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Products Made of Diversified Jute as Technical Textiles and their Uses

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Abstract

Technological advancements have enabled the jute industry to provide advanced textile solutions to a wide range of end consumers in many industrial sectors. Blankets, ornamental floor coverings, hand and shopping bags, handicrafts and other present novelty items are some examples of diverse jute products. Excellent advancements in the production of high-performance technical textiles such as jute-covered structural composites and automotive textiles. The potential of jute reinforced plastics has been investigated and determined to be suitable owing to jute's unique features. An huge amount of research has gone into all aspects of jute processing, beginning with novel applications such as agrotextiles, geotextiles, composites, and garments, which will increase jute demand in industrial, technical, and high-performance fabrics. The development of new goods and technologies must focus on acceptable and cost-effective solutions based on a thorough understanding of the inherent strength and capabilities of jute fibres.

Keywords*: - technical textiles, automotive textiles, structural composites, agro-tech, multi-cell fibre, reinforced plastics.*

INTRODUCTION

The use of jute as technical textiles has an immense future and can drive its growth for different new generation products. This is not a new concept, but it has its application and uses in many industrial sectors. Some of the uses are such as jute based nonwoven door panels, woven and

nonwoven fabrics it the automobile industry, jute based composites, jute soil savers, jute geo-textiles, serine cloth and net fabrics for agro-textiles, hydro-carbon free food grain jute bags as environmental textiles, design matt fabrics, for home textiles, dyed and printed form of blended textiles, corded jute yarns, jute based composite boards and doors, etc. The new sectors of diversified jute products are known as cloth tech, geo-tech, agro-tech, home-tech, Oeko-tech, pack-tech, sport-tech, mobil-tech, build-tech, indu-tech, medi-tech and personal property-tech [01]. Jute products that are suitable for the technical textiles are classified by David Rigby Association into twelve classes. The presently available jute technical products include jute upholstery, soft luggage, decorative, jute canvas cloth and jute soil savers. The recent developments in the manufacture of jute high-performance technical textiles comprising jute cover structural composites and composite door and panels [02].

Jute as home textiles has specific end-uses. The fabrics are manufactured as natural colour/blended, dyed, printed fabrics, wall hangings, wall decorative, floor coverings, floor table mats, fashion accessories like laces, patch work and braids, floor mats, aprons, soft luggage, hats, gloves, file covers, footwear, miscellaneous handicraft items from jute fibres, yarns and jute tarpaulins and jute blended products [03]. Fabrics used to package products ad corps or cereals including wheat, rice, potato, tea leaf, and coffee beans is called packaging textiles or pack tech. Those used in households furnishing, home crafts and floor covering are called home textiles (Home Tech). Fabrics used as soil savers for hill slopes, protecting of materials or as geo-synthesis for under lay or over lay in road constructions are known as geo-textiles (Geo Tech). Fabrics used as much or as sapling pots or as fruit nets are agricultural textiles (Agro Tech). Fabric used in automobile furnishing in cars, railways and aviation as components like doors or panels, tyre cords and fuel filters are auto mobile textiles (Mobil Tech) [4-6].

Technical textile is the fastest growing area of textile consumption in the world and the growth rate varies from 3% to 5% per annum. According to the survey by David Rigby Association {04} by 2010, the requirement could have reached about 24 million metric tons per day. Jute based auto trims offer the following advantages. This is an example of jute yarn to high-tech performance technical textiles. Lighter weight of the vehicle leads to fuel

savings and low thermal conductivity of the jute fibres act as good barrier to heat. It has same performance as compared to composites made of synthetic used in automobiles. Jaychandran et al, evaluated non-woven jute fabrics as seat backing carpet under laying and fibre reinforced structure punching where it is an environment friendly option over powder phenol resin which is non-cycle able ad non-degradable car body panel developed by IJIRA with resin transfer moulding using jute/polyester composites have the following advantages over glass/polyester composites: it is substantially cheaper than glass, it offers real weight savings, it allows recycling of moulded parts, it is not as abrasive as glass fibres giving less tool wear. Thermoplastic composite from jute/polyester shows better quality characteristics over polypropylene composites [07-11].

Most common products from jute fibres are yarns, clothes, bags, non-woven fabrics and bleached, dyed and printed decorative fabrics. From the fibres technical textiles like geo-textiles, agro-textiles, automotive textiles and home textiles are also produced. Products as agro-tech, floor coverings, Oeko-tech and specialty garments are considered as the functional textiles of jute [12]. Needle punched non-woven of 120-150 gsm can well be used as agricultural mulch for cultivation of Bhindi, Mung, Kolai, Maize, Merigold and Dahlia. They are also with Mousambi and Cauliflower. The mechanism of action is probably to controlling of weeds and supplementation of nutrients to soil by decaying of jute fabrics. Jute can also release water from its absorbed condition slowly as per requirement of the plants. Horticultural pots using non-woven of 180-200 gsm can also be used for maintenance and transportation of seedlings of forest trees like Mehagini, Shaal and Shegun. Jute and jute blended floor coverings can well replace conventional carpets in a big way for price factor and eco-friendliness. .Jute geo-textiles of non-woven types with 450-500 are suitable for road construction. Jute and sisal blended fabrics (50/50) are used for making lustrous wrappers and upholsteries. They are also used for making scrubbers. Light weight bags are made from jute blended fabrics (f jute/sisal) non-woven types and knitted structures. For warmth, co-friendliness and aesthetic appeal speciality garments from jute with motifs and designed fabrics have become a reality and well accepted by consumers.

Quality of jute fibres depends on its strength, defects, root content, colour and lustre, fineness and density. Depending on these quality parameters, weight age gets for each of the six attributes of the jute fibres is given to their importance with reference to the end product quality. Jute fibres are graded as W1, W2, W3, W4, W5, W6, W7 and W8 for white varieties and TD1, TD2, TD3, TD4, TD5, TD6, TD7 and TD8 for Daise / Tossa types. The major disadvantages of jute fibre are coarse nature, harsh feel, surface fuzziness, prominent hairiness and poor wash ability. Its natural texture and strength, lend s it to a variety of uses both functional and decorative. A variety of handicrafts, handloom items are being used from jute/ jute yarns / jute fabrics.

Jute is a gradable product so it has proved to be a dependable material for use an alternative to plastic and timber. Technological advancement and continuous research finding by the textile research institutes has changed the profile of jute. Utilization of jute for manufacture of market worthy products has opened up large opportunity. In view of challenges faced from cheaper price of synthetic substitutes more thrust have been given on diversified products. The trusted areas of value added diversified products of jute are discussed as follows: jute handloom and handicrafts, non-woven and industrial applications, jute rigid packaging, reinforced plastics, jute composites, jute decorative and jute geo-textiles and other products; jute based fabrics used in the areas of furnishing, upholstery, blankets, and other home textiles; hydrocarbon free jute products for packaging of food grains, etc; DREF spinning technology for manufacturing of technical yarns, jute blended yarns, like jute/viscose, jute/acrylic, jute/cotton, etc; in other categories the yarns such as jute/silk, jute/wool, etc as modern yarns in R&D efforts [14].

From the traditional carpet backing cloth, jute has moved up to the value chain and being used to make attractive floor coverings. Consumer preference is also shifting away from synthetics to natural floor coverings. A traditional jute mat known as Satranchi has also received much acclaim from the consumers and has a large market potential. Hand and shopping bags, carrier bags in the form of travel bags, fancy bags, table lamps, and range of different bags are available for use. Several decorative items, toys, wall hangings, decorative, furniture coverings any more are made of jute fabrics. Cushion covers, sofa covers, bed covers, curtain

clothes, prayers mats, napkins, aprons, etc are also made of jute and combination with other textile fibres. Jute as a golden fibre is a natural, renewable, bio-degradable and eco-friendly product that meets all the standards of safe packaging in the global market. The study declined in the markets for traditional jute products forced the Government and the Jute Industry to give the priority to the revival and development of jute sector in its policy matrix. Besides attention is directed towards promotion of packaging materials for conventional and new end-users with the emphasis on bio-degradable and eco-friendly attributes of jute as a natural fibre so that the jute industry does not depend primarily on mandatory packaging [16-18]. A list on the exploring of jute diversified products from India has been provided by JDPS and it covers various products from floor covering to hard shopping bags [19]. A report of the National Jute Board has also provided a list of jute diversified products [20].

TECHNICAL TEXTILES FROM JUTE

Jute fibres, yarns and fabrics have immense applications in the technical sectors and are growing continuously in the form of technical textiles. Such products are in the areas of non-woven based door panelling, woven and non-woven fabrics in the form of product for automobile industry, jute based composites, fabrics for agro-textiles, geo-textiles for construction, jute bags for environmental textiles, etc. Many organizations are changing over to value added products for technical textiles with the demands for value added products for technical textiles with the demands for functional purposes. There is a steady growth observed in the world of textiles for technical textiles and jute is playing an important role in it [01].

After reviewing the use of jute fibres in technical textiles, it is noticed that there are 12 areas in technical textiles where the use of jute products are suitable as stated by David Rigby. Some of these products are jute canvas cloth, soft luggage, decorative, jute upholstery, jute soil savers,, etc. The need of manufacturing of technical textiles has been focused due to the greater ecological awareness [02].

Thermo set jute rigid composites can be used as door and window frame for low cost house, corrugated sheet for false roof, etc. Thermo plastic jute rigid composites are used for garden canopy, fence, lamp shades, etc. Flexible composites as laminated or coated flexible jute

composites can be developed for architectural textiles, breathable aprons, flexible hoods for automobiles, etc. Jute home-textiles manufactured from natural jute or jute/cotton decorative are used as furnishing fabrics, wall hangings, etc. Jute geo-textiles has its applications in rail and road way constructions for surface soil erosion control, stability of embankment, strengthening of sub-grade soils, protection of banks of rivers, etc. Jute fabrics are now-a-days used as agricultural textiles in the form of sun screens, plant nets, field nets, etc. Other items in this area are field wind nets for protecting crop from birds, weed protection, mulching on seed beds, soil construction, development of forests in semi-arid zones, nursery pots and nets, etc [03-06].

Jute can be used for protective aprons and gloves for the oil installation and refinery, fire brigade, refractors and engineering plants. The materials made from jute composites are increasingly replacing metal and wood. These products are less expensive compared to other composites but are very effective while performing. Jute particles board made from jute sticks are excellent sound absorbing materials. Jute felts are used in auto-interior. Jute based auto trims offer many advantages like fuel savings, for lighter weight of the vehicle. It acts as good barrier to heat with low thermal conductivity. Jute as an environmental friendly material can be used as seat backing, carpet underlying and fibre reinforcing structural punching from resin transfer form are used on car body panels. Jute/polypropylene thermoplastic composites have better quality characteristics than polypropylene composites [07-11].

Some natural fibres like jute, sisal, pineapple, meats, ramie, cotton, etc are being used for long time in the manufacturing of products like packaging materials, ropes, bags, composites, etc. These materials are mostly used in the manufacturing of yarns, clothes and bags. Non-woven fabrics and bleached, dyed, printed fabrics are made for decorative items. These fibres are also used for the manufacturing of geo-textiles, agro-textiles, automotive textiles and home-textiles. Needle punched jute non-woven can well be used as agricultural mulch for cultivation of vegetables like bhindi, mung, kolai, maize, marigold and dahlia. Horticultural pots using jute non-woven can be used for maintenance and transportation of seedlings. Floor coverings from jute and jute blended materials are considered as well as replacement of conventional carpets from

the view point of cost and eco-friendly items. Jute/cotton union fabrics have been developed with textile grade resin like phosphate. Jute speciality motif designed garments are well accepted by the consumers for their warmth, aesthetic and eco-friendly properties [12].

An area which offers new possibilities for jute has the potential for meeting the challenge is the market for natural fibres for industrial applications. This depends on the ability of jute products to be able to meet stringent quality specifications and there has been lot of improvement in quality/production of lighter and better jute fabrics. At the same time there is a need to create newer markets with innovative products to pick up technical textiles, composites and many other items in industrial applications. The jute diversified products and their applications to meet the challenges of newer products with standard quality can lead to the development of new markets. Along with this there must be continuous up-gradation of product designs and quality improvement to meet the changing scenario of the market [13].

INTENSIFIED DIVERSIFIED PRODUCTS

The largest producer of jute goods in the world is the Indian Industries. Jute fibres have some better qualities like, lustre, abrasion resistance, and aesthetic appeal. These qualities of jute fibres ensure the final products made from jute after bleaching, dyeing and finishing and blended with other natural and synthetic fibres. As an eco-friendly annually renewable and abundantly available fibres, the opportunities for its applications in the manufacturing of diversified products. Some of the diversified products from jute and blended jute products are summarized below [14].

The jute based products are jute handlooms and handicrafts, jute non-woven, jute rigid packaging, jute reinforced plastics, jute composites, geo-textiles, decorative items, etc. In the recent past, there has been a steady decline in the markets for traditional jute products and due to such reasons the Government products and the industry are forced to opt for the diversification of jute items. In order to shift their traditional jute packaging, more stress have been given on the diversification of products. In the context of present scenario of the world consumers on biodegradable and eco-

friendly products newer concepts of diversification of jute products are also very valuable. As the consumers preference is shifting away from synthetics to natural fibres, jute woven and piled/tufted carpets have found a new market. In the market items like, hand and shopping bags, travel bags, carrier bags, beach bags, etc are available which are made from jute materials. In the market of decorative items, products like toys, decorative bags, table lamps, wall hangings, furniture, etc are found which are made from jute fabrics. Various different products such as cushion covers, sofa covers, napkins, blankets, aprons, prayer mats, etc are available which are made of jute [15-18]. Jute made attractive upholstery and tapestry carpets are available in the market. Some of the fashionable items made from jute such as lamp shades, hats, footwear, candle holders, jewellery boxes, are immensely available in the fashion goods markets. Export of jute diversified products from India during the period 2012-13 to 2016-17 has been listed in the report [19] and the products mentioned are floor coverings, hand shopping bags, wall hangings, gift articles and decorative. It has a methodical analysis of the JDP exports and their % share on export during the period [19]. Another report by ITC (INDIAN Trade Classification) of diversified jute products have been furnished [20]. The report covers a detailed summary of products from each class of items with their properties and uses. These items are such as blankets, decorative fabrics, floor coverings, hand and shopping bags, and handicrafts and gift novel items.

CONCLUSION

Technological advancement through research and innovation, jute has made it possible for the jute industry to cater the needs of the technical solutions to the multiple end-users in the different industrial sectors. Jute diversified products like home furnishing textiles need to focus on colour, surface texture, look, softness, drape, and aesthetic appealing designs are very much needed. A systematic planning with determined efforts can improve the jute markets for the diversified products in the near future for the entire jute industry. It is expected that new products including garments made from jute materials will improve the demand for use in industrial, technical and high performance fabric. Jute as the golden fibre has a potential to reach the height where it was used in the past but it can be possible only when Government takes continuous efforts and

the proper follow-up actions are taken by the industry.

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