SPORTS AND OEKO TEXTILES

SPORTS TECH /SPORT TEXTILES

1.1 INTRODUCTION

The Indian sport tech industry is one of the fast growing sectors of technical textiles with high potential. The application of textiles in sports and leisure involves wide range of products such as sleeping bags, tents, sail cloth, swim wear, sports composites, sport nets, sports shoes, racquet frames, parachute, balloon fabrics, artificial turfs, fishing rods and cycle frames. The percentage of their indigenous production differs hugely for various products. The major share of 85% of the total sector is covered by sports footwear components followed by sport composites with 11% share. The leading manufacturers of sport tech products in India are Bata India Ltd. Lakhani India Ltd., Liberty Shoes Ltd., Mayur Uniquoters Ltd. and Relaxo Footwears Ltd. The India government has established Wool Research Association (WRA), as the Centre of excellence for sport tech.

1.2 OBJECTIVES

At the end of the session the learner will be able to

✓ Understand the significant role of sports textiles in sportsman’s performance.
✓ Relate the characteristics of fibers and fabrics structure and their functionality in the performance of sport textiles.

1.3 DEFINITION

Any type of fiber, yarn or fabric used to help the proper functioning of any sports activity can be defined as sports textiles. Sports textiles include materials used for the sports environment and the items used by the player to effectively play the game.
1.4 CATEGORIZATION OF SPORT TEXTILES

1.4.1 Sports Composites
The tournaments such as Indian football league, Indian cricket league, etc. play an important role in boosting the demand for sports composites. Sport composites involve cricket protective equipment, boxing equipment and inflatable balls like basketballs, volleyball and footballs. About 30% of the sports composites materials are exported. Cosco (India) Limited is one of the main producer of the sports composites.

1.4.1.1 Boxing equipment:
This category includes gloves, punching gloves, head guards, abdominal guard, punching bag, punching pads and speed balls used for boxing. PU coated or laminated, nylon coated PVC, woven polyester and PVC/PU coated fabrics are chiefly used to make boxing equipment. South Africa, UK, US and Australia are the major exporters of boxing equipments.

1.4.1.2 Inflatable balls:
The products such as basketball, football and handball fall under this category. Fifty percent of the market is dominated by foot balls. The size range of footballs is 3, 4 and 5 and the circumference size 5 is approximately 68.5cm – 69.5cm. The weight ranges between 420 to 445 grams having 0.8 bar pressure. Similarly all other game balls are also having their own measurements. Most of the balls are designed with woven fabrics high strength fibers. Mostly these fabrics are given abrasion and UV resistance finishes. UK, US, Germany and Australia are the chief export market.

1.4.1.3 Protective equipments:
The protective equipments used during cricket involves batting gloves, leg-guards, thigh pads, cricket kit bags, helmets, leg-guards, caps and hats. Leg guards are constructed using PVC coated/PU laminated fabric in top and cotton on the inner side. Batting gloves are made with PU
laminated fabric, whereas wicket keeping gloves which are subjected to more wear and tear is made with PVC coated fabric. Cricket protective gear has huge demand in domestic market; they are also exported to countries like New Zealand, UK, South Africa, Australia and USA.

### 1.4.2 Artificial Turf or Synthetic Turf

Artificial turf is fabricated from synthetic materials that looks similarly like natural grass used for playing sports such as hockey and soccer. It is also used for landscaping indoors and outdoors, balconies and jogging tracks. It is a safe substitute for natural grass that has no direct dangerous effects on children and pets. The artificial turf need to be installed and maintained properly for its correct performance. Good quality sub base is very essential for ground installations. The life period of an artificial turf lasts for a decade. Artificial turfs are chiefly exported in India by Suravaram Marketing (Pvt) Ltd and Inderjit Mehta Constructions Pvt. Ltd.

The artificial turf consists of four layers such as the pile fibers, backing cloth, shock absorbing layer and the supporting base.

- **Pile Fiber** - The piles are soft to touch like grass. It is made out of polyamide nylon or nylon 6.6 or PP/PE. The pile fibers that exactly match turf colour is knitted straight into the backing using rachel knitting. It needs to permit the ball to roll smoothly and bounce. It should be able to support non-directional foot traction, need to have appropriate strength, stiffness and elasticity capable to endure regular wear and tear. The threads used to fasten are of weather resistant in nature with high strength.

- **Backing Fabric** – The underside of the artificial turf where the surface fibres are attached is backing fabric. It should readily permit free water flowing through the fabric.

- **Shock-Absorbing Foam** – The form serves as a cushion for the falling and running athletes. It is made of closed-cell polymer like polyurethane, ½ inch in height and permits vertical drainage through perforations.

- **Supporting Base** – It helps to supports the load placed on the entire structure of the artificial turf.
1.4.3 Parachute Fabrics

A parachute helps to slow down the decline of the falling body. Air permeability is one of the chief attributes of the parachute fabric that controls its descents. The fabric needs to be of minimum thickness that permits it to fold into a bag. A parachute comprises of four main parts: parachute canopy, rip-cords, suspension lines, and the harness. High tensile nylon yarn with 210 to 840 deniers is used to make webbing, harness, and tapes because nylon has a maximum strength to weight ratio.

- **Parachute canopy**: They are primarily woven out of 32 to 200 deniers high tensile multi-filament nylon fibers. The special reinforcement in the rip stop will manage the strength to weight ratio, which also reduces ripping and tearing of the fabric.
- **Harness**: Harness is used to fasten the pack to the wearer's back or front. It needs to be especially designed in a manner that the wind, gravity, and deceleration forces won't cause injury to the wearer when the parachute opens. This is made out of woven or braided nylon and polyamides fabrics.
- **Rip-cord**: A rip-cord helps to open up the duck pack and let the chute to pop out. Rip cords are usually braided with high strength multi filaments of nylon and polyesters.
- **Suspension lines**: It helps to connect the parachute cloth with ring on the harness. This is made out of high tensile braided nylon or polyamide multi filaments yarns.

1.4.4 Ballooning Fabrics

Hot air balloons find their application as scrutiny equipment by military forces and adventure sports. It is driven by the hot air enclosed within envelop. Basket, envelop, and burner are the chief components of hot air balloons. The envelop is made with strong and light weight nylon or dacron rip stop fabric which can withstand a temperature around 120 degrees Celsius.

Rip stop fabrics of 150 to 250 GSM are exclusively used to make ballooning fabrics. They are woven fabrics using a special reinforcing technique by inserting thick threads, typically 5 to 8 mm apart during weaving at regular intervals in a cross hatch pattern that gives extra resistance towards tearing and ripping. The adequate weights to strength ratio and tear resistance are the
peculiarity of this fabric. The fabric, either fully or 1/3 part is coated with polyurethane or silicone to make it non-permeable to air. Moisture, heat and the mechanical wear and tear resistance are the basic properties of balloon fabrics.

The market demand for ballooning fabric is very poor in India. There are no exports for the ballooning fabric from India. The regulatory body for hot air balloons in India is Director General of Civil Aviation (DGCA).

1.4.5 Sail Cloth

Sail is a big piece of canvas fabric that helps to move a vessel by means of wind before the arrival of motor boat. Today sail is used in sporting yachts, sailing boats and during recreational activities. Earlier flax, hemp or cotton fibers were used to make sail, but nowadays inexpensive materials such as polyester or nylon having 200 to 600 GSM or costly fibers such as carbon and aramids are used. Synthetic materials have more advantage over natural ones due to their strength and light weight. The demand for sail cloth in India is negligible. The ideal properties required for sail cloth are tear resistance, stretch resistance, high tenacity, breaking strength, creep resistance and UV resistance.

1.4.6 Sports Nets

Sports nets are essential part of various sports such as football, handball, badminton, tennis, volley ball, basketball. The average GSM of sports net is 200 GSM. The nets are mainly made up of nylon, PP and HDPE. The mesh shape can be hexagonal or square according to their end use. The dimension of Badminton nets is 24 x 2.5 ft. The sides and bottom are finished with black PVC tape made out of HDPE, PP, nylon and cotton whereas tennis nets have 42 x 4 ft dimension made out of HDPE with UV resistance knots. Volleyball nets are 9.5 x 1Mtr with PVC coated side and bottom fabric made up of PP and nylon. Football nets/soccer goal nets, 24 x 8 x 6ft dimension is also made out of HDPE, PP, and nylon. The largest manufacturers of sports net in India are Garware Wall Ropes and Kwality nets. Sports nets are chiefly exported to US, Belgium and Finland.
1.4.7 Sport shoes components

Sports shoes are used for playing various sports such as hockey, tennis, cricket, football and during jogging, running and as casual wear. The components used for making sports shoes are PVC/PU laminated or coated fabrics. Normally shoes consist of shoe uppers, linings, counters, labels, sandwiched meshes, elastics, nonwoven insoles, tapes and laces. The shoe upper layers should be of uniform thickness and suitable colour with water-proofing finish. The desired qualities required for shoe uppers are dimensional flexibility, durability, breathability and light weight and colour fastness. The chief materials for making shoes are polyester, PU and PVC. Casual shoes are of great demand in India. The shoe manufacturing sector in India remains as small scale and cottage industries located at Delhi, Agra and Vellore. Foot wear components are imported from China, Italy, Germany, Taiwan and Portugal. The leading brands of sports shoes in Indian market are Liberty, Adidas, Nike, and Reebok.

1.4.8 Tents

Tents can be described as any cloth that can be made into transportable shelters, supported by poles. Ideal characteristics required for tent fabric are strength, breathability, durability; flame retardancy, water proof, light weight, UV protection, rot proof and decolorize resistance. Tents can be of Solar-aloha or Toray. A Solar-aloha tent has the ability to absorb and convert less than 2 mm wavelength light to heat. This can be used in winter to capturing 90% sun light and to convert them in to heat there by giving warmth. Toray are thermo chromic materials with microcapsules of heat sensitive dyes, encapsulated or coated evenly on its surface. The heat sensitive dyes are capable to produce ‘fun’ and special effects by changing their colour at 50°C intervals for a temperature range from 40 to 80°C.

The components of tents are, Outer tent and fly sheet, a Fabric cover inclined over the tent that provides protection from bad weather, Inner tent and lining and ground sheet, a waterproof finished sheet spread on the inside tent ground. Cotton canvas (100%), jute, polyester, poly cotton (30/70 or 50/50), nylon and Ripstop nylon are the fabrics used to fabricate tents. Among them 100% cotton canvas and poly cotton blends are widely used for making tent. Non-woven
Terrylene, 4 mm with 500 GSM is used as lining as synthetic insulation. Ground sheets are made of waxed cotton canvas with 440 GSM, PVC coated 500 GSM canvas or LDPE coated woven polypropylene of 175-200 GSM.

Based on the application tents are classified as army or defense tents, disaster relief tents and others consists of camping tents and party, wedding or exhibition tents. Synthetic materials are used to make camping tents. The excellent strength, flexibility, abrasion resistance, resistance to insect attack and micro-organisms makes nylon a popular material for making tents. Based on design they are categorised as frame tents, that are supported by frames providing nearly perpendicular sides with silhouette of letter A. Second type is Dome tent having sloping aerodynamic profile which is ideal for adverse weather situations. Next is the Hoop tent with sturdy and flexible poles that suits camping. The last category is tunnel tents with two or more hoop along its length. Depending on the construction style tents can be classified as Single -fly that have one layer of fabric. Double fly consists of one layered fabric tent along with a fly sheet and the third category is Winterized, consists of one-layer tent fabric with a lining (usually cotton), a fly and a stove-pipe hole.

In India leading supplier of tents are located in Kanpur. Tents are mostly imported from Hong Kong, China and Malaysia. Most of the tents from India are exported to Malaysia, UK, Australia, France, Luxembourg, Italy and Germany.

1.4.9 Swimwear

Swim suit also known as swimming costume or bathing suits. It is a clothing item designed to be worn while doing water sports such as water polo, surfing, swimming, diving and skiing. Men’s swimsuit known as swimming trunks, include briefs, board shorts, jammers or G-strings. Women’s swim suits are either one or two pieces. Specially made swim suits are called Diveskins. Partial and full body suits, jammers, racer back styles and racing briefs are designed for competitive swimming that assists to glide in water and helps to gain speed. Fabrics used are cotton, spandex/lycra, nylon and polyester. Metallic overlay and velvet suits are used to provide only fashion. The LZR Racer Suit is high-end swim suits made of woven polyurethane and
elastane-nylon fabric. The fabrics are given chlorine resistance treatment to lengthen the life time and to prevent destruction. The market size for swim wear is very small in India. Fashion swim wear is exported from India but high performance swim wear demands are met through imports from Speedo, Puma, Adidas, Reebok and Nike.

1.5 OBSTACLES IN THE GROWTH OF SPORTS PRODUCTS

The key obstacles that affect the growth of Indian Sport tech industry are; insufficient domestic demand, non-availability of sufficient techniques and machines for making products like artificial turfs and ballooning fabric. Sourcing these products and raw materials from outside inversely increase the product cost while comparing to other manufacturing nations. Tents and parachutes were used only by the defence sectors; hence people need to be encouragement to participate in adventure sport activities that boost the demand of the sport tech products. Availability of skilled labour for fabricating Sportech products is another difficulty faced by this sector. Rules and regulations regarding the issue of licenses and clearances related to ballooning fabric is one of the major hinderers in this sector.

1.6 SUMMARY

The change in the outlook of people in developing interest in adventurous activities and healthy life style will increase the outdoor games and sports. Apart innovation in inventing high performance materials helps to make high end products. Conduct of awareness programs related to sports activates and conduct of national and international tournaments by the government tend to increase the demand for the sports goods.

2. OEKO TEXTILES

Oeko textiles are one of the recent technical textiles branches. The textiles related to environmental issues are called as Oeko textiles. It can be described as confidence in textiles safety to earth and mankind during production and final product. This textile production is related to ecologically balanced concepts in environmental protection, waste disposal and
recycling of waste especially water used during processing of textile production, finishing, dyeing and printing.

The development of these textiles depends upon the tendency of the producers to produce and consumers to use environmentally safe textiles. This branch of textiles is expected to increase by 22% which is 66 million US$ by 2016-17, as per the estimation of the Working Group on Textiles and Jute Industry, Ministry of Textiles, Government of India. Demand for Oeko textiles products are expecting to increase due to the greater awareness in the society for the requirement of proper waste disposal rules according to the Municipal Solid Wastes (Management & Handling), 2000 and use of skin friendly fabrics.

2.2 OBJECTIVES

At the end of the session the learner will be able to

- Understand the significant role of oeko textiles in environmental safety.
- Relate the characteristics of fibers and fabrics structure and their functionality in the performance of oeka textiles.
- To gain knowledge about the certification of oeko textiles.

2.3 DEFINITION

Any type of fiber, yarn or fabric used or produces based on environment safety can be defined as Oeka textiles. These products need to be certified as OEKO-TEX®. The criteria for Oeko-Tex testing are reviewed every year. The testing takes into account every feasible way for the absence of harmful substances in the product. Oeko textiles include several products which are part of other technical textile sectors, like personal clothing from cloth textiles, table linens from home textiles, filtration nets from industry textiles, erosion fabrics from geo textiles and mulch sheets from agro textiles.
2.4 Classification of Oeko-Tex

Oeko-Tex is a global standard, accepted worldwide. Generally these textiles are given certification as OEKO-TEX®, common to all countries. The certification means independent testing of raw materials, semi-finished and finished textile products at all processing levels, and testing of accessory materials used for the production. The certification is to confirm that the raw materials and the finishing materials used and the final product are free from any type of harmful substance and did not produce any harmful by products during the processes. These textiles also include materials used for personal grooming and materials used for safeguarding landfills from dangerous waste leakage, preventing chemical or oil leakage from the ground covers or containment tank from chemical and other processing industries.

Oeke textiles are classified based the certification which in turn is associated to the product, production environment and end user. The certifications are:

- The Oeko-Tex 100
- The Oeko-Tex 1000
- The Oeko-Tex 100 plus

2.4.1 The Oeko-Tex 100

The Oeko-Tex 100 is also known as The Oeko-Tex Standard 100. It was first presented at the trade fair in 1997. It deals with clothing industry. Within a year 214 companies across Germany, Austria and Switzerland include the certification process. Today there are about 7,500 textile and clothing manufacturers throughout the textile processing chain in and around 80 countries certified for Oeko-Tex Standard 100. It refers to their tests for harmful substances according to Oeko-Tex Standard 100 for textile products which pose no risk whatsoever to health. It confirms that the fabric is skin friendly and stands as a criteria for purchase. To obtain this certificate the fabric is tested against 100 substances known to be harmful to human health. This certification is not concerned with organic fibers of waste, byproducts environmental properties. The products under this certification include...
baby products which includes any fiber yarn or fabric used for children below 36 months, direct contact products like underwear, Non direct conduct products like buttons and accessories and finally products which are used for decoration like curtains. The major properties of these fabrics are they are free from carcinogenic and allergenic dye-stuffs, formaldehyde, absences of heavy metals under artificial perspiration.

2.4.2 The Oeko-Tex 1000

Based the production environment Oeko-Tex 1000 is certified. It deals with eco friendly production processes, the production sites, the waste and byproducts. The testing includes aspects like energy consumption, space utilized; use of renewable or non-renewable raw materials, use of ozone-depleting chemicals, water contamination, workplace contamination, noise and air pollution. It does not include aspects related to the human resources.

2.4.3 Oeko-Tex 100 Plus

The certification for oeko tex 100 plus is given to products that have the standards for the Oeko-Tex 100 certification and is produced in an production site which is certified for Oeko-Tex 1000 Standard. In a nut shell oeko tex 100 plus includes all standards of Oeko-Tex 100 and Oeko-Tex 1000. For example a cotton shirt must be produced with fibers which are not be exposed to any harmful pesticides during growth and banned chemical during production in a site with proper disposal of waste during the production process.

2.4.5 Certifications Categories

The certification of Oeko-Tex 100, Oeko-Tex 1000 and Oeko-Tex 100 plus are categorized based upon the authorities who issue the certification. They are

- In first party certifications: a person or an organization with certain standards set by themselves.
In second party certification: an association gives assurance that a product is of the required standards.

Third party certifications: an independent testing company tests and issues the certificate that the product/production site are in par with the required standards. This certification is considered the best. Most of the exports require this certification. The norms are reviewed at regular intervals.

2.4 Oeko Tex application

The application of Oeko textiles apart from being a part of one’s garments, health and hygiene care products vary depending upon the end used also. Their properties are governed by the applications. Some of the most common application is Geo synthetic materials for leak detection system. Geo grids are used to reinforce slopes underneath waste, Geo nets applied in-plane drainage. Geo membranes applied as filtration fabrics between liquids and gases, Geo composites were used for the separation, drainage or filtration purpose. Generally Non-woven fabric layers having 180-250 GSM are applied as an intermediate layer to make geo synthetic clay. Geo-textiles material of 285 to 3000 GSM nonwoven fabrics is used for cushioning or filtration purposes. Geo membranes with 2 mm thickness are used for filtration textiles. Apart non woven textiles are also used in agro textiles.

2.6 CONCLUSION

The awareness among public and government for efficient waste management has boosted the need for Oeko textiles application. The use of natural produces which are safe is gaining importance hence people are looking out for oeko certified products especially in view of exports. Lack of knowledge, financial constraints and delay in enforcement of laws at proper time are the factors that hold back the application of geotextiles in landfills for proper waste management. If proper technology and mass movement towards safe production increases the production oeko textiles, in turn it will also increase exports and lead forward the country to a Green Pollution Free India.