

A STUDY TO ACCESS THE TYPES OF MATERIAL USED IN PACK-TECH TEXTILES

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Abstract

Technical textiles can be classified into twelve main application areas. They are Agrotech, Buildtech, Clothtech, Geotech, Hometech, Indutech, Medtech, Mobiltech, Oekotech, Packtech, Protech and sporttech. Of the twelve segment of this industry this paper focuses on packaging textile which is one of the most important areas in technical textile applications and have 41% share. Packaging Textile comprises of the textile components used to contain, carry, store, and secure goods. The demand for packing material is directly proportional to economic growth, industrial production and trade as goods are produced and then distributed both locally and internationally.

Introduction

Packaging Textiles, also known as Packtex or Packtech with, “package” as symbol includes all significant innovations in the packing, covering and transportation of goods. It can be made from natural or man-made fibers. The natural fibers used for Packaging Textiles are cotton, flax and jute which come from plants and are available in India in large quantities at cheaper rate. They are durable and biodegradable. But the use of natural fibers alone was beset by problems of uncertain production volume and quality since it is an agricultural product. The synthetic fibers used for making packaging products are polyamide, polyolefin and polypropylene. Polypropylene bags are stronger and withstand much higher impact loads. These are quite competitive in price and have good appearance.

Products includes in packaging textiles are Flexible Intermediate Bulk Container, leno bags, Polyolefin woven sacks, Polypropylene nonwovens sacks and wraps, tea bags, coffee filters, soft luggage products, jute hessian, jute sacks and food & industrial product wrappings. Woven sacks (excluding FIBC) represent around half of the technical textiles utilization under Packtech followed by Jute hessian and sacks (counting Food grade jute sacks) with around 30% share. FIBC and wrapping fabrics represent around 20% of the total usage. Utilization of specialized textiles in soft luggage products, leno sacks and tea-bags is under 5% of the total usage in Packtech.

Aims and objectives-

The present research work entitled “A study to access the types of material used in Packaging textiles” was undertaken with the following aims and objectives:

- To study various types of packaging textiles.
- To find out the units involved in manufacturing of these textiles.
- To explore the raw materials used in manufacturing of these textiles.

Methodology

The methodology opted for this study is descriptive nature. Various write ups, research papers and journals were studied and analyzed for the presentation of this paper. Through the process of analysis this paper presents the in-depth information about packaging textiles.

Related Studies

Gurcum and Ibrahim (2015) reported in their Article “Poly (lactic acid) nano composites and packtech applications” that the poly (lactic acid) meets many requirement of a packaging application. Because of its versatile and biodegradable characteristics it is suggested as a commodity resins for general packaging application. It can also be employed in the preparation of bio plastic, useful for producing loose-fill packaging, compost bags, food packaging, and disposable tableware.

Radhika et al., (2014) conducted a study on the application of Nano-Technology in Technical Textiles. They opined that the ability of packaging textiles can be enhanced by using different nanotechnologies like carbon nanotubes, zinc oxide nano particles, aero gels, hydrophilic/hydrophobic titanium dioxide nano coating, etc. Different nano technologies can be embedded on packaging textile results in enhancing the innovative packaging such as oxygen scavenging, anti-static packaging for electronic equipment, etc. the possibilities with nano technologies are immense and numerous.

Results

1. Difference between packaging and technical packaging textiles

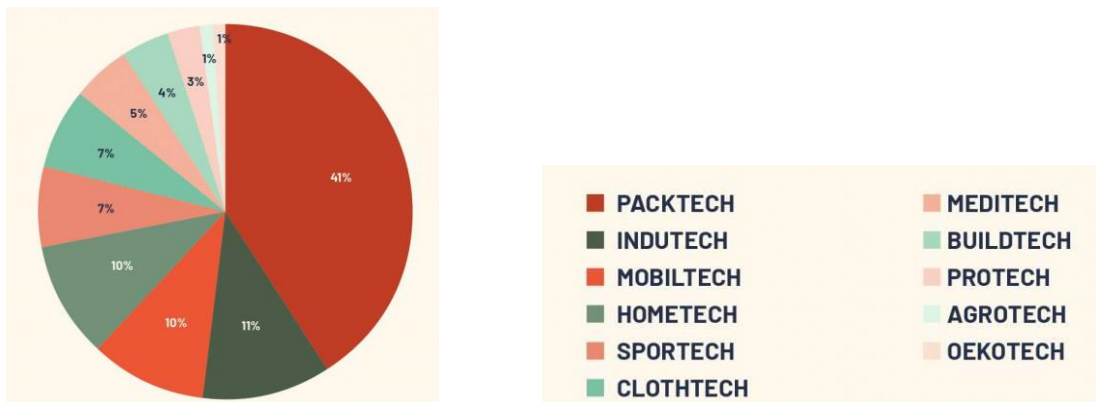
Packaging includes any kind of material which is used for covering, transporting and protecting variety of goods whereas technical Packaging textiles includes the material which is made from textiles used for packing industrial, agricultural and other goods. All technical packaging textiles materials can come under packaging material, but all packaging materials cannot come under technical Packaging textiles.

2.1 Packaging textiles industry

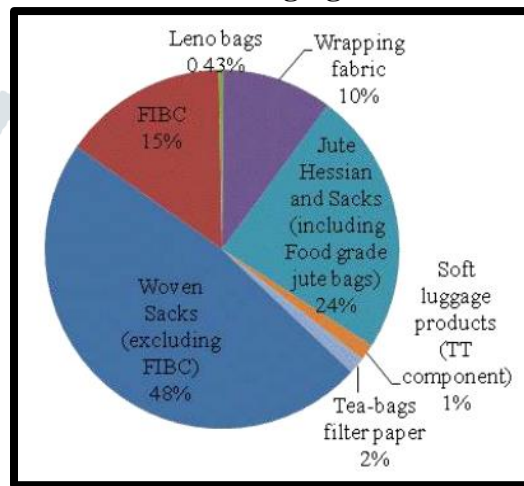
There are more than 3000 units which are manufacturing technical textile products in India. 2/3rd of the Technical Textiles units produced commodity products, only 1/3rd of the technical textiles units produced high ended products. The predominant segments are pack-tech, cloth-tech, home-tech and sport-tech which primarily include commodity products. Among all categories, packaging textiles forms the largest segment and holds 42% of the market share.

Segment wise share in technical textiles market

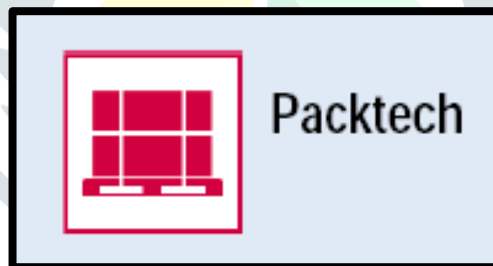
In 2017-18, packtech segment had the highest share of 41%, followed by Indutech, Hometech and mobiltech with a share of 11%, 10% and 10%, respectively. Although packtech accounts for 41% of the total market share, it is a low-value, low technology product.



Value-wise share of various products in Indian Packaging Textile market



2.2 Symbol of Pack-tech-



2.3 International trade- Indian Packaging textile industry is self-reliant as less than 1% of the aggregate domestic consumption by value is imported; However soft luggage products and tea bag filters are the key import products, with imports representing 20% and 10% respectively, of their domestic consumption by volume. Majority of imports of soft luggage fabrics are from China, Hong Kong and France, while that of tea bags are from Germany, UK and US. Indian Packaging textile industry is focused on the domestic market with exports comprising only 5% share of the overall market. FIBC, soft luggage products, jute hessian and sacks are the export products. The key export markets are UK, US, Germany, Spain, France, Egypt, UAE, Saudi and Japan.

3. Different types of packaging textiles material



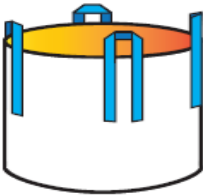
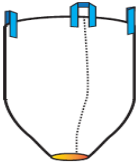
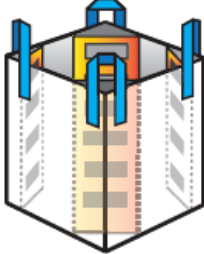
 <p>Polyolefin Woven Sacks</p>	 <p>Flexible Intermediate Bulk Containers (FIBC)</p>	 <p>Leno Bags</p>	 <p>Wrapping fabric</p>
 <p>Jute hessian, sacks and twine</p>	 <p>PP non-woven shopping bags</p>	 <p>Tea bags</p>	 <p>Soft luggage</p>

3.1 Polyolefin Woven Sacks- The raw material used for making of these sacks is Polypropylene. Weaving of Polypropylene yarn is done by using circular weaving machine. Polypropylene/High Density Polyethylene printed sandwich bags are made by sandwiching Polypropylene and High Density Polyethylene. They have good appearance and are used for packaging products like pesticides, seeds, wheat flour, high-end chemicals, cement, fertilizers, thermo plastic raw material etc. The list of user-industries of sacks are cement, fertilizers, chemicals, food grains, cattle feed, salt, sugar, polymers, Sacks-exports, etc. They may also be used for secondary packaging.

The major characteristics of polypropylene are its high strength, lowest density (light weight) and minimal seepage. It is long lasting as it is durable; cheaper as it can be reused and eco-friendly, since product is recyclable, 100% reusable. It is non-toxic and non-staining fabric. This fabric is easy to clean and anti-bacterial in nature. It can be breathable or water proof with a laminated film. It is an economical material as it is easy to produce. It has an excellent resistance to stress and high resistant to cracking. The melting point of PP is 167°C which is very high. It is resistant to most alkalis and acid, organic solvents, degreasing agents.

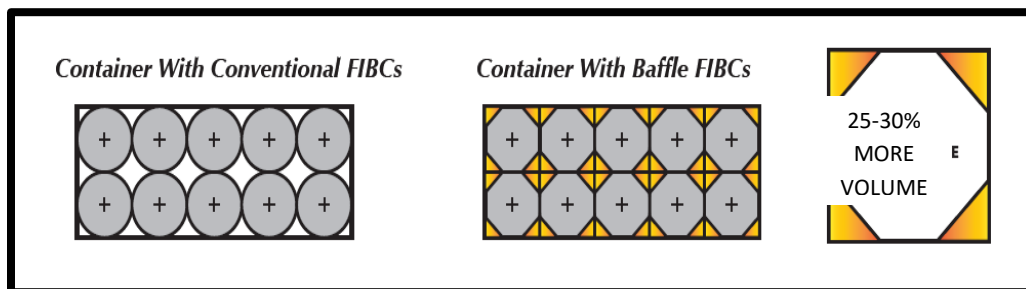
3.2 Flexible Intermediate Bulk Containers (FIBC)- are also called jumbo bags. It is similar to HDPE/PP bags, only difference is that this is bigger in size. It is used for shipping and storing of dry bulk products. They can be produced from either tubular or flat polypropylene (PP) woven fabrics. These fabrics can be coated or uncoated and vary in terms of weights depending upon the requirements of the Safe Working Load (SWL), or Safety Factor (SF). These bags have capacities ranging from 500-4000 kgs. The weight of fabric varies from 180-275 gsm. FIBCs can vary from 900 gms to 3 kgs in weight depending upon the bag properties and weight to be carried.

Table 2.2- Types of FIBC are-

Plate No.	Type of FIBC	Figure	Description
2.16	U-panel bags		It is the most popular FIBC shape, made by joining 2 pieces, which are stitched along the two opposite sides to create two panels. This “U” panel shaped construction gives the bag a large lifting capacity.
2.17	Four-panel bags		As the name suggested, the body of the bag is formed by sewing four panels together, having the top and bottom panel sewn in it. They hold their shape better than other types of bags and are suited for stacking.
2.18	Circular woven bags		These are the seamless bags which are woven into cylinder or tube form and cut to the correct size. The most common construction type is a circular fabric on the body with a sewn square base. Fine and hydroscopic materials can also be packed in it. Due to its shape it can be easily lifted and manipulated with a forklift.
2.19	Conical bags		These bags are designed to discharge the content quickly and easily. Slightly sticky contents such as brown sugar, premix flour products are packed in it. The content is discharged from the conical shape at the bottom.
2.20	Form stable or baffle bags		The bulging of the bag was prevented by sewing four baffles at the corners of the main fabric. The Baffle Bag is ideal for light-density products and can be more economical as it increases payload - the larger panel width allows corners to be filled with 25%-30% more product. No additional staff is required to carry these bags with forklift as this special baffle construction offers maximum stability to the bags. It also reduces the potential of contamination as the sewn edges are turned outside. It also increased the stack ability.

A standard bag is flexible in nature and can bulge at the sides when filled losing its square shape. Baffles are extra fabric panels or pieces of string sewn into each of the bag's four corners. This reinforcement allows the bag to better hold its square shape when filled making them easier to store side by side or stack.

Container with and without baffle FIBCs



3.3 Leno Bags- Vegetables like potato, onion, ginger, garlic, cabbage etc. and fruits like pineapple, citrus fruits, raw mango, coconut etc. can be packed and preserved (excellent) in leno bags. The leno bags are made of netted fabric of virgin polypropylene (PP) with colour master batch. The width of the leno bags ranges from 20 cm to 72 cm and length differs as per the customer's necessities. The mesh again is as per requirement with a maximum of 574 tapes in the warp in different colours.

Different size of leno bags

Size (in cm) width X height	Application
56.0 X 105.0	50kg Potato/ Onion
45.8 X 84.0	25kg Potato/ Onion
30.5 X 66.0	10 g Potato/ Onion

Leno bags have superior aesthetics and excellent mechanical properties. These bags are chemically inert, cost effective, reusable and recyclable. These bags are easy to handle and are also suitable for cold storage.

3.4 Wrapping fabric- wrapping fabric can be made out of HDPE/PP, cotton canvas, etc. (un)laminated PP/HDPE woven fabric is mainly used for wrapping of paper rolls, paper bundles, steel coils, tyres, yarn cones etc. The size of the wrapping fabric varies from 20 to 210 cms and weight varies from 50 to 200 gsm. Laminated woven sheets are used for packing of cloths etc.

3.4 Jute hessian and sacks- Jute hessian are also termed as burlap and is made up of finer quality of jute fabric. It is used for making bags, wall covering, wrappers etc. Presently, shopping bags are being made out of hessian fabric. Jute sacks are made up of heavy jute fabric either in plain or twill weaves. Sacking refers to the coarser and heavier clothes, which do not need special protection but has higher weight. It is in demand because of the openness of the weave, which allow the air to circulate while protecting the contents. Jute fabrics employed for the manufacture of bags may be classified into four broad groups:

Different types of jute hessian sacks

Types	Weight	Meant for Packing
i) Open Hessian	200 - 300 gm ²	Onions, Ground Nuts, etc.
ii) Dense Hessian	300 - 475 gm ²	Sugar, Fertilizers, Sand etc.
iii) Heavy duty Sacking	500 - 800 gm ²	Grains, Sugar, Salt, Cement, etc
iv) Coarse Nettings	650 - 800 gm ²	Cotton bales

Woven jute fabric is strong and durable. This fabric is environment friendly and organic as it is 100% biodegradable and recyclable. It has high tensile strength, low extensibility and ensures better breathability. It has good insulating and antistatic properties. Low thermal conductivity and a moderate moisture regain made this fabric appropriate for packaging.

3.5 Tea bags- It consists of filter paper pouch with a thread, which holds the tea powder and a tag. It can be made with a blend of wood and vegetable fiber or by Poly propylene. 100% non-woven technical textile is used for making PP non-woven tea bags. The heat sealing type tea bag paper is of 16.5 to 17 gsm approx. while the non-heat sealed tea bag paper is around 12 to 13 gsm.

3.6 Soft luggage- The luggage industry is classified into hard and soft luggage. Hard luggage are made from molded plastic while soft luggage is made of woven fabric like nylon and polyester. It can be with or without wheels and handles and are becoming more popular due to the ease of carry as it is light and flexible. Handbags, military backpacks, athletic backpacks, wallets, briefcases and other soft sided luggage items come under soft luggage.

3.7 Non-woven bags- Non-woven bags are bags made from non-woven polypropylene (PP) fabric. This fabric is made with spun and bond polypropylene fiber which is soft, smooth and air-permeable. PP non-woven is thin and lightweight fabric having excellent bulkiness. These bags can be easily printed and the material is strong enough to last up to 5 years. Non-woven bags are a great tool in corporate branding and are attractive as gifts. In a spun laid non-woven material; the fibers are directly taken onto a moving web which arranges them randomly. The unprocessed web looks somewhat similar to cotton. The fibers on this web are then bound together thermally or mechanically.

These bags are durable, attractive, breathable, reusable, water resistant, hypoallergenic, fire resistant, soft, light, odor-free, non-toxic, non-irritating and sometimes washable. It has a good texture, moderate strength and stability. It is odor-free, non-toxic and non-irritating i.e. it does not stimulate human skin. It is chemically stable and colorfast. Colors will remain bright and it can be colored without degrading the plastic quality.

Conclusion

Important uses of Packaging textiles include the manufacturing of bags & sacks traditionally from cotton, flax and jute but progressively from Polypropylene. The benefit of jute fabrics and bags is in their high mechanical strength characteristics, low cost, soft surface of high frictional resistance to sustain high stacking of filled bags in storage and transit, permeable structure enabling ventilation to grain and vegetables. Whereas the high strength and consistency of this engineered material, combined with modern materials handling techniques, have permitted the introduction of FIBCs for more efficient handling, storage and distribution of a variety of powdered and granular materials ranging from fertilizer, sand, cement, sugar and dyestuffs. 'Huge Bags' with typical carrying capacities from 1½ to 2 tons can be fitted with special liners, carrying straps and filling/discharge arrangements. The ability of re-use these containers in numerous applications in place of disposable 'one trip' bags and sacks is another effective contention for their more extensive use. The lighter weight packaging including nonwoven materials like wet-laid, spun bonded nonwovens, are used in the food industry, medicine packaging, and electronic parts.

With increased advancements in the technical textiles and its utilization in relatively every sphere of life made the researcher to embrace the study, as an exploration of the field was required because of lack of data available regarding the various forms and manufacturing process of packaging textiles. The study will be helpful and

valuable for the upcoming entrepreneurs as growing environmental need for reusable packages and container is opening new opportunities for textile products in this market.

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