

Study on Drive Towards Eco Processing – Denims for Green Fashion

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Abstract

The apparel industry's new driving force is high value added products such as denims and Jeans is prompted by increasing competition from the global industry players. Since the demand for the fashionable jeans and other special effects on non denims is increasing day by day, worldwide chemical consumption in apparel segment especially in Wet processing/ finishing is growing higher and higher. Hence Chemicals play a very significant role by giving a class of touch through the effects, colorful prints to soft handle, from easy care to nanotechnology finish and so on. But, the use of chemicals in finishing has created illicit effects of the environment as a whole.

Apparel industries are facing a severe challenge in the field of quality and productivity, due to the globalization. The highly competitive atmosphere and the more stringent ecological parameters make way for innovations and changes in the present processes.

European legislation is looking for RSL free products from 2014 onwards for all the reputed exporters. Hence the challenge for all the exporters to produce the products concerning the Environment, recycling of materials, usage of less resources, etc.

In Production of Jeans, especially in the washing/finishing of jeans lots of chemicals are used, as well as consumption of water and other forms of energy consumption is at the highest level. Hence Jeans manufacturers should think of the waterless treatments, new technology such as Laser technology, combinations of treatments to achieve the desired effect with less consumption of water resources and other energy consumption.

Apparel industries must analyze and seriously looking forward to provide one-stop sustainable solution along the whole Textile/Apparel value chain from pretreatment, through dyeing, various Jeans washes to finishing. The understanding of how to minimize the impact of their production on the environment and maximize quality, innovation and efficient solutions using intelligent chemistry and eco friendly treatments must be their long term goal. This will promote eco friendly garments as a whole and counterbalance the harmful effects of the present day chemicals.

Hence this article focus on the study of various techniques through which Apparel industries are developing textiles with smart functioning, using new Sustainable products to provide extra comfort and increased performance in an eco friendly manner. Sustainability will be new mantra or essential for all the denim/ jeans brands / Denim manufacturers to withstand in the global environment.

Keywords

Sustainability, RSL, Dyeing, Finishing

I. Introduction

The textile industry is the world's ancient and rich branch of consumer goods manufacturing. It is a diverse and dynamic sector

which covers the entire production chain of transforming natural and chemical fibres (such as cotton, wool, silk, Polyester, Nylon, Tencel, etc) into end-user goods, including garments, household goods, and industrial textiles. Textiles are heavily influenced with environmental, social and governance issues. In the past, efforts of producers and retailers have primarily focused on improving the social aspects of textiles e.g. establishing fair working conditions, setting social standards, establishing minimum wages, ensuring occupational safety, imposing a ban on child and forced labour, etc. But over the decades, all manufacturers, Brands, started thinking and increased concern about the environmental impacts as well with the help of concept Sustainability.

The Environmental impact of textiles also varies significantly based on the type of Fiber, Type of Garment manufacturing, Types of Treatments given to the fabrics/Garments. Generally we can include below for the impacts,

- Water usage, toxicity of fertilizers, Pesticide, Energy usage, etc for cotton garment manufacturing.
- Energy use, resource depletion and GHG (green house Gas) emissions from processing fossil fuels into synthetic fibres, e.g. polyester or nylon;
- Energy use, greenhouse gas (GHG) emissions, nutrients releases (leading to eutrophication) and eco-toxicity from Garment washing (water heating and detergents) and Fabric/ Garment dyeing.
- Avoid usage of water, harmful chemicals, and replacing the treatments with new technologies like Laser treatment, Ozone utilization, etc.
- Recycling of the products and made as a fresh product without wasting the natural resources used for making the garments.

II. Objective of Study

- To provide a better solution to the jeans processing to reduce the consumption of Water and other energy.
- To make sure that all the apparel manufacturers and Brand holders use the concept of sustainability to save this beautiful earth.
- To reduce the water pollution and also Air pollution.
- To enhance the importance of producing Sustainable products to attract the Euro-American customers
- To satisfy the consumers by giving the better sustainable product.

III. Review of Literature

Reviewed the following literatures related to present study on sustainability.

Chinta S. K., Landage S. M. & Ketan Verma. article published in the Textile review magazine , October 2012 , opined that "Biopolishing of cotton fabrics with cellulase enzyme results in both beneficial and adverse effects. By suitably optimizing the

process conditions, the strength loss during the process can be aimed to a required level, without compromising other handle properties”.

Zhu, Sarkis, JosephG & Yong, 2005 stated that In a green supply chain the manufactures can encourage the suppliers to adopt green practices and management systems so as to respond to the conscious consumers out there in the market.

Nilanjana Bairagi in his article Eco- Friendly Processing: Current Status & Way forward in fibre2fashion, November 2013, opined that “The leading textile chemical manufacturing industries have been working towards product stewardship in supplying of chemicals that meet the criteria of eco-labels, (Bluesign, Green label, Oeko-Tex, etc) prohibited substances list and are compliant to REACH legislation.

IV. Methodology

Sustainability has been expressed as meeting the needs of the present situation without compromising the ability of future generations to meet the needs of the customer/consumer. An “unsustainable situation” occurs when natural capital (the sum total of nature’s resources) is used up faster than it can be replenished.

The methods focused in this paper for achieving sustainable denim includes 4 folds:-

1. Significant reductions in Water and Energy.
2. High concentrated chemicals, leads to less consumption of water and energy.
3. Use of High technology for the reduction of usage of chemicals and Water.
4. Re-processing of denim garments after usage.

A. Foam Dyeing AND Finishing

Foam application of process chemicals, or paste coating, is very essential, because it helps in giving the finishes only at the required places. Its advantageous compared to conventional systems of dip tanks, sprays, pad mangles, and suction boxes, which in turn enables the uniform application of aqueous functional chemistry to cotton fabrics with less than half of the water required by conventional processing. Even though foam technology has been existing for few many years, major advances in formulation chemistry, foam generation, and application control have been made over the past decade to suit the specific requirements. Foam systems are effectively used for knits and woven, including denim, for pigment dyeing, finishing, and coating. The low moisture content of the paste or foam coating results in faster drying, enabling a significant increase in production. Because coating places the solution only where ever required, single-sided or dual-sided applications are possible. For example, in the case of functional finishes in denims, one side of the fabric can be treated to be hydrophobic and the other side to be hydrophilic.

B. During Production of Denim Jeans, Combining Two or More Processes Into One Can Significantly Cut Water Consumption

Combination of several processes drastically reduces the chemical consumption as well as the water consumption, and finally achieving the required result.

1. Tests have shown that , when we combine Stone wash in addition to the Bleach wash , consumption of water drastically reduces 30 leters per KG of denim Garments.
2. If we combine Biopolishing with the stone washing, we shall

achieve the desired effect with saving of atleast 30 – 50 L of water per KG of denim garments.

3. With the help of new silicone softeners with remarkable stability which offers several ways to combine treatment baths and thus saving lots of water, energy and chemicals; i.e. saves upto 50 litres of water for every pair of Jeans; Reduce utility costs and Energy Usage ; Assists in marketing of Sustainable Denim Garments.

New kind of silicon softeners (Nearfinish Eco-Fast) can be added to: -

- The Desizing bath in compatibility with Detergents and Alkali,
- The Enzymatic Abrasion Bath , in compatible with Cellulase Enzymes

This has the capacity to reduce the Back staining, hence also acts as anti-back staining agent.

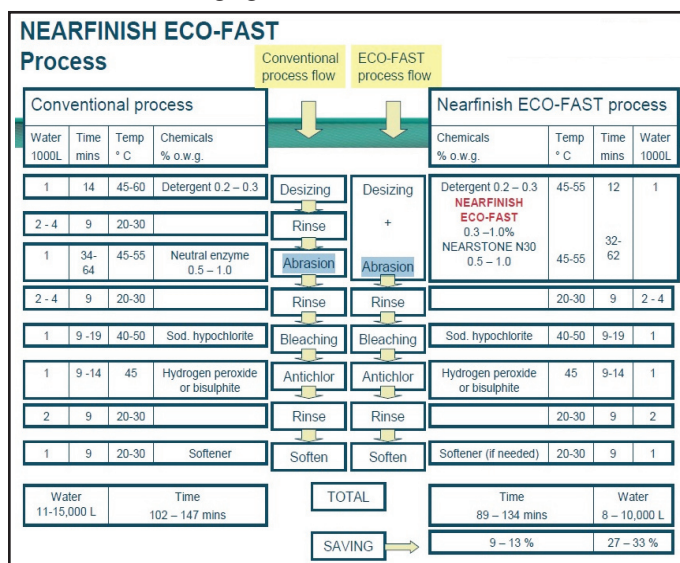


Fig. 1:

C. Usage of Speciality Chemicals

In the conventional denim wash process, Sodium hypochlorite is used to bleach and also Potassium permanganate was used to spray to discharge the indigo, hence producing vintage effect. Which in turn affecting the environment with the discharge of chlorine as well, along with usage of heavy energy (including water)

Now we have specialty chemicals, to achieve the similar discharge effect without use of potassium permanganate or Chlorine. With this not only achieving the desired effect, but also saves environment with the discharge of the chlorine.

NEARBLEACH ECO LT is a new lactase enzyme, and a new type of mediator, which contributes to improved sustainability in processing of denim garments. **NEARBLEACH ECO LT** enables the creation of new vintage looks at room temperature, and may be applied in the same bath used for stone washing, so saving energy and water, and replacing corrosive chemicals such as potassium permanganate and sodium hypochlorite.

1. Two-Step Method

After the stone wash abrasion cycle, the bath is drained and refilled, followed by enzymatic bleaching with NEARBLEACH ECO LT

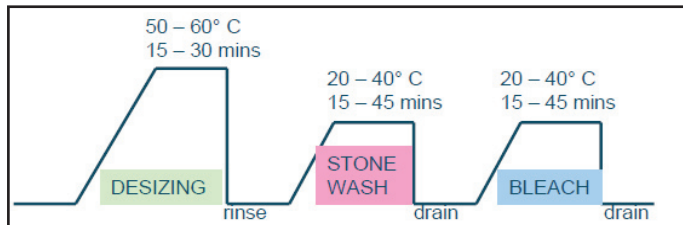
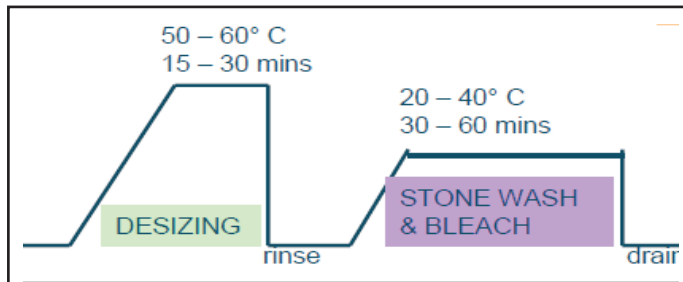


Fig. 2:

2. One Step Method

Stone wash, for example with NEARSTONE N30 cellulase and shade adjustment with NEARBLEACH ECO LT can be combined in one bath at low temperature.



D. Ozone Bleaching

Conventionally we always feel that bleaching needs strong chemicals which have to be treated with heavy bleach chemicals and with high temperature. To avoid all these hurdles, new ozone technology arrived, wherein ozone acts as a powerful oxidizer which works very quickly and in the room temperature. There are no other chemicals used in the process other than Ozone, when it decomposes it turns back to free oxygen, which is environmental friendly.

With ozone bleaching, the moisture content of the jeans will influence the bleaching effect achieved; all precautions possible should be taken to maintain the moisture content more constant whilst garments stand around waiting for treatment with Ozone, preventing or retarding premature or uneven drying out.

E. Recycling of Denim Garments

After the usage of denim garments, instead of keeping them as scraps, we can always think of reusing the same in terms of converting the garments to the beginning stage of yarn i.e. Fiber form. All denim garments are unraveled and broken the garment/fabric structure to get the initial stage of the yarn. These fibers are processed neatly by various chemical processes such as bleaching, etc. so that it gets the fresh fiber stage. Then the fibers are freshly used to convert the same into the yarn and then proceed to make denim fabric/garments. Normally with five used denim garments we will achieve one KG of the yarn after all the wastages. Hence we can completely utilize the used jeans with the help of recycling of the same.

V. Results and Discussions

Currently, the producers and retailers are focused, who are mostly driving the improvements in sustainability of apparel products such as Jeans, etc and are also working at raising consumer awareness. There is growing attention towards not only social, but also environmental impacts of textiles and apparels especially for certain specific kind of products such as Jeanswear. Demand for more environmentally friendlier textiles is continuously increasing simultaneously saving natural resources. Permanent

and quick changes in fashion can be an opportunity for rapid uptake of sustainable garments, but also a barrier since such trends could quickly be replaced by something else. Jeans Brands will have their reputation by improving their environmental and social performances. It also builds strong customer / consumers connections by involving them in sustainability initiatives. Technological innovations in terms of production and processing of jeans will certainly a relevant solution for the Sustainability of jeans.

VI. Conclusion

Retailers and Producers need to do collaborative works to produce and promote more environmental friendly Textiles/Apparels. Developing production processes using lower amounts of water, Lower chemicals, hazardous chemicals or lower releases of GHG etc. is as important as the measures adopted by retailers, producers and in the due course for consumers to select such textiles/apparels. However, consumer behavior in how they care for and dispose of clothing and other textile products is of equal importance, e.g. selecting the appropriate washing temperatures, taking the right steps to significantly extend the lifetimes and encouraging recycling of garments once they have reached their end of life. These important issues are all areas where retailers' brands can have a high degree of influence on the consumers to increase the demands of the products.

VII. Scope For Further Study

Sustainability cannot have any kind of limitations, as it has got wide scope in the Textile / Apparel Field. This paper focuses on the denim / Jeans garment and finishing; If the same is extended to the other types of fabrics and fabric finishes such as dyed fabrics/ dyed garments, it can always have sustainability with respect to the same.

Appendix

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