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## **Pakistan lags behind in Technical Textiles**

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### **ABSTRACT**

This paper highlights and demonstrates the technical and economical impact of technical textiles in the industrially developed countries and their future contribution to the development of economics of newly developing countries, such as China, South East Asia, and North Africa etc. Pakistan still lags behind in technical textile products as neither the government nor the textile industry has made any serious efforts towards synchronizing textile products with the emerging needs of the world market by developing higher value-added products. Although the textile sector is the backbone of Pakistan's economy, the Government as well as the textile industry has kept their focus on conventional textiles, ignoring technical textiles and knowledge-based products. A special focus is placed on the application of technical textiles related automotive, medical, construction/civil engineering and sportswear's fields.

### **1. INTRODUCTION**

Technical textiles as defined as textile materials and products manufactured primary for their technical performance and functional properties, rather than for their aesthetic and decorative characteristics.

Technical textiles are so ubiquitous that is difficult to envisage a world without them. Their end-uses range from simple products such as dental floss and sutures, to heart valves and vascular prostheses from air filters to heat and flame barriers; and from car seat covers to load bearing composite materials.

The historical progress of technical textiles has seen the advance of alternative textile forming technologies, most prominently the broad family of non-woven techniques but also warp and weft knitting, stitch bonding and modern braiding methods. The use of loose fibres with sophisticated cross-sectional profiles for insulation, protection and fibrefill applications is another important growth area. On the other hand, the total value of yarns and fibres and of all technical products will grow slightly less fast than their volume because of changing mix of materials and technologies, especially reflecting the growth of non-woven.

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Hence it is obvious that technical textile products can be used in various industries like automobile, advertising, agriculture, civil constructions, environmental protection, chemical, electronic, geo-textile, industrial coverings, medicals, printing, space, etc. In many cases it has been replacing the conventional materials with low cost, high efficiency materials along with many other features. The technical applications of textiles have now taken a firm footing in the global scenario.

## 2. Technical Textile in Pakistan

Pakistan still lags behind in technical textile products as neither the government nor the textile industry has made any serious efforts towards synchronizing textile products with the emerging needs of the world market by developing higher value-added products. Although the textile sector is the backbone of Pakistan's economy, the Government as well as the textile industry has kept their focus on conventional textiles, ignoring technical textiles and knowledge-based products.

Technical textile products are those required for special purposes such as fire fighting and protective gear, industry, aerospace, military, marine, medical, construction, geo-textile, transportation and other high-tech applications.

As competition continues to increase in the general and consumer textiles industry, even companies based in countries previously seen as low-cost producers are facing the question of how to survive in a truly global market.

Presently, Japan, Germany, the US, the UK, France and China have monopoly over knowledge-based textile sector, producing technical textiles. These countries except China have abandoned producing conventional textile products.

Traditional applications for technical textiles include tyre cords and ropes, but producers are increasingly manufacturing fibres used in high-tech products for a wider range of end uses. Industries, which are now involved in technical textiles, include agriculture, automotive, building and construction, medical/hygiene, packaging, protective clothing, sportswear and transport.

By realising its importance, China has launched a comprehensive programme called 'Double Incentive Scheme for Technical Textiles', whereas India has also announced a bundle of relief package for the promotion of technical textiles in the country.

Contrary to this, only one textile mill deals in production of higher value-added products in Pakistan and in the absence of incentives from the Government besides unfavourable conditions it is passing through a very difficult phase.

Pakistan also spends a huge amount of foreign exchange every year on import of higher value-added textile products in order to meet its local demand including aerospace, military, marine and medical.

The revenue contribution of textile sector in Pakistan does not come from export of textile processing machines or chemicals; it comes from the export of garments, clothing, and textiles where cotton is the sourcing material. Import of such technical textile articles is in textile and clothing products that are used in defence, medical, protective and safety applications etc.

The value of home textile articles weighing 10 kg would hardly be equivalent to 100 kg value of smart textile article, Most of the major cotton producing and textile exporting countries have done much in developing smart textiles. However, there is a lot needed to be included in this category.

The country's monetary policies favour the big industrial set-ups. These industrial set-ups lack flexibility in their manufacturing, technology and processes. They cannot introduce new products especially technical textiles due to high complexities in corporate practices. Banks and financial institutions turn a blind eye on technical and innovative aspects of the industry. They fear new experimentation of markets and its associated risks. They keep revolving their money in the existing markets.

There is a huge gap between academia and industry which must be closed by establishing stronger links with the industry. Otherwise the research done in the institutions would never benefit the industry. In case of technical textile, it is important to introduce new high-tech materials and processing techniques to develop high quality textile products.

### **3. WORLD CONSUMPTION**

The historical progress of technical textiles has seen the advance of alternative textile forming technologies, most prominently the broad family of non-woven techniques but also warp and weft knitting, stitch bonding and modern braiding methods. The use of loose fibres with sophisticated cross-sectional profiles for insulation, protection and fibrefill applications is another important growth area. On the other hand, the total value of yarns and fibres and of all technical products will grow slightly less fast than their volume because of changing mix of materials and technologies, especially reflecting the growth of non-woven.

In machinery development, the trend will be towards automation in all stages including computer colour match prediction and composition of designs in printing. The evolution will be towards equipments using less and less of water like continuous dyeing, HT steaming and 'thermosoling' are expected to make rapid strides with increasing use of infrared irradiation in many application.

In fibre technology and development, emphasis will be on the fibre blends and modification in cellulose. Fibbers with better dimensional stability, soft handle coupled with modified dyeing properties will be in demand. The share of synthetic fibres in the technical textile sector will rise from 79% in 2000 to 81% by 2010. There will also be an increase in the share of non-woven and will grow from 35% in 2000 to 39% by 2010 in weight terms. This increase will largely be at the expense of woven fabrics, whose share will decrease from 58% to 53%. The global demand and market for technical textiles and products is projected to increase from US\$ 75 billion in 2006 to around US\$ 130 billion 2010. The largest application areas by value are transport, industrial and sports related products and according to Technical Textile Intelligence, the fastest growing segments will be medical and hygiene products and geotextiles. Asia is expected to account for 45% of the market share in 2010 in terms of the weight and volume growth will average between 4% and 5% per annum to year 2010. According to Textiles Intelligence new report of World Market for Technical Textiles: Forecast to 2010, Chinese consumption of technical textiles will increase in future, and China imported almost 500,000 tons of technical textiles in 2004 and it given its propensity of self reliance, it will be matter of time before they start exporting the same to global markets. Similarly, India has also reported that total market of technical textiles and nonwovens amounting to US\$ 444, whereas the growing segments are agro-textiles and automotive applications.

An Indian BCH (Business Co-ordination House) research organization reported that with a population of over a billion people, of which above 300 million are middle class with high living standards and purchasing power, the potential for nonwovens products, such as feminine hygiene products, consumer wipes, diapers and other disposables, in India is huge. There is already a growth in nonwovens applications such as automotive, interlinings, agriculture and medical. Nonwoven geotextiles, especially, are expected to grow rapidly since over 10,000 kilometres of coastal roads are planned for the next five years. The Turkish textile industry is gearing towards technical textiles and nonwovens. The 2006

data revealed that export of technical textiles and nonwovens from Turkey is more than US \$847 millions, as compared to US\$ 405 million in 2000. The top countries where the technical textiles from Turkey are being exported include Germany, France, Spain, Italy and United Kingdom. The technical textiles and nonwovens segment is growing rapidly and the imports are more than doubled from 2000 to 2006. World consumption of technical textiles by product types is given in Table-1 and World consumption of technical textile by region is given in Table-2.

<b>Table-1</b> <b>World consumption of Technical Textiles</b> <b>(By Products)</b>						
					Quantity: Tonnes Value: US \$ Million	
Product	Quantity		Growth % per annum	Value		Growth % per annum
	2000	2005		2000	2005	
Fabrics	3,760	4,100	1.7	26,710	29,870	2.2
Non-woven	3,333	4,300	5.4	14,640	19,250	5.6
Composites	1,970	2,580	5.5	5,960	9,160	5.6
Other textiles	7,687	8,703	3.4	12,950	14,060	3.3
Total	16,750	19,683	3.9	60,260	72,340	3.7

**Source:** David Rigby Associates / Techtexsil

<b>Table-2</b> <b>World Consumption of Technical Textiles</b> <b>(By Region)</b> <b>(Quantity in '000' Tonnes)</b>				
Region	1995	2000	2005	2010
North America	3,584	4,184	4,774	5,591
South America	705	847	1,004	1,230
West Europe	3,002	3,614	4,107	4,760
East Europe	493	584	666	817
Asia – ex. China	3,895	4,449	5,220	6,348
China	1,515	2,155	2,871	3,808
Other Countries	778	917	1,041	1219
Total	13,972	16,750	19,683	23,773

**Source:** 'Technical Textiles and Industrial Nonwovens: World Market Forecasts to 2010', David Rigby Associates, 2002

The following major future growth areas of technical textiles can be identified:

- automotive and other transportation media;
- medical, hygiene and healthcare;

- geotextiles, civil engineering, building and construction
- sports and leisure;
- environmental protection, filtration and cleaning; and
- Safety protection.

In finishing, functional knits, transparent fabrics weighing less than 100 g/m<sup>2</sup>, micro-fibbers, leisure wear, non-staining and easy care fabrics, fire proof, weather protection, free of harmful chemicals will be in demand. The tendency will be to evolve a "universal finish" which at one stage will impart easy care, flame retardant and bactericidal characteristics to the textile material. The development of synthetic polymer fibbers, production of high performance fibbers and high technology textiles will rapidly change the textile industry from science served to science based.

#### **4. APPLICATION OF TECHNICAL TEXTILES**

The 12 main application areas for textiles have been defined as given below:

- Agrotec: agriculture, horticulture, forestry and fishing
- Buildtech: Building and construction
- Clothtec: functional components of shoes and clothing
- Geotech: geotextiles and civil engineering
- Hometec: products used in the home; components of furniture and floor coverings
- Indutech: filtration and other products used in industry
- Medtec: hygiene and medical
- Mobiltech: transportation, construction, equipment and furnishing
- Oektech: environmental protection
- Packotech: packaging and storage
- Protech: personal and property protection
- Sporttech: sports and leisure technical components

#### **5. MOBILTEC**

Automotive textile sector is the largest single consumer of technical textiles. Textiles provide a means of decoration and a warm soft touch to surfaces that are necessary features for human well being and comfort, but textiles are also essential components of the more functional parts of all road vehicles. At world level, its market share is about 25%. During the 10-year span from 2006 to 2016, world-wide sales of cars are expected to increase by 22.75% with developed nations contributing only 10.55% to 12.29% while developing nations contributing to as high as 38.24% to 90.03% by 2016.

Automotive textiles is one of the three application sectors particularly stressed at Techtexil 2001 on account of its greatest turnover and consumption of its products envisaged in years to come. The overall growth in terms of value will be about 23% with nylon tyre cord having only 4.15%, while it is 27.96% for airbags. The over all growth value will be around 45% over a period from 2004-05.

Polyester still remains the principal fibre worldwide for seating fabrics and polyamide the main fibre for tufted carpets and polyester, with some polypropylene, is the most fibre for needle felt materials.

On worldwide basis the warp knitted fabrics which include tricot, poll and double needle bar are the most widely used with 34% share of the market. However, use of flat woven fabrics is 28%, woven velour's 16%, circular knitted fabrics and leather having a share of 11% each. The increasing use of printed fabrics, particularly in Asia, is likely to increase the share of knitted fabrics, both in flat and velour forms.

## 6. GEOTEC

Geo-textiles are mainly applied for earth related underground work, road construction, ground stabilisation, erosion control, soil reinforcement, etc. Woven, knitted and non-woven textiles find application in these areas. About 70% of all fabrics fall into the category of non-woven and 25% are woven (both warp knitted and weft structures) are used in the manufacture of geotextiles.

During the period 2000-2005, while Geotec showed the largest growth with Medtecl, it is projected s the sole leader during 2005-2010. Geotec market products value was US \$ 740 million in 2000 whereas it is now expected to reach US \$ 927 million at the end of year 2006 and is projected to grow to US \$1,203 million in 2010 with an annual growth rate of about 5%, the highest among all the market segments.

## 7. PROTEC

The protective textiles encompassing those used both for clothing with relevant protective properties such as from fire, heat, weather, radiation, etc and those with relevant protective properties used in structures such as tents, roofs, etc.

Defence sector happens to be the largest consumer of protect followed by fire service, police, paramilitary forces, industrial security forces and boarder security forces. At present day the military textiles, clothing and equipment of all major nations have become ever more sophisticated and diverse. The now utilise the most advanced textile fibres, fabrics and constructions available. It had now been recognised that, no matter how sophisticated weapon systems and equipment become, they ultimately depend for their effectiveness on a human operator to make the final decisions. This has led to significant increases in the reliance on scientific and technical solutions to solve the perennial problems associated with protection of the individual from environmental and battlefield threats, with the need to maintain comfort, survivability and mobility of fighting forces.

Protect products constitute about 5.5% of total technical textile global market, which is expected to grow from US \$6,857 million in 2010.

## 8. SPOTEC

The dramatic growth in the active-wear and sportswear sector has significant implications for the textile industry worldwide. Consumers demand high levels of comfort, design and easy care in all types of clothing. Worldwide sale of in sports goods increased by 23% during 1997 to 2001. Sales within the European market worth 16 million pounds with 11 billion pounds being spent on sports wear. UK consumers spent about 4.05 billion pounds on sport wear. The increasing cultural importance of sportswear in fashion meant that only 25% of sportswear was used for active sports or during exercise. It is estimate that in UK sportswear market sale touches 5 billion ponds by 2007.

Multi-layer fabrics produced by using both warp and weft knitting technology, have been designed for use in sportswear and active wear.

A simple two-layer construction ca be knitted in which the inner layer is made of a textured synthetic filament yarn which is hydrophobic and has good capillary action. The outer layer, made from a hydrophilic yarn, absorbs the wicked moisture then allows it to evaporate. This system allows immediate removal of sweat from the skin with evaporation unhindered by layers of fabric.

## 9. MEDTEC

An important and growing part of the textile industry is the medical and related healthcare

and hygiene sector. The MedTec product includes the complete range of innovations in the manufacturing, processing and application of medical and hygiene products such as the latest ideas for special bandages and a variety of conductive textiles. The extent of the growth is due to the constant improvements and innovations in both textile technology and medical producers.

Textile materials are suitable for any medical and surgical applications where a combination of strength and flexibility are required. Fibres used in medicine and surgery may be classified depending on whether the materials from which they are made are natural or synthetic, biodegradable or non-biodegradable. All fibres used in medical applications must be non-toxic, non-allergenic and non-carcinogenic, and be able to be sterilised without imparting any change in the physical or chemical characteristics. For the production of medical textiles and hygiene non-woven and for products in the personal, healthcare and cosmetics sector mainly cotton, rayon, wood pulp, cotton linters, synthetic fibres and blends of various fibres are used. The raw materials used and the appropriate production processes are the essential factors for meeting the specified demands. Non-woven and knitting are making dramatic inroads in this sector and more specifically in some niches having a high scientific content.

In Europe the share of the medical textiles is already 10% of the technical textile market, with 100,000 tonnes of fibre, a growth rate of 3% to 4% per year and a market of US \$7 billion. Table-3 show World consumption of Technical textiles- by application.

<b>Table-3</b>				
<b>World Wide Consumption of Technical Textiles (By application)</b>				
<b>Quantity (000 Tonnes</b>				
<b>Value : US \$ Million</b>				
	<b>2000</b>		<b>2005</b>	
	<b>Quantity</b>	<b>Value</b>	<b>Quantity</b>	<b>Value</b>
Transport textiles (auto, train, sea, aero)	2,220	13,080	2,480	14,370
Industrial products and components	1,880	9,290	2,340	11,560
Medial and hygiene textiles	1,380	7,290	1,650	9,530
Home textiles, domestic equipments	1,800	7,780	2,260	9,680
Clothing components (thread, interlinings)	730	6,800	820	7,640
Agriculture, horticulture and fishing	900	4,260	1,020	4,940
Construction-building and roofing	1,030	3,390	1,270	4,320
Packaging and containment	530	2,320	660	2,920
Sports and leisure (excluding apparel)	310	2,030	390	2,210
Geotextiles, civil engineering	400	1,860	570	2,360
Protective and safety clothing	160	1,640	220	2,230
All others	5,410	520	6,003	3,580
<b>Total</b>	<b>16,750</b>	<b>60,260</b>	<b>19,683</b>	<b>75,340</b>
<b>Source:</b> Technical Textiles and Industrial Non-woven's, David Rigby Associates, 2002				



The lack of technological advancement in Pakistan has restricted cotton's presence in home textiles. These days when textile fibrous materials are becoming an integral component in bridges, architecture, combat vehicles, automobiles, aeroplanes, medical implants, protective wears against bullet, shock, radiation and heat, the idea of perceiving textiles only for party dresses, suiting or bed sheets appears too narrow.

World consumption of this sector is 19.6 million tonnes in 2005 and will rise to 23.8 million tonnes in 2010 with an average growth rate of 3.8%. On the other hand global market for technical textile product increased from US \$75 billion in 2005 to around US\$ 130 billion by 2010.

## 9. CONCLUSION

From the above concepts, we find that the application of technical textiles is required in innumerable fields, thus making them so varied and exciting. Globalisation is not only about increasing internationalisation of markets, is also about the emergence of companies and supply chains which operate across national and continental boundaries. Such globalisation has already proceeded furthest in the automotive and transport industry, the largest segment of the technical textile markets.

The future development of the technical textiles markets and products will largely be centred upon new materials, new processes and new applications operating on a global basis for the development of economies of scale in production and product development. With the fast changing scenario in textiles, steps towards the "HRMS" will become more and more important. With economic liberalization and globalization, there will be tremendous amount of pressure for improving technical know-how, quality standards at every stage with reduced costs and use of eco-friendly products. Value-added technical textiles will become more important from the point of growth and profitability.

World market of technical textiles is projected towards the annual growth rate of 3.6% during the period 2000-2010. For Asian region, the annual growth rate projected is more at 4.33%. In future in this important market would be in Eastern Europe, South America, Asia and the rest of the world. In many industrialized countries, technical textiles account for over 50% of the total textile activity, while this figure for China is 20%.

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