

# Geotextiles and its prospects in Pakistan

by Syeda Faiza Jamil, Research Assistant, Textile Research and Innovation Centre.

Textile Research and Innovation Centre (TRIC) commenced its work on technical textile area of 'Geotextiles' in September of 2008. The main focus of TRIC is to explore the possibilities of indigenous production of geotextiles in Pakistan and to create market awareness of the various civil and infrastructure advantages associated with its use. American Society of Testing and Materials (ASTM) define Geotextiles as "permeable textile materials used in contact with soil, rock, earth or any other geotechnical related material as an integral part of civil engineering project, structure, or system".

A simple composite of textile and earth material can perform mammoth tasks of reinforcement, filtration, ground stabilization and separation; and it can do so cost-effectively, both in short term and long term period. In developed countries, their use has expanded rapidly into nearly all areas of civil, geotechnical, environmental, coastal, and hydraulic engineering. According to David Rigby Association, the potential global market size in 2010 in Geotech is estimated to be 413,000 tonnes by volume, and USD 1203 million by value. It's second in rank amongst all technical textile segments in terms of expected growth between 2000 up to 2010.

The market for geosynthetics in general and geotextiles in particular has shifted towards developing and fast emerging regions such as Middle East and Asia. In the Middle East, with most of the European and US companies winning infrastructure development contracts, the use of geotextiles has already been widespread. The fastest growing consumer of geotextiles today is China. In recent years, China has invested as much as US\$86.70 billion in infrastructure construction, including improving road-rail networks, building new airports and water conservation projects. In 2001 -02, China's actual consumption of geosynthetics stood at US\$250 million, compared with India's market potential of US\$22 million during the same year.

According to BCH (Business Co-ordination House), the consumption of geotextiles in India in the year 2006-07 stood at 6000 tonnes (30 million square meter) which is projected to go up to 18311 tonnes (92 million square meters) in 2011-12. In India, the market for geotextiles is expected to grow in excess of 25% per year. The post quota macro trend is witnessing the shift of focus from low to medium ends of the market to high value added and technical products in textile industry of Asian countries. It is in the backdrop of this scenario that the need is realized to create and foster the market of geotextiles in Pakistan.

## Geotextiles can be utilized for various purposes including

- As a Separation Media:** Two different types of soils are kept apart, so that they do not get mixed under the action of applied force. This separation also helps to spread the load over a larger area and increase load bearing capacity of soils.
- As a Filter Media:** Restraining of soil particles while allowing the passage of fluids into or across a geotextile is termed filtration. Geotextile Filter media have pore size that is large enough to allow water to pass through but small enough to retain the soil particles. The filtration function is associated with dam construction, erosion control and subsoil drainage.
- As a Stabilization Media:** Geotextile is a composite that has superior engineering properties than its separate components: soil and textile. When used in civil infrastructures, they increase the tensile strength of soil and prevent its lateral expansion under axial loads.

Textile Research and Innovation Centre has short listed the application area of roads to see how geotextiles can benefit both in cost reduction and design improvement of roads and highways in Pakistan.

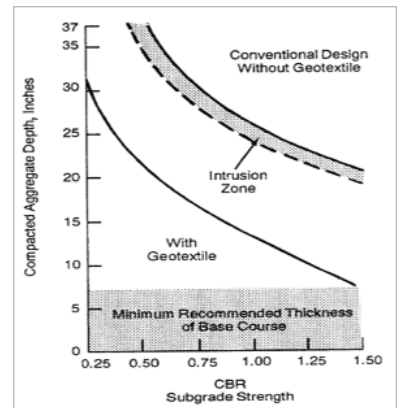
The primary function that a geotextile will serve in the construction of roads depends on the soil type and strength on which the road is being constructed. The following table sums it up.

Category	Soil subgrade description	Field CBR	Primary Function	Cost Justification
1	Soft	less than 3	Reinforcement	Significantly less stone base utilization
2	Intermediate	3 to 8	Stabilization	Less stone base and longer lifetime
3	Firm	Greater than 8	Separation	Much longer lifetime

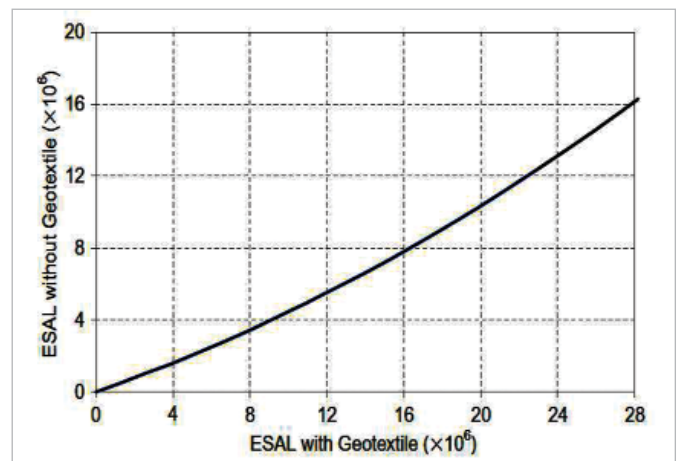
Note: CBR (California bearing Ratio) is a parameter to measure strength of soil.

The advantages that geotextiles can accrue to roads built on different soil CBR's have also been investigated by other independent researchers and research bodies.

- For very weak soils of CBR < 3, following relationship was developed by Departments of the Army, Washington D.C in 1992. It clearly shows that for very weak soils, there is a considerable cost saving involved in terms of the amount of aggregate depth used.



- For soils of intermediate strengths, the amount of loading cycles that would cause certain specified rut depth (ESAL) in a road, with and without geotextile have been graphically displayed in the following figure.



2. In case of roads built over relatively stronger soils, it has been proven through experiments conducted by Geosynthetic Institute, that the life of pavements incorporating geotextiles is increased manifolds.

Since geotextiles are very effective hi-tech materials for ground improvement and engineering, can Pakistan make use of this technology for her benefit?

The SWOT analysis for prospects of geotextile market in Pakistan is done below:

### Strength

The strength of Pakistan lies in its developed textile industry and its indigenous production of synthetic fibers such as polyester and polypropylene. Existing machinery, sometimes with only change of conventional settings can be used for the production of geotextiles. Pakistan textile industry incorporates mature market for the production of polyester staple fibers and filaments, and even polyester filament yarns.

### Weaknesses

A major obstacle to the growth of geotextiles in Pakistan is the level of human expertise. We do not have enough research institutes working in this field to develop important standards related to application requirements and property tests. However, at this initial stage, Pakistan can start by borrowing international standards.

Another major obstacle to the growth of technical textiles in Pakistan is the absence of legislative encouragement on part of the government. The government should start by giving incentives to textile industries and end users for the production and use of geotextiles; and eventually as the industry progresses there is also a possibility of making the use of geosynthetics mandatory, for example in the construction of roads where the subsoil is below a certain level-where the California Bearing Ratio (CBR) is less than 3. This will enhance the performance of roads and reduce maintenance cost. This pattern of gradual progress was followed by European countries, with the introduction of CE Mark for Geotextiles, in October of 2004. It now applies virtually to all public projects.

### Opportunities

There are vast market opportunities in terms of indigenous use of the material especially in soils that are weak, wet or near the Arabian Sea like coastal areas of Gawadar and Karachi.

There is also a possibility of export to neighboring countries like China and India; and to countries in South East Asia e.g. Thailand and Malaysia.

### Threats

The threats that Pakistan might encounter in the production and application of geotextiles is the same that is associated with these products all over the world. For example production runs can be erratic since geotextile is a durable product, and is not demanded by a user regularly. Furthermore, a geotextile cannot be inspected until it is in use. Industrialists in Pakistan might resist the change from conventional products to this innovative market. There is an initial risk involved, but the idea is to create awareness that opportunity cost is still very high.

Furthermore, there is also a need to see to the fact that the production cost of the local market is cheaper as compared to the alternatives from outside. The government can take appropriate measures like increasing import duties on products that might flood an aware Pakistani consumer market from neighboring countries like India and China. The scope of Pakistan's entry and establishment in the filed of geotextile appears to be very promising. However, much more concrete work needs to be done to attain the figures of the profits and performance benefits that this new market has the potential to accrue.

### Acknowledgement

Technical guidance received from Dr. Anbahan Ariadurai, Head of Department, Textile Research and Innovation Centre, is greatly acknowledged.

### References

- ❖ Departments of the Army, (1992). Military Soils Engineering. Washington D.C: Author.
- ❖ Koerner, R.M (1998) Designing with Geosynthetics. Englewood Cliffs, NJ.Prentice Hall Publishing Co.
- ❖ Koerner, R.M (2000 June/July). Geotextile Separation Study. GFR Magazine 18 (5)
- ❖ Narejo, D., Marienfeld, M., Hawkins, B., Lacina, B. (2005). Long-Term Performance Using Separation Geotextiles. GFR Magazine 23 (5)
- ❖ Ritika, G .(2008). International Conference on Technical Textiles and Nonwovens. IIT Delhi Business Coordination House. ◆

## Textile associations in Pakistan put forward ideas for industry development

Leading textile-related export associations of Pakistan asked the Ministry of Textile and Federal Board of Revenue (FBR) to abolish the customs duty on the import of textile/weaving and stitching machinery etc, among other requests including massive changes in customs tariff and revision of Temporary Importation Scheme. Some export associations also proposed revamping of licensing of freight forwarders rules to monitor their activities to avoid misuse. Other suggestions included changes in procedures for "analysis certificates" requirements; issuance of bank guarantees/indemnity bonds; relaxation of conditions in the Temporary Importation Scheme and proper adoption of the harmonized customs tariff schedules.

The Pakistan Textile Exporters Association (PTEA) proposed to the government reduction of customs duty under SRO.575(I)/2006 from 5% to zero on the import of textile

machinery for spinning, weaving, processing, stitching and knitting. It also suggested 5% concessionary duty on the import of spare parts of the textile industry, as well as duty reduction from 20% to 10% on import of sodium hydroxide caustic soda in the coming budget.

The Pakistan Readymade Garments Manufacturers and the Exporters Association (PRGMEA) emphasized the importance of zero customs duty on the temporary imports of buttons, denim and other items. It also proposed new procedures for release of bank guarantee, indemnity bonds along with post dated cheques under the Temporary Importation Scheme (SRO.1065(I)/2005) and etc. Concessionary rate of 5% duty on the import of 100% polyester filament yarn, poly/viscose yarn, acrylic yarn and mixed yarn was proposed by the Pakistan Silk and Rayon Mills Association. ◆