UNIT-1 PRODUCTION SEQUENCE

Textile is a very widely used term which includes

- All kinds of fibers (e-g: Cotton , Jute, Wool, Viscose etc),
- All kinds of process (e-g: Spinning, Weaving, **Knitting**, Dyeing, Printing, Finishing etc),
- All kinds of machineries (e-g: Spinning Machineries, Weaving Machineries, Knitting Machineries, Cutting machineries etc),
- To convert **textile fiber** into finished or
- End use products (e-g: Garments, Furnishing Materials, Household Textiles, Medical textiles, **Smart Textiles**, Shoes Textiles, Fishing Nets etc).

Textile manufacturing is a very complex and lengthy process. It is based in the conversion of three types of fiber into yarn, then fabric, then textiles. These are then fabricated into clothes or other artifacts.

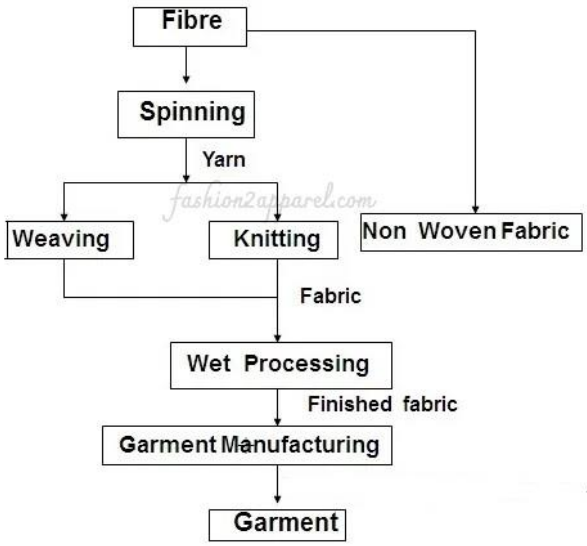
A textile product passes through several processes in its manufacturing before it becomes wearable. These processes include spinning, weaving, knitting, wet processing and garments manufacturing.

Textile manufacturing is an old but massively important industry. It is a huge and diverse industry that is basically involved with the conversion of fiber into yarn and then yarn into fabric. These fabrics are then printed, dyed, or fabricated into clothes, household products, upholstery, and various industrial products.

The factors that will determine the value and quality of your textiles are:

- Quality of raw materials used.
- The character of the yarn spun from the fibers like clean, fine, smooth, and coarse. It also includes whether they are soft, hard, or medium twisted.
- Density of weave
- Finishing processes

Process Sequence Of Textile



Fiber

The process of textile manufacturing begins with the cultivation of natural textile fibers. This means that the first step in the production of textiles is harvesting raw fiber and sourcing it.
Fibers are extracted from:

- Plant or
- Animal or
- Mineral sources

They are then processed into a continuous strand known as yarn.
There are many types of fibers like:

- Cotton
- Linen
- Wool
- Silk

And so on. Additionally, today, man-made or synthetic fibers are also used in textile manufacturing. These include but are not limited to the following:

- Polyester
- Rayon
- Nylon

Spinning or Yarn Manufacturing

Yarn manufacturing is the textile process of turning raw materials into yarn. To create the final yarn of thread, raw materials are sorted, cleaned, and then mixed together. This is used in weaving, knitting, or crocheting. Yarn can also be called a thread when it is used for sewing purposes.

Yarn manufacturing is known as the mother of the textile manufacturing process. Mainly, yarn is done by spinning together fibers such as cotton fiber, wool, or synthetic fibers. While originally, the yarn used to be made from animal hair, today, the same is not the case.

In fact, the market has many different types of yarn today. This is because textile manufacturers have found ways to make them out of other things like hemp, basalt, or bamboo. Yarn can also be made from recycled materials like plastic and polyethylene. In the case of synthetic yarn production, it is turned into petroleum-based products like rayon and polyesters.

For example, if the raw material is wool or cotton, then you will have to ensure that any debris that might contaminate a batch is removed. If, however, your raw material is bamboo, then you will need to strip away its outer layer before spinning it into sewing thread for knitting projects.

After the raw materials are prepared, they are spun into yarn through a process called spinning. Spinning is done using machines with steel bobbins that have been wound with fiber or spinning material, known as roving. This can come from natural sources such as wool or cotton.

The machine winds the roving around a bobbin and then pulls it between two rollers that turn at different speeds to create the yarn. Here, some machines can also "twist" in order to add strength and elasticity to the final product.

Fabric Manufacturing Process

Also known as weaving, the fabric manufacturing process is the next step in textile production. Here, yarn is taken from one machine and transferred to another machine in order to create a length of fabric.

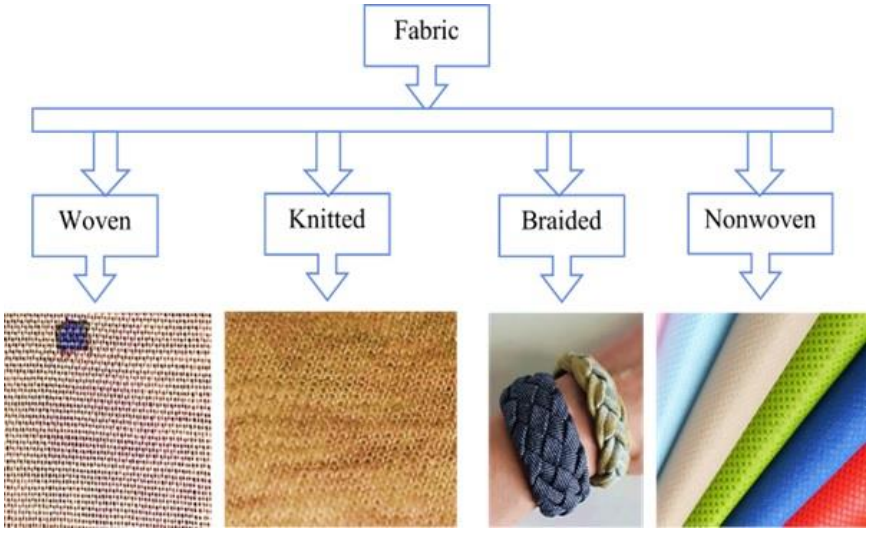
This process is completed using machines that turn yarn into lengths, which are then fed onto a loom with different types of colors or threads on specific sections called harnesses.

The warp (lengths) must be fitted precisely between the two sides of the heddles before the loom is turned on and the weaving process begins. Once a length of textile fabric has been created, it is removed from the looms and then sewn together to create a finished product.

There are four types of fabrics that are produced in the garments industry. These are:

- Woven fabric

- Knit fabric
- Nonwoven fabric
- Braided fabric



Fabric Wet Processing

This is a process used to dye and finish textiles. The dyeing process involves the application of colorants to fabric in order for it to become colored. The wet preparatory processes are:

- Fabric inspection
- Stitching
- Desizing
- Scouring
- Bleaching
- Dyeing
- Printing
- Finishing

Textile finishing may involve adding additional properties such as soil release, anti-pill, or flame retardant treatments with different textile auxiliaries. This is applied chemically before packaging and shipping. What needs to be noted here is that there are several types of textile finishing that can be done by hand or machine.

Textile printing includes the use of inkjet printing on fabrics like sweatshirts, aprons, children's clothes, t-shirts, etc. It also includes screen printing on various types of clothing, including hats, shirts, etc. Some of the types of textile printing are:

- Digital textile printing uses computers/plotters to print onto fabric
- Flexography which prints onto plastic film
- Gravure printing which prints with engraved cylinders onto paper
- Dye sublimation printing, where heat-activated chemicals are transferred onto a carrier medium from an inkjet printer

Garment Manufacturing Process

Garment manufacturing is the heart of yarn manufacturing. The steps involved in the garment manufacturing process are:

- **Garments design-** This could be provided by the buyer, or you will need textile design in the designing section. When garments are received from the buyer, their design starts with a technical sheet. This step can either be done manually, or it can be automated.
- **Pattern making-** Based on the garments' design, technical sheet, and artwork, the pattern master makes the pattern for all garments. Today, however, this can be done with an automated machine. Patterns are drawn, keeping in mind the different components of apparel by standard body measurements. They are often known as basic blocks or block patterns.
- **Sample making-** After the perfect pattern has been made, a complete apparel sample is made to ensure that it meets the requirements of your buyers. Once this sample is approved by the buyer as per their required specifications, it is known as an approved sample.

  This will help in ensuring that the pattern adheres to the instructions issued for complete apparel production. This will help in saving your expenses while also keeping your customers satisfied.

- **Production pattern making-** The approved sample is followed by the counter sample, which is made for bulk production. Here, an additional extra measurement with exact or actual measurement is taken. This is known as an allowance, which is crucial for bulk production. Allowance can either be added manually or using the computer and is often known as a working pattern.
- **Grading-** Grading is the stepwise decrease or increase of the block or master pattern to produce different patterns and sizes. In bulk garments, production grading is important to maintain the production's size ratio. It is graded according to the buyer's instructions.
- **Marker making-** A marker is a thin paper containing every apparel part. Marker-making helps to produce the cutting process smoothly. This step can be done manually as well as by using automation.
- **Fabric spreading-** This is one of the crucial parts of the garment production process. This is also known as fabric lying. This process is undertaken after a process named fabric relaxing is undertaken.

  The main objective of fabric relaxation is to relax and contract the fabrics. This makes the fabric ready for the garment production process.

  The benefit of this process is that it not only helps in preventing fabric strain at several stages but also helps in reducing fabric shrinkage. Post this, the fabric is spread on a long table so that it can be cut properly.

  Currently, fabric spreading is done using automation. However, it still requires skilled manpower to spread the fabric properly. Thus, it is during the fabric spreading process that any fabric fault from the production line is detected.

- **Fabric cutting-** The fabrics need to be cut according to the marker. To do so, the process starts with fabric lying, marking, and then cutting. This is one of the most essential steps, as once the fabric is cut, there is no going back.

  Hence, this can negatively affect your sewing process if not undertaken properly. This process can be done manually with a straight and sharp knife or through a computerized cutting system.

- **Cutting parts sorting and bundling-** After the errorless cutting, all the parts are sorted out according to the bundle tag. The bundle tag represents the fabric component bundle to identify the component. It is required to maximize production and maintain it. However, this step is not required in cases of single-garment production.
- **Sewing-** Here, all the cutting components of fabric are sewn together to make the garment or part of the garment as required. This is done manually and depends on the skills of the workers.
- **Garments inspection-** Final garment inspection is an important part of quality control. Higher the quality of your garment, the better your factory is represented. This step is undertaken manually.

  Often, garment factories set a commodity standard to measure production output. Quality control is the most complicated section where the quality of your garments will be defined based on the inspection.

- **Spot removing, ironing, and finishing-** This step happens after the production defects are identified in the quality control, and marked with a sticker. The garments are now taken to the spot cleaning area. Here, your apparels will be cleaned with the help of hot water, steam, or chemical stain remover. Then it goes for manual ironing and finishing.
- **Final inspection-** A final quality control check is done to ensure that your buyer's requirements are met. Sometimes this is also done by the agents of your buyer. This step is always carried out manually.
- **Garments packing-** Once all the above-mentioned steps are completed, your garments will be packed. The packing is carried out by using the buyer's instructed poly bag. This step can be done either manually or it can be automated.
- **Cartooning and shipment-** Once your garments are packed, they are cartooned to reduce the damage of the garments. This is done in accordance with the buyer's instructions. Post cartooning, shipment starts.

FINISHES:

Introduction:

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.

Textile Finishing:

Textile finishing is a term commonly applied to different process that the textile material under go after pretreatment, dyeing or printing for final embellishment to enhance their attractiveness and sale appeal as well as for comfort and usefulness.

Objects of Finishing:

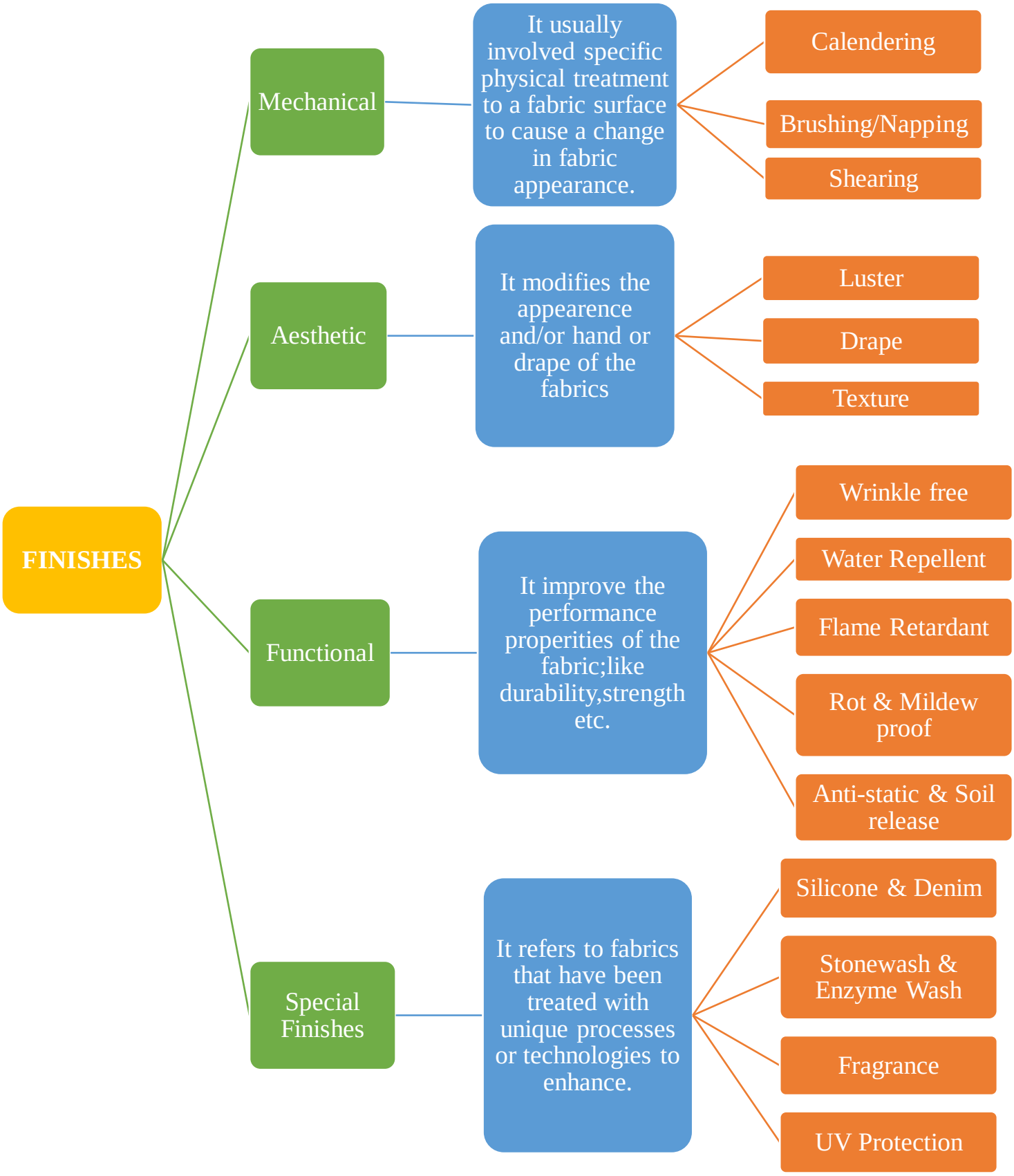
The aim of finishing is to render textile goods fit for their purpose or end use. Besides that, finishing can be done for achieving the following purposes-

a) To improve fabric attractiveness.

- By modification of fabric appearance (Calendaring, Optical brightening)
- By altering fabric handle (Softening, Stiffening)
- Control of fabric dimension (Sanforizing, Compacting)

b) To improve service ability.

- Protection of fabric (Flame proofing, Water proofing)
- Improved performance (Water repellency, Raising)
- Easy care properties (Resin finish, Crease recovery)


FINISHES
Mechanical
It usually involved specific physical treatment to a fabric surface to cause a change in fabric appearance.
Calendering
Brushing/Napping
Shearing
Aesthetic
It modifies the appearence and/or hand or drape of the fabrics
Luster
Drape
Texture
Functional
It improve the performance properities of the fabric;like durability,strength etc.
Wrinkle free
Water Repellent
Flame Retardant
Rot & Mildew proof
Anti-static & Soil release
Special Finishes
It refers to fabrics that have been treated with unique processes or technologies to enhance.
Silicone & Denim
Stonewash & Enzyme Wash
Fragrance
UV Protection

Importance of Textile Finishes:

Textile finishes are crucial because they enhance fabric appearance, feel, and functionality, making them more desirable and practical for various uses. Finishes improve durability, protect fabrics from damage, and can add specific qualities like wrinkle resistance or water repellency.

Here's a more detailed look at the importance of textile finishes:

1. Enhancing Appearance and Feel:

- Finishes can improve the look and feel of a fabric, making it more appealing to the consumer.
- Examples include treatments that add sheen, improve texture, or enhance the drape of a fabric.
- Finishes can also improve the hand (feel) of a fabric, making it softer, smoother, or more crisp.

2. Improving Functionality:

- Finishes can impart specific properties to fabrics, making them more useful for particular applications.
- For instance, wrinkle resistance in clothing, water repellency in outdoor wear, or flame retardancy in safety gear are all made possible by specific finishes.
- Finishes can also protect fabrics from damage caused by UV radiation, moisture, or mildew.

3. Increasing Durability:

- Finishes can strengthen fabric fibers, making them more resistant to wear, tear, and abrasion.
- This can increase the lifespan of the fabric and reduce the need for frequent replacement.
- Examples include treatments that enhance colorfastness, resist fading, or prevent pilling.

4. Adding Value:

- Finishes can add value to a fabric, making it more desirable and marketable to customers.
- This can be achieved by improving the aesthetic appeal, enhancing functionality, or adding unique features.
- In turn, this can justify higher prices and increase profitability for manufacturers.

APPLICATION METHODS:

Finishing applications in manufacturing involve various methods to enhance a product's surface appearance, durability, and functionality. These methods can be broadly categorized into

mechanical, chemical, and coating applications. Examples include polishing, plating, painting, and various coating techniques.

Mechanical Finishing:

- **Polishing:** Uses abrasives to smooth and create a glossy surface.
- **Grinding:** Removes material to achieve precise dimensions or surface texture.
- **Sanding:** Smooths or shapes materials using abrasive materials like sandpaper.
- **Abrasive Blasting:** Uses high-pressure streams of abrasive materials to clean or texture surfaces.
- **Deburring:** Removes small imperfections like burrs or sharp edges.
- **Burnishing:** Smooths surfaces through rubbing with a hard object.
- **Lapping:** A precision finishing technique using abrasives on laps to achieve fine surface finishes.
- **Mass Finishing:** Involves tumbling or vibratory finishing to smooth and polish parts.

Chemical Finishing:

- **Anodizing:** Creates a protective oxide layer on metals, primarily aluminum, improving corrosion resistance and allowing for dyeing.]
- **Electroplating:** Deposits a thin layer of metal onto a substrate using an electric current. **Electroless Plating:** Deposits metal through a chemical reaction, without using electricity.
- **Painting:** Applies a liquid coating to a surface for protection or aesthetic purposes. **Coating Application:** Includes various techniques like powder coating, where a dry powder is applied and then fused to the surface.
- **Dyeing:** Immerses textiles in a dye solution to change their color.

Coating Applications:

- **Spraying:** Applies a liquid or powder coating using a spray gun.
- **Rolling:** Applies a coating by passing the material between rollers.
- **Hot Dip Plating:** Immerses the workpiece in a molten metal bath to coat it.
- **Laser Ablation:** Uses a laser to precisely remove material for aesthetic or functional purposes.
- **Textile Finishing:** Includes a variety of wet and dry processes like calendaring, heat-setting, and applying various chemical treatments to alter fabric properties.

These finishing methods are chosen based on the material, desired surface properties, and the intended application of the finished product.