
UNIT 7 FIBER TO YARN

Structure

- 7.0 Objectives
- 7.1 Introduction
- 7.2 Spun and Filament Yarns
- 7.3 Yarn Classification
- 7.4 Yarn Twist
- 7.5 Yarn Manufacturing System
- 7.6 Yarn Fineness Measurement
- 7.7 Let Us Sum Up
- 7.8 Keywords
- 7.9 References & Suggested Readings
- 7.10 Answers to Check Your Progress

7.0 OBJECTIVES

You have learnt about various natural and synthetic fibers in the last Unit. Each fiber has its own importance in our daily lives but we cannot wear fibers. We need fabrics for daily use be it for apparel, furnishings or industrial purposes. The fibers are converted into fabrics but before that they are converted into yarns and we will be learning about this process in this Unit. After going through this Unit, you should be able to:

- Identify the difference between spun/staple and filament fibers;
- Discuss different types and qualities of yarns;
- Identify yarn type to end use performance;
- Discuss the yarn twist and the yarn numbering system and
- Elaborate the process used in manufacturing yarns from fibers.

7.1 INTRODUCTION

To convert textile fibers into fabrics some type of fiber arrangement is required and the most common method is to convert fibers into yarns, which are then constructed into fabrics. Yarns are essential for knitted, woven or knotted structures and for many braided ones.

“A yarn is a continuous strand of textile fibers, filaments or materials in a form suitable for knitting, weaving or otherwise intertwining to form a textile fiber”. ‘Yarn’ is defined by the American Society for Testing and Materials (ASTM) as “A generic term for a continuous strand of textile fiber, filament, or material suitable for knitting, weaving to form a textile fabric.

Yarns are a grouping of fibers twisted together to form a continuous strand. All textile fabrics, except few nonwovens are produced from yarns. You will be learning about the process of fabric manufacturing i.e. weaving, knitting and nonwovens in further Units of this Block. In this Unit you will understand the process of conversion from fiber to yarn and the various types of yarns.

7.2 SPUN AND FILAMENT YARNS

A general understanding of making the yarn will help in understanding the products made out of yarn. Before proceeding further, we would understand the basic spun and filament yarns.

Spun yarns: Spun yarns are composed of short length fibers held together by some mechanism. It can also be understood as spun yarns that are continuous strands of staple fibers held together (Fig. 7.1). Generally, the fibers are held together by twist or spun yarn is made by twisting or otherwise bonding staple fibers together to make a cohesive thread, or "single." Spun yarn fabrics are like cotton and wool.



Fig.7.1: Spun Yarn Cotton

Source: thefamilyrecorder.blogspot.com

Filament yarns: The filament yarns are composed of long fibers and are further twisted. The filament yarns are generally smooth as most of them are manufactured fibers and are made through extruding a polymer solution through a spinneret. Filament yarns can be composed of one single filament or many filaments known as monofilament or multifilament respectively. Spun yarns can also be into manmade fibers and filament yarns are also available in natural fibers e.g. Silk.

Yarn Forms

- a) A number of fibers twisted together
- b) A number of filaments lay together without twist
- c) A number of filaments lay together with more or less twist
- d) A single monofilament e.g. silk

Characteristics of Spun and Filament Yarns

Spun Yarns:

- Short fibers twisted into continuous strand, has protruding ends
- Dull, fuzzy look
- Lint
- Subject to pilling
- Soil readily
- Warm (not slippery)
- Loft and bulk depend upon size and twist
- Do not snag readily
- Stretch depends upon the amount of twist
- Absorbent
- Size often expressed in yarn number
- Various amount of twist used
- Most complex manufacturing process

Filament yarns:

- Long, continuous smooth, closely packed strand
- Smooth, lustrous
- Do not lint
- Do not pill readily
- Shed soil
- Little loft or bulk
- Snagging depends upon fabric construction
- Stretch depends upon amount of twist
- Absorbency depends upon fiber content
- Size in denier
- Usually very low or very high twist
- Least complicated manufacturing process

Check Your Progress I

Note: Use the space provided for your answer

1. Define textile yarn.

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2. Explain the difference between the spun and filament yarn.

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3. Write down the characteristics of spun and filament yarns.

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7.3 YARN CLASSIFICATION

You must have observed various types of fabrics around you. It is the yarn and the weave type which categorizes one fabric from another and we can see many fabrics around us which are used for different purposes from apparel to home furnishings. We will be learning about the different types of yarns which are used for various purposes in textiles. Fig. 7.2 gives the classification of yarns on the basis of yarn length, number of strands, type of effect produced and fiber content.

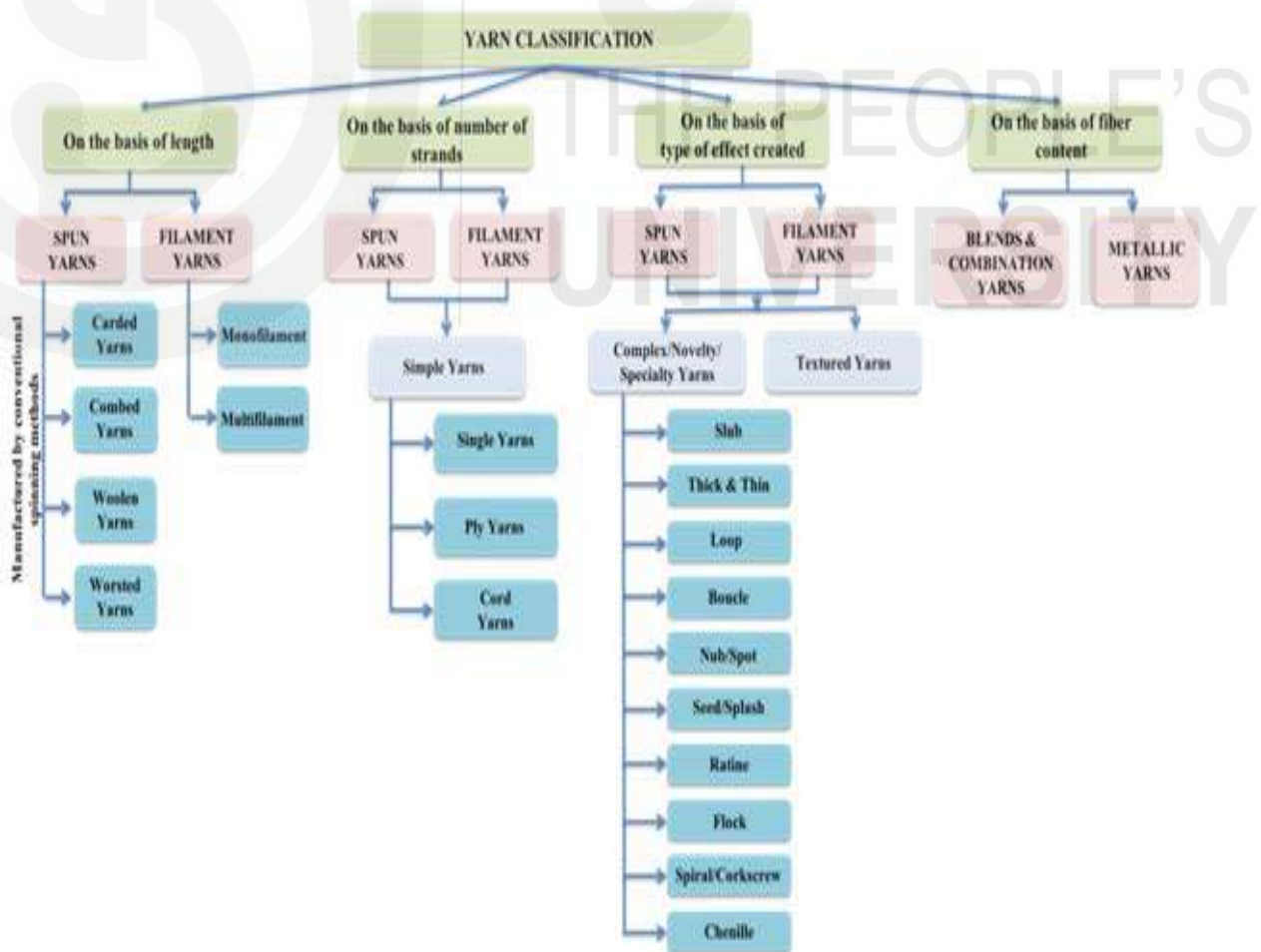


Fig.7.2: Yarn Classification

Yarns Classified on the Basis of Length

On the basis of length, yarns can be categorized into spun yarns and filament yarns. You have already learnt about spun and filament yarns in section 7.2 of this Unit. Let us discuss about the different types of spun and filament yarns in this section.

Spun Yarns

Spun yarns can be manufactured by both conventional and non conventional spinning methods. When manufactured using conventional methods spun yarns can be carded, combed, woolen and worsted.

a) **Cotton system:** These yarns are spun from the shortest staple lengths. Cotton system yarns can be carded yarns and combed yarns (Fig. 7.3).

- **Carded yarns:** A cotton yarn that has a wider range of fiber length is known as carded yarn and as a result, is not as uniform or as strong as combed yarns. This type of yarn is rougher than combed yarn and is found in medium and coarser count and is considerably cheaper. In yarns spun from cotton fiber, carded yarns produce more variation in thickness. Carded yarns are made purely from cotton fiber especially in the lower grades, contain non fibrous matter.
- **Combed yarns:** In combed yarns the short fibers are removed and only certain length and above fibers are used for yarn formation. Combed yarns are expensive and are used in finer counts.



Fig.7.3: Carded and Combed Yarn

b) **Woolen system:** It is a different method. It is not developed from any other system; it is short fiber system. It consists of opening, picking, carding and spinning processes. Yarns produced by this system are generally of coarse count. Woolen yarns are bulky, provides better insulation, therefore they are commonly used for sweaters, blankets, tweed fabrics and jackets. Surface appearance is quite fuzzy due to numerous fiber ends projecting from the yarn (Fig. 7.4).

c) **Worsted systems:** The worsted system is a complex system. Worsted yarns are more even, compact, tightly twisted firm yarns (Fig. 7.4). This staple system can handle staple fiber from 2” to 9”. In this system the short fibers are removed by combing. The yarns produced under this system are used for fine quality suitings.



Fig.7.4: Woolen and Worsted Yarn

Filament Yarns

- a) **Monofilament yarns:** These yarns consist of a single filament that comprises the entire yarn and is theoretically of limitless length.
- b) **Multifilament yarns:** Multifilament yarns can be either continuous filament or discontinuous filament. They are made up of many single filaments grouped together. Continuous multifilament yarns may or may not have twist.

Yarns Classified on the Basis of Number of Strands

Simple Yarns

Simple yarns are even in size, texture and have an even twist per inch. They are uniform in appearance, are more durable and easier to maintain. They can be of the following three types

- 1) **Single yarn:** A single yarn is made from a group of filament or staple fibers twisted together (Fig. 7.5 a). A single yarn is a yarn which if untwisted, will separate into the individual fibers from which it was made.
- 2) **Ply yarn:** Ply yarns are made by twisting together two or more single yarns (Fig. 7.5 b). If ply yarns are untwisted, they will divide into two or more single yarns, which in turn can be twisted into fibers.
- 3) **Cord yarn:** Cord yarns are made by twisting together two or more ply yarns (Fig. 7.5 c). Cord yarns can be identified by untwisting the yarn to form two or more ply yarns. Cord yarns are used in making ropes, sewing threads etc.

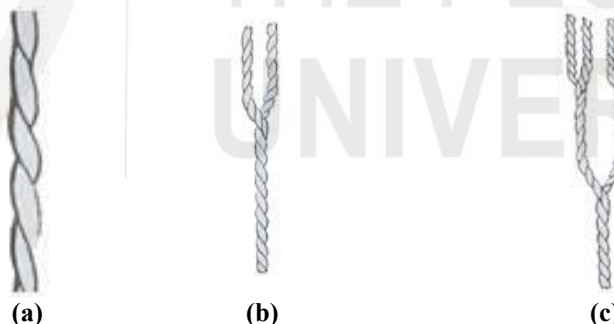


Fig.7.5: Single, Ply and Cord Yarn

Yarns Classified on the Basis of Type of Effect Created

Complex/Novelty/Specialty Yarns

Complex or novelty yarns differ from simple yarns in that their structure is characterized by irregularities in size. They are uneven in texture and have a non-uniform twist per inch. Novelty yarns are made primarily for their appearance. They create interesting decorative effects in the fabric into which they are woven.

Most complex yarns are single or ply. Corded complex yarns consist of a base yarn, effect yarn and a binder yarn. The base yarn is the one on which the others are twisted and is responsible for giving the yarn length and

stability, whereas the effect yarn is responsible for the special effect, texture and for the look of the yarn. The binder yarn holds the base and the effect yarns together (Fig. 7.6).

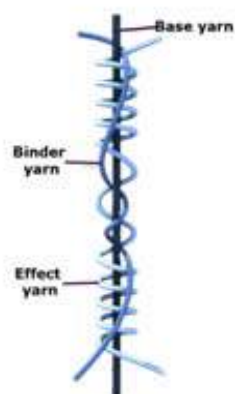


Fig.7.6: Complex Yarn

Novelty yarns are classified into:

Slub yarn: A slub yarn may be either a single yarn or a two ply. The slub effect is created by varying the twist in the yarn, allowing areas of looser twist to be created in order to produce soft fluffy yarn (Fig. 7.7).



Fig.7.7: Slub Yarns

Thick and thin yarns: These are similar to slub yarns. These are made from man-made filaments and are created by increasing the pressure in the spinneret intermittently to get thick or bulbous spots (Fig. 7.8).



Fig.7.8: Thick and Thin Yarns

Loop yarn: These are three ply yarns. The base is a heavy and coarse yarn. The effect yarn is curled up in loops around the base and is held in place by the binder yarn (Fig. 7.9).



Fig.7.9: Loop Yarns

Boucle yarn: This is also like a loop yarn, but has tighter loops instead which project from the body of the yarn. The effect strand in boucle yarns is usually soft and bulky (Fig. 7.10).



Fig.7.10: Boucle Yarns

Nub/Spot yarn: A nub yarn is a ply yarn. It is made on a special machine that holds the base yarn while the effect yarn is wrapped around it several times to build up a nub/spot or enlarged segment (Fig. 7.11).

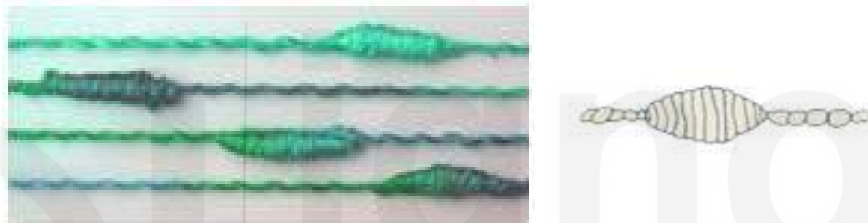


Fig.7.11: Nub/Spot Yarns

Seed/Splash yarn: In this type of yarn, a nub is formed but in an elongated shape to resemble a seed.

Ratine yarn: Both ratine and gimp yarns exhibit a slightly wavy appearance and are very similar to each other and in addition are rather like boucle and loop yarns (Fig. 7.12). The major difference between ratine and boucle yarn is that the loops are close together in ratine while in boucle they are spaced evenly along the base yarn.



Fig.7.12: Ratine and Gimp Yarns

Flock yarn: It is made up of loosely twisted yarns that are held in place either by a base yarn as it twists by a binder yarn. These yarns are relatively weak and are used in the filling to achieve decorative surface effects (Fig. 7.13).



Fig.7.13: Flock Yarns

Spiral yarn or corkscrew yarns: are the ones in which the desired effect is obtained either by twisting together yarns of different diameters, different sizes and different fiber content, or by varying the rate of speed or the direction of twist (Fig. 7.14).

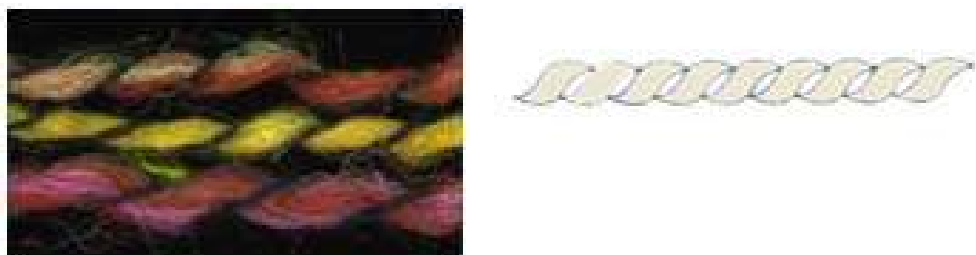


Fig.7.14: Spiral/Corkscrew Yarns

Chenille yarns: The word ‘chenille’ is taken from French which means ‘caterpillar’. This is because of the appearance of the yarn. Chenille yarn is actually a short thick pile yarn with soft velvety appearance. Short lengths of yarn (pile) are placed between two core yarns and then twist is inserted to produce such yarns. As a result, the pile yarns stand out at right angles from the core yarn covering it completely and giving a soft fuller look to the yarn. Fabrics made from chenille yarn are known as chenille fabric. Chenille will look different in one direction compared to another, as the fibers catch the light differently. The yarn is commonly manufactured from cotton, but can also be made using acrylic, rayon and olefin (Fig. 7.15).



Fig.7.15: Chenille Yarns

Facts about Novelty Yarns

1. Novelty yarns are usually ply yarns, but they are not used to add strength to the fabric.
2. If novelty yarns are used in one direction only, they are usually in the filling direction. They “go further” and are subject to less strain and are easy to vary for design purpose.
3. Novelty yarns add interest to plain weave fabrics at lower cost. Novelty yarn effects are permanent.
4. Novelty yarns that are loose and bulky give crease resistance to a fabric but they make the fabric spongy and hard to sew.
5. The durability of novelty yarn fabrics is dependent on the size of the novelty effect, how well the novelty effect is held in the yarn and on the firmness of the weave on the fabric. The smaller the novelty effect, the more durable the fabrics, since the yarns are less affected by abrasion and do not tend to catch and pull out so readily.

Textured Yarns

Textured yarns are used for manufacturing a wide variety of textile products: hosiery, knitted underwear and outer wear, and shape-retaining knitted fabrics for men and women suits and overcoats. They are also used in the production of artificial fur, carpets, blankets, drapery and upholstery fabrics. Textured yarns are given texturization treatments that modifies the geometry of the yarn by de-shaping, deforming, twisting, bending, crimping them so as to increase their specific volume. Majority of textured yarns are produced from thermoplastic fibers. Textured yarns may be looped on one or both sides, curled, bent or crimped, or fluffed out. Heat may be applied at any selected point, depending on the texture desired in the yarn. The following types of textured yarns are distinguished by production method, properties and use:

High-tensile yarn: It is also called *elastic*. It is produced by the twisting of synthetic fibers (polyamide, polyester, and other fibers).

Low-tensile yarns: These are different from high-tensile yarns in that they have greater bulk, high crimp, and fluffiness, with little elastic elongation.

Crimped yarn: This class consists wholly of continuous filament yarns. Crimped yarns have considerable bulk and a highly textured appearance.

Loop yarns: It shows greater number of fiber loops, random in size and spacing together with straight fibers.

Shaped yarns: These are formed by spinnerets with shaped orifices rather than round ones. They can be polyamide, polyester, and other types.

Bicomponent yarns: These are formed from two or more polymers. The orifices of the spinnerets are separated by a partition into two or more sections, and a different spinning mixture is fed to each section.

Combination yarns: These are obtained from the combined texturization of different yarns.

The ever increasing demand for textured yarns fosters the development of new texturizing methods and the improvement of existing ones. Technical progress in texturizing methods is being carried out in various directions.

7.3.4 Yarns Classified on the Basis of Fiber Content

Blends and Combination yarn: Blended yarns may be similar to simple yarns in appearance but are composed of two or more different types of fibers that have been blended in processing. This fiber may look different from simple yarns because of differences in luster or fiber and dyeing affinity. One fiber may dye whereas the other does not or cross dyeing may be used, which results in each fiber dyeing a different color.

Metallic yarn: Metallic yarns are created by adding a metallic fiber or yarn to the blend. It is primarily decorative and is used for decorative purposes.

Intext Activity 1

Visit a fabric store, see the fabrics made up of specialty yarns, feel them and write down their uses in 200 words.

Check Your Progress II

Note: Use the space provided for your answer

- 1. Differentiate between woolen and worsted yarns.

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- 2. Define novelty yarns.

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- 3. What do you understand by single and ply yarns?

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- 4. Write a short note on textured yarns?

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7.4 YARN TWIST

Yarn twist: The purpose of yarn twist is to hold the fibers together in order to make the yarns strong enough for weaving, knitting or other construction for durability in wear and to give the type of surface desired in the fabric. Different fibers vary in the amount of twist. Direction of twist is defined as ‘S’ twist or ‘Z’ twist.

It determines the appearance as well as the durability and serviceability of a fabric. Warp yarns, which are used for the lengthwise threads in woven fabrics, are given more twist than are filling yarns, which are used for the crosswise threads. To retain the twist in the yarns and prevent any tendency to untwist or kink, the yarns are given a twist-setting finish with heat or moisture, depending upon the kind of fiber used.

Direction of twist: ‘S’ twist is a clockwise twisted yarn and ‘Z’ twist is counter – clockwise twisted (Fig. 7.16). Twist is identified by the number of turns per unit length: turns per inch (tpi) or turns per meter (tpm)

* **TPI (twists per inch or turns per inch)** is a term used in the textile industry. It measures how much twist a yarn has, and can be calculated by counting the number of twists in an inch of yarn.



Fig.7.16: ‘S’ Twist and ‘Z’ Twist

Source: Kadolph and Langford (1998)

Amount of twist: The amount of twist varies with

- The length of the fibers.
- The size of the yarn
- Its intended use

If the amount of the twist is increased to the point of perfect, fiber to fiber cohesion increases the strength of the yarn but excess twist places the fibers at right angles to the axis of the yarn, causing a shearing action between fibers as a result of which the yarn loses strength. Increasing the amount of twist also affects the yarn hairiness, comfort, cost and linting.

Combed yarns with long fibers do not require as much twist as carded yarns with short fibers. Fine yarns require more twist than coarse yarns. The twist is evenly distributed throughout the yarn.

7.5 YARN MANUFACTURING SYSTEM

The twisting process by which fibers are formed into a yarn is referred to as spinning. Spinning includes all the processes required to prepare and clean the fibers from the opening of the bale to the twisting of the yarn in its preparation for the textile loom. In case of filament fibers several common systems are used by the manufacturer in spinning industry for filament yarns.

- Wet spinning
- Dry spinning
- Melt spinning
- Bicomponent spinning
- Biconstituent spinning

Filament yarn spinning requires fewer stages for manufacturing as compared to staple yarn spinning. The molten polymer of synthetic is inserted into a vessel, after few colorations are done at this stage, the solution will be pushed out through the spinnerets to become different yarns.

In case of manufacturing yarns from staple fibers it requires several stages before staple yarns can be produced. These are discussed below:

1. Opening and Picking (Blow room process)

In this process, the fibers from numerous bales are blended, or thoroughly mixed together, and from this composite, the final yarns will be produced. As these masses of fiber are loosened and thoroughly mixed, some remaining heavy impurities such as dirt, seeds, leaves or stems, are removed by a line of machines known as pickers, breakers, intermediates and finishers each in succession being somewhat more refined and cleaner of the raw fibers. From these machines, the fabric emerges as a lap, a loose, formless roll (Fig. 7.17).



Fig.7.17: Raw cotton, separated seeds and Bales

Source: Chittlangia Cotton Ginning and Pressing Factory, Sri Ganganagar (Rajasthan)

2. Carding

It's the heart of spinning process. The lap is unrolled and drawn onto a revolving cylinder covered with fine hooks or wide bristles. These wide bristles pull the fibers in one direction, separate those which are individually tangled together and form them into a thin film. This process is known as carding. The thin film is drawn into a funnel shaped opening which molds it into a round rope like strand approximately an inch in diameter; this is called the sliver or it can be understood as it will ease to remove the excess impurities on the fiber surface. At this point, short fibers which are not suitable for production in terms of length requirements are also eliminated.

3. Combing

The comber is a refining device by which the paralleling and straightening of the individual fibers is carried to a more exact degree. In this process the yarn will be straightened again so that they are arranged

in parallel manner. While at the same time, the remaining of short fibers will be eliminated completely from the longer staple fibers. The longer fibers are again formed into sliver, known as the comb sliver.

4. Drawing

In the drawing operation, further blending is accomplished by working together several slivers and drawing or pulling them out in the drawing frame without twisting but reducing the several slivers to a single one about the same diameter as each of the components. Most of the manufacturers will use blending process where two or more different types of fibers will be blended to form a yarn. The most common type of blend used is cotton/polyester as it not only reduces the cost but also increases the performance.

5. Roving

The combined or condensed combed sliver is taken through a series of machines called roving frames. This is the final stage in the preparatory steps for insertion of the twist. Enough twist is given to hold the fibers together but still has no tensile strength. The roving in bobbins is placed in spinning frame where it passes several sets of rollers which are running at high speed to convert it into yarn forms.

6. Spinning

Spinning is a continuation of the roving and on the spinning frame many spools containing the roving pass through the ring spinning mechanism which further draws and twists a yarn of the required size and twists and winds it on bobbins preparatory to the weaving operation. Basically, making yarns from fibers is known as spinning. Spinning involves chemical or mechanical processes.

Intext Activity1

Watch a video on you tube on ‘Turning Fibers into Yarns’ and write your observations in 200 words.

7.5.1 Preparation of the Yarn for Fabric Manufacturing

The most important methods of fabric manufacturing are weaving and knitting. However, the yarn produced on the spinning frame is not in the right state for cloth manufacture and we must therefore consider the preparatory processes to which the yarn must be subjected before it is ready for use on the loom or knitting machine.

The preparatory process can therefore be considered under the general heading of winding, warping, sizing and looming.

Packaging or Winding: One of the main reasons for winding yarns is to obtain longer lengths of yarns to permit the continuous production of long lengths of fabric. The tension of yarn is also adjusted and faults such as slubs or other thick places in the yarn are removed. Devices are now available which can automatically detect yarn faults while the thread is being wound

from one package to another. The yarn then breaks, the faults are removed and the two ends reconnect. It is essential that the number of yarn breakages shall be kept to a minimum on the loom. When breakages do occur, the broken ends or picks, the warp or weft threads must be reconnected and the loom should be restarted. The economics of weaving are closely related to the number of breakages because if these are numerous the production rate of the loom will be taken up in reconnecting and restarting the loom.

Warping: The aim of warping is to produce a sheet of parallel yarns from the various supply packages. After being spun and plied, the yarn is taken to a warping room where the winding machine takes the required length of yarn and winds it onto warp bobbins. The yarns pass from the package on the creel through a reed, a type of comb which separates the individual yarns. The spaces between this comb are known as dents.

Sizing: Stresses are imposed on the yarn during weaving and most of the warp would completely breakdown and prevent weaving if they were not sized. The purpose of sizing is therefore to apply a protective coating against the abrasion. Warp sizing involves the application of an adhesive to the warp before weaving. A lubricant or other substance may be added and the aim is to prevent the disruption of the yarn as a result of weaving process. The adhesive provides a protective coating against the abrasion and binds the fibers together. The lubricant reduces the friction at contact points between the yarns. It is essential that the sizing can be removed readily before bleaching and dyeing the fabric.

Drawing in/Looming: The process of drawing each end of the warp separately through the dents of the reed and the eyes of the healds, in the order indicated by the draft.

Pirning (Processing the weft): Pirn winding frame is used to transfer the weft from cheeses of yarn onto the pirns that would fit into the shuttle.

Weaving : At this point, the thread is woven. The weaving process is explained in Unit 4 of this Block.

7.5.2 Yarn Performance and Yarn Quality

Yarn characteristics and performance are identified and measured so that the right yarn is used in the fabric. Standard test methods identify size, twist, bulk, evenness, appearance and performance. Yarn strength is determined by measuring the load that breaks a yarn and the percent of elongation at that load.

Yarn Quality: Yarn quality is an important factor related to the quality of the resultant fabric and product. Yarn quality refers to various factors such as yarn strength and thin spots within yarns. A good quality of yarn determines the quality of the fabric. The thin spots in the yarn results in a weak fabric. These thin spots or nips can create thin areas in the fabric or unacceptable fabric variations. Yarns should be strong enough to withstand the stresses of the loom and knitting machines. There are many factors which determine the quality of the yarn. The yarns which have a better quality have parallel yarns,

tighter twist and are more regular than lower quality yarns. High quality yarns are regular in structure with few thin spots. Their performance and appearance makes the finished material suitable for the end use and the target market.

Yarn Regularity: Yarn regularity describes the uniformity of the yarn throughout its length in terms of its appearance and structure. Regular yarns have a similar appearance and structure throughout the length. There may be some slight variations due to uniformity of fiber distribution and fiber length within the yarn and regularity of fiber size or diameter. For example, yarns with a wide variety of fiber length, unparallel fibers or bast fibers like flax or ramie may be slightly less regular than other yarns.

7.6 YARN FINENESS MEASUREMENT

Yarns can be classified as per their thickness or thinness. The technical terminology used to represent fineness is called yarn count. Yarn count is a numerical expression which defines the fineness or coarseness of a yarn. There are various yarn count systems. Broadly they are divided into direct system and indirect system (Fig. 7.18).

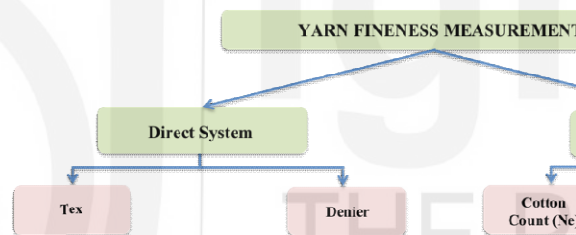


Fig.7.18: Yarn Fineness Measurement

1. **Direct system:** In this system of fineness representation, length is kept constant and weight is measured. So, the yarn count is mass per unit length of yarn. Direct count can be of two basic types:

- a) *Tex*: Weight in grams of 1000 meter length of yarn
- b) *Denier*: Weight in grams of 9000 meter length of yarn

In this system, higher the value of yarn count, coarser will be the yarn. It means 50 tex is coarser than 20 tex.

2. **Indirect system:** In this system of fineness representation, weight is kept constant and length of the yarn is measured. So, the yarn count is length per unit mass of the yarn. The popular indirect systems are:

- a) *English Cotton count (Ne)*: It is defined as number of hanks each of 840 yards in one pound. English cotton count is the most widely used yarn count system. For example, yarn count in English cotton count of a yarn having length of 16800 yards that weighs 2 pounds will be $Ne = 16800 / (840 * 2) = 10Ne$
- b) *Worsted system (Nw)*: It is the number of hanks each of 560 yards in 1 pound.

c) *Metric system (Nm)*: It is the length in kilometers/weight in kilograms.

In the indirect system, the higher the value of yarn count, finer will be the yarn. It means 50's Ne yarn is finer than 30's Ne

Yarn Count Formulae

- English cotton count (Ne) = L (length in yards) / $840 \times W$ (weight in lbs)
- Worsted count (Nw) = L (length in yards) / $560 \times W$ (weight in lbs)
- Metric count (Nm) = L (Length in Kilometer) / W (weight in kilogram)
- Tex (T) = W (weight in gm) / L (length in meter) $\times 1000$
- Denier (D) = W (weight in gm) / L (length in meter) $\times 9000$

Relation between various yarn count systems

- $D=9T$
- $T \times N_e = 590.5$
- $D \times N_e = 5315$
- $N_w = 1.5N_e$
- $N_m = 1.693 N_e$

So, if a yarn has yarn count 20's Ne, its equivalent value in tex would be = $590.5/20 = 29.52$ Tex

Now let us understand where these various yarn count systems are used:

English cotton count- for cotton, cotton blends and almost all type of yarns

Worsted count- for worsted yarns

Tex system- for filament yarns

Denier system- for filament yarns

Intext Activity 2

Collect and paste fabric swatches of various fibers you have studied in this Unit.

7.7 LET US SUM UP

A fabric is made out of yarns and you have read various types of yarns in this Unit. The yarns are basically divided into staple and filament yarns and both have their advantages/disadvantages. Each of them is used in various end use products such as fabrics, ropes and fishing yarns. Filament yarns are majorly synthetic yarns except silk; have advantages of pre-choose coloration,

alteration in physical and chemical structure while in case of staple yarns the absorbency is higher but in some cases the staple yarns are blended with the filament yarns (for example: cotton is blended with polyester as it overcomes the weakness of staple yarns). Each of them has their method of production. Specialty yarns have taken a special place in our lives. Time was when simple yarns were spun into fabrics but today's fiber and yarn stories are different. The days of simple colorless yarns are over and the revolution of specialty yarns is a boom in the textile industry. Specialty yarns are classified into novelty yarns and textured yarns which add variety in clothing manufacturing. Twisting of yarns is another important feature in yarn performance. The purpose of yarn twist is to hold the fibers together in order to make the yarns strong enough for weaving, knitting or other construction for durability in wear and to give the type of surface desired in the fabric whereas yarn fineness measurement has its own importance in the textile industry. Once the yarn is manufactured it is prepared for fabric manufacturing in different steps of winding, warping, sizing and looming. You will study the fabric manufacturing processes in the same Block.

7.8 KEYWORDS

Cotton system: It is used to measure the size of many spun yarns. Finer yarns have bigger numbers.

GSM: The standard measurement for weight and quality of fabric is grams per square meter (GSM). Generally, towels and bathrobes vary from 300-800 gsm; whereas toilet papers and other tissue papers have values between 18-22 gsm.

Filament yarns: A continuous, often plied yarn composed of either natural or man-made fibers or filaments and used in weaving and knitting to form cloth.

Spun yarns: Spun yarns are composed of relatively short length fibers held together by some mechanism. It can also be understood as spun yarns are continuous strands of staple fibers held together.

Tex: It comes under direct system and it determines yarn count or yarn number in same way for all the yarns; weight in gms of 1,000.

Yarn numbering system: Yarn size or fineness is referred to as yarn number. The filament yarns are expressed in terms of weight per unit length, whereas the spun yarns are expressed in terms of length per unit weight.

Yarn twist: Twist is needed in yarn to hold the fibres together, and is added in both the spinning and plying processes. The purpose of yarn twist is to hold the fibers together in order to make the yarns strong enough for weaving, knitting or other construction for durability in wear and to give the type of surface desired in the fabric. Twist is of two types 'S' twist and 'Z' twist.

Yarn number: Yarn size or fineness is defined by yarn number.

7.9 REFERENCES & SUGGESTED READINGS

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7.10 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress I

1. A yarn is a continuous strand of textile fibers, filaments or materials in a form suitable for knitting, weaving or otherwise intertwining to form a textile fiber.
2. Staple yarns or spun yarns are composed of relatively short length fibers held together by some mechanism whereas filament yarns are composed of long fibers and can be composed of one single filament or many filaments known as monofilament or multifilament respectively.
3. Spun yarns are made from short length fibers and the fabrics are like cotton and wool. These fibers are dull, absorbent, soil readily and not slippery. The filament yarns are long, smooth, lustrous, shed soil easily and have little loft or bulk.

Check Your Progress II

1. Woolen yarns are bulky, provide better insulation, therefore they are commonly used for sweaters, blankets, tweed fabrics and jackets. Surface appearance is quite fuzzy due to numerous fiber ends projecting from the yarn. Worsted yarns are more even, compact, tightly twisted firm yarns. And are used for fine quality suitings.
2. Novelty yarns are usually made up of two or more singles. One single acts as the 'lease' or 'core' on which the others are twisted, a second single carries the special effect and the third holds the other two together.
3. A single yarn is a yarn which if untwisted, will separate into the individual fibers from which it was made. Ply refers to the number of individual strands, that make up a yarn and manner in which they are put together.
4. Textured yarns are the yarns that are complex in their structure or have been given texturing treatments. The majority of textured yarns are produced from thermoplastic fibers. Textured yarns may be looped on one or both sides, curled, bent or crimped, or fluffed out. Heat may be applied at any selected point, depending on the texture desired in the yarn.

