

Artificial Turf or Synthetic Grass on Play Grounds -A Challenge

Prof (Dr) Nemailal Tarafder

Ex-Emeritus Professor

Corresponding author's email id: tarafdern.14@gmail.com

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Abstract

Artificial turf gained a substantial attention about 54 years back in 1966, when it was installed first in that year in old Astrodome. Astro turf or artificial turf is a surface made of synthetic fibres, which looks similar to a natural grass like surface. These are mostly used in the sports fields but nowadays these are also applied in private lawns. The maintenance of artificial turf grounds are easier because of heavy use on them, they require no irrigation and trimming. It was developed by Monsanto and rebranded as Astro Turf. It is a generic term in the games and sports fields. It has become a registered trade mark but it is no longer own by Monsanto. The short-pile fibres without infill were the originality of first generation turf materials and it has been replaced by the second generation and third generation turf systems. Artificial ground cleats are the cleats those are made primarily for use on man-made surfaces such as artificial turf or running tracks. Originally it was limited to large sports clubs but common people use these in their lawn or grounds also.

Keywords: *Artificial turf, Sports Surfaces, Modern turf, Synthetic Grass*

INTRODUCTION

Background of Astro turf:

Astro turf first came into the limelight in the year 1966, when it was installed in the year in old Astrodome. It was basically a product of Chem Grass, which was developed by Monsanto and rebranded as

Astro turf. Since then it became a trade name as artificial turf throughout the 20th century. It is no longer remains under the ownership of Monsanto, although it is still a trade name as Astro Turf. Artificial Turf was first installed in 1964 for a recreation at the Moses Brown School in Providence,

Rhode Island [01]. The public came to know about the Astro Turf when it was first installed in 1964 in the Astrodome in Houston, Texas. The so called modern indoor stadium was covered with artificial grass only in the infield in April in 1966. It became known to all that the use of Astro Turf and similar surfaces had widespread applications in the US and Canada in the early 1970s. It was installed both in the outdoor and indoor stadiums for use in football and baseball playing. It has been reported that more than 11,000 artificial turf playing grounds are there throughout the US and other nations. More than 1200 were installed in the U.S in 2013 according to the report of the group the Synthetic Turf Council.

Sports Surfaces

According to Artificial Turf Melbourne, for many years, customers have relied on Tuff Turf to provide best quality artificial grass in Australia. If someone is looking for the highest quality artificial turf in Australia with outstanding customer services, it is claimed that the right choice is the Synthetic Grass. Synthetic grass is the ideal long lasting solution for the turf in residential yards, businesses, schools, sports grounds and play grounds. Tuff Turf has the impeccable reputation for providing long lasting high quality

synthetic turf to homes across Australia [02]. Synthetic grass looks great all over the year, regardless of the of the weather or water conditions. It is soft and comfortable to touch, even when people walk around barefoot. Experience of the wonder artificial turf today is by calling out friendly team for expert advice on all the top notch products of the said company Tuff Turf. Artificial turf of the Custom Golf Greer [03] is found in many places including backyard putting greens, practice golf greens, on play grounds and also in use as pet turf, sports turf and field turf. SYN Lawn grass Synthetics are the most durable in the industry as well as it can be customized to synthetic grass installation as per the exact specification. SYN Lawn of Central Coast is the most durable and realistic artificial grass in the industry and their products are precise, clean and unmatched in the industry. SYN Lawn of Bakersfield artificial grass gives the freedom to enjoy a stunning green lawn without the maintenance and high irrigation costs of a sod yard.

Artificial Modern Turfs

The market for the artificial grass is growing quickly because it is driven by a combination of better manufacturing techniques combined with an increasing awareness of the longer term

environmental and economic benefits. Originally it was limited to larger sports clubs but now it is seen on many of the private lawns/gardens. There is no doubt at all that in the busy schedule lives, time becomes more precious as people seek to juggle all our responsibilities. Artificial grass needs very little maintenance and can free up a lot of time. Again, as the weather grows warmer there will be no more pressure on restricting water usage. Hose pipe restrictions can really destroy a natural lawn, but artificial grass will not be affected. Another important benefit is that artificial grass is of such a material which actively helps the environment. As well as substantially reducing water usage and pollution from water run-off carrying chemicals into the drains is minimized [05].

It always surprises people to know the varied circumstances when artificial grass can be beneficial. The areas are like dog runs, swimming pools, roof gardens, and high wear and tear areas and event management. There are certain disadvantages also in artificial grass, especially related to infilling materials like shredded car tyres. The other disadvantage is that the urban flooding. This is reported by App-AD & Policy Optimization in the HINT AND THINGS.

According to the UK's premier artificial grass manufacturer Tiger Turf [06], they manufacture, install and maintain by their top sports surface contractors and local landscapers. They manufacture from their designed high performance artificial grass sports, featuring technical innovation arising from last 30 years of dedicated R & D department. They work with specialist sports surface contractors and landscapers who install and maintain Tiger Turf across the UK and EMEA. Their product meets the demands of FIFA, World Rugby, ITF, FIH, GAA, and RFL. The quality performance, safety attributes and realistic appearance of their artificial grass surfaces are independently tested for certification by sports governing bodies. It ensures that their artificial grass surfaces can fulfil the expectations for many years. They have vigilant quality control throughout the manufacturing point to delivery of sports surfaces to satisfy the users. They are the international suppliers and distributors. They have their operations in UK, New Zealand, U.S, Australia and India also.

When searching for synthetic grass through literature review, it becomes extremely difficult to understand the terminology. Not everyone is a chemistry wiz and knows what polypropylene or polyethylene is. It is also to be known why

some other companies use nylon, the same material as women's stocking? What exactly are rubber granules and why does it have to go in the infill?. Nylon is a thermoplastic silky material, used first in a bristle tooth brush. Nylon can be good for tooth brushes, stockings or carpet but not for synthetic grass. Companies that use nylon in their turf use it to keep their blades standing upright. Although these can quickly wear down, flatten and later become hard. Because nylon becomes hygroscopic, it can absorb liquid more easily.

Polyethylene is what we see in the grocery bags, shampoo bottles and children's toys. The uniqueness that comes from the polyethylene is its sift texture which prevents rug burns and abrasions that are common with nylon turfs. It is best to choose a synthetic grass with polyethylene rather than nylon because for the blades offer twice the resistance to ultraviolet light degradation and are also seen as better for the environment. It is seen as strong and durable which handle to damage pets and pests. Granular materials like sand or rubber pallets that are about the size of sand grains are most commonly used. The rubber infill allows the blades of the synthetic grass to stand upright giving the grass a natural appearance. It also

provides a cushioned surface to play on similar to that of natural grass and is capable of withstanding higher than the normal stress [07].

It is claimed that SYN Lawn artificial grass is more capable of withstanding stress than just synthetic turfs and there is much more to it than that. As per their report, it is instead of fusing around mowing the lawn on a week end, their artificial landscape turf remains virtually maintenance free. It requires no more watering and no more mowing. It is easy to understand why SYN Lawn artificial grass is the perfect choice for landscaping solution. They are the manufacturer of synthetic landscape grass, pet turf, play ground grass, synthetic putting surfaces and many more and installer also. It saves over 50% reduction in residential water use average. Massive time savings allowing people more time to enjoy their yards instead of working maintain it. It helps to reduce carbon emission and no need for lawn maintenance equipment. It utilizes renewable resources with over 70% of the petroleum based Polyol of competitors' turfs varieties replaced a plant based Polyol [08].

Reuse of post manufacturing waste including coal ash added to extra strength

and dimensional stability. It is 100% recyclable with cleanest and safest environment for pet with the introduction of pet deodorizing system have pet system components. They have research and development laboratories for product innovation unmatched in the industry and it is claimed that it is only one of its kind. The SKY Lawn products are approximately 20% cooler than competitors' products.

Gluing Artificial Grass from W. I. Polymers Ltd speaks about how an all weather pitch works. It is the experience enjoyed by the Ireland and how it would ensure play during all seasons. It is becoming day by day more popular in Ireland to help give a beautiful synthetic lawn. Their main object is to stock a range of glues most suitable for gluing synthetic grass. They have offered a few tips for the best work firstly the turf has to be rolled on specified area, always making sure that the fibres run in the same direction. Then the next roll has to be laid beside the first overlapping the edges by about 300 mm. Then a chalk mark to be given of the centre of the seam line on the base. Then a sharp knife trimming is to be done on the overlap to match the trimmed edge of the first roll and a load has to be applied to prevent the grass from moving. The

exact/proper glue has to be selected. The glue has to be applied on both sides of the full overlap area and glue to be allowed to take-off, which can be best applied by a stiff brush. Then glue covered area of the each strip has to be directly laid on to glue covered area of the base and adjacent roll, keeping the weights on the seam for approximately 24 and thus the job is completed [09].

APPLICATION OF ASTROTURF ON VARIOUS SPORTS GROUNDS

American and Canadian Football-Houston Oilers was the first professional as American Football team to play on the artificial turf and thereafter part of the American football league who moved into the Astrodome in 1968, which had installed the Astroturf two years ago. In 1969 the University of Pennsylvania's Franklin Field in Philadelphia, at the time also home field of the Philadelphia Eagles switched from grass to Astroturf, making it the first National Football League Stadium to use the Artificial Turf. In the year 2002, Century Link Field, who had a natural grass field, was instead surfaced with field Turf upon positive reaction from Seattle Seahawks when they played on the surface at their temporary home ground Husley Stadium during 2000 and 2001 season. More examples of Astroturf grounds are

like Paul Brown Stadium which went from grass to turf in 2004, Gillette stadium which made the switch in 2006 and NRG Stadium which did so in 2015 and today 12 NFL fields are Astroturf covered out of 31 fields [10].

The first professional Canadian Football Stadium to use artificial turf was Empire Stadium in Vancouver, British Colombia the home of CFL's BC Lions, which instead 3M Tartan Turf in 1970. Presently of the nine stadiums in the Canadian Football League currently use artificial turf. The first stadium to use the next generation artificial turf was Ohawa's Frank Clair Stadium, which the Ottawa Reigarle used when they began play Rrough Riders' Taylor field, which replaced in 2007.

Association of football club-Some association football clubs in Europe installed synthetic surfaces in 1980s, which were called plastic pitches in the countries such as England. There were several professional club venues who had adopted them; QPR SLOffs Road, Luton Town's, Keinl Worth Road, Olaham Athletic Boundary Pat and Preston Deep Date. QPR had been the first team to install an artificial pitch at their stadium in 1981, but were the first to remove it when

they did so 1988. The last Football League team to have an artificial pitch in England was Preston North End, who removed their pitch in 1994 after eight years of use [11]. In 1981, London football Club Queens Perk Range dug up its grass and installed an artificial one. By the mid 1980s, there were four artificial surfaces in operation in the English league. Gradually clubs returned to natural grass and in 1990, many North American soccer clubs also removed their artificial turf and reinstalled grass pitch.

The use of artificial turf was banned by FIFA, UEFA and many domestic football associations yet in the recent past governing bodies have expressed resurrected interest in the use of artificial turf in competitions provided they are FIFA recommended. A team of UEFA, FIFA and German Company Polytar conducted tests in the Stadium Slazburg Wals-Siezenneine in the Stag Burg, Australia which had matches played on it in UEFA Euro 2008. It is the 2nd Star approved artificial turf in European domestic top flight after Dutch Club Heracles Almelo received the FIFA certificate in August 2005 and the tests were approved. FIFA originally launched its FIFA quality concept in February 2001. UEFA announced that starting from 2005-

2006 season, approved artificial surfaces were to be permitted in their competitions [12].

A full international fixture for 2008 European Championships was played on 17th October 2007 between England and Russia on an artificial surface, which was installed to counteract adverse effects, at the Luzniki Stadium in Moscow. It was one of the first full international games to be played on such a surface approved by both FIFA and UEFA [13]. UEFA stressed that artificial turf should only be considered an option where climatic conditions necessitated. One Desso Hybrid Grass product incorporated both natural and artificial elements. FIFA designated a Star System for artificial turf fields that have undergone a series of tests that examined quality and performance based to Star System. In 2009, FIFA introduced the Preferred Producer Initiative to improve the quality of artificial football turf at each stage of the life cycle. The two most prominent English Football Clubs to currently use third generation artificial pitches are Sutton United, whose FIIFA 2-star quality pitch was installed at Gander Green Lane in august 2015 [14].

Field hockey-In the games of hockey, the introduction of synthetic grass/surface in

the fields has significantly changed the character of the game. It was introduced in the year 1970 and in the western countries most of the competitions are now being played on the artificial surfaces. Much improvement in the speed of the game has taken place by the introduction of artificial grass. There is a big difference between the artificial turf in hockey fields and other games. The shorter fibre structures allow the improvement in the speed brought by earlier artificial turf to be retained. The International Hockey Federation (IHF) and manufacturers are driving research in order to produce new fields that will be suitable for a variety of games and sports. It is observed that the changes in the type of artificial grass has brought a huge change in the techniques of many games and ultimately enjoyed by the players as well as the spectators [15].

Baseball-In the year 1966, in the Houston Astrodome, artificial turf was first introduced in major League Baseball, replacing the grass field used when the stadium opened one year earlier. For the greater part of the 1965 season, the Astros played on green-painted dirt and dead grass. The solution was to install a new type of artificial grass on the field, Chem Grass, which ultimately became the Astroturf. As the supply of Astroturf was

very low, only a limited amount of material was available for the first home game. On July 1966, the installation was completed covering the total outfield portion. The Chicago White Sox became the first team to install artificial turf in an outdoor stadium as they used it in the infield and adjacent foul territory at the Comiskey Park from 1969 through 1975. Artificial turf was subsequently installed in other new multi-purpose stadiums. The biggest difficulty in playing on artificial turf was that the ball bounced higher than on real grass and also travelled faster, causing infielders to play further back than they would normally and as a result they would have sufficient time to react. However, the biggest impact on the game of turf, as it came to be called, was on the body of the players. Players also complained that the turf was much hotter than grass, sometimes causing the metal cleats to burn their feet or plastic one to melt. Ultimately, these factors provoked a number of stadiums to switch from artificial turf back to normal grass. In 2000, Tropicana Field became first MLB field to use a third generation artificial surface, FieldTurf with the replacement of Minneapolis's Hubert H. Humphrey Metennis. Courts such as Wimbledon

are considering using an artificial hybrid grass for place Ertodome by Target Field in 2010. Only two MLB stadiums used artificial turf from 2010 through 2018. In 2019, this number will grow three when Arizona's Chase Field replaces its natural grass surface with artificial turf and in 1920, the new Globe Life Field in Arlington, Texas will also have an artificial surface.

Rugby-Rugby also uses artificial surfaces at a professional level. Infill fields are used by English Aviva premiership teams Saracens F.C, Newcastle Falcons and Worcester Warriors, as well as Pro 14 teams Cardiff Blues and Glasgow Warriors. Some fields including Twickenham Stadium have incorporated a hybrid field, with grass and synthetic fibres used on the surface. This makes the ground to be much hard wearing and making it less susceptible to weather conditions and frequent use.

Tennis-Tennis courts such as Wimbledon are considering using an artificial hybrid grass to replace their natural lawn courts. Such fields are covered with natural grass and synthetic fibres to create a more durable surface which to play tennis games. Similarly, synthetic grass/turf can also be used in the golf industry, because

of the vast areas of the golf courses and the damage from clubs during shots it is not feasible to surface fairways with artificial turf.

CLEATS FOR ASTROTURF

Athletes have worn cleats/studs since at least 1500 years. The written documentation of cleats come from 1526, when football boots were listed in King Henry the VIII's Great Wardrobe. According to the researchers, the English Monarch ordered the Royal Cord Wainer (shoe maker), Cornelius Johnson to make him a pair of hand stitched boots to play football. The shoes were costly and were probably made of especially strong leather. The Football Association in 1863 organized the game football in England. The cleats began to be used in the United States in 1860s when metal spikes were first used on baseball shoes. The first official baseball shoes was invented and produced by Waldo M Claflin, of Philadelphia in 1882. The use of cleats gained further notoriety in the United States with the birth of American Football in the early 20th Century. The innovation of cleat technology continued to take place throughout the mid of late 20th century. In 1954, the first modern football boots were made by Adidas. Today, different types of cleats exist for different surfaces:

replaceable aluminium cleats, which are worn in wet dirt, firm plastic rubber cleats for very hard surfaces [04].

Types of Cleats

Firm ground cleats are defined as cleats that are made typically for use on natural surfaces such as dirt and grass. These cleats are equipped with large studs on the bottom of the shoes to assist in gripping the surface and preventing sliding and assisting in rapid directional changes. In association football, where the shoes themselves are known as football boots, there are different types of cleats. They are soft ground cleats, firm ground cleats and sliding tackle cleats. In Australian Rules, football boots are traditionally referred to as stops. Prior to modern moulded plastic soles, there were often replaceable screws in wooden studs. In 1889, there were two types of studs, one had a screw in the centre of the stop/stud and the other had fixed studs at the boot sole fixed by nails [18].

In baseball, they were referred as cleats or spikes. The spikes are rectangular in shape and can be made of rubber, plastic or metal. Rubber spikes are almost exclusively used in the upper class of the sports. Lacrosse cleats are characterized by having a high support for the ankle and

appear most similar to American Football cleats. Lacrosse cleats contain a typical standard toe cleat in the front and beneath the toe, for gaining traction off the toe. Detachable cleats are defined as those in which the studs are removable, typically through attaching or detaching a metal or plastic piece to the bottom of the shoe. In cycling cleats, a specially shaped metal or plastic piece that attaches to the bottom of the cycling shoes to positively and securely attach it to a Clip Tess pedal system is called a cleat. In the ice cleats crampons are a typical type of spikes that usually are attachable under the sole of shoes to prevent slipping, especially on ice. On soft grounds, football players often opt for removable studs. These are usual metal cones that vary in length but are generally longer than the traditional soccer studs. In golf, initially metal spikes were used and nowadays, those have been replaced by soft spikes [20]. Artificial ground cleats are cleats that are made primarily for use on man-made surfaces, such as artificial turf or running tracks. Although conventional cleats can be used on turf surfaces, specialized baseball and softball turf shoes are also manufactured. These shoes typically have numerous rubber studs along the soles as opposed to spikes.

APPLICATIONS

Since the early 1990s, the use of synthetic grass have been widen in the areas like residential and commercial landscaping rather than athletic fields. Artificial turf has been used at airports. Some of the Astroturf/artificial grass can be integrated with optical fibres for runway lighting in the artificial landing surfaces for aircrafts. Both the rubber granules and the synthetic fibres of artificial turf are subject to wear and can be washed into environment. The rubber granulates from artificial turf infill constitutes a significant source of rubber pollution. Fragments from the artificial reeds make their way into the environment as micro plastics pollution in both marine as well as the soil environment [16].

The use of artificial grass has caused to raise a number of health and safety concerns about their continuous involvement in action. The friction between skin and the old generation Astroturf surface can cause more abrasion than natural grass. Again the surface of artificial turf can retain heat from the sun rays for a prolong exposure. Therefore, it is reported that periodic disinfection is required for artificial turf as pathogens are not broken down by normal process in the same manner as natural grass. A higher number of injuries to the players have been

reported while playing on the Astroturf. A study of the NFL Injury and Safety panel, published in October 2012 issue of the American Journal of Sports Medicine, Elliot B. Harsh Man et al, was reviewed for the injury data from NFL games played between 2000 and 2009. The review report pointed out that knee injury of the players played on Astroturf increased by 22% compared to normal grass players. Again, crumb rubber is referred in some cases/granulated rubber, which is some artificial turf used by in filled silicon sand/granulated rubber. Some of the granulated rubber is made from recycled car tires and may carry heavy metals which can leach into the water tables. As early as 2007, a moratorium on the use of ground up rubber tires in fields and play grounds was recommended by the appropriate authority on health concern [17].

CONCLUSION

Artificial turf first gained substantial attention in the year 1966. Artificial turf does have its down side, limited life, periodic cleaning, petroleum use, toxic, chemical from in fill and heightened health and safety concerns. Tuff Turf has an impeccable reputation for providing long lasting, high quality synthetic turf to homes across Australia. SYN Lawn

artificial turf gives the freedom to enjoy a stunning green lawn without the maintenance and high irrigation costs of a sod yard. The market of artificial grass is growing quickly because a contribution of better manufacturing techniques combined with an increasing awareness of the longer term environmental and economic benefits. Vigilant quality control throughout the manufacturing processes and finishing at the delivery end of Tiger Turf reflects the quality consciousness about the products of the artificial grass. The most important reason to choose a synthetic grass with polypropylene rather than nylon is because it does not absorb water like nylon does. Massive time savings allowing users more time to enjoy their yard instead of working to maintain it, when SYN Lawn artificial turf is used. Gluing of artificial grass is also essential for long lasting of the turfs. Artificial ground cleats are the cleats that are made primarily for use on man-made surfaces, such as artificial turf or running tracks.

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