Oeko-Textiles: Creating a Sustainable Future

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The interaction between textile materials and the environment is a complex one taking two distinct forms. Firstly, the effect of a change in properties that the environment can bring about in the textile, generally classed as degradation. Secondly, there is the manner in which the production or use of textiles can impinge on the environment, generally classed under the term' pollution for the negative impact', but also including environmental protection by pollution reduction where, a landfill liner is used to prevent leaching. Daily 150 million tons of waste is generated in India and only 10-20% of it is recycled, compared to 60-70% in developed countries. There is a need to increase consciousness of the community about the need for sustainable development and waste recycling and there is an urgent need to set standards, higher level of definitiveness and create synergy between Industry and Government to increase the use of Oekotech group of technical textiles.

Oekotech also known as Eco-friendly Textiles or Ecotex. They are used in environmental protection applications - floor sealing, erosion protection, air cleaning, prevention of water pollution water cleaning, waste treatment/recycling, depositing area construction, product extraction, domestic water sewerage plants. Major applications of Oekotech are for landfill waste management. It includes products used to prevent leakage of municipal or hazardous waste in landfills and suitable use of waste. The consumption of these technical textiles products remains limited despite their perceived benefits. With rapid urbanisation, the waste management has become major issue in India and Oekotech applications provide an effective way of managing the waste in an environment friendly manner. The article deals with discussing on the need for eco-friendly textile production. The new generation ecofriendly fibers, the different eco-norms and labelling available are enumerated in a crisp fashion. This can pave way for thinking about researches in the area of waste management and green fashion.

Technical Textiles: Oekotech

The latest coined term technical textiles has been a collective domain that encompasses of various applications of textiles grouped and linked to technical textiles. Among the different branches, Oekotech deals with ecofriendly textiles products. This generic term explains interesting concepts of environmental protection, waste disposal and recycling. In view of the increased interest worldwide in environmental and ecological issues, it is not surprising that Oekotech shows by far the fastest growth rates of around 7%.

Features of Okeotech

- Processed with less damaging inputs.
- The processing units are equipped with good sewage treatment.
- The fabrics are of good quality and long lasting.

Need for Oeko Textiles: This is an individual certification given after testing of the fiber to fabric for tor the items sold in retail stores.

OEKOTECH: Market Drivers

- Protection and preservation are leading many ecological and technological changes.
- Disposal and recycling of technical textiles.
- Increased environmental pressure against certain chemicals for e.g. azo dyes and formaldehyde.

Market Trend

- Dominated by synthetic woven
- Fitration textiles
- Insulation products
- Geotextiles
- Treatment of oil spills

- Low formaldehyde linnings
- Eco friendly diapers.

Oekotech Market Size

As an important part of the textile industry, industrial textiles are different from general clothing and household textiles, but refer to specially designed textiles with engineering structure characteristics, high technical content, high added value of products and high labor productivity. And the characteristics of industrial penetration are wide. The global Oekotech Textiles market size is projected to reach USD million by 2026, from USD million in 2020, at a CAGR of during 2021-2026.

Geotextiles in Land and Water Pollution Management

Land pollution can arise when a textile, or a substance used during its production, is thrown away on a landfill site. Fibres or chemicals can be harmful if their decomposition under the influence of air, water or sunlight produces a toxic agent. A range of toxic breakdown products from materials such as polyester, nylon, or other polymers which have been discarded into the waste stream and find their way into a landfill site. Steps taken to render them 'biodegradable' include the use of starch as a source of bacterial nutrition or the incorporation of a substance decomposed by ultraviolet radiation, both of which facilitate disappearance of the waste material.

Technical textiles in the form of barriers to this transfer may well prevent serious escape of pollutants from taking place. Geotextiles are engineered permeable fabrics which play an invaluable role in improving the durability of the civil engineering infrastructure through improving the stabilisation of road and highway systems, reducing the erosion along our coastline providing drainage and lining layers in a waste containment structure; and promoting revegetation by stabilising the soil to allow a root system to develop.

Geotextile Fabric for Separation

A geotextile acts as a separator by preventing the intermixing ofsoil materials and pollutants whilst allowing the free flow of wateracross the geotextile. Geotextile is placed between the subsoil and the granular sub- base of an unpaved road, it prevents the aggregate from being punched down into the soil during initial compaction. Industrial waste in harbours and oil spills near sensitive coastal regions have been prevented from causing irreparable damage by the effective use of geotextile membranes to prevent widespread dissipation of the polluting substances, while ditch liners, landfill liners and stabilization fabrics for banks of vegetation have prevented the loss of valuable topsoil and the movement of soil containing pesticides or other harmful reagents into water supplies. A geotextile made from natural fibres such as jute, coir, etc. would be more suitable for such applications, because it would be biodegradable and hence more environmentally friendly.

Geotextile Fabric for Erosion Control

The main aim is to control erosion whilst helping to establish vegetation which will control erosion naturally. The geotextile is then surplus to requirements and can degrade, enriching the soil. Geotextiles can reduce runoff, retain soil particles and protect soil which has not been vegetated, from the sun, rain and wind. Erosion control can be applied to riverbanks and coastlines to prevent undermining by the ebb and flow of the tide or just by wave motion.

Geotextile Fabric for Drainage (fluid transmission)

The strength of soil is determined by its water content as the water content decreases its strength increases and vice versa. A geotextile can convey

fluids or gases within the plane of the geotextile to an egress point. The drainage system allows dissipation of excess pore water pressure, thus consolidation can take place and the soil strength is increased. The rate of dissipation of excess pore water pressure can be enhanced by using temporary drains in the soil so that the drainage path is reduced. This type of drain is only required to perform for a limited time period, until consolidation has taken place.

Filters used for Air and Water Pollution

Industry filtration and separation systems includes bag house filter sand vibratory shifters. Coal washing and oil deep well water and gas injection filter systems bring us fuel for energy. Filters used in nuclear power plants remove particles from cool ant and wastewater. Mist eliminator cartridges purify air entering turbines and compressors. Coalescing filters extract water from every gallon of aviation jet fuel. Aviation fuel is also filtered for particulate removal and ultimately tested by passing samples through filter disks to determine whether it is adequately clean before dispensing it to the aircraft. Environmental water treatment and waste management, metal plating, textile processing, desalination, analytical laboratory filters. Australian technical and non woven textile firms produce a wide range of complex fabrics for use in air, gas and water filtration which reduce greenhouse gas emissions and prevent ground water contamination by toxic chemicals, eg: gas collector systems in coal fired power stations and landfill, mining and industrial leachate filtration and collection systems.

Noise Insulation

High noise levels are generated in, for instance, twisting, spinning and weaving processes. Unpleasantly loud noise can also arise from the use of vehicles or other equipment in loading, shipping or handling raw materials or finished goods. Technical textiles can be of service in controlling the effects of noise pollution. Widespread use of acoustic absorbent materials are use to reduce the annoyance of high sound levels for human beings. Insulation materials for engine compartment, wheel arches and foot wells have developed.

Recycling

Recycling, in the sense of making a new product from the waste of an old one (rather than just reusing an old product) needs heat, thus using energy. This brings about resource depletion and produces pollution, even if (a highly unlikely presupposition) that pollution is only carbon dioxide, a greenhouse gas. Environmentally friendly recycling is practised within the textile industry. This is the process by which surplus fibres or fibre assemblies are returned to the production train for reprocessing instead of merely being discarded. Unfortunately, there may be a diminution of properties (such as fibre length, yarn evenness or fabric strength) as a result, which can lower the quality of goods that can be produced from this recycled material. The effects of using reworkable waste on yarn quality, for instance, include a significant reduction in yarn tenacity. Production of wovens is the solution of the above problem. Environmental responsibility, sustainability and reduced raw material consumption have become key concepts in cutting-edge nonwovens production.

Whatever technology is applied to form a web, new requirements are in focus including reduced water, energy and raw material consumption. Traditional disposables, like hygiene and medical products, are in real trouble because of tighter environmental laws. There soon will be no more landfills to handle used disposables. The industry is challenged: Every production stage, from fiber to finishing, must reinvest heavily in new production

technologies. Therefore, the big disposable products labels are looking more and more for biodegradable products.

Biodegradable Fibres

The fiber-producing industry is heavily active in research for new fiber types that are derived from renewable sources. New and advanced fiber types like polylactic acid (PLA), derived from corn. Lenzing AG, Austria, produces the generic man-made cellulosic fiber lyocell. Tencel® lyocell fibers are made from wood grown in managed forests. Cellulose from wood pulp is dissolved in an organic solvent, and the resultant viscous solution is extruded into an aqueous spin bath. During the process, the cellulose is not changed chemically. The spinning process is a closed-loop solvent spinning system in which the solvent is recovered for reuse. As a result, there is virtually no release into the environment from the process. The result is a pure cellulose fiber with good moisture handling, thermal properties, microbiological effects and biocompatibility. It is biodegradable for safe disposability.

Tencel is better placed than competing fibers for medical applications due to its combination of properties. The hydrophilic fiber has a smooth surface with a rounded cross-section, giving fabrics that are smooth, have low friction and feel good. It is highly absorbent and provides excellent moisture management. Tencel C is a new product that is being assessed for applications including apparel, hygiene and active sportswear. It is produced by treating Tencel with chitosan during manufacturing. Chitosan is deacetylated chitin - the main structural polymer in the shells of many shellfish and other invertebrates. Chitosan has been shown to influence wound healing and in the right presentation performs well as a hemostat. It is also in use for antibacterial products. Clinical tests have shown the new fiber gives a positive effect on wound healing, morphology and cell proliferation at the wound margin. One of the main observations with regard to chronic wounds is that they show a significantly reduced rate of cell proliferation. Lenzing claims Tencel C has better performances compared to other dressing materials tested.

Sustainable clothing

Sustainable clothing refers to fabrics derived from eco-friendly resources, such as sustainably grown fibre crops or recycled materials. It also refers to how these fabrics are made. Environmentally conscious towards clothing meant- buying clothes from thrift stores or any shops that sell secondhand clothing/donating used clothes to shops previously mentioned, for reuse or resale. In modern times, with a prominent trend towards sustainability and being 'green', sustainable clothing has expanded towards/reducing the amount of clothing discarded to landfills, and decreasing the environmental impact of agro-chemicals in producing conventional fibre crops (e.g. cotton).

Eco-fibers

Bt cotton, to reduce the use of pesticides and other harmful chemicals, companies has produced genetically modified (GMO) cottons plants that are resistant to pest infestations. Among the GMO are cotton crops inserted with the Bt (Bacillus thuringiensis) gene. Bt cotton crops do not require insecticide applications. Insects that consume cotton containing Bt will stop feeding after a few hours, and die, leaving the cotton plants unharmed. Organic cotton is grown without the use of any genetically modification to the crops, without the use of any fertilizers, pesticides, and other synthetic agro-chemicals harmful to the land. A new type of organic cotton, soft to the touch and at the same time, grown without chemicals.

Soy fabrics are derived from the hulls of soybean-a manufacturing by product. Soy fabrics can be blended (i.e. 30%) or made entirely out of soy fibres. Soy clothing is largely biodegradable, so it has a minimal impact on environment and landfills.

Although not as durable as cotton or hemp fabrics, soy clothing has a soft, elastic feel. Soy clothing is known as the vegetable cashmere for its light and silky sensation. Soy fabrics are moisture absorbent, antibacterial, and UV resistant. Hemp, like bamboo is considered a sustainable crop. It requires little water to grow, and it is resistant to most pests and diseases. Unlike cotton, many parts of the hemp plant have a use. Hemp seeds, for example, are processed into oil or food. Hemp fibres are durable and are considered strong enough for construction uses. Compared to cotton fibre, hemp fibre is approximately 8 times the tensile strength and 4 times the durability. Hemp fibres are traditionally coarse, and have been historically used for ropes rather than for clothing. However, modern technology and breeding practices have made hemp fibre more pliable, softer, and finer.

Bamboo fabrics are made from heavily pulped bamboo grass. Making clothing and textile from bamboo is considered sustainable due to the lack of need for pesticides and agrochemicals. Naturally disease and pest resistant, bamboo is also fast growing. Compared to trees, certain varieties of bamboo can grow 1– 4 inches long per day, and can even branch and expand outward because of its underground rhizomes. Like cotton fibers, bamboo fibers are not naturally yellowish in color and are bleached white with chemicals during processing.

PET plastics are also known as Polyethylene terephthalate (PETE). PET's recycling code within the three chasing arrows, is a number one. These plastics are usually beverage bottles (i.e. water, soda, and fruit juice bottles). Recycling plastic reduces air, water, and ground pollution. Recycling is only the first step; investing and purchasing products manufactured from recycled materials is the next of many steps to living sustainably. Clothing can be made from plastics. Seventy percent of plastic derived fabrics come from polyester, and the type of polyester most used in fabrics is polyethylene terephthalate (PET). PET plastic clothing come from reused plastics, often recycled plastic bottles. The Coca Cola Company, for example, created a "Drink2Wear" line of T-shirts made from recycled bottles. Main benefit of making clothes from recycled bottles is that it keep the bottles and other plastics from occupying landfill space. Another benefit is that it takes 30% less energy to make clothes from recycled plastics than from virgin polyesters.

The organic & ecological textiles is continuing to grow, led by the increasing awareness of the consumers who are now informed of the risks conventional textiles pose to health and the environment. For ensure the customer in your responsible project, it is important to ask for a control of your goods or activities in order to guarantee the organic or ecological propriety.

For that, Ecocert offers you to certify according to:

- **GOTS** (Global Organic Textile Standard) for a social and environmental responsibility.
- **OCS** (Organic Content Standard) to guarantee the traceability of organic textiles .
- **Ecological & Recycled Textiles** (Ecocert Standard) to claim the environmental quality.

Eco-Labels

- **Eco-Tex:** it is the label of Eco-Tex Consortium.
- **EPG**: The European product guarantee of ELTAC (European largest textile and apparel companies)
- **GuT**: label of environmentally sound carpet association
- **GuW:** label of environmentally sound furnishing fabrics association
- **Oko-Tex Standard:** label of the international association for research and testing in the field of textile ecology.

Conclusion

Textile industry plays a vital role in the Indian economy and constitutes nearly 30% of India's exports. Globalization of Indian textile industry makes it necessary to analyze its production techniques, procedures and product qualities to satisfy all international eco-standards. In different textile production processes, steps should be taken to ensure

that these processes are done chemically, but do not create any toxic effects. For making sure that the effluent created complies with the standards set by effluent control authorities, appropriate changes in recipes should be made, effluent treatment plants should be set and re-use of effluent wherever viable should be made.

The process of management should be designed in such a way that proper control on choosing and purchase of input materials are inbuilt in the system itself. The cost of effluent treatment is measured as inevitable. Any effort to decrease this cost should not be made by diluting' eco-standards. Suitable audit system should also be introduced by textile units, which ensure that eco-standards are realized. Sustainable clothing has a huge potential and growing market share with very good business opportunities. More researches are done in creating new products and techniques and reduce the carbon foot print. World-wide sorting of the disposed wastes is given attention. Collecting bins in retail outlets and public areas has kindled the spirit of safe disposal among the consumers. Plethora of options are available in this eco-system which can be a wonderful option for a greener path for future.

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