



Textile Manufacturing Process (Fiber to Fabric)

Discover how textile is manufactured, what affects textile quality and Cotecna services that help determine textile compliance and quality.



Textile manufacturing is the process of converting fiber into yarn and then into fabric. The textile industry was worth almost US\$1 trillion in 2022. Textile manufacturing requires many tests and regulations to ensure the quality and safety of finished products.

Textile refers to any material made of interlacing fibers; hence textile raw materials are those fibers capable of being converted into yarns and fabrics.



FIBER

YARN

FABRIC

Types of Fiber:

- > **Cellulosic Fiber:** Cotton, Bast Fibers, Leaf Fibers, Coir.
- > **Protein Fiber:** Silk, Wool, Mohair, Cashmere, Camel hair.
- > **Synthetic Fiber:** Nylon, Nomex, Kevlar, Polyester, Acrylic.
- > **Mineral & Organic Fiber:** Glass, Metallic Fiber, Carbon Fiber.

Fiber Properties:

Yarn diameter, hairiness, linear density, permeability, strength properties, etc. depend upon the end-use requirement of the woven or knitted fabric, (e.g., apparel or industrial fabrics), sewing thread, or cordage.

Length: must be several hundred times the width, to give the necessary flexibility which enables them to be spun into yarns.

Tenacity or Strength: to withstand the stresses during spinning and weaving.

Elongation: specified as percentage of starting point and it is important since textile product without elasticity would hardly be usable in day-to-day life.

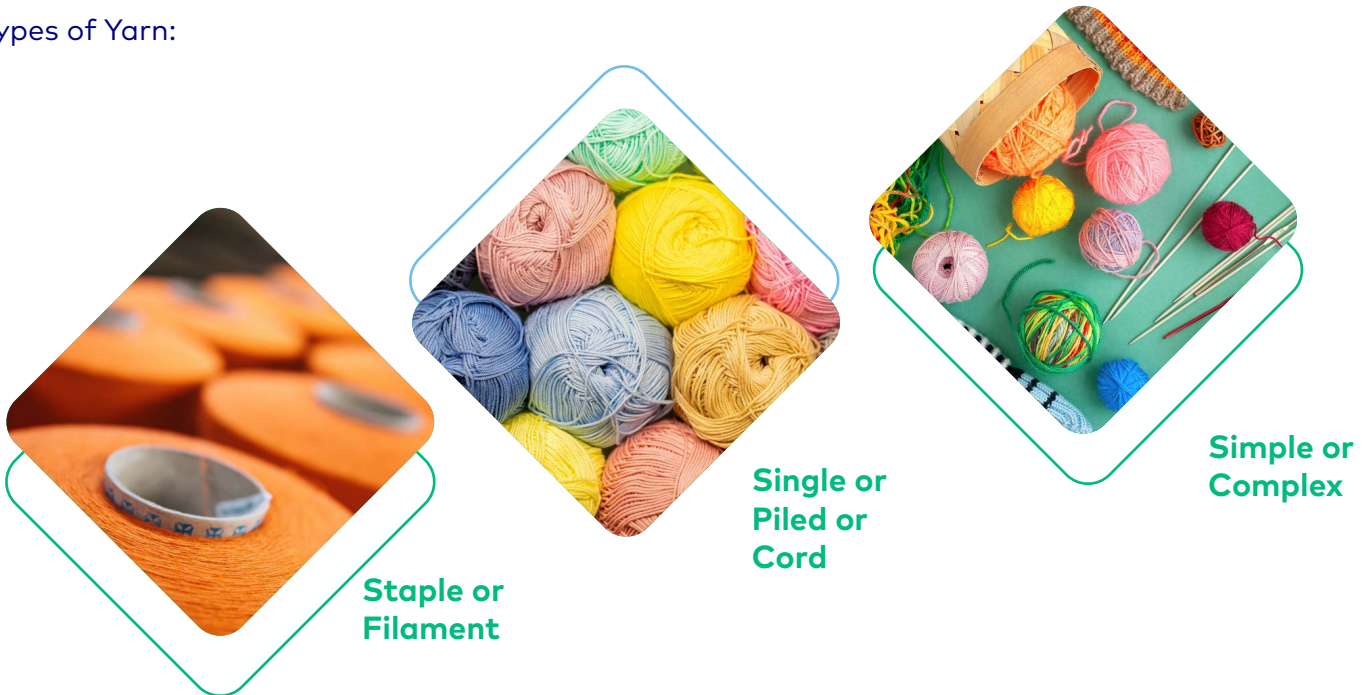
Uniformity: fibers should have the same length, width and flexibility to produce even yarns.

Yarn Manufacturing:

Yarn is a generic term for a continuous strand of textile fibers, filaments, or material in a form suitable for knitting, or weaving or otherwise intertwining to form textile fabrics. It can be produced in different sizes and texture and vary in other characteristics. Yarn characteristics affect the performance and end use of the fabric produced.

Traditionally, yarn manufacturing comprises a series of processes involved in converting the fiber into yarn. It was rooted in natural fibers obtained from natural plant or animal sources. Natural fibers were produced with natural impurities that were removed from the yarn in subsequent pretreatment processes. For instance, cotton fiber is processed starting from when the fiber bale is opened, followed by a series of continuous operations of blending, mixing, cleaning, carding, drawing, roving, and spinning.

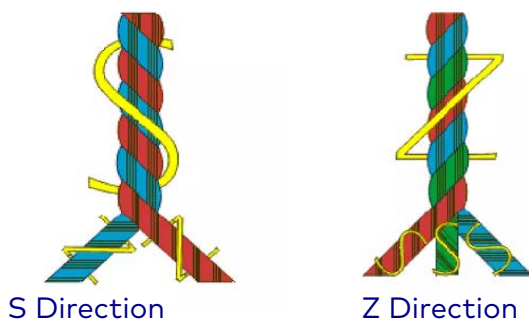
Types of Yarn:



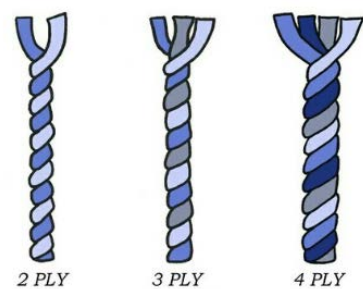
Yarn Twist and Ply:

Yarn is twisted together to hold the bundle of fiber together and to make the yarn strong.

Yarn Twist



Yarn Ply



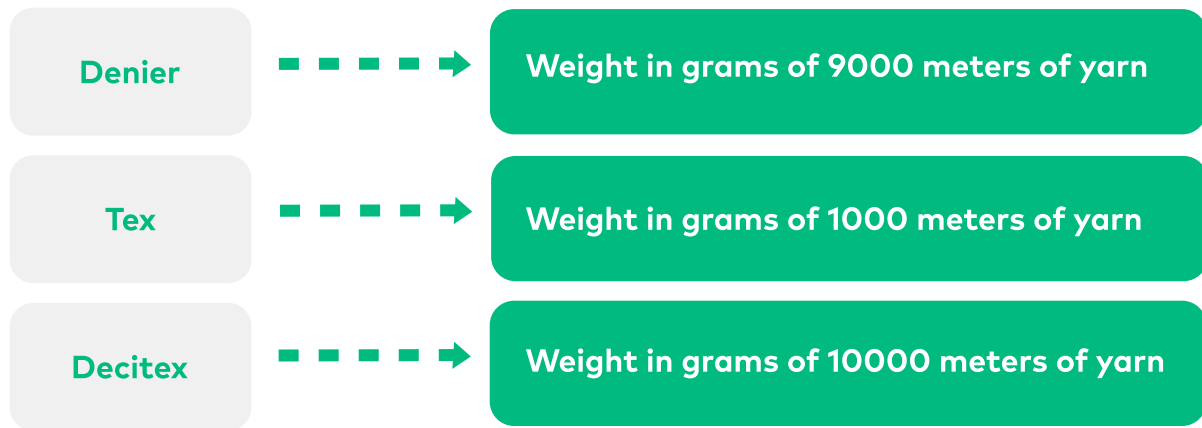
Yarn Size/Number:

Yarn number is a measure of the fineness or size of a yarn expressed either as mass per unit length or length per unit. Yarn Count and Yarn Size are synonymous with Yarn Number. There are two systems of expressing yarn number or yarn count. Direct yarn numbering system (mass/unit length) or indirect yarn numbering system (length/unit mass). Examples:

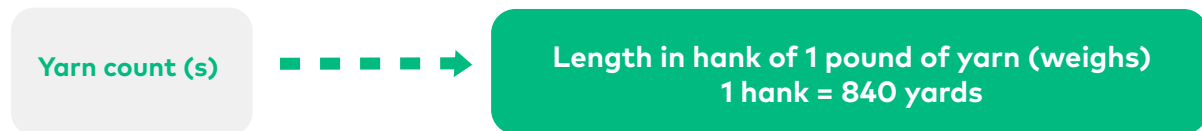
> **Direct System:** 9,000 meters of yarn weight 40 grams, it is 40 Denier Yarn. In this system the higher the number, the coarser the yarn will be.

> **Indirect System:** 10 hanks of cotton yarn weighing one pound, it is 10's count yarn. In this system the higher the number, the finer the yarn will be.

Direct System

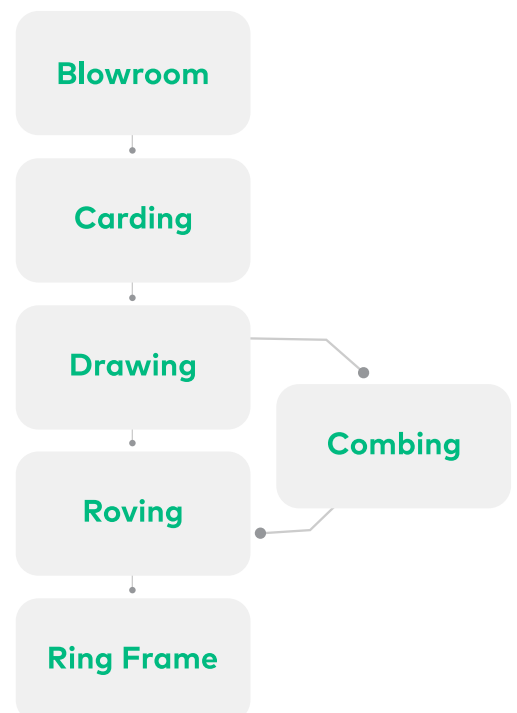


Indirect System



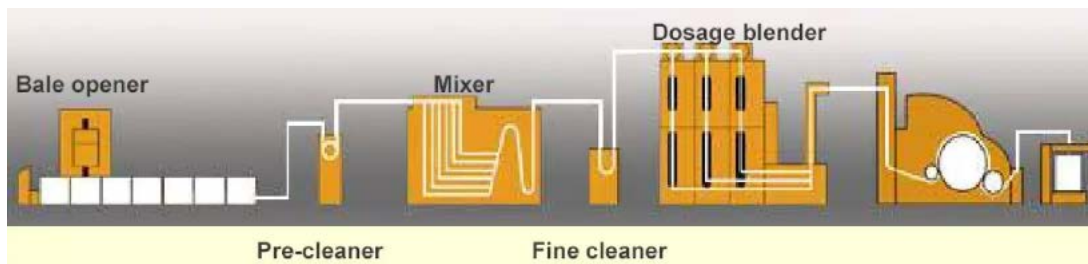
Yarn Manufacturing Process:

Each processing stage in yarn manufacturing utilizes a specialized machine that produces required yarn qualities. The advancement in fiber processing and machine technology for yarn manufacturing is continuous. The manual picking of cotton fiber is now replaced with machine picking. However, continued future advancement in blending, carding, drawing, roving, and spinning are very important.



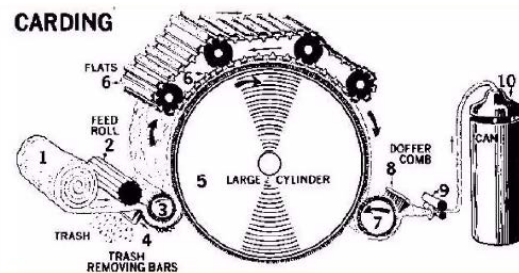
Blowroom:

It is the first step of cotton yarn production, which is used for opening, cleaning, and dust removal, blending, and prepared for the carding process.



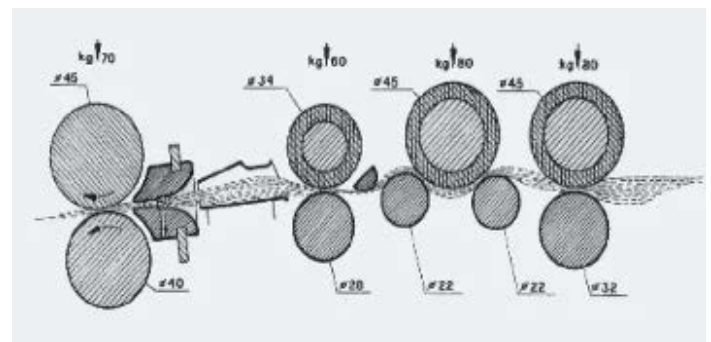
Carding:

This step involves opening of individual fibers, elimination of impurities, dust, short fibers, disentangling of neps, fiber orientation and sliver formation:



Drawing:

This process involves improving the evenness of the sliver, arranging fiber in parallel, blending fibers, and dust removal. The draw frame has a series of rollers (drafting arrangements) rotating at different rates of speed.



Combing:

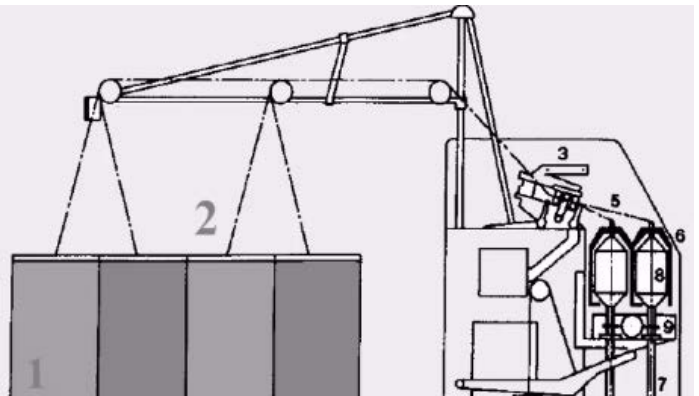
This process upgrades the raw material by removing the short fibers, remaining impurities and neps. Combed yarn is stronger, more uniform, has greater shine, smoother and purer form of yarn.



Roving:

Function: The attenuation of the sliver, impart protective twist in order to increase the strength of slivers.

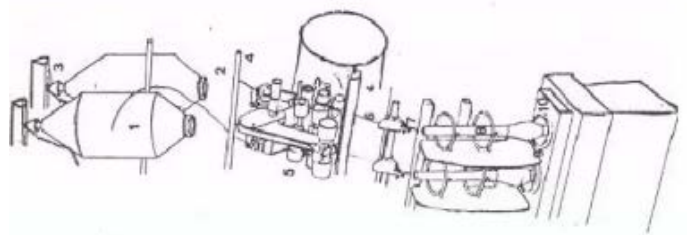
Winding of roving into a package that can be transported, stored and used on the ring spinning.



Spinning on Ring Frame:

This is the final step of producing yarn.

Function: Attenuate the roving until required fineness is achieved, to impart strength to the fiber strand by twisting it and to wind up the resulting yarn in a suitable way for storage, transportation, and further processing.



Fabric Manufacturing:

Textile fabric is at least a two-dimensional structure produced by fiber/yarn interlacing. The interlaced fibrous structure mainly used is woven, nonwoven, and knitted. Traditionally, weaving technology was the principal source for fabric production.

The important types of woven fabric produced are the basic weaves, such as plain or tabby, twill, and satin, and the fancy weaves, including pile, jacquard, dobby, and gauze. Knitted fabric is the second major type of fabric used following the woven. It has a characteristic of accommodating the body contour and ease of movement. It is a particularly comfortable form of fabric structure for sports, casual wear, and undergarments. Knitted fabrics include weft types and warp types, raschel, and tricot.

Net, lace, and braid are other useful interlaced fabric structures. Nonwoven fabrics are rapidly increasing in market consumption. These fabrics are finding interesting uses in industrial and home applications. Nonwoven fabrics include materials produced by felting and bonding.

Services offered by Cotecna Inspection India Pvt Ltd



Cotecna offers the following textile tests to help determine the quality and compliance of textile products.

Services offered for Yarn Testing:

- > Yarn Count / Yarn Size
- > Determination of Twist in Yarns
- > Yarn Strength & Elongation
- > Moisture Content etc.
- > RSL testing like Azo dyes, carcinogenic, disperse dyes, formaldehyde, pH value etc.
- > Color Fastness Testing like washing, rubbing, water, Light, perspiration, pool water, sea water etc.

Services offered for Fabric Testing:

- > Color Fastness Testing like washing, rubbing, water, Light, perspiration, pool water, sea water etc.
- > Strength Properties like tensile, tear, seam slippage/strength, bursting strength etc.
- > Performance testing like shrinkage, appearance after washing & dry-cleaning etc.
- > RSL testing like Azo dyes, carcinogenic, disperse dyes, formaldehyde, pH value etc.

To learn more about Cotecna textile services or for a free quotation, please contact any of the following:

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