

# Pitch, tune and harmonise

## Artificial surfaces for professional football

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**Amsterdam Arena's fan-friendly design, coupled with intensive use of the pitch, is not so kind to natural turf. That is why the Arena and AFC Ajax are fine-tuning the development of artificial pitches**

**O**ver a period of years, Amsterdam Arena and AFC Ajax have been following closely the developments in the artificial turf technology field. On the one hand, they are striving for continuous innovation and improvement of the stadium's state-of-the-art image and multifunctional concept, and, on the other hand, such turf is a possible solution to the stadium's limitations with regard to growing a healthy natural turf. As a result of the "closed" and public-friendly design of the stadium and the intensive use of the pitch, the recovery capacity is limited and the pitch needs to be replaced a number of times each year using a re-turfing technique developed in-house.

With the arrival of the third-generation rubber-infill artificial turf pitches, a technological breakthrough has come about with regard to the use of artificial turf for football purposes. These pitches combine sport-technical characteristics that come very close to those of natural turf, with a consistent quality throughout the entire season and a practically unlimited number of annual playing hours. Reason enough for many leading European professional teams to already have installed these artificial turf pitches at their training complexes.

In addition, these developments have led to the *Quality Concept for Artificial Turf* from FIFA, the international football association, published at the beginning of 2001. Providing the pitch complies with a number of (sport-technical) characteristics, matches can be played on it up to World Cup qualification level. The Union of European Football Associations (UEFA) has just presented its quality concept and has already expressed its intention to open all European competitions, including the Champions League, to artificial turf playing surfaces from the beginning of the 2004-05 season.

### Leading the way

Although developments in artificial turf have accelerated tremendously in the past few months, there is still hardly any experience of playing matches on artificial turf at the highest level. This is why Amsterdam Arena and AFC Ajax have decided to take the lead and have defined a project to optimise the sport-technical and utilisation characteristics of rubber-infill pitches to pave the way for their application and acceptance at the highest professional level.

The aim of the project is the development of a state-of-the-art artificial turf football pitch, specifically tuned to the wishes and requirements of AFC Ajax and within the limitations of the conditions set by UEFA, FIFA and De Koninklijke Nederlandse Voetbalbond (KNVB), the Dutch football association. The end result should be an artificial turf construction for football that performs better than the best natural turf pitch over a 12-month period. In addition, the project also strives for greater acceptance of artificial turf at the top level. Current systems already approach this level, but appear to be unsuitable for application at European competition level.

### User groups

To improve current artificial turf pitches and tune them to the specific requirements that Ajax (or any other top European team) demands from an artificial turf pitch (or playing surface in general), the players, technical and medical staff need to play a central role. In other words, the users' expertise, requirements and wishes must serve as the basis for further developments.

This is why a gradual and phased introduction of artificial turf within AFC Ajax has selected so as to be able to meet the increasingly high requirements, to allow everyone in the club to familiarise themselves with the new generation of artificial turf and, in this way, create a basis for acceptance within the entire club. Users at every level will be able to input requirements and wishes to continually improve the concept, with the development of a pitch that is suitable for use in competitions at the highest professional level being the ultimate goal.

This has already been initiated within the youth and amateur section of the club. Once this section has gained sufficient experience and the artificial turf concept has been adjusted and improved on the basis of this experience, the step to the professional section will be taken.

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### Selection of partners

Specialist companies were chosen who were prepared to function as partners by combining efforts and – on the basis of the expertise and experience of users – to test, develop and improve their products and/or components.

The sub-areas that were designated here are:

- Manufacture and installation technology;
- Artificial turf fibre and backing;
- Rubber-infill material;
- Substructure and supporting systems, such as irrigation and under-pitch heating.



**[Top]** The entrance of the Ajax youth training complex near the ArenA

**[Above]** The artificial turf pitch with the Ajax building and Amsterdam ArenA in the background

**[Left]** Artificial turf installed at the indoor facility

A “restricted tender” tendering procedure was employed, in which a pre-selection was made of possible partners based on their reputation and financial standing. Five potential main contractors were invited to draw up and submit a technical and financial proposal, in which the most important selection criteria were:

- Fibre based on LSR® technology, with the possibility of offering an alternative product;
- Proposed total concept, including support systems for irrigation, drainage and so on;
- Proposed approach for supporting users and use of their input for improving the concept during the various phases of the project;
- Proposed approach for the maintenance and service of the pitches;
- Total price for the delivery of the project.

After thorough evaluation of the proposals submitted, the main contractor with the best price-quality performance was opted for: Edell Grass. The project team was further completed with the following partners for the specific sub areas: Ten Cate Thiolon (fibre and backing, as well as co-ordination of all the R&D activities), Rubber Resources (rubber infill) and Arcadis (substructures and supporting systems).

## Project implementation

This three-year project commenced at the end of 2001 with the objective of developing a state-of-the-art artificial turf system that outperforms natural grass 12 months a year.

During the three years, the current rubber-infill system based on LSR® artificial turf fibre technology will be improved further with user input. In addition, the intended approach aims to conquer the emotional barrier synonymous with artificial turf. The ultimate goal is to develop an artificial turf football system that performs better than an optimum natural grass pitch. The name of the artificial turf system under development is ArenA Grass System®.

The project is in the following phases:

- Phase 1: December 2001. Laying two indoor pitches the size of a volleyball pitch. This phase has already been completed;
- Phase 2: May 2002. Laying a rubber-infill artificial turf training pitch at Sport Park De Toekomst for the Ajax Youth and Amateur section. This has recently been completed;
- Phase 3: spring 2003. Laying a rubber-infill artificial turf training pitch for the first and second teams at the training pitches next to the Amsterdam ArenA;
- Phase 4: summer 2004. Laying a rubber-infill artificial turf main pitch (ArenA Grass System®) in the Amsterdam ArenA.

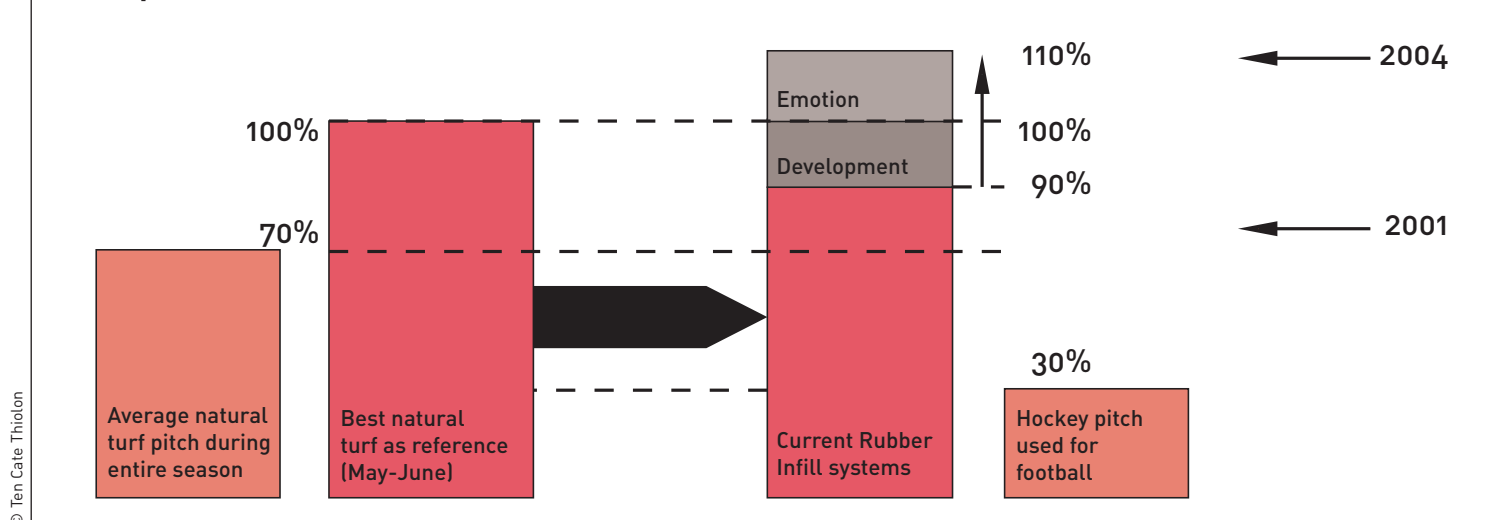
The realisation and introduction of each phase will be supervised by the project partners. A preliminary design for each phase, including the underlying principles and plan of approach, is drawn up and submitted to the Amsterdam ArenA, who will review this partly for Ajax.

This design is initially based on:

- UEFA quality concept;
- FIFA quality concept;
- KNVB guidelines (NOC\*NSF);
- Dutch national standards (environment, health & safety).

In addition, results from studies and tests from each phase are incorporated in the design:

## Development of artificial turf over time



- Experience from players, technical and medical staff. Using test circuits with the players under medical supervision, the sport-related characteristics of the pitch are judged and evaluated. From a sport-related angle, the pitch is tested for grip, sliding friendliness, stability, shock absorption and ball behaviour. The tests will be carried out under various weather conditions on artificial turf and natural turf to gain an insight into the influences and differences;
- Results from the mechanical tests into the sport-related characteristics of the pitch. Users' experiences are validated through objective measurement of the sport-related characteristics (for example, hardness, ball bounce). In addition, results are compared with a database from natural turf pitches throughout Europe during the season;
- Results from laboratory studies into specific characteristics of the system and the individual parts, for example, the hardness of the rubber used, resilience of the fibre;
- Investigation into improvement of utilisation characteristics of the pitch. The possibilities are investigated and instructions drawn up for use and management, such as pitch lines, covering and under-pitch heating.

After evaluation of the preliminary design, a definitive design is drawn up by the partners that will serve as a basis for laying a pitch in that particular phase. After completion of the first three phases, it is expected that sufficient expertise and experience will have been gained to arrive at a suitable design for the final phase.

### Preliminary results

The completion of the first two project phases has resulted in a system that is tuned specifically to the AFC Ajax sport-related requirements, based on what is currently technically possible. The following results in the various sub areas have been achieved as a result of this collaboration.

**Manufacture and installation technique** – Together with users, Ten Cate Thiolon and Edel Grass have tested turf density (number of stitches per m<sup>2</sup>) and fibre length in order to optimise shooting behaviour. This has resulted in the use of a slightly longer fibre and an

altered stitch density. In addition, a S&S zone (support & stability) is installed under the artificial pitch, which, together with a backing developed by Ten Cate Thiolon, ensures that the artificial turf lies stable and remains so, while also providing extra support to the fibre.

**Fibre and backing** – Ten Cate Thiolon has developed and manufactured a new type of artificial turf fibre for this project based on LSR®-fibre technology, namely Thiolon Arena Grass®. This very sliding-friendly artificial turf fibre comprises three different fibres, each in a different colour of green. This improves the

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"natural" look of the artificial turf. The fibre also has a new fibrillation pattern that does away with the need for the turf fibre to be brushed after installation and means an optimum playing surface can be achieved within eight weeks.

**Rubber infill** – An important part of these third-generation artificial turf pitches is the rubber-infill system. Until now, granulated car tyres were often employed as infill material. For this project, a special rubber compound has been developed based on playing experience that has been translated into rubber characteristics such as hardness, shock absorption, elasticity and weight. The rubber infill complies with the strictest standards for ageing, fire retardation and the environment. It is also important that the characteristics remain constant over a wide temperature range.

**Substructure and supporting systems** – From

measurements gained from tests with players, as well as mechanical tests, the ratio of sand to rubber in the top layer can be adjusted so that, irrespective of the substructure construction, the same sport-related characteristics can be achieved. The substructure design focuses on water permeability, flatness and load-bearing capacity. Sand/Steagran has been chosen, because these components are not frost sensitive, do not break or pulverise and so will not compact further after laying. In addition, a mobile sprinkling system has been developed that can dampen the pitch quickly and with a minimum of water to simulate dew on the pitch. The system can also be used for spraying the pitch with fungicide and herbicide.

Ten Cate and Arcadis are also involved in working out the details of a pitch-covering system (for extremely poor weather conditions) based on the covering system that is employed in the Ullevi Stadium in Sweden.

### Project continuation

In the coming months, the pitch installed at De Toekomst will be evaluated further, together with its users. The differences between the sport-related characteristics of the artificial turf pitch and the surrounding natural turf pitches, under various weather conditions, will be points for attention. In collaboration with the Ajax medical staff, an injury registration system has been set up and a number of specific condition and physiological tests will be conducted.

In addition, Ajax professional players will carry out training sessions to provide their own input into the design of their training pitch. Parallel to this, the partners will strive for further technological improvements of components. ■

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Amsterdam Arena, 6-7 March 2003  
• See pages 16-17 for full details •

# *Synthetic Grass in the Amsterdam Arena*

*Starting with the training pitches.*



Top Dutch football club Ajax intends to start playing its matches on synthetic grass.

The club already trains on synthetic grass, both indoors and outside. Synthetic grass developed and manufactured by the partners below, who can of course hardly wait to be sent on to the famous ArenA as well.

For more information about the partners:



[www.rubber-resources.com](http://www.rubber-resources.com)



[www.edelgrass.nl](http://www.edelgrass.nl)



[www.thiolon-grass.com](http://www.thiolon-grass.com)



[www.arcadis.nl](http://www.arcadis.nl)



[www.amsterdamarena.nl](http://www.amsterdamarena.nl)