

Modern Textiles Fabrics in Games and Sports-Review

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Abstract

Sport is generally recognized as system of activities based on physical athleticism or physical dexterity with major competitions. Sports fabrics are technical textiles which help to keep the wearer's comfort during exercises. Appropriate moisture and heat management are the key factors for the endorsement of required physiological comfort level. Smart materials are able to sense changes in the environment. In 1904, Olympics Games featured a fourth discipline of Fencing known as single stick but it was dropped after that year and is not a part of modern fencing. While choosing custom sports clothing, the type of materials should be one of the most important factors to consider. Sports textiles are one of the various branches of technical textiles. In sports industry, textiles are highly engineered and built for specialized performance and usage depending on the sports profile of the user. In various sports, the sportswear that players wear such as jerseys of T-shirts, Trousers, Shorts, Caps, Footwear, etc and some sports associates used 6

Keywords: *physical dexterity, sportswear, appropriate moisture, smart materials, modern fencing, performance sports.*

INTRODUCTION

Sports are usually governed by a set of rules and customs, which serve to ensure fair competition and allow consistent adjudication of winner. Winning can be determined by physical events such as scoring goals, or crossing line first. It can also be determined by judges who are scoring elements of the sporting performance, including objective or

subjective measures such as technical performance or artistic impression. Records of performance are often kept and for popular sports this information may be widely announced or repeated in sports news. Sport is also a major source of entertainment for non-participants with spectators' sports drawing large crowds to sports venues and reaching wider audience through broadcasting. Sports betting in some cases severely regulated and in some cases are central to the sport [1].

Sports fabrics are technical materials which help to keep the wearer comfortable during exercise. The type of fabric required will depend upon the intensity of the exercise and the activity. Yoga clothing should use fabrics with exceptional stretch ability for easy movement which will likely require the fabric to be a knitted construction. Apparel for long-distance running will keep the wearer in good comfort if it has excellent moisture wicking properties to enable sweat to transfer from the inside to the outside for the garments. Performance clothing for outdoor sports in the winter or snow sports should use breathable fabrics with very good insulation properties [2].

The design of functional sport wear varies for different types of sports and also by weather conditions, type of sports, and the physical activity required for that specific sport. The development of high functional sportswear for various kinds of sports requires immense researches by industries and academic professionals. To meet the demand for sportswear, there is a need to produce new fibres, fabrics and textile finishing for the improvement of sports textile functions. In this field, development of different man-made fibres contributed a lot to converting simple sportswear into high-performance sportswear. The fashion applicability and functional performance of sportswear can be judged during international games like Olympics. The scientific development of sportswear was aided by the manufacturing of speciality fibres by which advanced and smart sports clothing can be engineered for suitable and applications [3].

Smart materials include ones that monitor body functions and administer medicines and give warnings, maintain a personal micro-climate and can provide buoyancy and support. They also have chromatic properties and change colour in response to specific situations with shape memory and are self-cleaning. They use biometrics that initiate nature, can generate solar power when exposed to sunlight and sense and track movements. Smart materials are

photo chromic dyes made fabrics able to change when exposed to UV light. This is used in sun bracelets to warn the wearer that they have been in the sun for too long. Reactive materials react to changes such as loss of heat. These are used in sportswear or in safety clothing. Phase changing materials are to help regulate body temperature and in hiking equipment for extreme environment [4].

The shift towards fencing as a sport rather than as military training happened from the mid-18th century and was led by Domenic Angelo, who established a fencing academy, Angelo's School of Arms in Carlisle Soho, London 1763. He established the essential rules of posture and foot work that still govern modern sport fencing, although his attacking and parrying methods were still much different from current practice. Basic conventions were collated and set down during 1880's by the French Fencing master Camille Prevost. It was during this time that many officially recognized fencing of the world, such as Amateur Fencers League of America was founded in 1891, the Amateur Fencing Association of Great Britain 1902 and the federation Nationale des Societies d' Escrime et Salles d'Armss de France in 1906 [5].

In the past, the general consensus among industry exports was that cotton is a material that doesn't absorb sweat, so it wasn't a good option for active wear. However, of late, cotton sportswear is experiencing a revival as it has better odour management compared to other materials. It's breathable and doesn't hold on to the bi-products of activity like foul smell and odour. However, when it comes to rapid sweat absorbing, cotton still lags behind when compared to its modern and technologically advanced competitors. In modern times, the sportswear market is saturated with a vast range of clothing items for every type of sport activity and environment. It can therefore be natural to get overwhelmed when trying to choose what fabric is best for sportswear embroidery projects [6].

The use of high-tech textile materials in sports is nothing new. In recent years, some fabrics and designs have been observed that can quickly removed moisture from the body, meaning it absorbs sweat faster and dries the skin. The patches on all black jerseys help players dry their hands faster. On the other hands, some smart technologies are being used equally so that the cloths can understand the player's rate, temperature and other physiological information. Technological textiles have been able to produce some materials harder than wood which keep the skin dry. Waterproof like rubber and at the same time environmentally friendly and

highly profitable. Due to the wide spread use of advanced and smart technology in today's sports textiles, it is becoming possible to produce high quality and high-performance sports garments and the quality of sports textiles is increasing day by day [7].

Jersey is a soft stretchy, knit fabric that is made from wool. Georgette is a type of crepe fabric that is typically made from silk but can also be made from synthetic fibres like rayon, viscose and polyester. Crepe georgette is woven using tightly twisted yarns, which create a slight wrinkle effect on the structure. Cashmere is a type of fabric that is made from wool of Cashmere goats, and Pashmina goats. Cashmere is a natural fibre known for its extremely soft feel and great insulation property. Satin is one of the three major textile weaves, along with plain weave and twill. The satin weaves create an elastic, shinny soft fabric with a beautiful drape. Satin fabrics are characterized by a soft, lustrous surface on one side with a duller surface on the other side [8].

In sports industry, textiles are highly engineered and built specialized performance and usage depending on the sports profile of the user. Use of engineered fabrics in sports industry has evolved over time owing to the technological advancement in textiles. Currently smart materials such as memory foam and dry-fit technology are highly demand. Modern sports textiles are required to be light weight, sustainable and most importantly comfortable. Sports textiles are correlated to performance high-frictional fabrics are associated to high-performance [9].

Some essential features of sports textiles as described as follows: sports textiles must have adjustability, ease to wear, easy handling, etc. It must have the ability to transport heat and moisture, fast drying and cooling function. Sports textiles have very high electrical conductivity so they have anti-static performance. It must be resistant to anti-microbial. It must have good air permeability and water permeability. They must have the ability to absorb moisture quickly. It should strong and durable and light weight also. It must have good thermal conductivity and it can offer better level of defence [10].

What Are Sports Textiles?

The word sport comes from the old French de sport meaning leisure with the oldest definition in English from around 1300 being humans find amusing or entertaining. The precise

definition of what differentiates a sport from other leisure activities varies between sources. The closest to an international agreement on a definition is provided by the Global Association of International Sports federations, which is the association for all the largest international sports federations and is the therefore the de facto representative of international sport. Sports have been increasingly organized and regulated from the time of the ancient Olympics up to the present century. Industrialization has brought motorized transportation and increased leisure time, letting people attend and follow spectator sports and participate in the athletic activities. These trends continued with the advent of mass media and global communication. Professionalism became prevalent, further adding to the increase in sports popularity, as sports fans followed the exploitation of professional, while enjoying the exercise and competition associated with amateur participation [1].

Typical sports textiles include tracksuits, shorts, T-shirts, and polo shirts. Specialized garments include swimsuits, wet suits, ski suits and leotards. Sportswear also includes bikini and some tops. Sportswear is also at times worn as casual fashion clothing. For most of the athletes wear a combination of different items of clothing, e. G. Sports shows, pants and shirts. In some sports protective gear may need to be worn such as helmets or American Football body armour. Especially in team sports which involved blocking, intercepting or purchasing small, hard projectile such as cricket, base ball and hockey jack straps are standard equipment at higher levels of play. Other undergarments such as the sports bra, furnish a mixture of protection and comfort. Some protective or supportive orthotics resemble and function as undergarments, though intended to be worn for sports, these are not generally conceived of as sportswear per se [2].

Smart materials are defined with example are noted as follows: for students to know about the modern textiles from smart materials for examples that belong to each category are

- smart materials
- reactive materials
- photo chromatic dyes
- phase changing materials
- modern materials
- microfibers
- nano-fibres

- Microencapsulated fibres and fabrics. Modern textile materials are constantly being developed and improved. New fibres can be made to have specific properties which are needed for specific purposes. For examples
 - a. microfibers
 - b. nano-fibres
 - c. Micro-encapsulated fibres and fabrics, etc. Technical and Modern Materials include the : Gore-Tex, Kevlar, Phosphorescent textiles, Reflecting textiles using glass beads fabrics that wick moisture away from the body, Micro-encapsulated fibres, fabrics which protect against bacteria, fabrics with electronics materials using nano-technology, microfibers [4].

Modern Sports Textiles with Recent Developed Materials:

Physiological comfort is a state of mind, feeling the presence of pain and discomfort. Human psychology regarding clothing comfort broadly depends upon many factors such as age, heath, environment, weather, occasion social status, economic background, profession, religion and territory. Physiological comfort is essential in all kinds of sportswear. Physical comfort is usually determined by the human skin. When the body temperature is at equilibrium, the human being performed activities at its maximum efficiency. The interaction of the wearer's skin with the garment describes tactile comfort. Sportswear is usually worn right next to the skin. That's why the feeling of a person towards any garment is of major concern. Tactile comfort is also known as comfort. Friction on the external surface of a human may result in the skin injury. Thermo-physiological comfort depends upon many factors. The heat evolved by a high level of metabolic action in the body of athletes during high active sports like football can produce heat in the range of 800-1300 W. So, in this type of high physical activity, heat stress is of major concern [3].

Most of the personal protective equipment for fencing is made of tough cotton or nylon. Kevlar was added to top level uniform pieces following the death of Vladimir Smirnov in 1982 World Championship in Rome. However, Kevlar is regarded by both ultraviolet light and chlorine, which can complicate cleaning. Other ballistic fabrics, such as Dyneema have been developed that resist puncture and which do not degrade the way that Kevlar does. FIE rules state that tournament wear must be made of fabric that resists a force of 800 Newton and that the mask must resists twice that amount [5].

Nowadays, the sportswear market is saturated with a vast range of clothing items for every type of sports activity and environment. It can therefore be natural to get overwhelmed when trying to choose what fabric is best for sportswear in embroidery projects. While choosing custom sports clothing, the type of materials should be one of the most products can produce widely different results. Some of the biggest considerations are design comfort, weight and durability, moisture regulation, protection against the elements, price, etc [6].

The functional sportswear needs super light weight, low fluid resistance and super high persistence and stretch ability. For those that are seeking for comfort and healing pursuit crucial characteristics include thermal regulation, ultraviolet resistance, sweat absorption and quick drying, vapour permeability. From the sensitivity or aesthetic perspective softness, surface texture, handle, lustre, colour and comfort are important factors [7].

Recent Development in Sports Textiles:

Jersey is a soft stretchy knit fabric that was originally made from wool. Today, jersey is made from cotton blends and synthetic fibres. The right side of jersey knit fabric is smooth and is plied with loops. Jersey fabric is usually light to medium weight and is used for games and sports items, like sweat shirts, bed sheets, etc. Georgette is a type of crepe fabric that is typically made from pure silk, can also be made of synthetic fibres like rayon, viscose and polyester. Crepe georgette is woven using tightly twisted yarns, which creates a light crinkle effect on the surface. Georgette is sheer and light weight and has a dull matte finish. Silk Georgette is very similar to silk Chiffon, which is also a type of crepe fabric but georgette is not as sheer as Chiffon because of the light weave. Velvet is a soft, luxurious fabric that is characterized by a dense pile evenly cut fibres that have a smooth nap. Velvet has a beautiful drape and unique soft and shiny appearance due to the popular for evening wear and dresses for special occasion as the fabric was initially made from silk [8].

The latest study released was on the Global Sports Textiles Market by AMA Research Evaluators Market size, trend and forecast to 2007. Sports textiles market study covers significant research data and proofs to be a handy resource document for managers, analysts, industry exports and other key people to have ready to access and self analysed study to help understand market trends, growth drivers, opportunities and upcoming challenges and about the competitors. In sports industry, textiles are highly engineered and built for specialized

performance and usage depending on the sports profile of the wearer. Use of engineered fabrics in sports industry has evolved over time owing to the technological advancement in textiles. Currently, smart materials such as memory foam, and the dry-fit technology are highly in demand. Modern sports textiles are required to be light weight, sustainable and most importantly comfortable. Sports textiles are related to perform high functional fabrics associated with high-performance [9].

Special fibres used in modern sports textiles are discussed as follows: (1) Killat N 23 is a nylon hollow filament, in which the hollow portion is about 33% of the cross-section of each filament that gives good water absorbency and warmth retention property. Lycra 25 a truly synthetic fibre of long-chain polymer, composed of at least 85% segmented polyurethane and finds wide range of end used such as swimwear, active sportswear, etc. Fabrics used are mentioned as follows: (a) Entrant Dermizax EV is a light weight fabric having a feather like smooth texture, excellent waterproof/moisture permeability and durable water repellent property. (b) H2OFF is Toray made from polyester micro fibre fabric with uniform high-density weave structure comprising of millions of micro-crimped fine loops. Application of sports textiles materials in hi-tech textile for sports is nothing new. Different motives in the workplace make it mandatory for some people to wear special protective clothing [10].

CONCLUSION

Sportsmanship is an attitude that strives for fair play, courtesy towards teammates and opponents. Sports fabrics are technical materials which help to keep the wearers' comfort during exercise. The comfort properties of clothing may adversely affect the performance of sports clothing. Smart materials are able to sense changes in the environment. Most of the personal protective equipment in fencing is made of tough cotton or nylon. In modern time, the sportswear market is saturated with a vast range of clothing items for every type of sports activity and environment. Currently the use of sports textiles is increasing day by day. In sports industry, textiles are highly engineered and built for specialized performance and usage depending on the sports profile of the wearer. The production of breathable sportswear in various combinations in future will undoubtedly be in the level of comfort sportswear.

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