TWISTRING AND WEAVING

INTRODUCTION

The textile industry occupies a unique position in India's economy, not only because it performs the useful function of clothing the nations, but also it has given the lead in laying the foundation of the modern industrial economy in the country. The textile industry is the single largest employer in the organized sector and uses its vast capital in the most fruitful manner, which is of great importance for the success of our national economy.

The raw silk reeled from several cocoons to form a single thread has to be subjected to a process called twisting. Twisting is an important process between actual raw silk production and weaving. Twisting is a process of two or more silk threads, with a definite number of twists per inch to obtain a firm yarn having desired denier suitable for weaving or knitting of different warp and weft yarns.

The extent of twist inserted depends up on the end use of the fabrics where it is used. By proper setting of yarns of requisite twists, the particular quality desired in a fabric can be regulated. Twisting is done before degumming because the sericine present in the raw silk is holds the baves together and when the twisted silk is degummed the baves do not come out, as they are held firmly by the spirals of the twist.

Silk weaving in India is totally traditional. It is estimated that 75% of silk goes to hand loom and 25% to power loom. This sector has been modernised with the help of old weaving principles. At present there are about 2,28,000 hand looms and 40,000 power looms in India exclusively for weaving silk.

TWISTING

Yarn Twist

Yarn Twist is the measure of the spiral given to a yarn in order to hold the constituent fibres or threads together. According to textile institute "Twist is the spiral disposition of the components of a thread which is usually the result of the relative rotation of the two ends".

Twisted yarn

A twisted yarn is the result of twisting two or more yarns together.

Advantages of Twisted yarn

1. A two-fold twisted yarn has, depending on construction, not only approximately 20 per cent more tensile strength and more extension than the two single yarns together, but even more than the equivalent thicker single yarn.
2. The twisted yarn and the fabrics which have been produced out of it, are more even.
3. The twisted yarn, which is made by a normal twist, is more voluminous, that means, the produced fabrics are better covered.
4. With a twisted yarn a softer and pleasant fabric feel will be obtained.
5. Fabrics made of twisted yarns are more durable and resistant to chaffing.
6. With a twisted yarn a higher dimensional stability of the end-product will be achieved.
7. With special twisted yarns a specific effect and character can be achieved.
8. The twisted yarn has better running characteristics in the subsequent processing and allows a higher efficiency rate.
9. A normal twisted yarn produces less curl than a single yarn (reduction of the inner torque).

Types of Twisted Yarns

According to direction of twist, it is of two types

1. S- Twist
2. Z- Twist.

1. S-Twist: A single yarn has S twist if, when it is held in the vertical position. The fibres inclined to the axis of the yarn conform in the direction by slope to the central portion of the letter “S”.

2. Z-Twist: A single yarn Z Twist if, when it is held in the vertical position, the fibres inclined to the axis of the yarn conform in the direction of slope to the central portion of the letter "Z".

WEAVING

Weaving is nothing but interlacing of warp and weft or in other words it is the conversion of yarn into fabric on loom, which interlaces two sets of threads. The longitudinal or vertical threads which run down along the length of the cloth are called warp and individual warp threads is known as an end. The traverse threads which lie at right angles to the warp crossing the fabric from selvedge to selvedge are called weft and the individual weft thread is known as pick.

It is possible to classify textile fabrics under four main headings namely a) Woven fabrics b) Knitted fabrics c) lace fabrics & d) felts.

SILK WEAVING PREPARATION OR PREPARATORY PROCESSES:

The yarn from the spinning frame is not necessarily in a fit state for the manufacture of fabric; some of it will require winding into suitable forms for weaving or for knitting. Perhaps some of the single yarns have to be double to strengthen them or folded to make fancy yarns; may be some yarns have to be dyed or bleached for certain special affects.

For use as warps in woven cloth, a great part of the yarn has to be sized so as to withstand the friction of the loom, and with many yarns intended for the knitting frames, an oiling process is desirable some lace yarns are waxed after doubling.

Apart from the coloration of yarns for coloured woven fabrics, the two chief preparatory processes are winding into more suitable packages for most yarns, and the warping and sizing of yarns for woven fabrics. The object of preparing a warp is to produce on the beam of the loom a continuous sheet of parallel threads in suitable

conditions for feeding to the weaving mechanism and suitable conditions for feeding to the weaving mechanism and interlacing with the weft yearns in accordance with the weaving plan.

Before going to actual weaving there are two preparatory process i.e., warp preparation and weft preparation. Therefore the whole silk weaving involves following three major operations:

1. PREPARATION OF WARP
2. PREPARATION OF WEFT : AND
3. ACTUAL WEAVING PROCESS

Warping and weft preparation are the preparatory process for weaving.

1. WARP PREPARATION

The longitudinal or lengthwise threads of the cloth are termed as warp.

Warp preparation means the process ranging from hanging the silk hank onto the weaving machine to weaving a fabric viz. so this involves

i. Winding
ii. Warping
iii. Sizing &
iv. Looming

i) WINDING :

The impure and intangled fibers from the raw material of the spinner ; similarly the spun yarn I the raw material of another branch of textile industry i.e., the fabric manufacturer. Just as certain preliminary operations are necessary before the start of the spinning sequence, so it is essential for the yarn to be submitted to certain processes preliminary to weaving or knitting.

Winding is an important preliminary to cloth manufacture ; it is to wind skeined thread or silk yarn in hanks on to the bobbins.

ii) <u>WARPING :</u>

Woven fabric consists of two sets of interlacing threads, warp and weft the farmer pass along the length of the fabric, and the latter interlace with them at right angles crossing from side to side. It follows therefore that for the weaving of long length of fabric, a long warp must be prepared.

The principle of warping is to construct a sheet of parallel yarns form the various supply packages which may be bobbins, cones, cheeses etc., the yarns must be evenly spaced.

The process of warping includes winding the threads from bobbins onto the warp beam.

In silk weaving normally sectional warping is followed because of the finer denier of the silk thread and consequently higher number of ends required.

Warping machine mainly consists of two parts :

i) Warping Creel ii) Warping drum

The threads from all the bobbins which are mounted on the Creel are passed through various guides and thread stop motion devises. Later the threads are collected and passed through a reed before making a section to be wound on the warping drum. After the required length of section is wound, no. of such sections are wound on the drum depending upon the total number of ends required in the fabric.

In case of hand looms, smaller warping devises are required, because these big warping machines will not be economically viable. Some times the warp is prepared by hand process by combining a number of threads and making into a section or ball and finally preparing the warp sheet for hand loom weaving.

Ball warping machine :

This machine is used for preparing warp for hand looms. Creel capacity is 50 bobbins. Circumference of the shift is 6 yards. Length of the warp is 60 yards. It is manually operated and no power is required.

iii) SIZING :

During the weaving process the warp threads are of necessity subjected to a certain amount of friction as they move forward through the eyes of the healds and between the teeth of the reed. There is also friction of the vertical separation of the yarns to make the space or shed through which the shuttle passes. Hence it is often essential to reinforced and lubricate the warp before it goes into the loom. This process is known as sizing.

iv) Looming :

Before weaving can start, it is necessary to have the warp beam placed at the back of the loom, and the ends of yarn drawn forward through the eyes of the healds, according to the weaving plan, and also through the dents of the reed, before going forward to the cloth roller; the proper insertion o fthe warp enmds is known as “Looming or drawing”.

2. PREPARATION OF WEFT OR PIRN WINDING :

After preparation of warp we go for pirning process. To prepare weft yarn pirn winding is necessary. During weaving silk filled pirn is mounted in the shuttle. The pirn is a small card board or a wooden beg about 6-8” long which fits into the shuttle. The aim of pirning process is to wind the silk from hanks onto bobbins and then from bobbins onto pirns.

LOOMS :

In India silk weaving is done by two types of machines i.e.,

i) Hand loom and ii) Power loom

i) **Hand Loom :**

A loom is termed as handloom when it is operated by human power. It is a simple device worked by manual power. It is made up of wood. It can be adjusted to weave from a simple plain place of fabric to a varied or complex, Figured or pattern fabric, but the quantity of its production depends largely upon the handcraft skill of the weaver. Weaving of the finest qualities and the most delicate pattern with extra –weft, silk etc., can more successfully be done in hand looms than in power looms.

There are mainly two types of hand looms, excluding primitive or throw-shuttle loom, fly-shuttle loom which are of insignificant importance because of their less use now-a-days. The other two are pit loom and frame loom, coming under semi automatic looms.

i) **Pit Loom** :

It is traditional one and requires more space. It can be installed in ordinary house where height is limited, Dobby and jacquard mechanism can be easily assembled on this type of loom. It is more study so less vibration occurs during weaving. In pit loom warp is prepared in the ball form, say about 5 sarees can be woven with one warp preparation. At a time one saree length of warp is taken for weaving, weft is introduced by means of throw shuttle or fly shuttle, any type of fabric in plain or design with different colours can be produced.

ii) Frame Loom :

This loom is slightly modern and requires less space,. It needs more height for its installment, it is less sturdy.

Any type of fabric can be produced on hand loom however production rate is very much limited (4 M / 8 Hrs) There are about 2,28,000 silk hand looms in our country.

ii) Power loom :

It is operated by mechanical or electrical power. A power loom differs from hand loom in few respects such as construction of loom, method of operating, different

motions of weaving. It works at high speed aiming at high production. This loom has all 3 motions Viz., primary, secondary and Auxillary motion with iron thread for compactness i.e., strength. The strength is required to resist shocks and vibrations resulting from several mechanisms of weaving. The power looms with iron conception gives an increased speed and production. A power loom once started runs continuously till the supply of pirn in the shuttle is exhausted. The production of power loom is three times more than that of hand loom.

WEAVING PROCESS AND ITS MECHANISMS :

Weaving is the process of interlacement of warp and weft in a fabric according to design. The weaving machine consists of warp beam, which has warp yarn on it, shift meant for dividing the warp yarns, harness meant for up and down movement of warp yarns, reed for pressing the weft yarn towards the cloth and shuttle carrying weft.

In order to utilize warp and weft threads to produce fabrics in any type of weaving machine, the following three operations are very necessary.

i) Primary motions ii) Secondary motions, and iii) Auxiliary motions.

PRIMARY MOTIONS :

In order to interlace warp and weft threads too produce fabric on any type of machine these operations play a significant role; they are :

a) Shedding, b) Picking and c) Beating-up

a) Shedding:

Separation of warp threads into two parts i.e., upper and lower layers for the easy movement of shuttle to lace a weft yarn in between the warp threads is called shedding or it is the process of separating the warp threads which rundown the fabric into two layers to form a tunnel known as shed and shed is produced by means heddles.

Sheds should not be too but sufficient for the shuttle to pass through comfortably with excessive frictional resistances. Shuttles in Silk looms are generally smaller than those used in cotton looms. The length of the wall between the back rest and the heald should be greater then that used in cotton looms as this reduces strain on the warp in shedding and tendency for making starting pace.

b) Picking :

Passing of weft thread from one selvedge to another through the division of warp threads is known as picking. It is done by giving a leteral motion to the picking handle and thereby driving the shuttle across the shed. A shuttle is used for picking in hand loom and also in conventionally automatic looms. A past reel loom is preferable to loose reel as there is a less silk of starting places where the shuttle is trapped in a loose reel looms. It has to force the reel out of its casting and this plays considerable strain on the warp threads which are stressed and strained to such an extent as to produce serious defects in the cloth which are very difficult and almost impossible to repair.A past reel loom is preparedly adjusted to give sufficient shuttle space when the loom back up with the shuttle in the shed.

c) Beating –up :

Pushing the newly inserted weft into the already woven fabric at a point known a fell is called beating up. It is done by reed. A sley moves forward to beat up the last pick of weft and goes backward to allow a shuttle pass through the warp division.

These three primary motions are done manually in hand loom and by means of various mechanical devises in power looms and automatic looms.

SECONDARY MOTIONS :

Which are involved in weaving process The secondary motions consists of following two operations i.e., i) Let off (warp control) motion ii) Take up (cloth control) motion.

i) Let off Motion :

The motion delivers warp to weaving area at the required rate and at constant and suitable tension by unwinding warp threads from warp beam or flanged tube.

ii) Take up Motion :

The motion withdraw fibre from the weaving area at a constant rate that will give the required pick spacing and then winds it unto a roll. Modern silk looms are built with ranging dimensions take up roller which provide sufficient surface contacts to resist slippage under normal conditions.

AUXILLARY MOTIONS :

A series of other mechanisms used in the interest of productivity and quality are known as auxillary motions. They are as follows.

a) Warp Stop Motion :

This is the motion automatically stops the operation of loom if the warp breaks.

b) Weft Stop Motion:

The loom stops when the weft is broken or if there is no weft in the pirn.

c) Shuttle Stop Motion :

It occurs due to loose reed and fast reed. The trap shuttle stops inside the shedding of yarn.

d) Shuttle Changing Mechanism :

It is the motion used when the shuttle becomes defective in function, another shuttle comes in to operation.

a) Weft Supplying Motion :

In this case new pirn is supplied, if either weft breaks or weft on the pirn is completed.