FIBRES USED IN TERRY TOWELS Prof. Rajendra D. Parsi, CTF, MPSTME

Abstract

In order to obtain better feel from the terry fabrics manufacturer required to use different fiber in order to improve serviceability of fabric and better absorption properties of terry fabric. In present situation, decentralized sector contributed to terry products, which gives excess of terry towel production against market requirement and which reduces the cost of terry products. In production of terry towel if manufacturer are concentrated on type of fibers and type of finishes to be used in order to obtain better comfort properties, quality and serviceability of terry fabric, which gives more satisfaction to the customer. It was observed that customer who purchased terry towel from 100% cotton, which gives very good serviceability and customer used that terry towel for long duration. Instead of using that terry towel for long period manufacturer required to add such properties like absorption, feel, and colorfastness properties so customer desire to purchase that terry towel frequently and fabric recycle time should be reduced. If manufacturer are used microfibers, Tencel fiber, bamboo fiber, Bamboo charcoal fibers then fabric recycled time reduced and cost benefits to customers and finally customer able to purchase terry fabric frequently. Cotton is the king of fiber, fabric produced from 100% cotton is quite expensive but in the market on different trade names regenerated fibers are also available which gives better hand feel properties than cotton. .If manufacturer are used these fibers in the production of terry fabrics that would give better scope for terry products.

FIBERS USED IN TOWELS

Properties required in the terry towel are high absorbency, high wet strength, and ability to dye well, good colorfastness wash-ability, soft hand, and hypoallergenic, low cost, and easy availability. Yarns made of cotton fibres and blends can provide these properties most effectively.

Cotton Fibers

Cotton fibres consist of the unicellular seed hairs of the bolls of the cotton plant, the Gossyum plant the chemical composition of typical cotton fiber is as follows: 94.0% of dry weight is cellulose, 1.3% is protein, 1.2% is pectic substance, 0.6% is wax, 1.2% is ash and 4% is other substances. Absorbency refers to a cotton fabric's ability to remove liquid water from the skin as in a towel. Cotton is hydrophilic; it wets easily, and can hold much more water than synthetic fibres can. Cotton releases a considerable amount of heat when absorbing moisture, but it dries slowly. It is not only the amount of water held that is most important, but the water held that is most important, but from the body. The size and distribution of the pores, and capillaries, between and within cotton fibres are uniquely suited for this purpose. Wet strength is one of the crucial properties required in towels,

as they are most likely to remain wet as compared to other home textiles. Cotton is stable in water and its wet tenacity is higher than its dry tenacity. The toughness and initial modulus of cotton are lower compared to hemp fibres, whereas its flexibility and its elastic recovery are higher. Cotton is a natural fiber and considered hypoallergenic. This means cotton has a low tendency to cause allergic reactions. It also does not cause skin irritation and can be sterilized. The microbial resistance of cotton is low, but the fibres are highly resistant to moth and beetle damage. The microbial resistance can be improved by antimicrobial finishing. Cotton uses in the medical institutional area are well known for their hypoallergenic characteristic and sterilize- ability. Cotton fabrics are often recommended for persons having skin allergies. Cotton sanitary products and cosmetic aids are promoted for their health benefits. Cotton towels, bedding and baby clothes have all been promoted on the basis of the hypoallergenic nature of cotton. Moreover cotton's resistance to high temperatures of water makes cotton easy to be cleaned as it can be boiled. It has easy availability as it is grown in more than seventy countries of the world. One other reason cotton is used for toweling is it is the most economical fiber among the natural fibres Shorter staple cotton fibres are generally used in towels because fine yarn counts are not required. The cotton fibres which are used in towels have relatively low fiber length, relatively low fiber strength, relatively low maturity ratio. The micronaire range can be said to be the middle range. Ranges of Cotton Fiber Properties which are used in Toweling Fabrics

according to US Cotton Fiber Chart

Fabric Type	Fiber Length (inch)	Fiber Strength (g/tex)	Micronaire	Maturity Ratio
Toweling	0.93-1.10	20-32	3.5-4.9	0.80-0.90

Other fibres:-

More and more towels are being produced from fibres other than cotton such as Modal[®], bamboo, seaweed, Lyocel[®] and now soybean, corn and other Tri-blend bamboo, silk and cotton blend is also beginning to be used in towels. **Bamboo** may be the next premium fiber other than high quality cotton fibres. Such as Egyptian, Pima and Supima qualities, bamboo can be used in towels because of its softness, luster, antibacterial properties and greater absorbency. However, it has yet to gain acceptance on a large scale. **Flax** is also among the natural hydrophilic fibres of cellulose like cotton. The fiber is termed flax, while the fabric made of flax it is called linen. Flax has better dry strength than cotton, and like cotton it gets 25% stronger when wet. It absorbs more moisture, and it wicks. It is longer, smoother, and more lustrous than cotton. However it is not used commonly in towels as it has been limited in supply and it is expensive because of the long processing and intense labor it needs to be turned into a yarn although uncommon, flax towels have a place in the specialty market. In the year place 2004, totally 1,949,421 flax towels were in the specialty market. In the year

imported to the U.S., which stands for 0.35% of the total towel import of the U.S. Micro-fiber towels are also pushing into the ultra-touch/high absorbency arena with a manmade synthetic product constructed primarily from a blend of polyester and nylon with polyamide. Through a chemical process, the polyester, nylon and the polyamide are bonded. The result is a cloth that goes through another process to split its fiber into smaller "micro" fibres, creating tiny channels. Micro fiber towels can absorb 5 to 7 times their weight in water. Like cotton, micro- fiber towels are available in various colors and weaves, such as waffle, cut terry and loop terry, with various patterns and in various weights. The heavier the micro- fiber towel, the more water it can absorb. Compared to ring spun cotton, micro-fiber is said to be more absorbent. Several companies are experimenting in combining micro-fiber with cotton to make it softer, give a better hand and perhaps make it more appealing to those who are unsure about having a synthetic towel product.

MODIFIED FIBERS, USED FOR TERRY TOWEL

Methods for the weaving and wet preparation of terry pile fabric for use in the production of terry towels are reviewed. Emphasis is given to new methods for meeting special requirements imposed by choice of style, type of fiber used and the size of the towels. The use of polyester fibers in the ground section of toweling requires modified scouring techniques involving the use of special sizing materials; i.e., polyvinyl alcohol. Like polyester different fibers were used in the production of terry towel product so as to reduce the cost and recycle time of the products. Some of the advanced fibers which are using in terry towel industries, they are given below.

Microfiber for terry products:

Microfiber consists of very fine threads of polyester and polyamide (nylon) that combine to form a single thread. Microfibers are so thin (100 times thinner than a single strand of human hair) that when they are woven together they create a surface area 40 times more than that of a regular fiber – creating an expanded surface area with dramatically enhanced absorbing power due to the capillary action of the fine threads. Microfiber is traditionally defined as a fiber with a denier of less than one. Denier is a measure of thinness of fiber and is the weight in grams of a continuous fiber of 9,000 meters.

As each microfiber strand may be smaller than the bacteria it is attracting, it is able to penetrate microscopic particles of dirt and grease on a surface. Split microfiber possesses numerous wedges instead of the rounded surfaces on ordinary cloth, sweeping underneath the particles and trapping them inside. In addition, the rounded fibers on most cloths only push the dirt around, whereas the wedge-shaped microfibers grab the particles of dirt and pull the dirt into its dense internal structure. Furthermore, chemicals only become necessary as a disinfectant, as the bonding agent is no longer necessary to keep the dirt on the fiber. Microfiber has two polymers. Polyester is lyophilic, or has an affinity to oil, so that oil and grease adhere directly to the fibers. Polyamide is hydrophilic, which means it has an affinity to water. As a result, any type of dirt is very quickly and completed removed with microfiber, leaving a sparkling clean, streak-free surface. Microfiber cleans without streaking, smearing, scratching or leaving lint. Microfiber is safe to use on all delicate surfaces. It will clean without scratching or harming the surface in any way.

Ordinary cleaning towels move or push dirt and dust from one place to another microfiber actually lifts or scoops the dirt and stores the dirt particles in the towel, until it is washed. Microfiber can absorb up to seven times its weight in fluids. Microfiber cloths are also extremely durable. They can be washed up to 1000 times and still maintain their effectiveness. This makes it an extremely cost effective product. Machine wash or hand-wash microfiber with mild soapy water.

VISCOSE FIBERS AND THEIR DERIVATIVES USED IN TERRY TOWEL

Revolutionary and eco-friendly and the fiber of the future.

The production of TENCEL® is revolutionary. The production process is based on a solvent spinning process and represents the greatest accomplishment in cellulosic fiber technology. The unique closed loop production process makes TENCEL® the fiber of the future: eco-friendly and economical.

Lenzing Modal®

These fibers extracted from beechwood. The beech tree is quite unique and has grown in Europe for a very long time. Directly from beechwood forests, Lenzing Modal® gives each and every textile a natural image. Beechwood, the raw material for Lenzing Modal®, is known as a deep-rooting plant. For this reason, beechwood, which is extremely resistant, has been known as the Mother of the Forest since the beginning of time.

Lenzing FR® protects against heat stress. Produced from wood, a natural raw material, Lenzing FR® offers protection against heat and flame in a variety of different applications. Around the world Lenzing FR® sets the standard for quality among cellulose fibers with an incorporated FR agent. Only Lenzing FR® is produced using the Lenzing Modal® process. This ensures that the very highest fiber tenacities are obtained. Lenzing FR® keeps the body dry and cool. Heat stress and heat stroke can be avoided.

BAMBOO CHARCOAL FIBER

Lihanre have developed white, gray and black bamboo charcoal fibers. The bamboo charcoal fiber is made of the wild bamboos as raw material, using the new techniques of pure oxygen and nitrogen high-temperature calcination barrier latency, make charcoal micropore innate and cellular technology more refined, and then with the trend of honeycomb-like microporous structure modified polyester slices and made from melt-spinning.

the bamboo charcoal products have the main characters of High ability of adsorption and deodorization, Adjust the humidity automatically, Bacterium and mildew resistant, Good moisture management, Warm in winter and cool in summer, Good Anti-pilling and Anti-fuzzing, Easy dyeing, Easy care. Lihanre bamboo charcoal fiber is a kind of natural and healthy green material with multi-effects of 1200°C bamboo-carbon, and negative ion. It is made of nanometer-level bamboo carbon and polyester, by using special spinning technology. The product has great efficacy of odor neutralization, humidity control, thermo preservation and health keeping.

we make the gray color and black color bamboo charcoal fiber by control the content of bamboo charcoal in the fiber. And we make the gray color and black color bamboo charcoal fiber by control the content of bamboo charcoal 2%-4%-6% the fiber. in White bamboo-charcoal fiber is made of bamboo-charcoal which made by traditional carbonized technology. Firstly grind the bamboo-charcoal into power by nanometer-lever technology. Then cover the white catalyst onto the bamboocharcoal power, smelt it with polyester, at last spin into a kind of white high quality new fiber. The bamboo charcoal powder surface is covered with a layer of white catalyst, and then mixed together with the polyester melt, and then spin the fiber. Then the white charcoal fiber is a kind of new functional modified polyester fibers. white bamboo charcoal are with the same function of gray or black bamboo charcoal fiber but also white bamboo charcoal fiber are good and easy for any color dyeing. white bamboo charcoal fibers with the black charcoal fiber as the functional fiber fully embodied by the charcoal adsorption odor, quality, character of anti-bacteria bacteriostasis, improve air block electromagnetic radiation, emission far-infrared, such as regulating temperature and humidity effects, and has excellent dye ability can be stained light, medium and deep variety of colors.

Fitness(D)	Length(mm)	Grad e	Color	Application
1.5D/2D/3 D	38/88/96	First	white, grey,black	spinning HYPERLINK "http://www.bamboo- china.com/product/bamboo -charcoal- yarn.html"_/ <u>nonwoven</u>
6D/10D	51/64/76/96/10 2	First	white,grey,blac k	for filling

Bamboo charcoal fiber as the functional fiber fully embodied by the charcoal adsorption odor, improve air quality, character of anti-bacteria bacteriostasis, block electromagnetic radiation, emission far-infrared, such as regulating temperature and humidity effects. The use of fabrics made of bamboo charcoal fiber can be widely used in

mattresses, pillows, mattress covers, sheets and underwear, bra, shirt, warm clothing, health care apparel, socks, towels, etc

Bamboo Charcoal fiber—Modified Polyester Staple Fiber: With the rapid development of modern industry, humans life style and living environment has been changed a lot, more and more people begin to pursue the natural, simple and healthy life. Returning to nature is becoming the fashion style of the citizen now, therefore, Bamboo Charcoal fiber is developed. This fiber owns the reputation of "black diamond". In Japan, this fiber is called the "environment guarder of 21century ".The bamboo we used must be six years old and faced south. In order to make bamboo charcoal with more tiny hole, we took the new technology of pure oxygen high temperature, nitrogen obstructed and time-lapse calcining, and then melt spinning with modified polyester chip, which are with honey comb structure.

Parameters considered in the production Terry Towel:-

- Weight & GSM: Weight and GSM should be same as required by customer. Every manufacturer has some template or software (ERPs) where towel manufacturers calculate everything likes pile's height, density of picks and ends to meet requirement. This database or any software has been developed through some basic calculation.
- **Softness/ Hand feel:** It depends on properties of the yarn used in pile, finishing chemicals and too some extent on pile orientation.
- **Pile Orientation:** Totally depends on process line.
- Lint: Lint is basically protruding fibers present in a finished towel. It is measured by weight of accumulated fiber collected from washing machine and tumble drying machine during testing.
- Absorbency: Terry towel should be highly water absorbent.
- **Dimensional Stability:** How a towel is behaving after washing is fall under dimensional stability properties. Dimensional stability is measured by the residual shrinkage % in a finished towel. Other Parameters are strength, color fastness etc.
- General Fabric Properties:-
- Tensile Strength:

The more the crimp the less the strength Other things being equal, plain weave fabrics which have the highest crimp have the lowest strength.

• Extensibility:

The more crimp there is in the yarn the more extensible is the fabric, therefore longer the floats, the less extensible is the fabric.

• Surface Friction:

Whether surface is smooth or rough. Long floats produce smooth fabrics with low crimp levels.

• Tear Strength:

In case of tensile loading, all the yarns in the direction of the loading share the load. In tear loading only one, two or at most few yarns share the load. In tight constructions, the movement of the yarn is restricted during loading and yarn will be presented to the load one by one; this results in a low tearing strength. Loose open constructions allow more freedom for the yarns to move and group together, thus presenting bundles of yarns to the tearing load; in consequence the tear strength is high. Designs which have group of yarns woven together such as rib or basket will have height tear strength.

• Abrasion Resistance:

The most important factors are the crimp levels and the height of the crowns caused by the crimp. The greater the number of crowns/area or the greater the area of each crown, the less will be the stress concentration on the crowns and this leads to a high abrasion resistance The longer the floats the larger the area of contact between the yarn and the abrading and the higher the abrasion resistance.

• Drape:

Heavy fabrics from coarse yarns and dense constructions have poor drape characteristics. Fabrics with long floats in the weave permit the yarns to move freely; this reduces the bending and shear resistance of the fabric, leading to a better drape behavior.

• Crease Resistance:

A plain woven fabric with a high fabric count puts a heavy strain on the fibers and limits the recovery of the fabric. The longer the floats, the higher will be the crease resistance of the fabric.

Conclusion:

The trends in terry towel marketplace are reviewed, basically In Indian textile market are customer oriented market customer decide the price of the product and frequently customer require change or value addition in the product. If value addition is not incorporated in the product, customer not attracted towards the product which will affect on selling of the product in market. It is seen that the terry towel market is a rapidly growing and innovative market with the new technologies of spinning, which is special for towel end use, new fibers -both natural and manmade-, new weaving features, new finishes such as antimicrobial finishes. All these innovations are aimed to increase the value gained from terry towels and reduce cost of the production of terry towel. Manufactures required to use different fibers in different proportionate so that cost of the production reduces and also reduces the cycle time of product and customer purchase the terry towel product frequently.

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