

4. Technical Textiles: Future of Textile Industry

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4.1 Introduction:

Technical textiles are defined as textile materials and products used primarily for their technical performance and functional properties rather than their aesthetic or decorative characteristics. This is one of the fastest-growing sectors of the Textile Industry, which is manufacturing high-tech, high-performance fabric designed not just to look attractive, but to present a significant added value in terms of functionality. The textile coating process is widely used in the manufacturing of technical textiles. Technical textiles are defined as textile materials and products used primarily for their technical performance and functional properties rather than their aesthetic or decorative characteristics. Other terms used for defining technical textiles include industrial textiles, functional textiles, performance textiles, engineering textiles, invisible textile and hi-tech textiles. Technical textiles are used individually or as a component of another product. This are used individually to satisfy various functions such as fire-retardant fabric for uniforms of firemen. It is also used to enhance the strength, performance or other functional properties of that product. Technical textiles have been steadily gaining progress due to specific reasons such as functional requirement, health and safety, cost effectiveness, durability, high strength, light weight user friendliness and eco friendliness. Technical textiles are mainly used for their specific physical and functional properties by the industries.

The textile industry is not only experiencing clothing application but also continuing a major outlook towards the non-clothing application of textiles known as technical textiles. The distinctiveness and confrontation of technical textiles lie in the need to understand and apply the principles of textile science and technology to give solutions, in the main leading technological problems but also often to engineering problems as well. Technical Textiles is a high technology sunrise sector which is steadily gaining ground in India. Technical textiles are functional fabrics that have applications across various industries including automobiles, civil engineering and construction, agriculture, healthcare, industrial safety, personal protection etc. Based on usage, there are 12 technical textile segments; Aggrotech, Meditech, Build-tech, Mobiltech, Cloth-tech, Oeko-tech, Geo-tech, Pack-tech, Home-tech, Protech, Indutech and Sportech.

4.1.1 Agro-tech (Agro-textiles):

Textiles used in Agriculture sector are known as agro textiles. The cloth used is strong, rigid, elongated, biodegradable, UV resistant, and toxic-free. All of these characteristics aid in the growing and harvesting of crops and other edibles. Bird protection nets, finishing nets, crop covers, mulch mats, shade nets, and others.

It gives the increasing awareness of the environment and the specific knowledge of the various technologies. Attention has been paid to unconventional technical applications, such as the use of textile structures in the agriculture and horticulture sectors to increase the quality and efficiency of agriculture and food products in terms of ensuring a healthy environment, social-economic equity, and a profitable economy. Some important features of Agro-tech include:

- It provides weed control and soil moisture conservation.
- It helps to maintain the growth of the plants and crops in gardens.
- It helps in keeping the soil from drying up, resulting in higher agricultural yields.
- It provides shield farmers from pesticides that are detrimental to their crops.

4.1.2 Build-tech (Construction Textiles):

Technical textiles that are used in construction or building purpose is Construction Textiles. This textile material is used in both indoor and outdoor applications for both visible and hidden uses. The use of fabric coverings for roof building is an intriguing and enticing application. Textile architecture is another name for this field. Textiles used in construction, façade foundation systems, interior construction, insulations, proofing materials, air conditioning, noise prevention, visual protection, protection against the sun, building safety. Architectural membranes, floor & wall coverings, scaffolding nets, awnings & canopies, HDPE tarpaulins, signage's, and others. Some important features of Build-tech include:

- It provides protection against Chemical substances.
- Build-tech fabrics are of excellent quality and also durable.
- It plays a significant role in infrastructural modernization.

4.1.3 Cloth-tech (Clothing Textiles):

Cloth-tech is a subgroup of technical textiles that comprises of all textile materials used in apparel and footwear. Cloth-tech in technical textiles for clothing purposes particularly include in the finishing process where the fabric is treated under high pressure and high temperatures which support the fabric and allow for process gradually. These applications include labels, zip fasteners, interlinings, umbrellas etc. Shoe components like fabric, sole materials, shoelaces, and fillings are the other application of this fabric. Some important features of cloth-tech include:

- Cloth-tech textiles are durable, smooth, and lightweight textile.
- Clothing textile is shrinking, abrasion, and water-resistant.
- Cloth-tech textiles have properties like high temperature and pressure stability.
- They ensures UV radiations and corrosion resistance.
- Geo-tech (Geo-textiles).

These are used in the reinforcement of embankments or in constructional work. The fabrics used in geotextiles are permeable fabrics and are used with soils having the ability to separate, filter, protect or drain.

The application areas include civil engineering, earth and road construction, dam engineering, soil sealing and drainage systems. The fabric used in it must have good strength, durability, low moisture absorption and thickness.

Mostly nonwoven and woven fabrics are used in it. Synthetic fibers like glass, polypropylene and acrylic fibers are used to prevent cracking of concrete, plastic and other building materials. Polypropylene and polyester are used in geotextiles and dry/liquid filtration due to their compatibility. Some important features of geo-tech include:

- Geo-textiles are durable, natural, and cost-effective textiles.
- These textiles provides quick and effective protection against corrosion problems.
- They are easy to use and convenient for a variety of purposes.

4.1.4 Home-tech (Domestic Textiles):

Textiles used in a domestic environment – interior decoration and furniture, carpeting, protection against the sun, cushion materials, fireproofing, floor and wall coverings, textile reinforced structures/fittings, furniture fabrics, fiberfill, stuffed toys, blinds, mattress and pillow components, carpet backing cloth, mosquito nets, vacuum cleaner filters, and others. Some important features of home-tech include:

- Hometech textiles are majorly flame-retardant and anti-microbial.
- They protects against draughts and prevents heat loss.
- They are durable and has a good texture.

4.1.5 Indu-tech (Industrial Textiles):

Textiles used for chemical and electrical applications and textiles related to mechanical engineering. Industrial brushes, paper-making fabrics, filtration products, computer printer ribbon, printed circuit boards, composites, ropes & cordages, coated abrasives, AGM glass battery separators, bolting cloth, cigarette filter nods, drive belts, and conveyor belts. Some important features of indutech include:

- Indutech textile are shrinking, abrasion, and water-resistant.
- These textile fabrics features durability, and texture is finishing.
- They have high temperature and pressure stability.
- They resists the effects of chemicals, pollution, and acids in the rain

4.1.6 Meditech/Med-Tex (Medical textiles):

These are commonly used in bandages and sutures (stitching the wounds). Surgical dressings, contact lenses, artificial implants, baby diapers, incontinence diapers, sanitary napkins, surgical sutures, surgical disposables, and others.

Medical textiles also cover surgical gowns and drapes. Some important features of Meditech include:

- Meditech textile is resistant to bacteria, viruses, and harmful chemicals.
- They are a non-toxicity fabric and has a non-allergenic response.
- Excellent durability and better flexibility.
- Has biocompatibility and stability to sterilization.

4.1.7 Mobiltech (Textiles Used in Transport):

Technical textiles used in automobiles, aircraft, railways, and shipbuilding, such as nylon tire cord fabrics, seat cover fabric/upholstery, seat belts, cabin filters, tufted carpet, helmets, insulation felts, automotive interior carpets, sun visors / sunblind's, headliners, airbags, seat belt webbing, car body covers, airline disposables, aircraft webbings, and others.

The automotive sector has been improving its existing market share and creating innovative products through new developments, consequently increasing the demand for technical textiles. The applications of technical textiles in the automotive sector are expected to grow the most and to drive the market for technical textiles in the future. Some important features of Mobiltech include:

- They are comfortable, functional, and decorative fabrics.
- They add a decorative accent to surfaces.
- These textiles also provides an excellent, warm, soft touch.

4.1.8 Oeko-tech or Echo-tech (Environmentally Friendly Textiles):

Oeko-tech is widely used of in environmental engineering and landfill waste management (geosynthetic products to secure landfills against leakage of municipal or hazardous waste), secondary protection in chemical/oil industries (ground covers and around process tanks as secondary containment for tank leaks). Eco-friendly textiles are widely used in Apparel and Fashion Industry. It is also used in the textile industry and home furnishing. Secondary protection is used in the chemical and oil industries, among other things. Health Care and hygiene products, Eco Packaging, and various medical application are also manufactured from this fabric. Some important features of oeko-tech include:

- They has a lower carbon footprint than traditional textiles.
- They are cost-effective and produce eco-friendly sustainable textile products.

4.1.9 Pack-tech (Packaging Textiles):

Packaging for textile industrial, agricultural, and other items is referred to as packaging textiles or Pack-tech. To provide scratch-free and secure handling of delicate items, textile packaging is an excellent choice. These packaging's are incredibly beneficial for transportation and handling in the automotive industry. One of the essential disciplines of technical textiles is packaging material. Textile products are seeing new potential as the demand for reusable packaging textile. Leno bags, wrapping fabric, jute hessian and sacks, soft luggage products, tea bag filter paper, woven sacks are some of the examples of Pack-tech. Some important features of Pack-tech include:

- Pack-tech textiles protects materials from dangerous chemicals and gases.
- Ensures waterproofing, flame retardancy, lightness, and breathability.
- Heavyweight, densely woven fabric is used in packaging textiles.
- Suitable for industrial, consumer, agricultural, and other goods.

4.1.10 Protech (Protective Textiles):

Protection against heat and radiation for firefighter clothing, against molten metals for welders, for bulletproof jackets etc., all these things are obtained by usage of technical textiles with high-performance fibers. High altitude clothing, ballistic protective clothing, fire retardant apparel, high visibility clothing, industrial gloves, and others. Some important features of Protech include:

- These textiles are lightweight, easy to handle, and has drape features.
- It has bacteria, ultraviolet, and microorganism resistance.
- They are highly durable, and is wind and also Water-resistant.
- Protects from bullets, chemicals, fire, and flame

4.1.11 Sport-Tech (Sports Textiles):

Sports textiles is a type of technical textile that is used in the sports sector. This fabric is suited for all climates and has a low maintenance cost. The fabric is primarily made from high polyester tire cord fibers. It's a foam underpaid that's been set down to provide cushioning and protection against hard falls. Some important features of Sport-tech include:

- Sports textile are adjustable to wear and easy to handle.
- Provides protection from the sun's harmful UV radiation.
- These are solid and durable and also lightweight.

4.2 Uses of Technical Textile:

Applications consist of apparel, protective textiles, transportation fabrics, home furnishings, window treatments, soft luggage and a range of other technical textile applications for woven, non-woven and knit fabrics.

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