

7. FINISHES



Do You Know ?

Can you name few finishes ?

Have you ever seen any fabric without any finish ?

Why do you feel finishes are necessary for textiles ?

Let's find out more such information in this lesson.

Newly constructed fabric as it comes from the mill is called 'greige goods or gray goods'. This does not imply that the fabric is gray in colour, it simply denotes any unfinished fabric. The goods must pass through various finishing processes to make it suitable for its intended end use.

7.1 Introduction

A finish is defined as anything that is done to fiber, yarn or fabric either before or after weaving or knitting to change the appearance (what is seen), the hand (what is felt) or the performance (what the fabric does).

Finishes contribute so much to the final character and appearance of the fabric that it is often said, 'It's the finish that makes the fabric'.

Finishes may be done in the mill where the fabric is constructed or it may be done in a separate establishment by a highly specialized group called converters.

7.2 Basic Objectives of Finishing

The finishing operations differ according to the type of fibers in a fabric and properties to be imparted. Fabrics can be finished in many ways, soft feel of mulmul, attractive appearance of embossed or khadi printed fabric, stiffness of organdie, warmth of flannel is all because of finishing.

❖ Following are the basic objectives of finishing

- **To clean the fabric:** These finishes remove natural impurities and other impurities deposited on fiber, yarn or fabric during fabric formation. These finishes improve appearance of fabric and impart standard quality to the fabric. eg. General or routine finishes applied to various fabrics are scouring, bleaching, degumming etc.
- **Improve aesthetic properties:** Finishes in this category improve luster, drape, texture, hand (feel) of the fabric. Mercerization, glazing etc are included in this category.
- **Impart special quality not inherent in the fiber or fabric:** These finishes usually do not alter the appearance of fabric but they improve performance of fabric. Finishes such as fireproof finishes, waterproof finishes are some of the examples.
- **Improve durability and other service qualities:** These finishes improve durability, resistance to biological conditions and impart easy care characteristics to fabric eg. Moth proof finishes, crease-resistance finishes etc.

7.3 Classification of finishes

I. On basis of processing: Finishing processes are categorized in several ways. Those concerned with textile processing may classify them as wet & dry finishes. They are also referred to as chemical & mechanical finishes.

a) Chemical Finishes : These finishes are obtained by deposition of chemicals such as starch, fats, rubber, latex, synthetic resins etc. These finishes can also be obtained by chemical reactions of acid, alkalies, bleaching agent etc. with fibers, yarns & fabrics eg. Mercerization, Bleaching etc.

Table no. 7.1 Classification of Finishes

On the basis of	Types			
Processing	Chemical Finishes (Wet Finishes)		Mechanical Finishes (Dry Finishes)	
Degree of Permanency	Permanent Finishes	Durable Finishes	Semi-durable Finishes	Temporary Finishes
End Product	Basic / Routine / General Finishes		Special Purpose / Functional Finishes	

b) Mechanical Finishes : They are also referred to as physical finishes. These finishing treatments include use of metal plates, brushes, calenders, rollers, roller with bristles, blades etc. eg. Calendaring, brushing.

II On basis of degree permanency: Finishes are also classified according to their degree of permanency as permanent, durable, semi durable & temporary finishes.

a) Permanent Finishes: A permanent finish generally involves a chemical process that changes the fiber structure that will not subsequently alter throughout the life of fabric. Eg. Macerization

b) Durable Finishes: Durable press finish may last throughout the life of the fabric but its effectiveness diminishes. Eg. Water Proofing

c) Semi durable Finishes: A semi durable finish will last through several launderings or dry cleanings; some are renewable. Eg. Sizing

d) Temporary Finishes: A temporary finish will be removed or substantially reduced when the fabric is laundered or dry cleaned. Eg. ironing

III On basis of End Product: Designers, merchandisers, sales personal & other concerned with end products classify finishes as Basic finishes & Special purpose finishes.

a) Basic Finishes : Basic finishes are often referred to as 'Preparation'. They are also termed as 'Routine Finishes' or 'General Finishes'. Routine finishing includes those steps in finishing that are done to most fabric to prepare them for dyeing & for special purpose finishes. In many cases they cannot

be seen or felt. These finishes mainly improve the appearance of fabric & impart standard quality to the fabric.

Eg. Scouring, Bleaching, Sanforization

- b) Special Purpose Finishes :** Special purpose finishes are also known as functional finishes. Special purpose finishes are directly related to the end use requirements of a particular textile item. These finishes impart special characteristic to fabric according to the use.

Eg. Waterproof finishes, Flame proof finishes etc.

7.4 Types of finishes:

After discussing classification of finishes and basic objectives of finishing, let's learn some of the basic finishes and special purpose finishes in detail.

7.4.1 Basic of finishes:

Table no. 7.2 Basic Finishes

Fabric Finish	Function
• Brushing	Removes short loose fibres
• Singeing	Burning surface fibres and lint
• Scouring	Removes dirt, oil and sizing materials
• Bleaching	Whitens the fabrics
• Sizing	Improves body, feel and add lustre
• Mercerizing	Imparts lustre and improves dye affinity of cotton
• Sanforizing	Shrinking the fabric – corrects length and width
• Calendering	Straightens, smoothens and embosses
• Degumming	Removes natural gum from silk fibre
• Weighting	Compensate boiled out gum
• Delustering	Making fabric dull or reducing lustre

❖ Brushing

Brushing is a mechanical finish that involves the removal of short loose fibre ends from the surface of the fabric. Cylinders covered with fine bristles rotate over the fabric, pick up the loose fibre ends and pull them away either by vacuum or gravity. This operation is usually applied to fabrics of staple fibres to give them a smooth and uniform appearance.

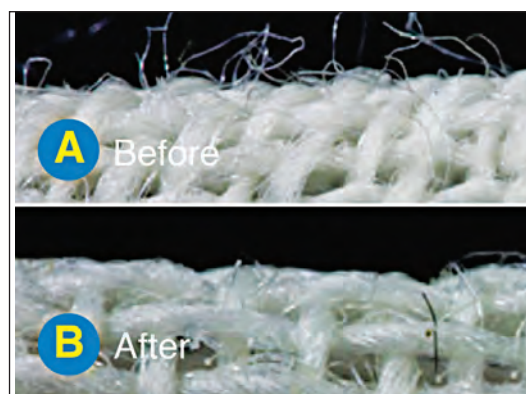
❖ Singeing

If a fabric is to have a smooth finish, singeing is one of the first essential preparatory processes.

Singeing burns off lint and threads as well as fuzz and fibre ends leaving an even surface. It is done before the fabric passes through other finishing processes or a printing operation.

Singeing is accomplished by passing the opened out fabrics directly over gas flames or hot plates at a speed sufficient to permit the protruding material to burn but not to allow the fabric itself to be scorched or burned. The fabric moves rapidly at a speed of 210-250 meters per minute and enters a water-bath as soon as it leaves the singeing area. The water-bath extinguishes any sparks or afterglow and prevents damage.

The finish is applicable only to the cotton and spun viscose rayon fabrics, but it is not suitable for wool or silk because fibres cling to each other. It is not applicable for man-made thermoplastic fibres because singe beads will be formed on the surface of the fabric and fabric will look very unattractive.



Picture No. 7.1 Effect of Singeing

❖ **Scouring**

Fabrics may be scoured or bleached before mercerizing, dyeing and printing. Scouring and bleaching are usually carried out together in large kettles called kiers.

Scouring is thorough cleaning of fibres to remove foreign matters such as dirt, natural waxes and grease, dry perspiration, processing oils and sizing compounds that are deposited on fibres, yarns or fabrics.

Scouring is a chemical finish and improves the moisture regain of the fibres for further finishing operations to be followed.

Scouring procedures vary depending on the fibres involved. Soap or synthetic detergents with alkaline builders and with wetting agents constitute the most common scouring agents. When the process is used for protein fibres, the chemicals selected should be neutral or slightly acidic.

❖ Bleaching

Bleaching follows the normal scouring operation. Fabrics, yarns or fibres are bleached either to make them white or to prepare them for dyeing or printing. Bleaching is a chemical operation, is relatively durable when the bleaching method is appropriate to the fibres involved.

Bleaching agents are of two kinds

Oxidising bleaches

Reducing bleaches

Oxidising Bleaches : These bleaches provide Oxygen to the fabric and make it white. They are many varieties available from the mildest to strongest. Sunlight, H_2O_2 are mild oxidizing bleaches while Sodium Hypochlorite (NaClO_3) or Javelle water is the strongest. The bleaches containing chlorite are strong and they are weaken fabric. That is why they can be safely used only on strong cellulosic fibres like cotton and linen.

Reducing Bleaches : These bleaches take away Oxygen from the fabric and make it white. Sodium Hypochlorite and sulphurous acid are commonly used reducing bleaches. These bleaches are milder and can be safely used on protein fibres like silk and wool.

Manmade fibers sometimes require bleaching but if they are properly processed during manufacture, many fibers are naturally white.



Picture No. 7.2 Effect of Bleaching

◆ **Sizing**

Sizing is the application of various materials to a fabric to produce stiffness or firmness. This is a chemical finish and is generally applied to cotton and linen to increase strength, weight, smoothness and stiffness. Cellulosic fabrics are sized with starches, resins, dextrin, clay and chalk etc.

Starch fills up the openings in constructed cloth creating an appearance of a greater compactness thus making an inferior fabric look attractive.

An important use of sizing is to prepare warp yarns for the weaving on loom. The sizing is applied to the yarn as they are wound onto the final warp beam. This is a temporary finish as the type of chemicals used are easily removed by the desizing and scouring processes that follow fabric construction.

❖ Mercerization

Mercerization is a chemical finish applied to cellulosic fibres especially cotton and cotton blends. It is also applied to linen.

The main purpose of mercerization is to alter the chemical & physical properties of the fiber. This process improves luster, strength, dye ability, absorbency, softness, elasticity of fiber.

The standard mercerization process uses caustic soda i.e. sodium hydroxide (NaOH) of 20-23% concentration. The fabric is saturated in the solution and held under tension. Fabric is then fed to timing rolls for a specific time period. Finally it is thoroughly rinsed in water & dried.



Know Your Scientist!

John Mercer was an English dye and fabric chemist. Born in Britain, he developed a process in 1844 for treating cotton with caustic soda. The process improved many physical properties of cotton. The process is named after him as 'Mercerization'.

❖ Sanforising (Shrinking)

Fibres spun into yarn are under constant tension during the weaving process. Their physical condition is changed but not permanently fixed. The fibres tend to revert to their natural state, causing shrinkage.

The fibres are made to assume a final condition by shrinking the fabric in a preparatory finishing process that minimize subsequent shrinkage, such as immersions in cold water, followed by hot water, steam or a chemical treatment.



Picture No. 7.3 Sanforizing Machine

Fabrics can be labelled as 'Preshrunk', 'Fully Shrunk', 'shrink proof' etc.

For basic finishes degumming and weighting refer to chapter Silk fiber. For delustering finish refer to chapter Viscose Rayon.

❖ Calendaring :

This is a mechanical finish.

Calendaring is the finish applied to nearly all the fabrics. Technically, the word pressing is used for wool fabrics and calendaring is used for all the other fibre fabrics.



Picture No. 7.4 Calendaring Machine

The need for calendaring arises mainly because the fabric when it is wet processed and dried is in the least lustrous state and its surface is not smooth because of the presence of highly crimped and wavy threads. To meet this need the fabric is passed between the rollers termed calender and this mechanical process is called 'calendaring'.

This finish is similar to ironing but is done with much higher pressure. Calendaring is done by feeding the fabric between large rollers. One of these roll is somewhat soft while a second roll is firm and heated. The action is similar to the use of heated iron placed on a padded ironing board.

7.4.2 Special Purpose Finishes

Following are some of the commonly used special purpose or functional finishes

Table 7.3

Special Purpose or Functional Finishes

Fabric finish	Example
<ul style="list-style-type: none"> • Finishes that add to durability 	<ul style="list-style-type: none"> • Abrasion resistant finish • Antislip finish
<ul style="list-style-type: none"> • Finishes that provide added comfort 	<ul style="list-style-type: none"> • Absorbent finish • Water-proof finish
<ul style="list-style-type: none"> • Finishes that provide safety 	<ul style="list-style-type: none"> • Flame retardant finish
<ul style="list-style-type: none"> • Finishes that make care easier 	<ul style="list-style-type: none"> • Crease-resistant finish • Durable press/ wash and wear finish • Stain and spot resistant finish
<ul style="list-style-type: none"> • Finishes that provide environmental resistance 	<ul style="list-style-type: none"> • Fume fade resistant finish
<ul style="list-style-type: none"> • Finishes that provide biological resistance 	<ul style="list-style-type: none"> • Moth-resistant finish • Mildew-resistant finish • Perspiration resistant finish

After getting information regarding Special Purpose Finishes, lets learn some of the finishes in detail.

❖ **Waterproof finish**

For a fabric to be truly waterproof, it must be completely sealed with a substance that is insoluble in water. The familiar rubber coated garb of police officer and fire fighters is a good example.

Modern water proofing materials include **vinyl resins**, which do not oxidize and crack as readily as rubber. Synthetic rubbers are also more durable to outside influences than natural rubber. Today's waterproof fabrics are mostly used to protect merchandise in transit. However these materials close the pore of the fabric and do not permit it to breathe and therefore are incompatible to wear. This finish is chemical in nature.



Picture No. 7.5 Fabrics with waterproof finish

❖ **Microporous waterproof Finish :** This is the latest invention in water-proofing

A microporous film is applied to the back of fabric. Although the film appears to be solid, it has millions of tiny cells called '**Micropores**'. These cells are too small to permit rain to penetrate, but they do allow passage of air. This finish is used for rainwear and outerwear fabrics.

❖ **Flame-retardant finish**

The term Fire-proof or Flame-proof can only be applied to glass or asbestos fibres because only a material which undergoes no change when exposed to fire can be termed Fire-proof. But in practice, a fire-proof material means one which does not propagate flame beyond the charged area. There is as yet no known finish which can make textile materials as fireproof in the real sense of term. What is aimed at in Fire-proofing is to make the material “**fire-resistant**” or “**flame-retardant**”. This finish is chemical in nature.

Certain textiles are required to be fire-proof where the risk of fire is involved or when statutory obligations demand them to be so. It is often used for uniforms of fire fighters, for workers in ammunition factories, coal mines. This finish has large application in defence organization.

Internet my friends

Find out detailed information about textile items which needs fireproof finish in defence organization.



Picture No. 7.6 Fire-proof Fabrics

Some interesting facts !

Evidence of asphalt being used as a plastic material and as a waterproofing agent was found as early as 6500 BC.

❖ **Moth proof finish**

Fibers containing protein such as wool and silk are especially susceptible to the damage caused by moth and carpet beetles. The protein keratin which is found in wool and other hair-fibres is believed to be what the moth prefers, than silk fibres that contain fibroin protein. Carpet beetles however are likely to eat all protein substances including keratin and fibroin. Protein fibres treated with this finish become so unpalatable as to cause the larva to starve and die. This finish is available in both temporary and permanent type & is chemical in nature.



Picture No. 7.7 – Textiles with Moth-proof finish



Picture No. 7.8 - Attack on Cloth by Moth

Let's Find Out

Find out information regarding moth-proof bags and moth repellents available in market.

❖ Mildew-proof finish

This finish is applied to cotton, rayon and linen and protects the fabric from damage caused by mildew and fungi. Starched cotton fabrics and damp fabrics are more susceptible to the mildew damage.



Picture No. 7.9 Fabrics with Mildew proof finish

TABLE No. 7.4

Difference between Basic finishes and Functional finishes

	Basic Finishes		Special Purpose Finishes
1.	The Finishes from this category are applied first on to the fabric eg. Singeing, Scouring etc.	1.	Finishes from this category are applied after basic finishing process. eg. Waterproofing, mothproofing.
2.	They impart standard quality to the textiles.	2.	They impart special character to the fabric according to the end use of textiles.



Use Your brain Power!

A) In the table given below finishes & their functions are given. Some places have been left blank. Can you fill them up?

	Finish	Function
1.	Calendaring	
2.		Removes dirt
3.	Bleaching	
4.	Degumming	
5.		Compensate boiled out gum

B) Can you complete the bracket by using similar word.

- Wet finish – finish
- Mechanical finish – finish
- finish – General finish
- Special purpose finish – finish

C) Can you reshuffle the letters to name the finish.

- GLHEIBCNA - _____
- EMUNDGIMG - _____
- REIECRMIZGN - _____
- ZNISGI - _____

EXERCISE

Objective Type Question

I A - Match the pairs.

	A		B
1	Mildew proof finish	a.	Makes fabric stiff
2	Bleaching	b.	Cellulosic fabrics
3	Singeing	c.	Remove dirt
4	Scouring	d.	Burns surface fibres
		e.	Whitens the fabric

B - Match the pairs.

	A		B
1.	Moth proof finish	a.	Thermoplastic fibre
2.	Sanforizing	b.	Stiffness
3.	Sizing	c.	Provides biological resistance
4.	Calendaring	d.	Length contraction
		e.	Similar to ironing

II. State whether the following sentences are true or false.

1. Singeing is making shrink proof fabric.
2. Brushing removes short loose fibres.
3. Weighting is compensating boiled out gum of silk.
4. Mildew proof finish is applied for protein fibres.
5. Degumming is removal of silk gum.

III. Multiple choice questions.

Select and write the most appropriate answer from the given alternatives for each sub-questions.

1. Special purpose finishes imparts special

- a. Texture b. Drape
 - c. Characteristics
2. Finishes which use acids, alkalies, bleaches are called
 - a. Physical finish b. Chemical finish
 - c. Mechanical finish
 3. Finish that improves care characteristic is
 - a. Starching b. Crease resistant
 - c. Scouring
 4. Newly constructed fabric without any finish is called
 - a. Gray good b. White good
 - c. Raw good
 5. Basic finishes removes
 - a. Impurities b. Hardness
 - c. Lustre
 6. Waterproof finish is applies to
 - a. Carpets b. Raincoat
 - c. Blanket
 7. Fireproof finish is applied to
 - a. Labcoats b. Umbrella
 - c. Curtains
 8. Fiber which is more susceptible to moth
 - a. cotton b. silk
 - c. polyester
 9. Process which burns out loose fibers from surface
 - a. Sanforizing b. Singeing
 - c. Scouring
 10. Finish which makes the fabric stiff
 - a. Sizing b. Bleaching
 - c. Brushing

Short Answer Type Question

- **List the following**

1. List two special purposes finishes.
2. List two properties improved after mercerization.
3. List one example each of reducing and oxidizing bleaches.
4. List two basic finishes.
5. List two examples where the fireproof finish is essential.
6. List two examples where waterproof finish is required.

- **Give reasons.**

1. Chlorine bleaches are not used for protein fibre.
2. Uniform in ammunition factories requires fireproof finish.
3. Woollen fabrics are given moth-proof finish.
4. Degumming is essential for silk.
5. Singeing is not used for fabrics made up of thermoplastic fibres.
6. Cellulosic fabrics are given mildew proof finish.
7. Calendaring finish is essential for most fabrics.

- **Differentiate between**

Basic finishes and special purpose finishes.

A) Classify the following finishes into Basic finishes & Functional finishes

- a) Water proof finish b) Scouring
c) Mildew proof finish d) Sizing

B) Classify following into chemical finishes & mechanical finish

- a) Brushing b) Bleaching
c) Mercerization d) Calendaring

- **Answer in short.**

1. Calendaring
2. Mercerization
3. Basic finishes
4. Singeing
5. Sanforizing
6. Scouring
7. Bleaching
8. Special purpose finishes
9. Fire proof finish
10. Water proof finish
11. Moth proof finish

Long Answer Type Question

1. Explain basic objectives of finishing.
2. Explain the term basic finishes & explain mercerization
3. Explain the term special purpose finishes and explain mothproof finish

Self Study Project

1. Study labels on the fabric and find out various routine finishes applied to fabrics.
2. Educate your family & friends regarding care of woollens from moth

