Presentation on: Textile Finishing

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Textile finishing

Textile Finishing is a process used in manufacturing of fiber, fabric, or clothing. In order to impart the required functional properties to the fiber or fabric, it is customary to subject the material to different type of physical and chemical treatments. For example wash and wear finish for a cotton fabric is necessary to make it crease free or wrinkle free. In a similar way, mercerizing, singeing, flame retardant, water repellent, water proof, antistatic finish, peach finish etc. are some of the important finishes applied to textile fabric. Broadly it can be classified into following classes:

i. Mechanical Finishing,

ii. Chemical Finishing.

iii. Enzyme Finishing

1.Mechanical finishing: Involving the application of physical principles such as friction, temperature, pressure, tension and many others.

Calendaring

A process of passing cloth between rollers (or "calendars"), usually under carefully controlled heat and pressure, to produce a variety of surface textures or effects in fabric such as compact, smooth, supple, flat and glazed. The process involves passing fabric through a calendar in which a highly polished, usually heated, steel bowl rotates at a higher surface speed than the softer (e.g. cotton or paper packed) bowl against which it works, thus producing a glaze on the face of the fabric that is in contact with the steel bowl. The friction ratio is the ratio of the peripheral speed of the faster steel bowl to that of the slower bowl and is normally in the range 1.5 to 3.0. The normal woven fabric surface is not flat, particularly in ordinary quality plain weave fabrics, because of the round shape of the yarns, and interlacing's of warp and weft at right angles to each other. In such fabrics it is more often seen that even when the fabric is quite regular, it is not flat. During calendaring, the yarns in the fabric are squashed into a flattened elliptical shape; the intersections are made to close-up between the yarns. This causes the fabric surface to become flat and compact. The improved planeness of surface in turn improves the glaze of the fabric. The calendar machines may have several rollers, some of which can be heated and varied in speed, so that in addition to pressure a polishing action can be exerted to increase luster.

Compacting
Durable finish imparted on man-made fibres and knitted fabrics by employing heat and pressure to shrink them to produce a creepy and bulky texture.

Embossing
This particular type of calendaring process allows engraving a simple pattern on the fabric. To produce a pattern in relief by passing fabric through a calendar in which a heated metal bowl engraved with the pattern works against a relatively soft bowl, built up of compressed paper or cotton on a metal center.

Sueding
This process is carried out by means of a roller coated with abrasive material. The fabric has a much softer hand and an improved insulating effect thanks to the fibre end pulled out of the fabric surface.

Raising or Napping
The raising of the fibre on the face of the goods by means of teasels or rollers covered with card clothing (steel wires) that are about one inch in height. Action by either method raises the protruding fibres and causes the finished fabric to provide greater warmth to the wearer, makes the cloth more compact, causes the fabric to become softer in hand or smoother in feel; increase durability and covers the minute areas between the interlacing's of the warp and the filling. Napped fabrics include blankets, flannel, unfinished worsted, and several types of coatings and some dress goods. Other names for napping are Gigging, Genapping, Teaseled, Raised

Wool Glazing
This is done on a special machine, which is used to perform functional finishing on wool fabrics after raising.

Shearing
Shearing is an important preparatory stage in the processing of cotton cloth. The objective of "Shearing" is to remove fibres and loose threads from the surface of the fabric, thus improving surface finish.

Stabilization
A term usually referring to fabrics in which the dimensions have been set by a suitable preshrinking operation

Decating
Also called Decatizing. A finishing process applied to fabrics to set the material, enhance lustre and improve the hand. Fabric wound onto a perforated roller is immersed in hot water or has steam blown through it.

Steaming and Heat setting
It is done by using high temperatures to stabilize fabrics containing polyester, nylon, or triacetate but not effective on cotton or rayon.it may be performed in fabric form or garment form it may cause shade variation from side-to-side if done prior to dyeing; may change the shade if done after dyeing

Sanforizing or Pre Shrinking

Sanforizing is a process where by the fabric is run through a sanforizer; a machine that has drums filled with hot steam. This process is done to control the shrinkage of the fabric. The fabric is given an optimum dimensional stability by applying mechanic forces and water vapour.

Fulling:

The structure, bulk and shrinkage of wool are modified by applying heat combined with friction and compression.

2.Chemical finishing

The finishes applied by means of chemicals of different origins, a fabric can receive properties otherwise impossible to obtain with mechanical means.

Softening

Softening is carried out when the softness characteristics of a certain fabric must be improved, always carefully considering the composition and properties of the substrate.

Elastomeric Finishes

Elastomeric finishes are also referred to as stretch or elastic finishes and are particularly important for knitwear. These finishes are currently achieved only with silicone-based products. The main effect is durable elasticity, because not only must extensibility be enhanced, but recovery from deformation is of crucial importance. After all stresses and disturbing forces have been released, the fabric should return to its original shape.

Crease Resistant or Crease Proofing

Crease Resistant Finishes are applied to cellulose fibres (cotton, linen and rayon) that wrinkle easily. Permanent Press fabrics have crease resistant finishes that resist wrinkling and also help to maintain creases and pleats throughout wearing and cleaning.

Soil Release Finishes

These finishes attract water to the surface of fibres during cleaning and help remove soil.

Flame Retardant Treatment

Are applied to combustible fabrics used in children's sleepwear, carpets and curtains and prevent highly flammable textiles from bursting into flame.

Peach finish

Subjecting the fabric (either cotton or its synthetic blends) to emery wheels, makes the surface velvet like. This is a special finish mostly used in garments.

Anti Pilling

Pilling is a phenomenon exhibited by fabrics formed from spun yarns (yarns made from staple fibres). Pills are masses of tangled fibres that appear on fabric surfaces during wear or laundering. Fabrics with pills have an unsightly appearance and an unpleasant handle. Loose fibres are pulled from yarns and are formed into spherical balls by the frictional forces of abrasion. These balls of tangled fibres are held to the fabric surface by longer fibres called anchor fibres.

Anti pilling finish reduces the forming of pills on fabrics and knitted products made from yarns with a synthetic-fibre content, which are inclined to pilling by their considerable strength, flexibility and resistance to impact. Anti pilling finish is based on the use of chemical treatments which aim to suppress the ability of fibres to slacken and also to reduce the mechanical resistance of synthetic fibre.

Non Slip Finish

A finish applied to a yarn to make it resistant to slipping and sliding when in contact with another yarn. The main effect of non-slip finishes is to increase the adhesion between fibres and yarns regardless of fabric construction, the generic term for these finishes would be fibre and yarn bonding finishes. Other terms that can be used include anti-slip, non-shift and slip-proofing finishes.

Stain and Soil Resistant Finishes

Prevent soil and stains from being attracted to fabrics. Such finishes may be resistant to oil-boure or water-bourne soil and stains or both. Stain and soil resistant finishes can be applied to fabrics used in clothing and furniture. Scotchgard is a stain and soil resistant finish commonly applied to carpet and furniture.

Oil and Water Proofing

Waterproof Finishes -Allows no water to penetrate, but tend to be uncomfortable because they trap moisture next to the body. Recently, fabrics have been developed that are waterproof, yet are also breathable

Water-Repellent Finishes

Water-repellent finishes resist wetting. If the fabric becomes very wet, water will eventually pass through. Applied to fabrics found in raincoats, all-weather coats, hats, capes, umbrellas and shower curtains.

Absorbent Finishes

Increase fibres moisture holding power. Such finishes have been applied to towels, cloth diapers, underwear, sports shirts and other items where moisture absorption is important.

Anti Static Finish

Reduce static electricity which may accumulate on fibres. The most common type of anti-static finishes are fabric softeners.

Anti Mildew

In certain ambient (humidity and heat) conditions, cellulose can be permanently damaged. This damage can be due to depolymerisation of the cellulose or to the fact that certain microoganisms (mildews) feed off it. The situation is worsened, during long storage periods, by the presence of starch finishing agents. This damage can be prevented by the use of antiseptics, bacteria controlling products containing quaternary ammonium salts, and phenol derivatives. Dyestuffs containing heavy metals can also act as antiseptics. Permanent modification of the fibre (cyanoethylation) is another possibility.

Mothproofing Finishes
Protect protein-containing fibres, such as wool, from being attacked by moths, carpet beetles and other insects.

Antibacterial Finish
The inherent properties of textile fibres provide room for the growth of micro-organisms. The structure and chemical process may induce the growth, but it is the humid and warm environment that aggravates the problem further. Antimicrobial finish is applied to textile materials with a view to protect the wearer and textile substrate itself.

Antimicrobial finish provides the various benefits of controlling the infestation by microbes, protect textiles from staining, discoloration, and quality deterioration and prevents the odor formation. Anti-microbial agents can be applied to the textile substrates by exhaust, pad-dry-cure, coating, spray and foam techniques. The application of the finish is now extended to textiles used for outdoor, healthcare sector, sports and leisure.
UV Protection Fabric treated with UV absorbers ensures that the clothes deflect the harmful ultraviolet rays of the sun, reducing a person's UVR exposure and protecting the skin from potential damage. The extent of skin protection required by different types of human skin depends on UV radiation intensity and distribution with reference to geographical location, time of day, and season. This protection is expressed as SPF (Sun Protection Factor), higher the SPF value better is the protection against UV radiation.

Colorfastness Improving Finish

Colour fastness is the resistance of a material to change in any of its colour characteristics, to the transfer of its colourants to adjacent materials or both. Fading means that the colour changes and lightens. Bleeding is the transfer of colour to a secondary, accompanying fibre material. This is often expressed as soiling or staining meaning that the accompanying material gets soiled or stained.

The physical and chemical principles involved in the performance of the fastness improving finishes concern either the interaction with the dyestuff or with the fibre or both.

The finishes are applied to

a. Improve the colorfastness to washing
b. Improve the colorfastness to crocking
c. Improve the colorfastness to light
d. Improve the colorfastness to weathering
e. Improve the colorfastness to chemicals washes such as mild bleaching , dry cleaning and commercial washing.

Plasma finish: Plasma treatment is a surface modifying process, where a gas (air, oxygen, nitrogen, argon, carbon dioxide and so on), injected inside a reactor at a pressure of approximately 0.5 mbar, is ionized by the presence of two electrodes between which is a high-frequency electric field. The need to create the vacuum is justified by the necessity to obtain a so-called cold plasma with a temperature no higher than 80 °C. This, with the same energy content that can be reached at atmospheric pressure at a temperature of some thousands of degrees C, permits the treatment of fabrics even with a low melting point such as polypropylene and polyethylene, without causing any form of damage. The fabric, sliding through the electrodes, is subject to a true bombardment from the elements that constitute the plasma (ions, electrons, UV radiation and so on) and which come from the decomposition of gas and contain a very high level of kinetic energy. The surface of the fabric exposed to the action of the plasma is modified, both physically (roughness), as well as chemically, to remove organic particles still present and to prepare for the successive introduction of free radicals and new chemical groups inside the molecular chain on the surface of the material. The mechanical properties remain, on the other hand, unaltered, as the treatment is limited to the first molecular layers.

3.Enzyme finishing

Bio polishing, also called bio-finishing, is a finishing process applied to cellulosic textiles that produces permanent effects by the use of enzymes. Bio-finishing removes protruding fibres and Slubs from fabrics, significantly reduces pilling, softens fabric hand and provides a smooth fabric appearance, especially for knitwear and as a pretreatment for printing.

Sewing thread finishing

Apart from many of the above said finishes which can be applied to sewing threads also, A variety of finishes are used to improve the sewability of sewing thread, for example

1. Lubricants reduce friction and improve the lubricity of the thread. Lubricity refers to the frictional characteristics of thread as it passes through the sewing machine and into the seam. Good lubricity characteristics will minimize thread breakage and enhance sewability.

2. Glazing increases strength and abrasion resistance. Glaze Finish refers to a finish put on 100% cotton threads or cotton-polyester core spun thread made from starches, waxes or other additives. This coating is then brushed to give the thread a smooth surface. A glaze finish protects the thread during sewing giving better ply security and abrasion resistance.

Sewing thread finishing

3. Bonding to increase strength and surface smoothness. Bonded Finish refers to a finish applied to continuous filament nylon and polyester threads which coats the fibers, giving the thread better ply security and abrasion resistance.