

Recent Trends in Textile and Apparel Finishes

Ms.N.Gayathri¹ & Mrs.V.A.Rinsey Antony²

¹. Assistant Professor, Dept. Of Costume Design and Fashion Sri Krishna Arts and Science College, Coimbatore (India)

². Assistant Professor, Dept. Of Costume Design and Fashion Sri Krishna Arts and Science College, Coimbatore (India)

Corresponding Author: Ms.N.Gayathri

Abstract: The Indian textile industry is as diverse as the country is and as complex an entity. There is an organised, decentralised sector and down the line, there are weavers, artisans as well as the farmers. Emerging technologies will always be the best available technologies keeping energy saving in mind as policy makers and regulators are addressing environmental issues in industries with the application of abatement strategy. This will improve the environmental performance of the industries and also limits pollutant discharges and helps the environment. Textile producers can sustain their competitiveness in a liberalised and competition-driven market only when they are able to develop new markets and enhance productivity by raising their real end product and investing in emerging technology. Added value can be obtained only by shifting away from labour-intensive mass products and concentrating on new, high-quality specialised products.

Key words: environment Finishing, innovation, technology, textile.

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I. INTRODUCTION:

A **textile** is any kind of woven, knitted, knotted (as in macramé) or tufted cloth, or a non- woven fabric (a cloth made of fibers that have been bonded into a fabric, e.g. felt).

Textile finishing is the term for chemical and mechanical processes used on fabric after it's manufactured but before it is cut and sewn into garments or made into other things. Textile finishing is used to achieve desired effects and it can have aesthetic or functional benefits. Finishing processes can modify appearance of the fabrics, make it softer, or improve elements of its performance according to the end use. Whichever process is done, textile finishing makes fabric more appealing to the consumer.

Garment finishing through garment wet processing add values to the garments and the additional effects become the clear differentiator. Garment finishing can be used for various applications, such as shirts, trousers or t-shirts, but majority of the effects are most popular for casual wear and denim segment.

1. Recent trends in textile and apparel finishes:

In textile manufacturing, finishing refers to the processes that convert the woven or knitted cloth into a usable fabric or any material and more specifically to any of the processes performed after dyeing the yarn or fabric to improve the look, performance, or "hand" (feel) of the finish textile or clothing.

Some finishing techniques such as bleaching and dyeing are applied to yarn before it is woven while others are applied to the grey cloth directly after it is woven or knitted. Some finishes, such as fulling, have been in use with hand-weaving for centuries; others, such as mercerization, are byproducts of the Industrial Revolution.

Special finishes for natural fibers

- **Bio-polishing** removes the protruding fibers of a fabric through the action of an enzyme. Enzymes, such as cellulase for cotton, selectively remove protruding fibers. These enzymes can be deactivated by an increasing the temperature.
- **Mercerization** makes woven cotton fabric stronger, lustrous; to have better affinity to dyes and abrasion will be reduced.
- **Raising** lifts the surface fibers to enhance softness and warmth, as in flannelette.
- **Peach Finish** subjects the fabric (either cotton or its synthetic blends) to emery wheels, making the surface velvet-like. This is a special finish commonly used in garments.
- **Fulling** or waulking is a method of thickening woolen fabric to make it more water- resistant.
- **Decatising** to bring dimension stability to woolen fabrics.

- **Anti-microbial finish** makes a fabric to inhibit the growth of microbes. The humid and warm environment found in textile fibers enhances the growth of the microbes. Infestation by microbes can cause cross-infection by pathogens and the development of odor where the fabric is worn next to skin. In addition, stains and loss of fiber quality of textile substrates can also take place.

Special finishes for synthetic fibers

- **Heat-setting** of synthetic fabrics abolishes the internal tensions within the fiber, generated during manufacturing, and the new state can be fixed by rapid cooling. Heat setting can be fixed in the fabrics at the relaxed state, and it eliminates subsequent shrinkage or creasing of the fabric. Presetting of goods makes it possible to use higher temperature for setting without considering the sublimation properties of dyes and also has a favorable effect on dyeing behavior and the running properties of the fabric. On the other hand, post-setting can be done along with some other operations such as Thermasol dyeing or optical brightening of polyester. Post-setting as a final finish is useful to achieve high dimensional stability, along with desired handle. Heat-setting is considered as an important part in textile finishing.
- **Stiffening and filling process:** A stiffening effect is desirable in certain polyamides and polyester materials (e.g. petticoats, collar inner linings). It can be done by reducing the mutual independence of structural elements of fabric by polymer deposition on coating as a fine film.
- **Hydrophilic finishes** compensate for lower moisture and water absorption capacity in synthetic fiber materials, which will be uncomfortable during the fabric is in contact with the skin. Certain products, based on modified polyamides, make the fabric more pleasant by reducing the cohesion of water so that it spreads over a larger area and finally evaporates more readily.
- **Anti-pilling finish** alleviates pilling, an unpleasant phenomenon associated with spun yarn fabrics, especially when they contain synthetics. Synthetic fibers are more readily brought to the surface of a fabric due to their smooth surface and circular cross-section, and due to their higher tensile strength and abrasion resistance. With knit "picking" also occurs: by abrasion, individual fibers work themselves out of yarn loops onto the surface, and the garment will get caught on a pointed or rough object. Knitting is susceptible to these effects due to the open weave and bulky yarn.
- **Anti-static finish** eliminates dust from clinging to the fabric. Anti-static effective chemicals are highly inert chemicals and require thermasol or heat treatment for fixing on polyester fabrics. Polyether agents are likely useful but it should not affect the dye- equilibrium on fiber, lest they impair the rubbing fastness.
- **Non-slip finishes** give the filaments a rougher texture on fabric surface. Synthetic warp and weft threads in loosely woven fabrics are particularly prone to slip because of their smoothness on the surface when the structure is disturbed and appearance is not attractive. Silica gel dispersions or silicic acid colloidal solutions are used in combination with latex polymer or acrylates dispersions to get more permanent effect, along with simultaneous improvement in resistance to pilling or snagging. These polymer finishes are also contributes in imparting a softer and smoother handle to synthetic fabric without making it water repellent.
- **Fire Resistant or Flame Retardant finish:** reduces flammability.
- **Anti-microbial finish:** with the increasing use of synthetic fibers for carpets and other materials in public places, anti-microbial finishes have gained importance. Products which are commonly applied are brominated phenols, quaternary ammonium compounds, organo-silver and tin compounds, which can be applied as solutions or dispersions. They can also be integrated in a polymeric film which is been deposited on the surface to obtain controlled release.

2. Garment Finishing:

Garment finishing through garment wet processing will add value to the garment and the additional effects become the clear differentiator. Garment finishing can be used for various applications, be it shirts, t-shirts or trousers, but majority of the effects are most popular in casual wear and denim segments.

Garment finishing



Purpose Of Garment Finish

Unless any product is characterized by value added ones it is impossible to stay alive in this highly competitive world market. Processing is significant to make a usable but finishing gives value addition to it.

- It makes the garments more attractive, comfortable & finishing can fit in desirable properties.
- Finishing is the heart of textile processing.
- **Value addition = {(Technology) + (Innovation)} x Quality.**

Method Of Application:

There are two methods of garment finishing.

1. Dip process.
2. Tumbling process

Dip process:

Dip the garment inside out in finishing chemical keeping MLR 1:5. Washing machine may be used.

- Rotate the garment for 20 min.
- Hydro extract the garment to 70 to 80% pick up.
- Tumble dry at 70°C to moisture content 10—12 %.
- Turn the garment right side out.
- Iron/steam press the garment to set the creases at desired places.
- Cure at 150°C—160°C

Tumble method:

- In this process the garment are placed into a machine with a sealed cylinder and application of recipe by either pumping or spraying.
- The drum is twisted for 20 min there should not be excessive dripping of chemicals from the garment. If so more tumbling time is allowed.
- This method is being used most readily due to the fact that there is no wastage of chemicals.
- After saturation the garments are hydro extracted tumble dry at 70°C to 10—20 % pick up moisture content.
- The iron and steam press the garments to remove/set creases. Cure at 150°C —160°C for 8 -10 min.

4. Important features:

- MLR should not be less than 1: 0.85 for the garment weighing 600 gm and 1:1 for those weighing more than 600 gm.
- Minimum time of tumbling should be 20 min.
- Tumble rotation speed 20-30 rpm.
- Tumble drying temp. Should not be more than 70°C.
- Moisture retention after drying should be 10-12%.

5. Wash down effects:

It can be obtained by a variety of garment processing techniques which are mainly reliant on physical and on chemical abrasion of the surface dye there by producing different wash down or break-in looks.

- In garment washing the seams, waistband, pockets, cuffs, etc develop a contour, which can be obtained by washing in garment from only.
- Washing down of garments is the latest development in fashion technology. Washing brings out special

effects changing the feel and look of garments.

6. Functional Finishes:

AquaTex Finish:

Traditional finishing processes for these fabrics typically require the addition of chemicals, in reality; however, these chemical compounds decrease the life span of such fabric's performance, and exclude the of recycling possibilities, and frequently engage appreciably higher additional expenses for wastewater treatments.

The AquaTex system or for the enhancement of woven and some knit fabrics has been developed In lieu of these chemicals, which frequently are environmentally objectionable, the AquaTex system only uses regular water at ambient temperature to attain adequacy of such fabrics in the trade and also makes them more profitable. Softness - the fabric usually does not

need any additional processes to obtain this property. Improvement In abrasion resistance - up to 50 % higher. A permanent mini-velour can be obtained in fabrics, which have spun weft or warp yarns. The surface of the fabric is very clean. Also improves definition and lucidity of the design and the colors. Reduced or eliminated use of environmentally harmful chemicals. More gainful - abolition of traditional finishing processes.

Feather touch & ultra soft touch:

Feather touch & ultra soft touch finishes are commercial names produced by treating with amino, carboxy, or epoxy silicones alone or in successive treatments. Amino Silicones are widely available in market are widely used in softening. They impart excellent softness with bounciness when used in concentration 2.5-3% on weight of fabric in garment finishing. Yellowing and some level of hydrophobicity are the disadvantages. Epoxy silicones, which are most compatible with most of the other finishing chemicals, impart softness without yellowing and improved fabric strength. They also play a vital role in wrinkle free finishes by imparting better tear strength.

Rubbery touch:

Rubber latex provide lustrous, brittle handle with characteristic rubbery effect, which are hard-wearing. This effect gaining much more importance among the youngsters. In leather finish, it is applied as final finish treatments which are after enzyme or stone wash or after mechanical abrasion and enzyme treatments. Many catching names such as bio polished & rubbery touch finish, enzyme bio polish & rubbery touch finish, are quite universal.

Non-stick Teflon spray:

This is a new generation multi-use lubricant based on poly tetra fluoro ethylene (PTFE). In service this lubricant forms a tenacious non-stick coating of the fluoro-polymer, which does not permit dirt and dust to settle on the fabric surface. This makes the product ideal for cement plants, textile mills and industries etc. where constant flow of dust and contaminants affect the conventional lubricants.

Stone wash:

Pre-washed, abraded, faded either regular or irregular looks are produced by subjecting the dyed garments to harsh washing treatments commonly known as stone wash garments.

In order to speed up the garment wash effect and to give garments an even more exclusive appearance and softer hand; abrasive stones were introduced to the wash bath. There are variety of natural synthetic stones are available for stonewashing with perhaps the most broadly used being pumice or volcanic rock. As the stones are used, they slowly disintegrate, reducing the severity of the stonewash effect over a period of time. The stones not only abrade the fabric but also steadily corrode the inside of the rotary drum. A machine used for stonewashing should not be used to dye when abrasion would be detrimental to the fabric.

Procedure:

Load stones into machine. Load garments into machine (ratio usually 0.5 - 3.0 part weight stones part weight garments). Desize with alpha amylase enzyme and detergent. Liquor ratio 5-8: 1. Rinse. Refill and tumble with stones 30 to 90 minutes, depending upon desired outcome. Liquor ratio 5-8: 1 at 50-70°C. Scouring additives can also be used. Drain. Separate garments from stones (garments can be transferred to another machine). Rinse. Apply softener (garments can be transferred to another machine for softening). Extract and unload. De-stone and tumble dry. Press, if required. Softeners and/or lubricants can be added during steps three and five to reduce creasing potential.

Ice wash: -

Either by accident or experimentation, a method was developed in which stones are used as a vehicle to

deposit a chemical on garments to strip the color. This surface deposit of chemical remove the color only on the outer surface of the garment and produces a frosted appearance. Indigo and selected Sulphur dyes are now the most candidates for this procedure.

Procedure:

Soak stones in solutions of potassium permanganate for 1-2 hours. Concentration ranges from 1.5% to 5% are being used commercially. Stones should be drained of excess liquor. This can be accomplished by placing stones in net or mesh fabric prior to soaking. Then the stones can be removed and the excess are drained off. Another alternative method is to place the stones in a rotary tumble machine along with waste fabric and tumbling for quite a few minutes to remove the excess solution. A third alternative is to use any number of the pre-soaked stones or materials available from suppliers. These are available in many different shapes with varying levels of chemical and other additives that produce different effects. Trials should be conducted to determine the best method for achieving desired effects.

Place stones and garments in machine. Tumble the garments for 10-30 minutes or until the preferred effects are achieved. Results depend on dyestuff, fabric, and concentration of chemicals, stones, additives, and equipment. In a number of cases, the stones can also be reused for another load before re-soaking, depending upon their porosity. It is advantageous to transfer the garments to another machine for washing, minimizing the number of machines used for the corrosive process of ice washing. If potassium permanganate is used, manganese dioxide will form (a brown/orange color) and must be removed by treatment with sodium bisulfite, hydroxylamine sulfate, or acidified hydrogen peroxide as the reducing agent. Fill the machine with water and add 1-5gpl of the reducing agent. Heat it to 50°C and run for 20 minutes. The process is usually repeated twice to make sure complete removal of the manganese dioxide. When sodium hypochlorite is used the residual chlorine should be removed with sodium bisulfite or hydrogen peroxide. Adding jeans to machine already charged with after wash chemicals will increase contrast. Rinse well. Apply softener. Tumble dry. Press, if required.

Cellulase wash:

Cellulase enzymes have gained recognition in the garment wash industry as a means to achieve a wash down appearance without the use of stones or with reduced quantities of stones. These enzymes are dissimilar from alpha amylase enzymes used for starch removal in that they are selective only to the cellulose and will not degrade starch. Under certain conditions, their ability to react with cellulose will result in surface fiber removal. This will give the garments a washed appearance and soft hand.

Procedure:

Load stones and garments in machine. Desize with alpha amylase enzyme and detergent. Rinse. Add cellulase enzyme Adjust pH as recommended. Tumble 30-90 minutes. Drain. Rinse well. Split those garments from stones if used. Apply softener. Extract and unloaded-stone and tumbledry. Press, if required.

II. Conclusion:

Globalization has opened the doors to competition at the highest level. Every industry must now produce products those are best in terms of quality & price. Customers now have a wide variety of choices in each price range & one who offers the best at a competitive price will survive & prosper. For the Indian Textile Industry, challenges are even greater. Technologically speaking in the textile processing industry there is still a lot to ask for. So more number of researches has to take place for enhancing the functionality of the fabrics with environment friendly finishes to be used for various kinds of product development which is the need of the hour.

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