BASIC TEXTILE OPERATION

NTQF Level -1

Learning Guide -76

Unit of Competence: Apply Finishing Processes to Textile and Garments

Module Title: Applying Finishing Processes to Textile and Garments

LG Code: IND BTO1 M20 LO2-LG-76

TTLM Code: IND BTO1 TTLM 0919v1

LO2. Operate and monitor finishing machines or equipment

Instruction Sheet	Learning Guide #76

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Undertaking and monitoring finishing process
- Checking product during and after finishing process
- Identifying product faults
- Applying environmental requirements
- Identifying and correcting minor product process and machine faults
- Reporting machine and product faults

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to:**

- ❖ Undertake and monitor finishing process
- ❖ Check product during and after finishing process
- ❖ Identify product faults
- ❖ Apply environmental requirements
- ❖ Identify and correct minor product process and machine faults
- ❖ Report machine and product faults

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 28.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1”.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions.
7. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
8. Accomplish the “Self-check 2”.
9. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 2).
10. If you earned a satisfactory evaluation proceed to “Information Sheet 3”. However, if your rating is unsatisfactory, see your teacher for further instructions.
11. Read the information written in the “Information Sheets 3”. And Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
12. Accomplish the “Self-check 3”.
13. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 3).
14. If you earned a satisfactory evaluation proceed to “information sheet 4”. However, if your rating is unsatisfactory, see your teacher for further instructions
15. Read the “information sheet 4” and try to understand the procedures discussed.
16. Accomplish the “Self-check 4”.
17. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 4).

18. If you earned a satisfactory evaluation proceed to “Information Sheet 5”. However, if your rating is unsatisfactory, see your teacher for further instructions.
19. Read the information written in the “Information Sheets 5”. And Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
20. Accomplish the “Self-check 5”.
21. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 5).
22. If you earned a satisfactory evaluation proceed to “information sheet 6”. However, if your rating is unsatisfactory, see your teacher for further instructions
23. Read the “information sheet 6” and try to understand the procedures discussed.
24. Accomplish the “Self-check 6”.
25. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 6).
26. Accomplish the “operation sheet 1”.
27. Accomplish the “operation sheet 2”.
28. Do the “LAP test” (if you are ready). Request your teacher to evaluate your performance and outputs. Your teacher will give you feedback and the evaluation will be either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work. But if satisfactory you can proceed to other learning outcome.

Information Sheet-1	Undertake and monitor finishing process

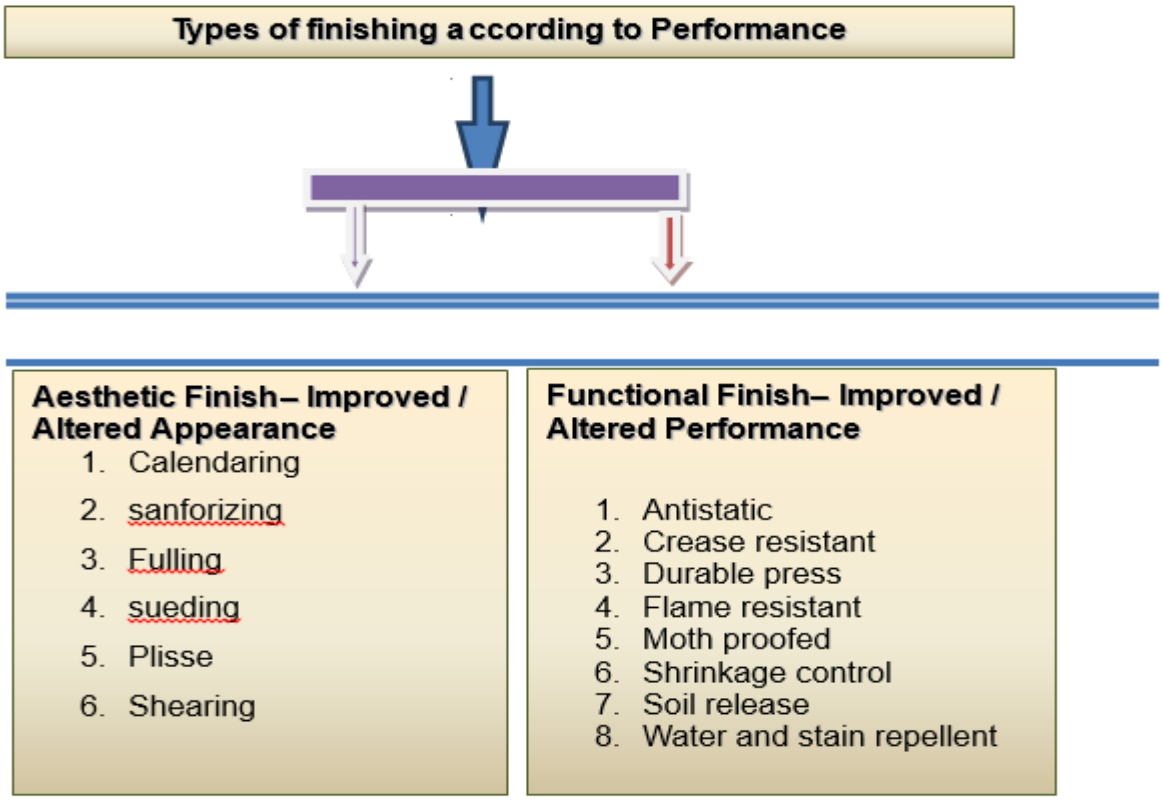
1.1. Types of finishing

1.1.1. Types of finishing according to method of application

Mechanical/dry finishing	Chemical/wet finishing
Application of physical principles like pressure, friction, temperature, stretching etc. also includes thermal processes like heat setting of synthetic fibres like polyester **Typical mechanical finishes** Calendaring (surface appearance improvement) sanforizing (improvement of dimensional stability) etc	Application of suitable chemicals to impart certain desirable properties according to end use. Development of high performance or high tech textiles has increased the importance of chemical finishing

1.1.2. Types of finishing according to degree of permanence

- ✓ Permanent Finish: Usually involve a chemical change in fiber structure and do not change or alter throughout the life of the fabric
- ✓ Durable finish: Usually last through the life of the article, but effectiveness becomes diminished after each cleaning; and near the end of the normal use life of the article, the finish is nearly removed
- ✓ Semi-durable finish: Last through several laundering or dry cleanings and many are renewable in home laundering or dry cleaning
- ✓ Temporary finish: Are removed or substantially diminished the first time the article is laundered or dry cleaned



Mechanical/dry finishes

Operation performed to improve fabric appearance or desired effect (softness) by mechanical means without the application of chemicals. Water or steam may be used to achieve desired finish. Sometimes lubricants may be used.

Types of mechanical finishes

1. **Calendaring:** A lustrous, dense and compact appearance can be obtained by means of friction, pressure and heat.

   Process: fabric is compressed by passing it between two or more rolls under controlled conditions of time, temperature and pressure. Calendaring used for mechanical finishing of fabrics made of cellulose, protein and synthetic fibers. The process is non-durable

   Mechanism: in calendaring, the yarns are flattened and become more oval in shape. This causes them to spread in two dimensions and closes up the fabric structure, leaving less open spaces between the yarn crossovers. Fabric becomes thinner and more lustrous.

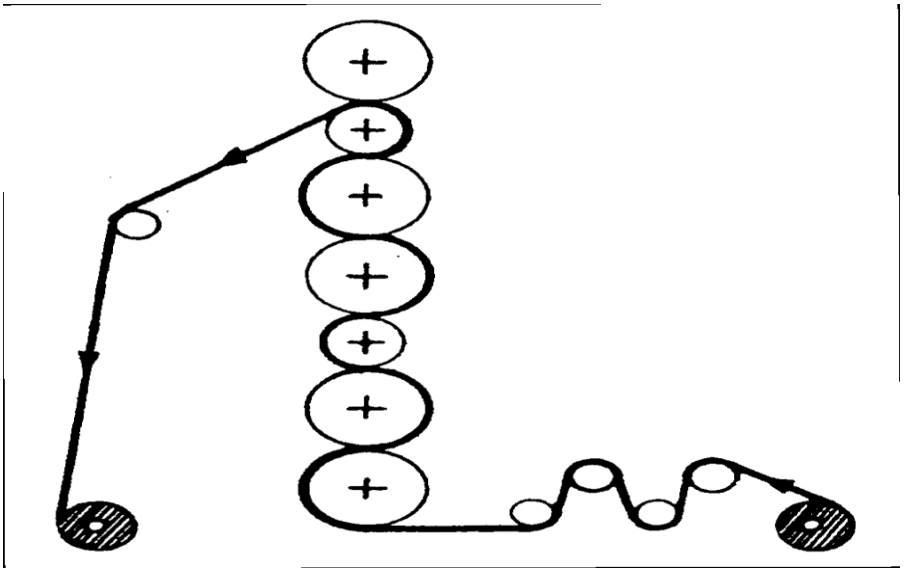
   Calendaring effect

   - smooth fabric appearance like ironing
   - Reduced fabric thickness.
   - increased fabric luster,
   - increased fabric cover,

- reduced air porosity
- Reduced yarn slippage.

Calendar machines

Calendar is a machine consisting of two or more massive rolls moving in contact with each other. The pressure on rolls is applied by hydraulic means one roll is considered the pattern roll and is responsible for the finished appearance of the fabric other roll is called a bowl and serves as the pressure back-up for the pattern roll and also serves move the fabric through the machine.



2. **Sanforising:** this process is also known as compacting. The fabric is given an optimum dimensional stability by applying mechanical forces and water vapour.

Cotton fabric after chemical processing operations has the tendency to shrink. Excessive shrinkage is undesirable for fabrics to be made into garments.

The residual shrinkage should be less than 2% otherwise the garment will not fit after it is laundered.

In order to prevent the altering of the garment, tailors usually soak new fabric in water for overnight and dry it under relaxed condition before stitching the garment for the customer.

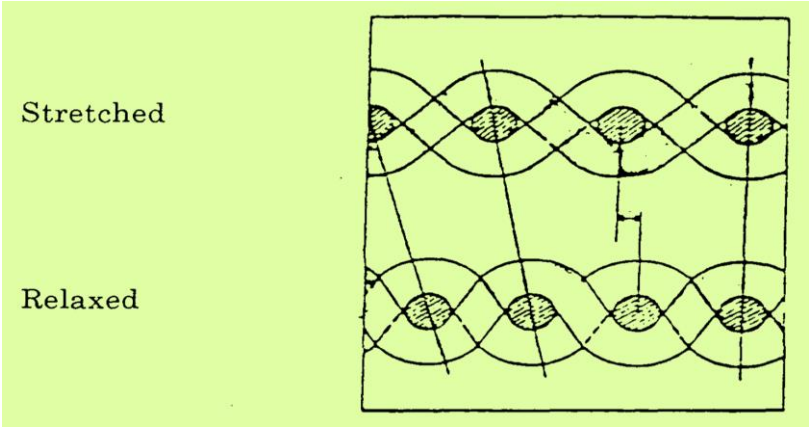
This relaxation is possible if the garments are made on small scale for individual customers by a tailor. However, where the readymade garments are made on large scale such relaxation of fabric before stitching is not possible at the garment factory.

Therefore it is essential to make the fabric (cotton) dimensionally stable by pre-shrinking at the textile mill

Mechanism of fabric shrinkage

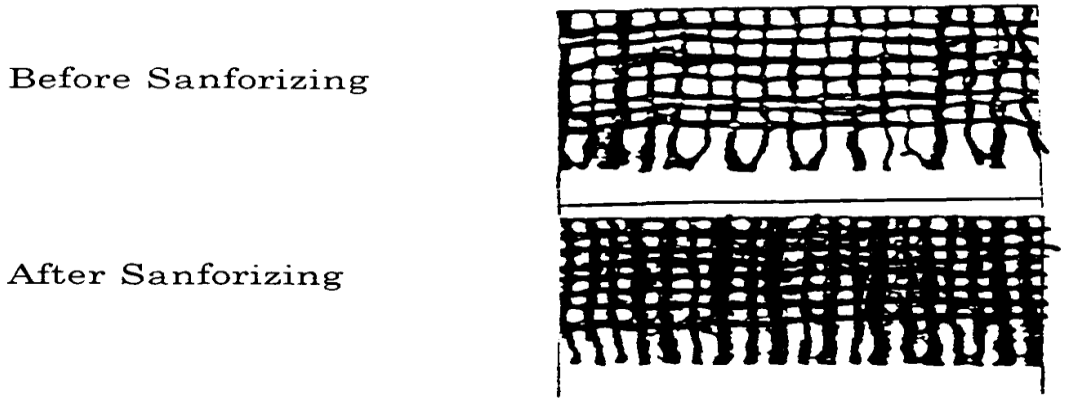
During weaving the straight yarns gets crimped when stretching tensions are applied to the fabric, the crimped amplitude decreases and the fabric extends in the direction of the stress. Later when the tensions are relieved and the fabric allowed to relax, the crimp amplitude returns to its stable configuration and the fabric shrinks.

Fabrics are stretched during wet processing as they are pulled from one operation to another. This is the major cause of fabric shrinkage. Forces yarns closer together and the fabric becomes thicker and heavier. as a result of this, the net yardage yield is reduced due to pre-shrinking



Change in yarn crimp on stretching and relaxation

EFFECT OF SANFORIZING



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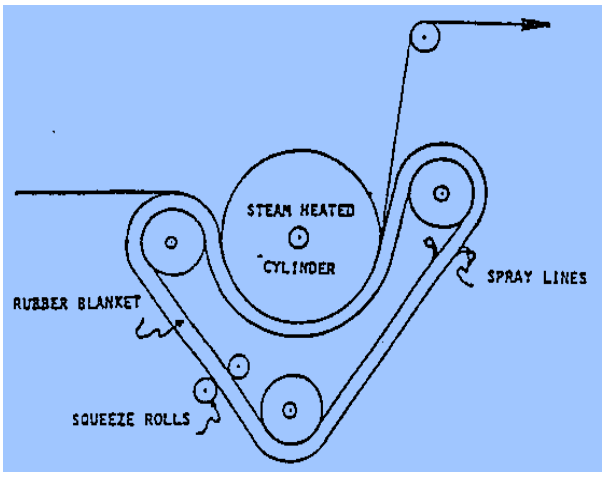
Open fabric structure gets compacted or closed up on Sanforizing

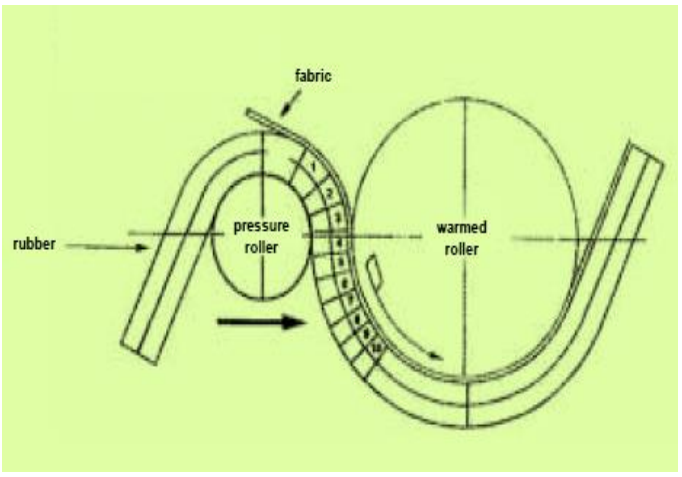
Process

Fabric is first moistened with steam, to *make it more pliable,* run through a short tenter frame *(pup tenter) to straighten and remove wrinkles,* fabric then passes through the compressive shrinkage head and then through a palmer drying unit to set the fabric. The fabric is wound into large rolls under minimum winding tensions.

If the winding tension is excessive, the fabric will be stretched and the degree of compaction reduced or lowered. Usually, a lubricant is added for realignment of yarns before the fabric passes through compacter



Compacting head



Compacting process

Compactor consists of a thick rubber blanket which runs continuously. The rubber blanket is stretched by moving it in contact with a steam heated cylinder steamed fabric is fed under the nip of rubber blanket and steam heated cylinder

Mechanism

Before the fabric moves in a compactor, its shrinkage is determined separately. The tension between stretchable rubber blankets by pressing steam heated cylinder is adjusted according to the shrinkage before compacting. the steamed fabric fed at the space between the steam heated cylinder and stretched rubber blanket with slight over feed the steamed fabric being pliable it stretches as it passes in contact with the stretched rubber blanket.

As the rubber blanket moves out of contact with steam heated cylinder it contracts to its original length, during this process the fabric also contracts or shrinks the extent of shrinkage will depend in the stretch provided by the compactor.

After leaving the squeezing unit the fabric is sent out to the drying unit (180°-190°) with the slightest possible tension. The fabric is fed into a felt calendar, which sets the shrinkage.

Finally the fabric is wound on roller without tension.

3. **Embossing:** This particular type of calendaring process allows engraving a simple pattern on the fabric.
4. **Sueding:** fibre end pulled out of the fabric surface to get softer hand this process is carried out by means of a roller coated with abrasive material.

5. **Raising:** fibre end pulled out to the fabric surface imparts an insulating effect. Process is carried out by means of hook-needles running in different directions on the fabric
6. **Fulling:** the structure, bulk and shrinkage of wool are modified by applying steam, heat combined with friction and compression.
7. **decating:** the lustrous appearance of the textile material is eliminated, the surface is smoothed and the fabric is given an optimum dimensional stability by the action of steam and heat . Process used for wool.
8. **Pressing:** Smoothing by means of pressing platens; mainly for wool.

Chemical/wet finishing

Application of suitable chemicals to impart certain desirable properties according to end use. Development of high performance or high tech textiles has increased the importance of chemical finishing

Types of chemical/wet finishing

1. Fire retardant treatment

All textile fibers with the exception of glass are flammable. The degree of flammability is dependent on the chemical structure of the fiber, the construction of the textile substrate, and the environmental conditions present at the time of fiber ignition. A fiber is flame retardant when it self-extinguishes on removal of the flaming source. Certain fibers, including wool, acrylic, aramid, and vinyon, are flame retardant by virtue of their inherent chemical structure and combustion characteristics.

Flame-retardant finishes provide textiles with an important performance characteristic. Protection of consumers from unsafe apparel is only one area where flame retardancy is needed. Firefighters and emergency personnel require protection from flames as they go about their duties.

Mechanisms of flame retardancy

In order to understand the mechanisms of effective flame retardants better, the mechanism of combustion should first be clarified. Combustion is an exothermic process that requires three components, heat, oxygen and a suitable fuel. When left unchecked, combustion becomes self catalysing and will continue until the oxygen, the fuel supply or the excess heat is depleted.

When heat is applied, the fibre's temperature increases until the pyrolysis temperature, *T*P, is reached. At this temperature, the fibre undergoes irreversible chemical changes, producing non-flammable gases (carbon dioxide, water vapour and the higher oxides of nitrogen and sulfur), carbonaceous char, tars (liquid condensates) and flammable gases (carbon monoxide, hydrogen and many oxidisable organic molecules).As the temperature continues to rise, the tars also pyrolyse, producing more non-flammable gases, char and flammable gases. Eventually, the combustion temperature, *T*C, is achieved. At this point, the flammable gases combine with oxygen in the process called combustion, which is a series of gas phase free radical reactions. These reactions are highly exothermic and produce large amounts of heat and light. The heat generated by the combustion process provides the additional thermal energy needed to continue the pyrolysis of the fiber, thereby supplying more flammable gases for combustion and perpetuating the reaction.

2. Repellent finishes

Finishes that repel water, oil and dry dirt are important in all parts of the textile market – for clothing, home and technical textiles. Water repellence is achieved using different product groups, but oil repellence is attained only with fluorocarbon polymers. They are modified to have a wide range of properties to fit the different demands of the users and the intended purpose. This is one of the most interesting new developments of chemical finishing. Generally repellence mean Drops of water should not spread on the surface of the textile and should not wet the fabric. The drops should stay on the surface and easily drip off. Similarly, oil repellent finishes should prevent oily fluids from wetting treated textiles. In a similar manner, soil-repellent finishes should protect textiles from both dry and wet soils.

Mechanisms of repellence

Repellent finishes achieve their properties by reducing the free energy at fibre surfaces. If the adhesive interactions between a fibre and a drop of liquid placed on the fibre are greater than the internal cohesive interactions within the liquid, the drop will spread. If the adhesive interactions between the fibre and the liquid are less than the internal cohesive interactions within the liquid, the drop will not spread. Surfaces that exhibit low interactions with liquids are referred to as low energy surfaces. Their critical surface energy or surface tension γ_C must be lower than the surface tension of the liquid γ_L (the internal cohesive

interaction) that is repelled. γ_L of water, at 73 mN m–1, is two to three times greater than γ_L of oils (20–35 mN m–1).

3. Softening finishes

Softening finishes are among the most important of textile chemical after treatments. With chemical softeners, textiles can achieve an agreeable, soft hand (supple, pliant, sleek and fluffy), some smoothness, more flexibility and better drape and pliability. The hand of a fabric is a subjective sensation felt by the skin when a textile fabric is touched with the finger tips and gently compressed.

The perceived softness of a textile is the combination of several measurable physical phenomena such as elasticity, compressibility and smoothness. During preparation, textiles can become embrittled because natural oils and waxes or fibre preparations are removed. Finishing with softeners can overcome this deficiency and even improve on the original suppleness. Other properties improved by softeners include the feeling of added fullness, antistatic properties and sew ability.

Disadvantages sometimes seen with chemical softeners include yellowing of white goods, changes in hue of dyed goods and fabric structure slippage.

4. Easy-care finishing

The primary cause of the shrinkage of cellulosic fibres is the fact that these fibres can readily absorb moisture. This absorbed moisture facilitates internal polymer chain movements in the amorphous fibre areas by lubrication. It disrupts the internal hydrogen bonding between these polymer chains. When a moisture laden cellulosic fibre is stressed, the internal polymer chains of the amorphous areas are free to move to relieve that stress. Hydrogen bonds can reform between the polymer chains in their shifted positions, in effect locking in the new configuration.

With no restoring forces available, a newly formed wrinkle or crease will remain until additional processes (ironing for example) apply adequate moisture and mechanical forces to overcome the internal forces. The swelling of cellulosic fibres by moisture can be reduced by the application of self-crosslinking urea or melamine products as well as by products that mainly crosslink with cellulose molecules. Without such a crosslinking finish, cellulose fibres can take up more than 10 % of their weight in water. As the fibres swell, the fabric must

crease and shrink to relieve the internal stresses caused by the swelling. The new arrangement of the cellulose molecules in the swollen form of the fibre is fixed by newly formed hydrogen bonds between adjacent cellulose molecules, mostly in the amorphous fibre area. Therefore the uneven and wrinkled appearance of the cellulose fabric remains after drying, in contrast to fabrics made of non-swelling synthetic fibres. Two different chemical approaches have been used commercially to produce non-swelling or durable press cellulose fabrics. The original approach is the incorporation of a polymerised finish in the pores of the fibres, so that water molecules cannot easily penetrate the fibre. The newer approach is the reaction of multifunctional crosslinking agents with the hydroxyl groups of adjacent cellulose molecules that hinder the swelling of the cellulose fibre.

5. Soil release finish

Soil-release finishes include protection from soil re deposition during laundering and absorbency or transport of liquid water. Fabrics with increased absorbency provide garments that feel more comfortable under hot, humid conditions, thus leading the name ‘comfort finish’ that has often been applied to fabrics treated with soil-release agents.

Mechanisms of soil release

Removal of soils from fabrics has been attributed to several mechanisms. These are:

Adsorption of detergent and absorption of water leading to:

• Rollup of oily soil
• Penetration of soil–fibre interface by wash liquid
• Solubilisation and emulsification of soils.

Particulate soil is removed from fibres by a two-step process. First, a thin layer of wash liquid penetrates between the particle and the fibre surface, enabling surfactants to adsorb onto the particle surface, and then the particle becomes solvated and is transported away from the fibre and into the bulk of the wash liquid by mechanical action.

6. Anti-pilling finishes

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.

Pilling effect shown on fabric in different ways which has different rate and quantity with fiber type and fabric structures. Generally pilling magnified on fabrics having loose structures and round cross- sectional fiber sources as well as short staple fibers.

Fabrics made from cotton, wool or rayon do not usually display pilling problems since the anchor fibres are easily broken and pills fall from the fabric soon after they are formed. When fabrics are made from polyester or nylon spun yarns, however, the stronger anchor fibres are not easily broken and the pills that are formed are not released quickly from the fabric, leading to appearance problems.

Fabric and yarn construction play a major role in pilling. Tighter constructions (woven versus knit, high twist versus low twist) show fewer problems than do looser constructions. Although pilling affects only the fabric aesthetics and does not cause any functional problems, it is important to minimize or prevent pilling in order to maintain customer satisfaction.

7. Finishes to improve colour fastness

Generally colour fastness mean 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. Meaning that colour fastness is the freedom from being bleed or fade the fabric.

There are different colour fastness quality parameters from these the majors are

- Wet fastness
- Rubbing fastness
- Light fastness

1. Wet fastness

Wet fastness mean when a given fabric exposed to wet condition there is the probability to lose the colour at considerable quantity; this is poor quality of the fabric with a low or poor wet fastness of that fabric. Commonly there are ratings for the degree of fastness after checked in wet condition.it ranges from 1 to 5; for the fabric showing 1 mean higher change (poor fastness) and 5 mean no change (good fastness).

Methods to have good fastness

- Intensive washing process.
- Removing reactive dye by washing by enzymes (peroxidases /oxidative Active enzymes such as Baylase RP).
- The reactant fixation of the dyestuffs to the fibre with highly reactive uncoloured chemicals.

2. Rubbing fastness

Rubbing fastness means a change in colour of the rubbed textile (by bleeding and fading).the principle is the same with wet fastness except the agents which is the mechanical abrasion to remove and change dyestuff and colour of the fabric respectively.
Fastness ratings, according to the grey scales for staining, range from 1 (poor rating) to 5 (best rating). Parameters of influence include:
• Kind and concentration of dyestuff
• Dyeing or printing procedure, degree of fixation, ring dyeing
• After treatment with softeners, silicones, crosslinking agents
• Type of fibre (tensile strength, wet abrasion)
• Type of textile in contact: shade, surface, kind of fibre and fabric
• Intensity of the contact: pressure, time, moisture and temperature.

- Rubbing fastness is improved by formation of films coating the fibres, reduced rubbing of the smoothed surface

3. Light fastness

The light fastness is the resistance of dyestuffs to the influence of light energy, especially the ultraviolet (UV) part of the electromagnetic spectrum. The shorter the wavelength, ƛ, the higher is the energy *E* and the dyestuff damage. The light protection of the applied dyestuffs is connected to the light protection of the fibre. Fibre damage also accelerates dyestuff decomposition. Fading by light is generally promoted by moisture, heat.

- Remember light fastness can be improved by protecting products show either interaction with the light or with the dyestuff. Examples of the first category are the UV-absorber or UV-screener, which have light filter effects (UV-cutting).

8. Antimicrobial finishes

The first is the protection of the textile user against pathogenic or odour causing microorganisms (hygiene finishes). The second aspect is the protection of the textile itself from damage caused by mould, mildew or rot producing microorganisms. The most trouble-causing organisms are fungi and bacteria. Generally manmade fibers are highly attacked by microorganisms than synthetic fibers.

Antimicrobial finishes are particularly important for industrial fabrics that are exposed to weather.

Mechanism of antimicrobial finish

One type consists of chemicals that can be considered to operate by a controlled-release mechanism. The antimicrobial is slowly released from a reservoir either on the fabric surface or in the interior of the fibre. This ‘leaching’ type of antimicrobial can be very effective against microbes on the fibre surface or in the surrounding environment. However, eventually the reservoir will be depleted and the finish will no longer be effective. In addition, the antimicrobial that is released to the environment may interfere with other desirable microbes, such as those present in waste treatment facilities.

The second type of antimicrobial finish consists of molecules that are chemically bound to fibre surfaces. These products can control only those microbes that are present on the fibre surface, not in the surrounding environment. ‘Bound’ antimicrobials, because of their

attachment to the fibre, can potentially be abraded away or become deactivated and lose long term durability.

Textile finishing machines

Textile machines (Padder, Stenter, calendaring machine, sanforizer, raising machine, stitching machine,roller,batch puller, fork lift etc)

Garment machines (garment dyeing, spray, pad spin, padder, hydroextractor, dryer,stone washing, pressing and ironing equipment's)

1. Slitting machine

The slitting machine is used in processing fabrics in the open line in the fishing section. The slitting machine consists of a blade and a sensor attached to the blade which indicates the needle line during slit opening the fabric for processing.

2. Squeezing Machine

Squeezing machine is used for extracting water from dyed fabric by squeezing through rollers having different pressure. Squeezer machine designed to extract water from piece goods treated in rope form. They are used as an intermediate devices such as washers or autonomous devices.

In the latter case they are usually full-width squeezers. The first padder rollers gives proper squeeze to the fabric and extracts the water and the second squeeze roller passes the fabric half the speed of the first squeeze roller which causes the softener chemicals to properly pass into the fabric.

3. Stented machine

The Stenter machine consist of 7 drying chambers, padder rollers and a weft straightening section which enables the machine to control Spirality, Shrinkage, GSM during the fabric passage. During processing first the fabric is passed through the padding section or squeezer for properly squeezing the fabric and processing softening treatment of the fabric through feed roller and guide roller.

Then it goes through the weft straightening section where by bowing roller fabric spirality is controlled and then passed through chain rail for shrinkage control.

4. Dryer machine

Dryer machine is used for removing the residual water contained in the fabric after squeezing by applying heat on the fabric. In this machine the fabric is fed on the drying net at low over feed speed and the humidity is continuously measured. Drying is done by applying heat through burner nozzles. During drying the total heat passed through the machine is extracted.

Self-Check -1	**Written Test**

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Discuss types of finishing according to method of application. (3 point)
2. List types of mechanical finishing. (3 point)
3. List calendaring effect of a fabric. (3 point)
4. List types chemical finishing. (3 point)
5. List types finishing machines. (3 point)

Note: **Satisfactory rating - 15 points** **Unsatisfactory - below 15 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
2. _____
3. _____
4. _____
5. _____

Information Sheet-2	Checking product during and after finishing process

Check product completion of finishing process

- ✓ Give a good appearance
- ✓ Desirable feel
- ✓ Impart certain durable properties
- ✓ Stiffness
- ✓ Softness
- ✓ Wash and wear finish
- ✓ Water repelling finish
- ✓ Fire proof finish etc.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List the parameters to check the product during and after finishing. (3 point)

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____
   _____
   _____
   _____
   _____

Information Sheet-3	Identifying product faults

3.1. Identifying product faults

- holes, stain
- scewness and bowlness
- width variation
- creases and folds
- stone washing
- marks and impressions
- inconsistent coverage
- broken or pull yarns
- oil and soil contamination
- shrinkage
- Inconsistent GSM and width
- Harsh feel for soft finish

Self-Check –3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List and explain finishing fault. (5 point)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____

Information Sheet-4	Applying environmental requirements

4.1. Waste treatment

- Waste treatment involves changing the form or composition of a waste stream to reduce the amount of, or eliminate, the pollutants.
- However, they do not affect the pollutants until after they have already been generated. Examples include wastewater pretreatment, detoxification, filtration, incineration, biodegradation, stabilization, and solidification.
- Textile finishing wastewater is a mixture of many different chemical compounds which can roughly be classified into easily biodegradable, heavily biodegradable (recalcitrant) and non-biodegradable compounds.
- Biological treatment is usually the most important part of textile wastewater treatment.
- In most cases, activated sludge systems are applied.

4.2. Pollution

- Pollution prevention (**P2**) (also known as source reduction) is the act of eliminating the pollutant before it is generated.
- The purpose is to prevent pollution from being generated rather than determine how to control pollution or manage waste after it has already been generated.
- P2 is philosophy that prevents or reduces pollution at the source through cost-effective changes in design and production.
- It includes practices that reduce the use of hazardous and nonhazardous materials, energy, water, and other resources, in addition to practices that protect natural resources through conservation or use that is more efficient.
- Such changes offer industry substantial savings in reduced raw materials, pollution control, and liability costs, protect the environment, and reduce risks to worker health and safety.

4.3. Recycling of materials

Off-site recycling (for example, solvent recovery at a central distillation facility) can be an excellent waste management strategy. However, because it is not re-introduced into the generating system or used as an alternative material or product, it is not a P2 measure.

Self-Check –4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define waste treatment. (2 point)
2. What does it mean pollution prevention? (2 point)
3. What does it mean recycling of material? (2 point)

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____
   _____
2. _____
   _____
   _____
   _____
3. _____
   _____
   _____
   _____
   _____

Information Sheet-5	Identifying and correcting minor product process and machine faults

5.1. Fabric Finishing:

A series of processing operations applied to gray fabrics to enhance their appearance and hand, properties and possible applications.

- Play a fundamental role for the commercial excellence of the results of textiles.
- The most simple form of finishing is the ironing or pressing on the fabric.
- In finishing, the fabric is subjected to mechanical and chemical treatment in which its quality and appearance are improved and its commercial value enhanced.
- Physical finishing techniques (dry finishing processes) or chemical finishing methods (wet finishing) are used.

Finishing defects

Functional finish: Wear ability, Hand, Mechanical resistance, Easy care, Wet ability, Wash ability, Deformability, Anti-bacterial, Anti-fungal, Soil-proof and Fire-proof ability.

Aesthetic finishes: Aesthetic looks

5.2. Finishing Defects:

The defects which are occurred in finishing process are enlisted below:

1. Unwanted marks on fabric
2. Decolorized patch on fabric
3. Pin holes
4. Sanforize Pucker
5. Bowing
6. Pilling
7. Water Spots
8. Cuts or Nicks
9. Seam Tears
10. Soil

11. Streaks
12. Inadequate Pressing
13. Pressing Producing Shine on Fabric
14. Loose Threads
15. Askewed or Bias
16. Folding Defects

1. Unwanted marks on fabric:

Oily stains with dust adhered to surface which makes the stains more prominent and difficult to remove, due to contact with oil or grease covered exposed machine parts, careless handling could be another cause.

2. Decolorized patch on fabric:

Caused due to

- Chemical spillage on fabric.
- Localized excess bleaching.
- Localized excess enzyme wash.
- Can be result into weakening of the fabric.

3. Pin holes :

- Holes along selvage caused by pins holding fabric while it processes through stenter frame.
- Major defect if pin holes extend into body of fabric far enough to be visible in the finished product.

4. Sanforize Pucker :

- Results from uneven wetting out on sanforize.
- Usually caused by defective spray heads.
- Fabric will appear wavy or puckering when spread on cutting table.
- Difficult to detect during inspection on inspection machine with fabric under roller tension.

5. Bowing:

- Usually caused by finishing.
- Woven filling yarns lie in an arc across fabric width; in knits the course lines lie an arc across width of goods.
- Establish standards of acceptance.
- Critical on stripes or patterns; not as critical on solid color fabrics.

6. Pilling:

- Pilling is a common fabric defect occurring on knitted and woven fabrics.
- In producing a yarn, long fibers tightly-twisted produce a serviceable yarn. When short stable fibers are mixed into the yarn the result is a yarn that will not hold together. The short staple fibers will separate from the yarn and curl up in a ball, forming what is referred to as a pill.
- Pilling is accentuated by the friction of normal wear, washing and routine dry cleaning.

7. Water Spots:

- Usually caused by wet fabric being allowed to remain too long before drying; color migrates leaving blotchy spots.

8. Selvage Torn:

- Usually caused by excessive tension while processing through stenter frames.

9. Cuts or Nicks :

Caused by indifferent handling of scissors. Snips or mechanical trimmers.

10. Seam Tears:

- Frequently caused by the turning equipment used to reverse garments in finishing.

11. Soil:

- Caused by oil, grease or dirt. Often times originating from a dirty work area or machinery not properly cleaned

12. Streaks:

- Markings caused by some types of turn boards or defectively finished trimming.

13. Inadequate Pressing :

- Caused by excessive heat or pressure resulting in poor pleating, fullness or twisting of a seam on garment surface.

14. Pressing Producing Shine on Fabric:

- Usually caused by excessive heat or incorrect type of pressing surface.

15. Loose Threads:

- Loose threads will get wound on guide rollers forming ridgesin the processing machines and cause creases at these places.
- Also loose threads can cause problems of Dye /Print transfer in a padding / Printing application

16. Askewed or Bias:

Condition where filling yarns are not square with wrap yarns on woven fabrics or where courses are not square with wale lines on knits.

17. Folding Defects:

- ✓ Garment not folded to Specifications
- ✓ Garment not Folded with proper Materials:
- ✓ Cardboard, tissue or other specified packaging materials omitted
- ✓ Garments not Buttoned, Flys not
- ✓ Closed, Incorrect Number of Pins

5.3. Textile Finishing Machine Problem

1. Stenter

- ❖ Uncurling Device Problem (Tandametic)
- ❖ Korino Part Uncurling Roller Problem
- ❖ Net Problem
- ❖ Mahlo Problem (Camera)
- ❖ Pin & Chine Prolem
- ❖ Master Rollar Motor Problem
- ❖ Front Monitor Problem
- ❖ Panel Board A/C Problem for Stenter Machine

2. Open Compactor

- ❖ Cantering Roller Problem
- ❖ Over Feed Roller Tape Problem
- ❖ Wheel Brush Problem
- ❖ Lower Cylinder Temperature Problem
- ❖ Upper Cylinder Steam Pipe Problem
- ❖ Steam Pipe Problem
- ❖ Mc. Speed Problem
- ❖ Chine Oil Line Problem
- ❖ Stenter Pert Steam Pipe Problem
- ❖ 10. Cooling Belt Steam Pipe Problem

3. Tube Compector

- ❖ C.P.U Alarm
- ❖ Folder Conveyer Belt Roller Problem
- ❖ Teflon Roller Problem
- ❖ Spreader Camera Problem

- Lower Show Problem

4. Dewater

- Monitor Problem
- Delivery Roller Poblem
- Back Side Ring Camera Problem
- Auto Air Line Problem
- Mc.Auto On & Off

5. Slitting

- Centering Roller Problem
- Blead Problem
- Folder Belt Problem
- Feeding Roller Auto Prolem
- 5.Padder Problem

6. Unitech Dryer

- Burner No – 3 Circuit Breaker Problem
- Net Problem
- Panel Board A/C Problem

7. Santex Dryer

- Emergency Switch Problem
- Power On/Off Switch Problem
- Net Problem
- 2 No Blower Motor Problem
- 2 No Nozzle Problem
- Folder Problem
- Panel Board A/C Problem
- 8. Exhaust Fan Problem

Operation Sheet 1	Undertake and monitor finishing process

Procedure for calendaring process

Step 1- prepare fabric roll close to calendaring machine

Step 2- unwound the fabric from the roll

Step 2- pass fabric it between two or more rolls under controlled conditions of time, temperature and pressure.

Step 3- wound the fabric on to the roll.

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Operation Sheet 2	Undertake and monitor finishing process

Procedures for sanforising process

Step 1- moist the fabric with steam, to make it more pliable

Step 2- fabric passes through a short tenter frame (pup tenter) to straighten and remove wrinkles

Step 3- lubricant is added for realignment of yarns

Step 4- fabric passes through the compressive shrinkage head

Step 5- fabric passes through a palmer drying unit to set the fabric

Step 6- The fabric is wound into large rolls under minimum winding tensions

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 3 hour.

Task 1. Carry out calendaring process

Task 2. Carry out sanforising process

List of Reference Materials

1- Reference books of textile technologies for finishing by Pietro Bellini Ferruccio Bonetti Ester Franzetti giuseppe Rosace Sergio Vago
2- Cotton: Science and technology Edited by S. Gordon and Y-L. Hsieh
3- Chemistry & Technology of Fabric Preparation & Finishing by Dr. Charles Tomasino
4- Chemical finishing of textiles W. D. Schindler and P. J. Hauser
5- Encyclopedia of Textile Finishing by Prof. Dr. rer. nat. Hans-Karl Rouette