing layer. In this embodiment, the polymeric foam layer has embedded filler particles, for example rubber particles. These filler particles contribute to the desired properties of the polymeric foam layer.

Tufts of grass yarns extend through the backing layer and polymeric foam layer and at the top side of the backing layer.

A coating layer is furthermore arranged on the bottom side of the backing layer to fix the tufts of grass yarns. In addition a padding layer is arranged on the bottom side of the backing layer over the coating layer. This padding layer could for example provide added shock absorption, further resilience to the artificial grass system and provide anti-slip properties of the artificial grass system in relation to the base on which the system is laid.

FIG. 3 shows a cross sectional view of a third embodiment of an artificial turf system according to the invention, which corresponds largely with the embodiment of FIG. 2. The same features are provided with the same reference signs.

Next to the tufts of grass yarns, a plurality of secondary texturized fibers are arranged on the top side of the backing layer and foam layer. These secondary texturized fibers fill the gaps between the separate tufts of grass yarns. This provides a more natural look of the artificial turf system, but also shields the polymeric foam layer from sunlight, such that the durability is increased.

An artificial turf system comprising:

1. A backing layer having in a top side and a bottom side; a plurality of grass yarns tufted through the backing layer and extend at the top side of the backing layer, and a polymeric foam layer arranged on the top side of the backing layer, wherein the plurality of grass yarns extend through the polymeric foam layer.

2. The artificial turf system according to claim 1, wherein the polymeric foam layer comprises a gel foam.

3. The artificial turf system according to claim 1, wherein the polymeric foam layer comprises embedded filler particles, such as rubber particles, fibers or plastic particles.

4. The artificial turf system according to claim 1, wherein the thickness of the polymeric foam layer is between 1 mm and 40 mm.

5. The artificial turf system according to claim 1, further comprising a plurality of secondary texturized fibers arranged on the top side of the backing layer.
6. The artificial turf system according to claim 1, further comprising a coating layer arranged on the bottom side of the backing layer for fixating the grass yarns.

7. The artificial turf system according to claim 1, further comprising a padding layer, such as a foam layer, arranged on the bottom side of the backing layer.

8. A method for manufacturing an artificial turf system according to claim 1, wherein the method comprises the steps:
   - providing a backing layer, for example a fabric web;
   - providing a continuous polymeric foam layer on one side of the backing layer, and
   - tufting grass yarns from the other side of the backing layer through the backing layer and through the continuous polymeric foam layer.

9. The method according to claim 8, wherein the continuous polymeric foam layer is applied in a liquid state to the backing layer and subsequently polymerized.

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