

Technical Textiles: Current global trends and prospects in Pakistan

The excerpts of the presentation by Dr. Tahir Shah from University of Bolton, UK are given here for the interest of our readers. This report is compiled and edited by Dr. H.R. Sheikh, Professor Emeritus, Textile Institute of Pakistan.

Dr. Tahir Shah from Institute for Materials Research and Innovation (IMRI) University of Bolton, UK emphasized importance of Technical Textiles in Pakistan and said that it is an opportunity for diversification of the production pattern into new areas of textile manufacturing. End-uses of these materials depend on the functional and not on the aesthetic properties.

In view of the problems faced by the conventional textile industry in Pakistan, textile industry should shift towards knowledge based products. We have a tremendous opportunity for diversification into technical textiles and make a real contribution to the development of the country – both in term of the economy and infrastructure. Government as well as the textile industry must look closely into the developments in technical textiles and knowledge-based products very seriously.

Main raw-materials used for the manufacture of Technical Textiles are Polyester, Glass, Polypropylene (PP), Nylon, Metal yarn, Natural Fibres and also Composite materials.

Value-added textiles

The Value-Added Textiles are the traditional textile products to which novel advanced technological characteristics have been added. They are mainly used in conventional markets for the purposes of meeting new needs of end users. Technical Textiles are value-added textiles manufactured by the application of fibre, yarn, film, wovens, knitted, braided, nonwovens, Composites and Hybrid Technologies.

Technological innovations supporting advances in technical textile

Some examples of technological innovations include nano textiles, intelligent and smart clothing, plasma technology, etc

Nanotechnology

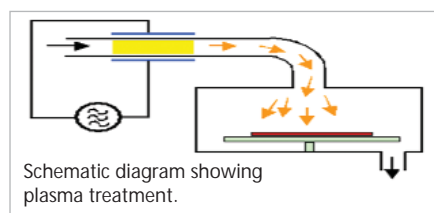
Nano-Technology is basically employed for a surface treatment through carbon or clay nano particles or metal oxide nano particles. For finishing treatment, nanotechnology is used through nano-sized emulsions and other applications include nanocoating of self-cleaning polymer films, nanoparticles (transparent) and Nanofibres. In 2007, the market for nano technology amounted to US \$13.6 billion, and in 2012 it is estimated to US \$115 billion.

Nonwoven, Composite and Hybrid Technologies

The integration of several components, or a combination of processes, for example, nonwovens combined with warp-knitted fabrics is also gaining acceptance as hybrid technologies. The stitch-bonded-hydroentangled composites are also considered in this context. The spunlace, combined with spunbonded, carded, meltblown or airlaid applications for medical, hygiene, wipes, industrial products, clothing, protective materials are few examples.

Plasma treatment

Plasma is the ionized state of a gas, whereas the gas reacts rapidly with textile surfaces. It is a cost effective finishing technology for producing water repellent, oil proof and stain resistant fabrics.



Intelligent Technologies

The word Intelligent represents textiles, which are responsive to requirements. Multiple applications include elements integrated into knitted fabric, fabric or nonwovens for applications in the medical, protection, safety and sport fields, etc. Intelligent Textiles can be programmed to produce the required response and provide protection and comfort to the user.



Global technical textiles and clothing

The global textiles and clothing sector trade has grown to reach US\$ 530 billion in 2007. Global technical textiles reached US\$126 billion in 2007, but are still growing four times faster than conventional textiles. In 2010 market valued at 22 million tonnes, representing a world market share of US\$140 billion. Asia is the hub of technical textiles. Market in India has increased from US\$ 0.5 to US\$ 12 billion and in China from US\$ 14.2 to US\$ 200 billion.

Major countries producing technical textiles are Germany, France, U.K, U.S.A., Japan, Korea, India, Turkey and China. In UK textiles and clothing sector was worth £10.2 billion in 2006 with £3.5 billion coming from technical textiles. In 2008 nearly 40% of total textile market belonged to Technical Textiles.

Prospects of technical textiles in Pakistan

Textile industry is extremely important for the economy of Pakistan, because it contributes to 46% of total manufacturing, 45% of total employment, 8.5% of total GDP and 31% of total investment.

Technical textiles growth by product classification

Type of Product	Value (US\$ millions)		Annual Growth Rate, 2005-2010
	2005	2010	
Nonwovens	19,394	24,958	5.2%
Knitted fabrics	4,143	4,927	3.5%
Woven fabrics	64,570	74,820	3.0%
Coated and laminated products	51,010	58,946	2.9%
Other fabrics	2,046	2,493	4.0%

World Technical Textiles Consumption by Region

Region	Year / (000Tons)			
	1995	2000	2005	2010
Americas	4,288	5,031	5,777	6,821
Europe	3,494	4,162	4,773	5,577
Asia	5,716	6,963	8,504	10,645
Rest of the World	473	558	628	730
Total	13,971	16,971	19,683	23,774

Technical Textiles: Global Consumption (000Tons)

Application Areas	Year			
	1995	2000	2005	2010
Agriculture	1173	1381	1615	1958
Building	1261	1648	2033	2591
Clothing	1072	1238	1413	1656
Geotextiles	196	255	319	413
Hometextile	1864	2186	2499	2853
Industrial uses	1846	2205	2624	3257
Medical	1228	1543	1928	2380
Automotive	2117	2479	2828	3338
Packaging	2189	2552	2990	3606
Protective	184	238	279	340
Sports	841	989	1153	1382
Total	13971	16714	19638	23774

Target growth areas for Pakistan include geo textiles, medical textiles, construction, agriculture textiles and other nonwovens products. In particular, building and construction industry offers a major opportunity for Pakistan's textile industry. It has huge areas of applications in the construction of dams, bridges, ports, etc.; it can also be utilized in the construction of stadiums, sports arenas, outdoor shelters, roofs etc.

Products include architectural membranes, roofing & waterproofing membranes & breathable liners, thermal and sound insulation, sewer and pipe linings, reinforcement of walls, facades, reinforcement and pre-stressing of concrete, awning, canopies, marquees, inflatable buildings, etc.

In agriculture, the industry can develop products for crop production, such as Crop protection fabrics against sun, wind, rain, frost, birds, insect, etc. Other product application include forestry (artificial mulch & insulating ground covers), Horticulture (balers & horticulture twines), animal & poultry (tarpaulins & other covers), fish farming (Fishing lines, nets, ropes, twines) and other novel application such as capillary nonwovens & seed/ nutrient/ moisture carriers.

Geo Textiles are used in the construction of embankments, cuttings, dykes, sub-sea coastal engineering and they offer lower cycle of construction, low maintenance costs as well as durability and optimal use of arid of land, etc.

Other important application area is reinforcement material for strengthening soil, slopes, walls and stabilization products for distribution of load to prevent erosion, cracking of roads, surfaces, The separation materials to prevent intermingling, sinking with filtration and drainage products to allow flow of liquids and retention of solids.

Fabric Architecture

Fabric Architecture is relatively new form of architecture, also known as tensile membrane architecture or fabric membrane structure architecture. The technological progress has increased the popularity of these structures due low weight, easier and cheaper construction.

Masjid-e-Nabvi, Madina, Saudi Arabia

PTFE coated fibre glass fabrics are being used in the mosque of Holy Prophet Muhammed (PBUH) and at the Haj Terminal in Jeddah. The fabric roof covers 430,000 sq.m. of plan area and is considered as the largest roof structure in the world. The roof reflects most of the heat and it consist of 10 modules of 320 m by 138 m fabric, whereas each module consists of 21 tent-like units. The structure is supported by steel pylons leaving the space under the units' wide open.



Masjid-e-Nabvi, Madina, Saudi Arabia.



The Millennium Dome, London, UK.

Millenium Dome, London, UK

Similarly, this PTFE coated fibre glass fabric can also be seen at the Millenium Dome in U.K. Two layer structure at Millenium Dome provides a degree of insulation and reduces the risk of condensation. The outer layer is a medium-weight PTFE/glass fabric and the inner lining is made of lightweight glass fibre fabric with an open mesh weave and a minimal coating of PTFE.

Among the most widely used materials are polyesters laminated or coated with polyvinyl chloride (PVC), woven fiber glass coated with polytetrafluoroethylene (PTFE fabrics). Typically, the fabric is coated and laminated with synthetic materials for increased strength, durability and environment resistance. ♦

Concrete Cloth

Concrete Cloth was invented by Imperial College London and Royal College of Arts. It is a flexible, cement impregnated fabric that hardens, when hydrated to form a thin, durable, water and fire proof concrete structure, which allows the concrete construction without the need for plant or mixing equipment.

Concrete cloth has a great potential for uses in Pakistan. Basically it is an impregnated fabric specially suited for earthquake affected areas also used for slope protection, coating for water pipeline protection, ditch or tank lining and in sand bag defence applications in the form of prefabricated structure or concrete canvas or rapidly deployable shelters. Dr. Shah provided details of specific product range and huge applications of concrete cloth. Dr. Shah also discussed 'Road Map' for Technical Textiles and opportunities for future.



Concrete Cloth: Can be rapidly unrolled to form ditch or tank lining.