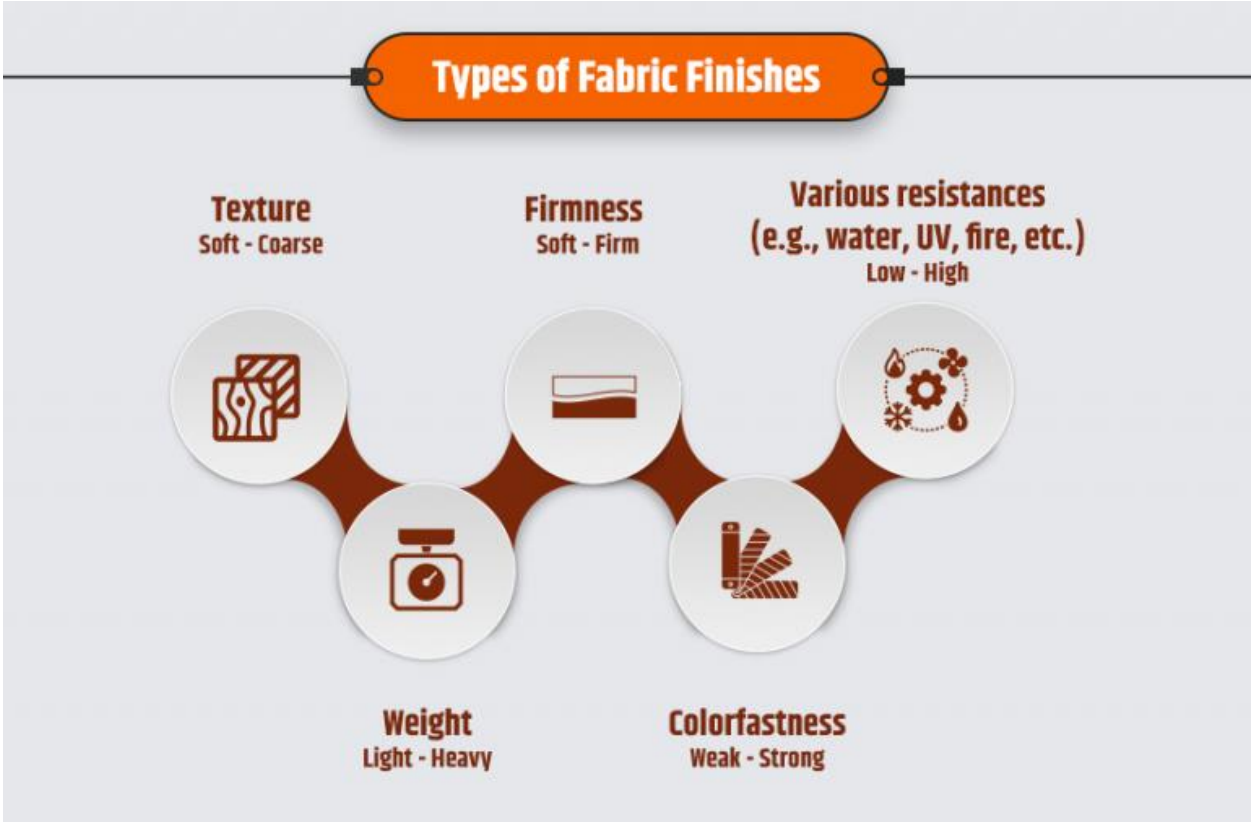
Textile Finishing



The finishing of a fabric includes all **those treatments** to which the fabrics are subjected at the end of **the ennobling operations**. These treatments are designed to **improve the appearance, the hand, the properties,** also according to the possible fields of use.

(For textile ennobling we mean the set of treatments aimed to transform the raw fabric into semi-finished products suitable for subsequent processing, or in finished fabric ready for the manufacture of products.)

With finishing it is therefore meant the set of **chemicals, physical and mechanical treatments** to which the fabrics are submitted in order to give them the specific properties for the use for which they are intended.

Textile finishing is carried out both on **fabrics made with digital printing and on traditional printed ones, and also on dyed fabrics**. Depending on the process, it can be useful on **woven and knitted fabrics**.

Modern textile finishing

Modern textile finishing and **finishing treatments** are **chemical-physical processes**. In addition to the historical **mechanical treatments**, we use chemical solutions specially designed and suitable for the purpose we want to achieve. The most used **physical means in modern finishing** are:

Heat: for the **diffusion of chemical products** inside the fiber. Promotes the homogeneous distribution of the treatment;

Pressure: it is applied by means of a **calender** and makes passages and crushing of the fabric between two cylinders, one of which can **be heated**;

Friction: it aims to **improve the surface of the fabric**; it is applied through a **friction calender** where the rotation speeds of the cylinders are different;

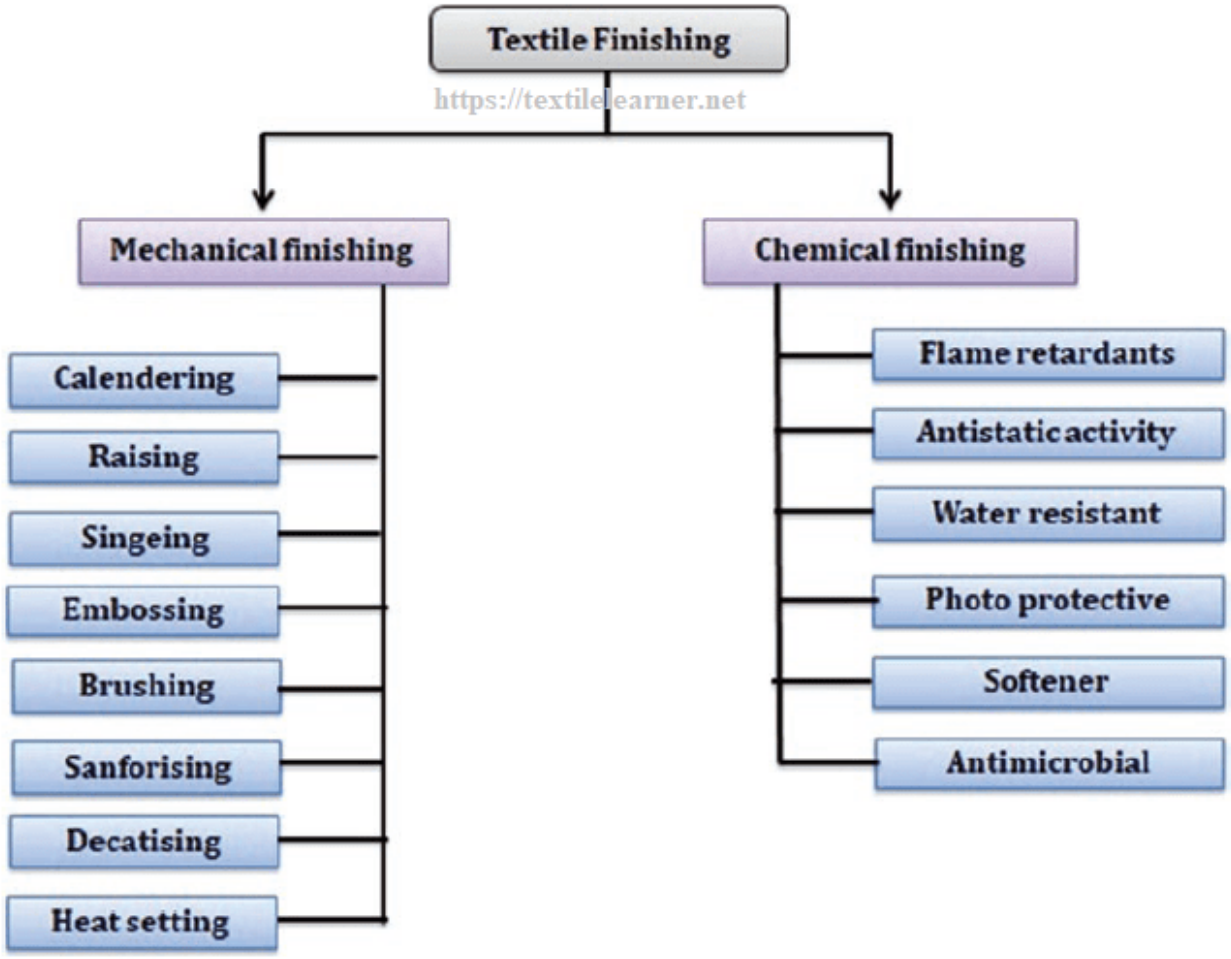
Tension: extends the fabric in both directions (**width and height**) to **improve dimensional stability;**

Humidity and steam: to **swell the fabric and improve the folding** of the fiber it is made of, modifying both **the appearance and the hand**.

What is the purpose of textile finishing?

- To improve serviceability
- To improve attractiveness
- To enhance their sale appeal
- To improve comfort & usefulness
- To get specific end use

Classification of Textile Finishes



Factors affecting the choice of finishing technique

- Nature of the fabric i.e. chemical composition, state, weaves etc. This determines the appearance, i.e., transparency, luster, weight, whiteness etc.
- Physical properties of the fabric i.e. hand feel, softness, stiffness, tensile strength, elongation, shrinkage property, insulation etc.
- End-uses of the material i.e. non-shrinking, non-creasing (good crease recovery), draping, resistance to abrasion, non-soiling nature etc.
- Receptivity of the fabric to various finishing operations, i.e., water-proofing, flame-proofing, rot-proofing etc.

Shearing Process

- ✓ Shearing is a mechanical permanent finishing process by which the fibres protrude from the surface of a fabric is cut to an even height. One important use of this technique is the production of pile fabrics from a looped terry and fleece fabric. When this type of fabric is sheared, the top of the loops of the fabric are cut off and velvet like appearance is produced.
- ✓ When knitted loops of fleece fabrics are sheared, knitted velour effect is produced that has great deal of use in upholstery fabric. Velour is used in dance wear, stage curtains and is also popular for warm, colorful casual clothing. When used as upholstery, velour often is substituted for velvet.
- ✓ The shearing machine can process a wide range of fabrics. Knitted fabrics can be processed in open width form but these cannot be processed in tubular form.
- ✓ Shearing Process is very important to cut the pile of random lengths present on fabric surface at a constant level of height and hence produce a certain hand feel, pile and velour effect. The process can also improve the color and appearance of the fabric.

Importance of Shearing Process

1. To clear out random lengths of fibers and produce a uniform pile
2. To cut the pile present on a fabric surface at a constant level of height
3. To prevent pill formation on the cloths
4. To produce a certain hand feel onto the cloths
5. To improve the color and appearance of the fabric

Crease Resistant Finishing

- ✓ Crease resistant finishing is a special type of chemical finishing process by which resins are applied on textile materials so that resins can cross-link inside the amorphous region of fibre and thus improve the crease recovery angle of the textile material.

- ✓ Sometimes, resins are also known as cross-linking agents, which are used on cotton, rayon and linen, because these three fibres are wrinkled easily. The textile material is saturated with the crease resistant finishes or resin finishes and then the resin is cured at the temperature ranges from 180-190°C.

Importance of Resin Finishing

1. Improved crease resistance and crease recovery property is achieved.
2. Resin finishes improve resilience, handle and draping properties of cloths.
3. It increases the strength of rayon in both dry and wet condition.
4. It decreases the extension of rayon with freedom from distortion.
5. Resin finishes decrease the shrinkage on laundering.
6. By resin finish color fastness of dyed goods can be improved.
7. Resin finish sometimes resists the degradation of textile material by light.
8. Resin finish gives comfort to the wearer.
9. It imparts adequate wear and tear resistance of fabrics.
10. Good soil repellency and easy removal of soil by washing can be achieved by resin finish.

Types of Cross-linking Agent used in Crease Resistant Finishing

i. Phenol formaldehyde
ii. Urea formaldehyde
iii. Tetra methylol acetylene di-urea
iv. Dimethylol ethylene urea (DMEU)
v. Dimethylol dihydroxy ethylene urea (DMDHEU)

Benefits of Using DMDHEU as Creases Resistance Finish on Cloths

i. It is very effective resin at low concentration.
ii. Its durability is very high.
iii. It does not reduce the colorfastness properties of dyed materials.

iv. Suitable for both colored and white fabrics and extensively used for high quality suiting.

v. It does affect the fabric handle.

vi. It has more ability to be post-cured for permanent creases.

vii. It does not cause strength loss in cloths.

Differences between Crease Resistance and Crease Recovery

Crease resistance	*Crease recovery*
1) It is a property of fabric that resists fabric from creasing.	**1) It is a fabric property that indicates the ability of fabric to go back to it's original position after creasing.**
2) Crease resistance comes into play before the fabric is creased.	**2) Crease resistance comes into play after the fabric has been creased.**
3) It resists the stretching and compression of molecular chain of fibre polymer.	**3) By this property, stretched or compressed polymer chain comes back to normal position.**

Water Repellent/Proof Finishing

- ✓ Water repellency is a feature of textile material by which it prevents the spreading of a drop of water on its surface.
- ✓ Water repellency can be defined as the ability of the fabric to withstand wetting or penetration by water under the test conditions.
- ✓ Water repellent fabrics have open pores and, by finishing the interstices between warp and weft yarns remain unaltered or little affected.
- ✓ So, these are air permeable and also allow water vapor to pass through.
- ✓ On the other hand, the term "water proof" is used to define a fabric coated with a solid surface film with no or little air permeability.
- ✓ When a uniform coating of suitable substances such as rubber, fats, wax etc. is produced on the surface of the fabric the interstices between the warp and weft yarns are blocked by the continuous film of the substance and the fabric

becomes completely impervious to water. The treated fabric becomes impermeable to air also. This type of finish is called as water-proof finish.

- ✓ The textile material is padded with the water repellent or water proof finishes and then is cured at the temperature ranges from 140-150°C.

Differences between Water Proof Fabric and Water Repellent Fabrics

Criteria	*Water proof fabric*	*Water repellent fabric*
1) Fabric pores	**1) Filled.**	**1) Open.**
2) Water vapor permeability	**2) None to very small permeability.**	**2) Small to large permeability.**
3) Air permeability	**3) None to small permeability.**	**3) Usually large permeability**
4) Resistance to water permeability	**4) Highly resistant even under external hydrostatic pressure.**	**4) Resistant to wetting by rain drops. Permits water only under external hydrostatic pressure.**

Name of Important Water Repellent Finishes

- ❑ There are two types of water repellent finishes, namely, durable finish and non-durable finish. Durable finish can withstand after washing many times whereas non-durable finish cannot withstand against washing for many times.
- ❑ Following finishing agents can be used to make the fabrics water repellent.

i. Aluminium salts

ii. Aluminium salt and wax combination

iii. Zirconium salt and wax combination (Phobotex FT)

iv. Pyridinium chloride (Velan PF)

v. Silicones (polysiloxanes)*

vi. Fluorochemicals (polyacrylates)

Silicone Water Repellent Finishes

- ❑ Silicones are relatively new class of durable water repellents which are very popular and widely used for its high solubility and chemical inertness, more durability, relatively low flammability, and non-toxic nature.
- ✓ The silicon polymer (-O-Si-O-) used as water repellent, is named as polysiloxane. There are three types of polysiloxane, namely,

i. dimethyl polysiloxanes,

ii. methyl hydrogen polysiloxanes and

iii. hydrogen polysiloxanes.

Among three polysiloxanes, methyl hydrogen polysiloxanes impart high water repellency.