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Denim Manufacturing and Washing as a Fashioned Garments

Ahmed G. Hassabo [a]*, Bouthaina M. Hegazy [b], Hala M. Elmorsy [b], Nanees Gamal [b], Aya Sedik [b], Fedaa Saad [b], and Hanan A. Othman [b]

[a] *National Research Centre (Scopus affiliation ID 60014618), Textile Research and Technology Institute, Pretreatment and Finishing of Cellulose-based Textiles Department, 33 El-Behouth St. (former El-Tahrir str.), Dokki, P.O. 12622, Giza, Egypt*

[b] *Benha University, Faculty of Applied Arts, Printing, Dyeing and Finishing Department, Benha, Egypt*

Abstract

In the last three decades, denim has been the most preferred material for dresses. Denim has waded into the acceptance of children, women, and men, from special wear to everyday wear. The current fashion shows that consumers are interested in wearing denim and believe it to be a comfortable material for clothing. In the 1980s, when denim was first introduced to the market, an effort was made to create cotton denim-style clothing using just 100% polyester threads. Denim is currently one of the most popular cotton dress fabrics, but in the future, blends may play a bigger part in denim.

Keywords: Denim, Washing, Technology, Laser, Ozone.

Introduction

No other kind of fabric has gained as much popularity as denim among all textile products. It has been widely used by individuals of all ages, social classes, and genders. Denim has been used for producing trousers, upholstery, and curtains from the seventeenth century to the present day. [1] Denim is believed to have derived from the French serge de Nimes, a fabric from the French town of Nimes. It was originally made of silk and wool, but denim is always made of cotton. Another fabric was jeans, a fustian made of cotton, linen, and/or wool blend, and it was manufactured in Genoa, Italy. By the eighteenth century, the jean fabric was made entirely of cotton and was used to create men's clothing, which was valued for its durability even after many washings. Denim was also becoming more common, and it was stronger and more expensive than jeans. Even though the two fabrics were very similar in many ways, there was one significant difference: denim was made of one colored yarn and one white yarn, whereas jean fabric was woven with two yarns of the same color. [2, 3] Denim fabric can be used to make a variety of fibrous products. Denim fabrics of various weights are produced depending on their intended use. The weight of denim is determined by the yarn count and cloth density. Denim fabric typically varies in weight from 5 to 15 oz/yd2. The weight range for medium denim fabric is 5 to 10 oz/yd2, whereas the weight range for heavier denim fabric is 10-15 oz/yd2. Medium denim is appropriate for draping, softness, and flexibility in dresses or tops, whereas heavy denim is appropriate for trousers and skirts with blue jeans. Cotton fiber is commonly used to make denim cloth, but very few are made from cotton blended fiber. Denim is typically made with open-end yarns, but there is also a large use of ring-spun or compact yarns. The same denim cloth can be combined with ring-spun and rotor spun yarns. [4-6]

Yarns used in denim manufacture

Cotton is widely utilized in denim production, where the quality of the fiber and the length of the staple are critical. Cotton would not be denim without it, yet cotton growing raises environmental concerns about the amount of water and fertilizers utilized. Denim made from organic or naturally colored cotton can help to solve sustainability

*Corresponding author: Ahmed G. Hassabo, E-mail: aga.hassabo@hotmail.com, Tel. 01102255513
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concerns to some degree. The adoption of genetically modified cotton is another option for reducing pesticide consumption. [7]

Cotton can also be blended with lycra, polyester, lyocell, wool, flax, hemp, and other materials to create unique denim styles. Even though many of these fibers are now being used in denim, it is quite impossible that they will ever totally replace cotton. Stretch denim is usually made up of 98% cotton and 2% spandex to give it the relaxed stretch we all adore. This combination provides excellent mobility while also providing support for those 'problem regions,' such as the hips and thighs. Stretch denim jeans are one of the most rapidly growing areas in the ladies' jeans market. [8] The poly blend is for those who like the look of denim but prefer polyester blends that are lighter weight and dressier and wash and dry quickly. These usually speak to a more established corporate sector, but they are also finding support for jeans suits, and other casual looks when the look is supposed to be 'dressy but easy-going.' [9]

Process of denim manufacturing

Warping

Unlike traditional woven textiles, the cotton warp yarn used in denim production is specially prepared. Before it is placed on the weaving machine, the yarn passes through several steps of processing. Weft yarn, unlike warp yarn, is packaged and transported straight to the weaving machine, where it is inserted into the fabric without further preparation. The process of transferring numerous yarns from individual yarn packages onto a single package assembly is known as warping. The strands are brought together and condensed into a rope before being wrapped onto a relatively short cylindrical barrel or shell with no end flanges for ball warp denim. The yarns that are created are then warped to make the fabric. Because of the wear and tear during the weaving process, warp sheets must be sized to improve their strength. [10]

Dyeing

The process of dying the fabric is different from most other weaves. Only the warp threads are dyed using dye. The weft threads are left in the natural color of white so we can see that dyeing methods for denim warp yarn are rope dyeing, bean dyeing, and slasher dyeing. this is due to denim manufacturing having unique preparation for warp yarn. [11] At present, a lot of types of denim are available with many colors not only blue. Denim has been dyed with many dyes Vat dyes (indigo–sulfur), direct dyes, and reactive dyes (Remazol group) are widely used for dyeing denim. Blue color and shades of blue color are produced through indigo dyeing as known. Sulfur dyeing, also used in denim, creates specific hues such as black, brown, greens, yellow, violets, greys, pinks, and oranges, as well as to obtain greater quality.

Before coloration, these textile fabrics must be pretreated. They are cleaned with sodium hydroxide and detergents during pretreatment to eliminate naturally hydrophobic substances. The washing of these process pipes may pollute the water. Only the warp yarns of denim textiles are dyed. Indigo and sulfur dyes are commonly used to color denim warp strips.

When exposed to air, the reduced dye oxidizes back to its distinctive blue color. The use of indigo as the main colorant in the dying process is common in the production of blue denim. Although indigo is often associated with low-quality vat dyes, it is extensively used in the denim industry due to the worn-out appearance it imparts on denim fabric. The science of indigo dyeing consists of an oxidation-reduction reaction as illustrated in Figure 1. Overall, the denim industry consumes 50000 tonnes of synthetic indigo; however, because indigo is naturally water-insoluble, it must be converted into a soluble form using alkali and a reducing agent before being applied to denim warps. After dyeing, the cloth is rinsed with water, extra dye is removed and dried (colored wastewater causes water pollution), and then sized. The indigo dye must be chemically reduced in the dyeing water using sodium hydrosulfite as a reduction agent. Reduced indigo (yellow in color) will attach to the fiber. [12]

Figure 1: Reduction and Oxidation process of indigo [12]

Sulfur dyes can be used to dye denim garments in some situations to obtain dark colors; however, sulfur dyes are not water-soluble. To make sulfur dyes water soluble, sodium sulfide (a reducing agent) is utilized to reduce them. Sodium sulfide reduces 90% of sulfur colors; however, various sulfides were involved in the reduction of sulfur dyes. [9]

Sizing

Denim cloth is made by weaving twill structures together. Following the warping (beaming) process, the warp sheets must go through a sizing process in which a sizing box includes natural or synthetic sizing agents such as polyvinyl alcohol or carboxymethyl cellulose. The fabric production process consumes a lot of energy and generates a lot of waste from chemicals, water, and packaging materials. [13]

Weaving

Cotton denim fabric for garments is woven in a twill weave with at least three warp threads and three weft threads repeating. The interlacing points in denim fabrics are mostly in the Z direction. Twill weave allows for tight processing, resulting in a firm and long-lasting fabric that was initially used for worker pants in the United States.

Denim Washing

Garment washing is the technology that is used to change the appearance, size, outlook, comfortability, and fashion of clothes. It is primarily used on denim and other clothing. A garment is given a profitable economical and glassy look during the washing procedure. [14] Washing operations are most commonly performed during a full textile finishing cycle. They are almost always associated with key treatments and seek to remove insoluble matter, a matter already in solution, or an emulsion of other impurities from the fabric. To meet the needs of the buyer, washing is an essential procedure for garment products. Due to the weaving, dyeing, and printing effects, the garment is uncomfortable to wear without cleaning. It requires a finishing treatment to make it softer, suppler, and smoother, which improves wearer comfort. As a result of its effects on appearance and comfort, washing is one of the most commonly used finishing treatments. [15, 16]

Importance of denim washing

- Soften the garment and eliminate sizing materials.
- To eliminate dirt, dust, and waste from clothing.
- To remove harmful elements from clothing.
- To make clothing more visible.
- To change one's look to be fashionable.
- To achieve various effects and textures.
- To achieve a vintage appearance and effect.
- To make immediately wearable after buying.
- Customers can find precise measurements for garments due to wash shrinkage.
- The quantity of detergent used, the processing time, and the processing temperature all affect the fading effect.

Types of Washing

There are three kinds of washing processes:

- Biological washing
- Wet or Chemical washing.
- Dry and mechanical washing.

Biological washing

Proteins called enzymes are present in all living things, including plants, animals, human beings, and microorganisms. Every living thing produces a huge variety of enzymes. Because enzymes come from natural sources, enzyme washing is environmentally benign.

Enzymes are referred to as "bio-catalysts" since they essentially catalyze particular chemical reactions. Enzymes function at atmospheric pressure, in mild temperatures, and at neutral pH levels and act on living cells. The use of entirely biodegradable, nontoxic, and ecologically friendly enzymes in the finishing process of contemporary textile technology has attracted more and more attention in recent years.

During the enzyme treatment, the enzyme hydrolyzes the cellulose. It first targets and hydrolyzes the projecting fibers. Then it attacks the yarn section inside the fabric and hydrolyzes it. As a consequence, color is released from the yarn portion, creating a faded effect. Many mechanical and chemical processes that have been used to date to increase the comfort and quality of fabrics can be replaced by enzyme treatment. Enzymes are used in the textile industry primarily to acquire a smoother fabric surface combined with conventional softeners, to reduce pilling tendency, to improve handle, and to get a cleaner fabric surface with less fuzz. The use of enzymes in cellulose materials made of cotton, linen, viscose, and their blends with synthetic fibers has been the main focus of development investigations in this field.

- **Enzymes used in the textile industry**
- Amylases: They are used in the desizing process.
- Cellulase: Used for finishing denim and biopolishing.
- Protease: A finishing agent for wool.
- Catalase: A tool for cleaning up bleach.
- Indigo colors are discolored by the enzyme laccase.

Wet process or chemical washing

The wet washing of clothes improves their appearance or effects through normal or rinse washing, pigment washing, caustic washing, silicon washing, enzyme washing, stone washing, stone enzyme washing, bleach washing, and acid washing. The washing process used a combination of wet and dry processes on raw samples to create a specific effect in the garments and measured the change in mechanical or physical properties caused by various wet or dry washing processes. On the one hand, wet washing is the most important finishing for garments to enhance the appearance and influence the chemical properties of garments, while dry washing is the most important finishing for garments to influence the mechanical properties of garments. To achieve the intended effect, a variety of dry washing processes are used on denim. The wet and dry washing processes are the most commonly used to obtain chemical and mechanical properties on garments in place of the traditional method. [17, 18]

Chemical	Function
Potassium permanganate (PP)	Potassium permanganate is used in acid washing with pumice stone to remove pigment from clothing. It is also used to spray the chamber by nozzle for color removal (whitish effect) from clothes. [7]
Hydrogen peroxide	In the bleach wash method, hydrogen peroxide plays a key role. In an alkaline medium, hydrogen peroxide breaks down and releases hydroxyl ions, which discolor the coloring materials and cause discoloration. Hydrogen peroxide is used in the scouring, bleaching, and pre-dyeing of gray cloth garments. It is also used to neutralize the alkaline state of the garment. [21]
Resin	Resin is a high-performance textile adhesive made from etherified dimethylol glyoxal in monoureine urea. In denim and other cellulose fabrics, the resin is used to create semi-permanent wrinkles. Cotton and synthetic fabrics are also used. After washing, the fabric maintains its soft handle.
Softener	Softener is used to give garment-treated textiles a sickly and soft surface feel while also providing exceptional lubricating properties. Diluted flax softener (cationic or nonionic) with hot water before using it in the washer.

Potassium Permanganate (PP)

Jeans are sprayed with potassium permanganate to give the sandblasting area a dazzling appearance. One crucial aspect of potassium permanganate spray is that it is frequently used as a sporting procedure to enhance the effects of sandblasting. Using a standard spray gun, potassium permanganate solution is applied to the denim garment's blasting. This potassium permanganate spray dries to a murky brown color after appearing pink on the fabric when it is still wet. Depending on the desired outcomes and the kind of cloth, potassium permanganate spray concentrations might range from 0.25 grams per liter to 15 grams per liter. [19]

Black sulfur cloth must be treated with high concentrations as opposed to indigo-dyed fabrics, which are typically treated with modest amounts.

Potassium permanganate does not have a significant impact on sulfur, thus it requires high concentrations and occasionally numerous spraying procedures.

The following are the spraying process' variables:

Distance between the spray gun and the garment: A closer distance will produce a more defined and sharp effect, whereas a farther distance will produce a more diluted and blended effect.

- The distance is between one and two and a half feet.
- The Gun's air-to-water ratio must be carefully calibrated. High air pressure will provide an extremely low bright spray effect to regions where it is not needed, but low air pressure may cause KMn04 to drop on the garment resulting in overly dazzling white spots.
- The concentration of the potassium permanganate solution will, of course, determine how bright the light is.

Acid Wash

Acid wash on denim jeans is growing in popularity because of the striking contrasts and appealing color appearance. Clothes made of indigo and sulfur base fabrics can be washed in acid. Acid Washing was a chemical procedure used to wash denim that left color in the bottom layers of the fabric but stripped the top layer of color, creating a white surface and a faded appearance.

In the 1980s, acid was introduced as a brand-new, cutting-edge treatment for denim clothing. This washing process involved immersing the stones in bleach, followed by neutralization. [32,43]

The typical method for performing an acid wash on denim garments involves tumbling the fabrics with pumice stones that have been soaked in a solution containing sodium hypochlorite (5 to 10%) or potassium permanganate (3 to 6%). This results in localized bleaching that creates an irregularly sharp blue/white contrast. Water addition is not necessary for this wash. Optical brightening can be used to boost the color contrast. Limitations of Acid Wash After wet processing, acid-washed, indigo-colored denim has the propensity to turn yellow. Remaining manganese from insufficient neutralization, washing, or rinsing is the main culprit. [33,49]

Remedy

1. Ethylene-diamine-tetraacetic acid is added as a chelating agent during washing to effectively remove manganese.
2. Acid washing jeans came with additional risks, costs, and pollution, but also avoided some of the issues with stone washing.

Dry process or mechanical washing

The most important finishing treatment for garments is dry washing, which is done to add scraping, spraying, whiskering, damages, spots, rubbing, and tacking on garments or denim products. In garment washing, some processes are done without the use of any chemicals or a garment-loading washing machine. These processes are referred to as dry processes or mechanical processes. Mechanical methods can be used to perform dry processes on occasion. [19, 20]

Types of dry washing processes applied in garments:

- ▪ Scraping
- ▪ Spraying
- ▪ Whiskering
- ▪ Damages
- ▪ Spots
- ▪ Rubbing
- ▪ Tacking

Hand sanding is a common process used to create a distressed effect in stiff clothing. Locations can be on the front thigh and back seat, or they can be used globally following Standard. Emery paper is used to scrape the clothing in a specific pattern and location. Emery paper is available in a variety of numbers, typically ranging from 40 to 600 and upwards; the higher the number, the finer the emery paper, and the lower the number, the coarser the paper. The most common and commonly used number papers in the clothing business are those with 2, 320, and 400. [48]

The most crucial element is choosing the appropriate quantity of paper following the fabric's strength and intensity requirements.

Stones are used to obtaining a soft hand and appealing appearance, and freshly colored jeans are fed into big washing machines and tumbled with pumice stones during the stone washing process. [25]

These stones are multipurpose due to their variations in composition, hardness, size, form, and porosity. The procedure is very expensive and calls for significant upfront commitment. Pumice stones remove certain color particles from the surfaces of the yarn while abrading the surface of the jeans like sandpaper, giving the added effect of a faded or worn look. [27]

Stone Selection The right stone should be chosen in terms of hardness, shape, and size for the intended end product. It should be noted that larger, harder stones have a longer lifespan and might only be appropriate for heavy-duty materials.

- Issues Resulting from Stones
- Stone-to-machine and machine-to-stone abrasion damages washing machines and clothing.
- An increase in labor required to dust finished clothing.
- Waste alcohol disposal causes water pollution.
- Repositioning and back staining

New Technology in denim dry washing

Laser Technology

For decades, laser technology has been used in the clothing industry. Laser technological advancements have lately engulfed the textile industry, intending to improve the efficiency of products and supply chains. Cutting, creating, patterning, printing, welding, engraving, fading, and digitizing are all examples of processes. **[22]** A laser is a tool that generates light by amplifying electromagnetic energy via optical amplification. "Light amplification by stimulated emission of radiation" is how the word "laser" came to be. Laser light is a form of electromagnetic radiation that produces light by changing the energy states of atoms in specific materials. Coherency, collimation, strength, and monochromaticity are characteristics of laser-emitted light. Although laser beams are not divergent, their intensity and power can be exactly adjusted. A laser can also focus on a specific item at a specific angle, based on the application. [23, 24]

Laser fading is a dry technique that has gained popularity in recent years thanks to the use of a computerized system that focuses a laser beam at the proper fading point. The laser beam dissolves any coloring ingredient faster than prior procedures, then vents the vapors created throughout the process when the laser beam focuses and contacts a thin surface on the fabric, allowing for faster and more precise fading. Solid-state and gas-based lasers are well-known in the business. These items' fading rate is proportionate to their wavelength and power. Laser fading, according to environmentalists, is better than acid washing as it is very safe in the surrounding area. [25]

Various types of laser

Fundamental characteristics of lasers are frequently used to differentiate them. Lasers of various kinds can be created using various types of atom excitements in various mediums such as solid, gas, and liquid.

Solid-state lasers are usually transmitted through a medium such as ruby rods or any other crystalline solid material. To allow energy levels to produce laser light, this material can be doped and replaced by impurity ions. Precision frequency is achievable when high-powered beams are produced in extremely brief pulses. Gas lasers, on the other hand, are powerful and efficient, generating continuous bright beams using noble gases such as CO_2. The CO_2 laser treatment, which is deemed a

dry treatment, can be used to achieve faded looks and worn-out effects on textile materials as an alternative to conventional wet treatments such as stone washing, sand washing, and bleaching. [26] An arc light injects organic dye molecules into a solution, which serves as the medium in liquid dye lasers. It produces a broader range of light wavelengths. When it comes to 'tuning' to produce different frequencies, it outperforms solid-state and gas lasers. [27, 28] CO_2 laser treatment has been used in various areas of the textile industry for several years because it allows for quick surface pattern design with high accuracy, attractive effects, and a variety of sizes and intensities without causing significant damage to the physicochemical properties of the textile materials. Depending on the laser process parameters, CO_2 laser treatment is an efficient technique for fading the color from denim fabric surfaces in a short period. [23, 26]

Laser and its Effect on Denim

Textile-engraving procedures have evolved for value-addition purposes, employing lasers as an alternative to traditional procedures (Denim-distressing), with laser-based methods providing a higher degree of sophistication to the denim segment than non-laser methods. It is feasible to use a laser to cut flexible objects such as fabric or stiff metal. Because of its benefits in precision, efficiency, simplicity, and automation scope, industrialists are eager to use laser technology. Traditional cutting instruments for cutting clothing typically degrade the quality of products, particularly on delicate fabrics, because the cutting force is applied to band blades, disks, and reciprocating knives. To say it another way, it leads to incorrect cutting. [29]

A laser beam with a high energy concentration per unit area can be quite intense even with a beam diameter of only 1-2 millimeters. Unlike all lasers, only a few of them are extremely powerful, despite their intense intensity. To put it another way, standard light is incoherent, happens at random times, and propagates in all directions. Lasers, on the other hand, are coherent and spread through a fine dot. [30] The coherency nature of lasers is linked to the monochromatic outcomes in the production of highly collimated lasers. Light has little divergence because all waves move in the same phase in parallel lines. This laser feature generates high intensity even after traveling a long distance. The energy content of a beam can be increased by focusing it with an optical lens.

Sustainable Benefits of Laser

The use of lasers has significant long-term advantages over traditional denim manufacturing methods, as mentioned in this section. Based on industrial data collecting, Table 1 contrasts the advantages of laser processing over the traditional way of denim manufacture.

1. Benefits to the environment: Laser technology is a dry process, thus there is no environmental pollution. Laser technology uses no water and has no issues with chemical use or water recycling.
2. Economical advantages: Using a laser application requires less water and energy to achieve the same results, which helps to lower the cost. Additionally, laser application uses a very small amount of consumables, such as inks, solvents, and auxiliary materials. It also cuts down operation time from the typical process's 30 to 45 minutes to just two minutes.
3. Social advantages: By adjusting the power of the laser, it is simple to change the intensity of the beam, skipping the time-consuming traditional processes. Additionally, the use of lasers eliminates the health risks that chemicals in the conventional approach pose to workers.
4. There are further advantages as well. The laser procedure can be used on finished clothing as well as little pieces of fabric. By using a laser, three-dimensional (3D) features can be created, which is not achievable using conventional methods. Traditional techniques are unable to make designs with the precision that the laser does. [30,31]

Table 1

Advantages of laser processing over the traditional method of denim manufacturing (Collected from the two denim companies and literature [15,29]).

Production parameters	Traditional method	Laser treatment
Duration	Slower (30–45 min/batch)	Faster (2 min/garment)
Productivity	50–60 garments/hr	150–200 garments/hr
Defect rate	3–5%	0%
Intricate patterns	Hard to achieve as no specific area can be selected	Achieved by using computer-aided design (CAD)
Number of operators per machine	2–3 operators needed for one machine	One operator can handle 1–2 machines
Effluent treatment [48]	Needed as the water contains residual chemicals	Not needed as it is a waterless technique
Operating temperature	55 °C	Room temperature
Rinsing steps	3–4	2
Carbon footprint [32]	High	Low
Energy consumption [32]	High	Low
Number of steps	≥1	1

Ozone treatment

Ozone (O3) is a powerful oxidizing agent that can be utilized in the batch-wise procedure to produce the effects of color fading in denim [19,24]. Ozone can be created using the corona discharge method or by exposing oxygen to UV (ultraviolet) light for use in industrial washing machines [39]. Ozone is a gas, not a liquid, thus it uses much less water because the materials must first be soaked before the color is removed [49].

Additionally, one to two washes are required to remove any remaining indigo from the fabric surface after the color is removed by ozone, which conserves water because ozone requires fewer washes overall. A popular chemical technique for producing color-fading effects in denim is ozone [18,50].

Ozone applications

Ozone is used to wash jeans with very little water and produce a fading appearance. Strong oxidizers like ozone can remove indigo from fabric surfaces without the need for chemicals or a water bath [51]. Ozone's oxidizing effect breaks the double bonds in indigo, which aids in the color removal process. The olefinic groups in the indigo dye and the cotton's glycosidic bond react with ozone, causing them to be eliminated [19]. By using ozone, this procedure aids in giving denim clothing a worn appearance.

Sustainable benefits of ozone

Ozone washing and one fading are regarded as sustainable chemical processes for CF, much as laser applications [19,52]. The use of ozone provides several advantages over conventional denim washing, which are addressed in the section below [18], and Table 2 details the benefits of employing ozone over conventional denim manufacture.

Environmental advantages 1 Because there are no issues with effluent formation or recycling during the ozonation process, especially dry ozonation, there is less environmental degradation. Lower temperatures are used throughout the ozonation process, which conserves energy and lowers GHG emissions.

2. Economic benefits: The ozonation process reduces the use of chemicals, water, and energy, which lowers production costs for denim makers. To remove the remaining ozone and the bleached indigo from denim, both the dry and wet ozonation processes only require one or two washings. This conserves water.

3. Social advantages: Because the ozonation process lessens environmental pollution, society is free from problems caused by pollution. In a similar vein, it lessens staff workload and tiredness. However, the use of ozone may be harmful to human health, particularly that of employees.

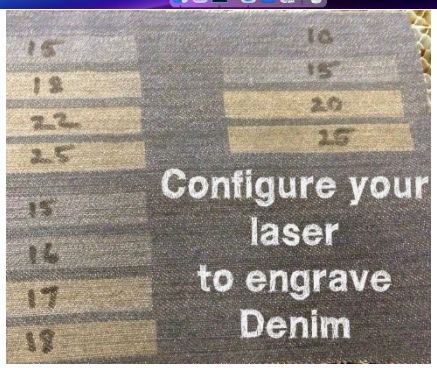
4. There are further advantages, such as speedier ozonation due to ozone's quick color removal, which reduces energy use and operational expenses. Unlike the dry ozonation procedure, which is free from this issue, and the wet ozonation process, which may have only a very little amount of back staining, the traditional bleaching method has the problem of back staining of the white threads in denim and pocket bags. [42,43]

Applications in denim washings for garments

Kids Wear

Women & Men Wear

Laser Printing:



Ozone Fading

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صناعة الدنيم وغسيله كملابس على الموضه

أحمد جمعه حسبو[1]*، بثينة محمد حجازي[2] ، هاله محمد المرسي [2]، نانيس جمال [2] ، ايه صديق [2]، فداء سعد [2]، حنان علي عثمان[2]

[1] المركز القومي للبحوث (60014618 ID Scopus) ، معهد بحوث وتكنولوجيا النسيج ، قسم التحضيرات والتجهيزات للألياف السليلوزية - الجيزة - مصر
[2] جامعة بنها - كلية الفنون التطبيقية - قسم طباعة المنسوجات والصباغة والتجهيز - بنها - مصر

المؤلف المراسل: البريد الإلكتروني aga.hassabo@hotmail.com :

الملخص

في العقود الثلاثة الماضية ، كان الدنيم أكثر المواد المفضلة للفساتين. لقد خاض الدينيم في قبول الأطفال والنساء والرجال ، من الملابس الخاصة إلى الملابس اليومية. تُظهر الموضة الحالية أن المستهلكين مهتمون بارتداء الدنيم ويعتقدون أنه مادة مريحة للملابس. في الثمانينيات ، عندما تم طرح الدنيم لأول مرة في السوق ، تم بذل جهد لإنشاء ملابس على طراز الدنيم القطني باستخدام خيوط بوليستر 100٪ فقط. يعتبر الدنيم حاليًا أحد أكثر أقمشة الملابس القطنية شيوعًا ، ولكن في المستقبل ، قد تلعب الخلطات دورًا أكبر في الدنيم.

الكلمة الرئيسية: الدنيم ، الغسيل ، التكنولوجيا ، الليزر ، الأوزون