

## A Study on the Properties of Tencel Cotton After Finishing

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### Abstract:

Background and objective: The properties of Tencel cotton were done in this study here 50 percentage of Tencel and 50 percentage of cotton were mixed in the 40:s count and it was knitted in single jersey pattern . the finishing plays a major in textile industry -apparel and clothing the Anti bacterial finish was given which is major required finishing now days , and a UV finishing was also applied so that the sun rays does not affect the sun and causes many problems , the bio polishing finish was given to reduce the pilling effect in the fabric , and the process were evaluated by using mechanical properties such as Abrasion resistance,Bursting strength , GSM ,Crease recovery.

**Keywords —Lyocell , Cotton , Finishing –UV Finish , Anti -Bacterial , Bio –Polishing.**

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### I.INTRODUCTION

A biodegradable cloth created from treated wood pulp is known by the generic name Lyocell. Lenzing AG, which produces it, sells it most frequently under the brand name Tencel®. This substance is utilised in everything from apparel to vehicles due to its adaptability, toughness, and strength both while wet and dry. Although being generally regarded as environmentally friendly due to its natural origins and production technique, it is created with petrochemical derivatives and requires a considerable amount of power to produce.

In its truest form, this substance is durable and robust in both wet and dry conditions. It can be treated to have a variety of textures, from silky to denim-feel, and it can be woven with many other types of fibres, including cotton, wool, linen, silk, and Lycra®. It is preferred for dress apparel since it drapes elegantly and minimizes creases.

Knitting is the process of interweaving along strands with the aid of needles to form elastic, porous cloth. Knitted fabrics can be produced much more conveniently, swiftly, and affordably than woven fabrics.

Each row of the cloth was made from two yarns that form loops. With numerous pointed needles or shafts, knitting machines create yarn loops. The horizontal rows of loops are known as courses, while the vertical rows of loops are referred as ribs or wales.

Knitted fabrics typically weigh less, are pleasant to wear even when travelling, and require little maintenance to maintain a pristine appearance. Another thing that contributes to knits' popularity is their propensity to resist wrinkles. Knitted materials are used to create activewear, comprising

In terms of improving the basic characteristics of textile products, such as dye penetration, printability, wettability, colour, hand, and appearance, textile finishing usually includes treatments like scouring, bleaching, dyeing,

and/or printing. These final mechanical or chemical finishing processing techniques are applied to yarns, filaments, woven or knitted fabrics during this stage.

When we refer to "textile finishing," we also refer to all the processing steps that, although being a part of the so-called finishing stage, are typically applied to fabrics to improve its look, feel, and qualities, often in line with their intended use.

The finishing step is crucial to the success of textiles' commercial outcomes because it is dependent solely on the market's needs, which are getting more and more strict and unpredictable.

## **II. IMPORANTANCE OF TEXTILE FINISHING IN CLOTHING**

The final stage of fabric production is finishing, which also represents the last opportunity to incorporate desirable qualities for clients. The method is also known as fabric beautifying. The final "touch" and special functional qualities that finishing provides bring the fabric's performance to a successful conclusion.

finishing textiles chemically

The process of chemically modifying a fabric to give it a desired attribute is known as chemical finishing. Chemical finishing, commonly known as "wet" finishing, encompasses procedures that modify the chemical make-up of the materials to which they are applied. In other words, a cloth treated with a chemical finish will not respond the same way to an elemental analysis as a fabric that was not treated with the finish.

Due to their environmental friendliness and versatility for use on various substrates under various application settings, enzymes are frequently utilised in the textile processing industry. From the preparation of the fabric through the finishing of the garment, the enzymes are now thought to be an essential component of practically every textile wet processing stage of natural fibres. Enzymes are a component of

"White Biotechnology," which focuses on using renewable resources and applying environmentally beneficial techniques.

### **A. ANTIBACTERIAL FINISH**

Microorganisms can proliferate because of the natural characteristics of textile fibres. Although the structure and chemical processes may encourage growth, the warm and humid climate only serves to make matters worse. To protect both the wearer and the textile substrate itself, textile materials are given an antimicrobial treatment.

Antimicrobial finishing offers a number of advantages, including preventing the growth of odours and staining while protecting fabrics against microbe infestation and quality deterioration. Exhaust, pad-dry-cure, coating, spray, and foam processes can all be used to apply anti-microbial chemicals to textile surfaces. The finish can now be applied to textiles used in the outdoor, healthcare, sports, and leisure industries.

### **B. BIO POLISHING FINISH**

Biopolishing is a textile finishing technique that improves fabric quality and reduce the propensity of (cellulose) knitted fabrics to pill and become fuzzy. Using enzymes, this finishing technique is done to cellulose textiles to create effects that last. This technique gets rid of slubs and projecting fibres from knitted fabrics, greatly minimises pilling, softens the fabric hand, and gives the fabric a smooth appearance. Biological textile polishing

By removing the tiny fibre ends that stick out from the surface of the yarn, the bio-polishing process aims to minimise the hairiness or fuzz of the materials. The protruding fibres become so weak from the hydrolysis action of the enzyme that they can be broken and removed with only a little physical abrasion force.

### **C. ULTRA VIOLENT FINISH**

Since the textile does not always provide appropriate protection, protecting the skin from

the effects of sun radiation is a relatively new goal of textile finishing. More and more emphasis is being paid to specific protective properties of fabrics against the widest range of impacts.

The prevention of UV radiation is a noteworthy goal of growing attention in this field. The tendency of humans to be exposed to more harmful UV radiation from natural radiation is the cause of this. The limitation of the unfinished fabric is that it cannot ensure enough protection. UV stabilisers are thus used as a specific extra sun protection finish. Ultraviolet rays are electromagnetic radiations with wavelengths between 150 and 400 nm. 10% of the sun's energy is in the form of radiation.

### **III. METHODS OF FINISHING**

#### **A. SELECTION OF YARN**

Selected for this research hthe 40's yarn count,50% equally blended Tencel cotton was taken and kintted.web knitting was knitted in circular knitting machine.weft knitting method of formation of a fabric in which loops or made in horizonsalway s from a single yarn and intermeshed of loops takes place in a circular or flat form on a accrossing basis narrates anbumani (2007)

#### **B. BLEACHING AND SCOURING**

The scouring And bleaching were done in a single process by conventional method .the knitted fabric are processed in the winch machine .The fabric is made into ended less chains and are rotated through the liquor by passing over the large drum for scouring and bleaching combined process .after the combined Process ,the fabrics were neutralized .then the fabric were rinsed well and finally dried

#### **D. DYEING PROCESS**

Once the scoring process and bleaching is completed the fabric were ready for the dyeing process .the dyeing process . The dyeing is

carried out in the same machine .the scoured and bleached fabrics were dyed using cold brand reactive -medium shade .once the dye fixation is finished the fabric are washed and soaping is done . after soaping ,the dyed fabrics were rinsed and finally dried

#### **E.SPECIAL FINISHES-BIO POLISHING**

A finishing is a anything that is done to fiber yarn or a fabric to vchange its appearance and the finish of an determines the fabric care required.finishing alters the surface of a fabric and therefore its look and feel says susheela(2002).

Cotton and other natural man made fibers can be improved by an enzyamatic treatment called biopolishing.the main advantage of biopolishing is preventing of pilling explains TST guide.after bio polishing a fabric shows a much lower pilling tendency.other benefits of removing fuzz or a softer,smoother feel and superior brightness that dyed shade or white.

##### **Method:**

The Tencel cotton fabric where bio polished where using cellulose enzyme-rossari.before starting the finishing process the ph level of the soft water was checked and then adjust to ph level of 5-5.5 by the addition of acidic acid once the ph reached the temperature is set for 55-58 c .Then the fabric were loaded and the machine was made to run for 4 minutes .the Ph level and the temperature were checked during the process after biopolishing was completed and the drained fabric and finished fabric washed and finally tumble dried.

#### **F.SELECTION OF ULTRA VIOLET FINISH**

Since the fabric does not always offer adequate protection, safeguarding the skin from caused by solar radiation is a relatively new goal of textile finishing. More research being done on the precise protective effects of fabrics against the broadest range of impacts.

The reduction of exposure to UV radiation is a major goal of the expanding interest in this field. Humans have a susceptibility to be exposed to more UV damage from natural radiation, which is the cause of this. The constraint of the unfinished cloth prohibits it from providing adequate safety.

**Method:**

The Tencel/cotton fabric were anti-ultra violet finishing cellulase enzyme before starting the finishing process the pH level of the soft water was checked and then adjusted to the pH level of 5-5.5 by the addition of acetic acid. Once the required pH was reached the temperature is set for 55-58°C. Then the required amount of the enzyme was added. Then the fabrics were loaded and the machine was made to run for 4 minutes. The pH level and the temperature were checked during the process.

After the bio-polishing process was completed, the drained out and the finished fabrics were washed and finally tumble dried.

Selection of anti-microbial finish:

**C. Special finishes- Anti -bacterial finish**

Cotton duck, webbing, and other military textiles were stiffened and given an odd smell after being treated with mixes of chlorinated waxes, copper, and antimony salts. Potential polluting effects of the use of these materials and toxicity-related issues were not given a lot of thought at the time. Compounds including 8-hydroxyquinoline salts, copper naphthenate, copper ammonium fluoride, and chlorinated phenols were among the insecticides used on cotton fabrics following World War II and up until the mid- to late 1950s. As the threats these compounds posed to the environment and the workplace came to the attention of the government and industrial companies. They searched for replacement products.

**Method:**

The Tencel/cotton fabrics were anti-microbial finishing before starting the finishing process then pH level of the soft water was checked and

then adjusted to the pH level of 5. Once the required pH was reached the temperature is set for 80°C. Then the required amount of the KI-AM 100050 gpl was added. Then the fabrics were loaded and the machine was made to run for 4 minutes. The pH level and the temperature were checked during the process.

After the anti-microbial process was completed, then drain out and the finished fabrics were washed and finally tumble dried.

**IV .RESULT AND DISCUSSION**

Objective evaluations

TCUV	Tencel cotton ultra violet
TCAM	Tencel cotton antimicrobial
TCBP	Tencel cotton bio polish

Table 1

**A.EVALUATION OF ABRASION RESISTANCE**

The following results were obtained for the abrasion resistance of the Tencel/cotton fabric with the selected finishes of UV, anti-Microbial and Bio-polishing.

S.No	Sample	Wt.before abrasion	Wt.After abrasion	Wt.Loss (gms)
1	TCUV	0.150	0.140	0.01
2	TCAM	0.160	0.150	0.01
3	TCBP	0.155	0.147	0.08

WT – WEIGHT

Table 2

The sample of TCUV showed higher abrasion According to the AATCC, abrasion is defined as the wearing away of any part of a material by rubbing against any other surface.

The martindale abrasion tester (Plate-10) was used to determine the abrasion resistance of the fabrics. The 10 test specimens were cut using

the template provided and weighed initially. Then the samples were fixed to the sample holder and clamped over to the top plate. The samples were then made to rotate 50 times (using one setting per sample) in the abradant that was positioned beneath the top plate. After abrasion the samples were weighed and the weight loss was noted in grams and the weight loss percent was calculated.

**B.EVALUATION OF BURSTING STRENGTH**

S.NO	Sample	Bursting strength (Kg/Cm <sup>2</sup> )
1	TCUV	6.99
2	TCAM	6.53
3	TCBP	6.35

Table 3

According to AATCC, bursting strength is the force or pressure required to rupture a textile by distending it with a force applied at right angles to the plane of the fabric under specified conditions.

The test is the determination of the resistance of the textile fabrics to bursting and generally applicable to a wide variety of knitted and non-woven fabrics tells Basu(2006). In testing, a fabric is exposed to a perpendicular force until it rips. As per Hu, the force is often applied using a ball or a hydraulically expanded diaphragm (2008).

Hydraulic bursting was the technique used to gauge the fabric's bursting strength. a strength meter The section of the fabric sample that was to be tested was clamped over an elastic diaphragm using a flat annular clamping ring, and an increasing fluid pressure was supplied to the diaphragm's underside until the specimen burst, according to bs (1979). The operating could be a gas or a liquid. The diaphragm was put over the 10 test samples so that it is flat and tension-free. Through the use of the clamping until the specimen bursts .the operating may be

either a liquid or gas . the 10 samples to be tested was placed over the diaphragm so that it lies in a flat tensionless condition.it is secured by means the clamped ring. The pressure is increased smoothly so that the specified bursting strength of the fabric was reached

**C.EVALUATION OF GRAMS PER SQUARE METER:**

The following results were obtained for the GSM of the Tencel/Cotton fabric with the selected finishes of UV, Anti-Microbial and Bio-Polishing

S.NO	Sample	GSM
1	TCUV	1.55
2	TCAM	1.56
3	TCBP	1.6

Table -4

All the sample TCUV,TCAM,TCBP recorded significantly different (<0.05)GSM Valves when compared to their respective samples.

S.NO	Sample	Crease Recovery in wales	Crease Recovery in Courses
1	TCUV	90.6°	90°
2	TCAM	91.6°	90.3°
3	TCBP	92°	91°

Table -5

From the above table it was clear that TCBP fabric was found to recover from crease very well with 92° in course wise when compared with recovery angle the TCAM and TCUV fabric.

**V. CONCLUSION**

- When compared with the anti-microbial and UV finished fabric sample the bio polishing Tencel cotton dyed with hot brand rteractive was focussed to have less abrasion resistance.

- when compared with the anti bacterial and bio polished fabric sample UV finished tencel cotton dyed with hot brand was focused to have more bursting strength .

when compared with the ani – microbial finish and UV finished fabric sample the bio polished Tencel cotton with hot brand reactive was focused to have more GSM ( grams per square meter ) value

when compared with the bio -polishing Tencel cotton dyed with hot brand reactive to recover from crease sonner in both coarser and walesthasn the anti microbial and uv finished

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