



**Textiles Committee  
Govt. of India  
Ministry of Textiles**



**Course material under ISDS for JACQUARD  
Hand loom Weaver (Frame Loom)**

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## 1. BASIC TEXTILES TERMS:

- **Yarn:** A continuous strand of fibers/filament, twisted /non twisted, it is basic raw material for weaving.
- **Type of Yarns:** single yarn, double or multi fold yarn, spun yarn & filament yarn etc.
- **Yarn count:**
- Yarn count is the numerical expression of yarn, which defines its fineness or coarseness. (Linear density).
- Yarn count system:
- Indirect system: English count (Ne), Worsted Count etc.
- i.e. Higher the yarn number, finer the yarn.
- Direct System: Tex, Denier
- i.e. Higher the yarn number , Coarser the yarn.
- Note: English (Ne) count system is commonly followed India.
- English Count: No. of Hanks of length 840 yds weighing in 1 pound
- 1yds: 0.9144mtrs
- 1lbs: 0.453 Kgs.
- e.g.  $40^s$  Ne = 40 hanks of 840 yds weighs 1 lbs.
- $20^s$  Ne = 20 hanks of 840 yds weighs 1 lbs.

## 2. WEAVING:

- **Weaving** is a process of fabric production in which two distinct sets of yarns are interlaced at right angles to each other to form a fabric or cloth.
- The lengthwise yarns are called the warp yarn and the widthwise yarns are called the weft yarn.
- **Selvedge:** The length wise running edges of woven fabric are known as selvages. It prevents unraveling of warp yarns.

## What is HANDLOOM?

### Hand loom

1. A hand loom is a simple machine used for weaving. In a wooden vertical-shaft looms, the heddles are fixed in place in the shaft. This loom is powered by hand. The warp threads pass alternately through a heddle, and through a space between the heddles (the shed), so that raising the shaft raises half the threads (those passing through the heddles), and lowering the shaft lowers the same threads—the threads passing through the spaces between the heddles remain in place.
2. It is a manual operating system.
3. Shedding is done by pedal and picking and beating is done manually.
4. Less production as compare to power loom.
5. Slow running speed as compare to power loom.
6. Initial investment is low as compare to power loom.

Basically there are two types of handloom:

1. Frame loom
2. Pit loom

These could be further divided in to fly shuttle and throw shuttle looms.

## What is Jacquard?

A jacquard shedding device 'used in weaving designs that are beyond the scope of dobby shedding. In practice, jacquards are mainly used for large and intricate figured designs with several hundreds, or even several thousands of ends working in different fashion and repeating upon a similar number of picks.

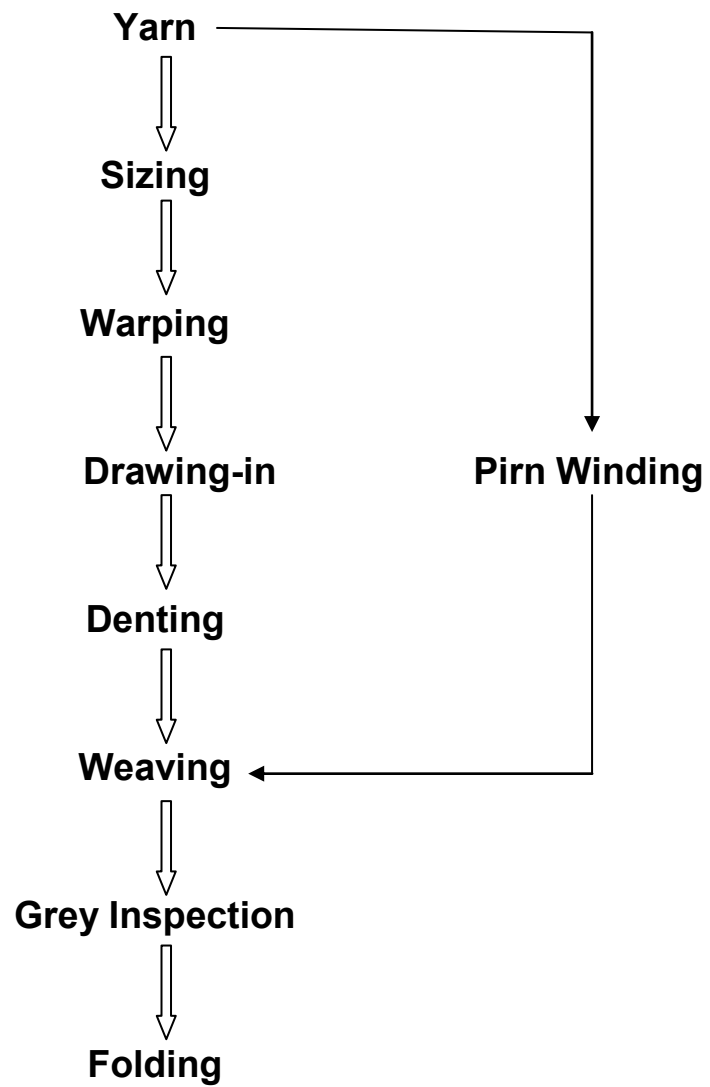
Types of Jacquard: Jacquard machines used at the present time are numerous and varied. However, they may be broadly divided in to two groups; Ordinary and special. Ordinary Jacquard may be further classified on the basis of the type of the shed formation achieved-

- 1) Bottom closed shed type with single lift, single cylinder.
- 2) Centre closed shed type.
- 3) Semi open shed type like double lift, single cylinder on double lift, double cylinder.
- 4) Open shed type

Special Jacquards are modifications of the ordinary ones. These are designed to increase the figuring capacity of the jacquard or to weave special types of fabrics. Some of the special jacquards are listed below.

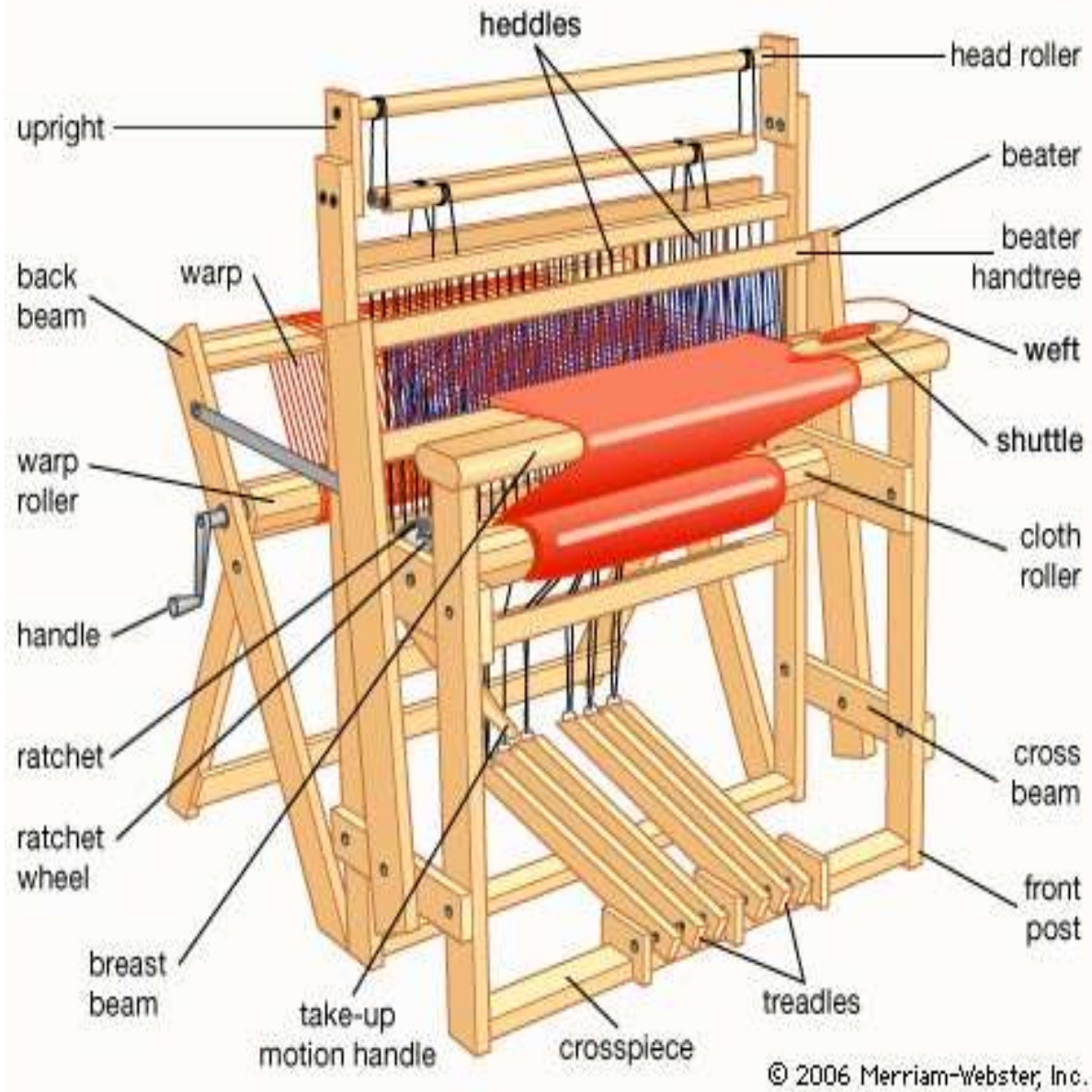
- 1) Cross border jacquard
- 2) Leno jacquard
- 3) Scale harness or banister jacquard
- 4) Pressure harness jacquard
- 5) Twilling jacquard
- 6) Inverted hook jacquard
- 7) Jacquard with working comber board
- 8) Fine pitch jacquard

## Sequence of operations in weaving (Hand loom):



### 3. IDENTIFICATION OF HAND LOOM PARTS:

#### Frame Loom



## Major Parts of Loom:

**Warp Roller:** The warp roller which consists of the lengthwise yarns is located at the back of the loom & it releases the warp yarn to the weaving area of the loom as needed.

**Handle:** The handle is provided on the warp roller to tighten or loosen the warp sheet which ultimately changes the tightness factor of the fabric.

**Back Beam:** To maintain the constant tension and proper angle to the warp sheet.

**Heddles:** it is a frame to hold the heald wires. Heald wire it is a wire with a hole or eye in its centre through which a warp yarn is threaded. In some cases cotton or synthetic yarn head wires are also used.





**Bobbin and Shuttle:** The weft yarn wound on a bobbin (pirn), which sets into a shuttle. As the shuttle passes back and forth through the warp shed, it releases weft yarn from the pirn.



**Beater:** This is inevitably a combination made up of metallic wires set vertically in a frame. The spaces between the wires are known as dents. There is a beater free (Reed frame) mounted on beater. The weaver holds the beater free to give beater a to and fro motion for beating the last pick to the fell of the cloth.

**Beater**



**Cloth roller:** It is located at the front of the loom, hold the completed fabric



**Treadles:** these are located at the bottom the loom and are designed to control warp shed formation by controlling the up and down movement of the heddles. The weaver presses the treadles by their feet for shed formation. The shed on a handloom is controlled manually by giving proper movement to the treadles using foot.

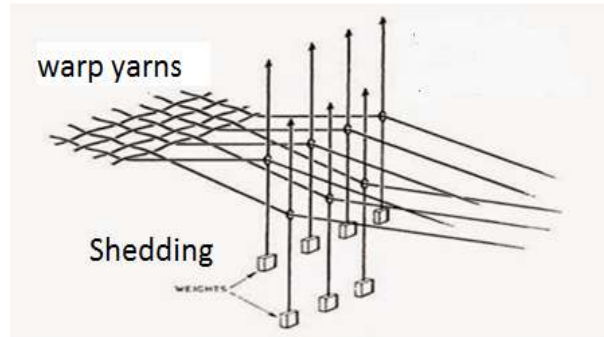


## MOTIONS OF LOOM:

### Primary motions:

#### Shedding motion:

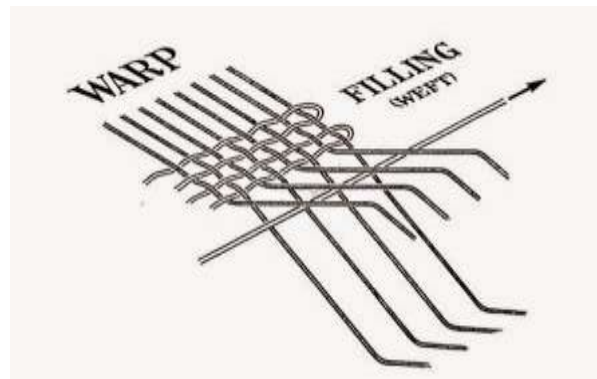
Shedding separates the warp yarns into two layers for the insertion of a pick. The function of shedding mechanism is to raise & lower the heddles. Which carry a group warp ends drawn through heald eye. There are different kinds of shedding mechanism like Tappet, Jacquard etc.



#### Picking motion:

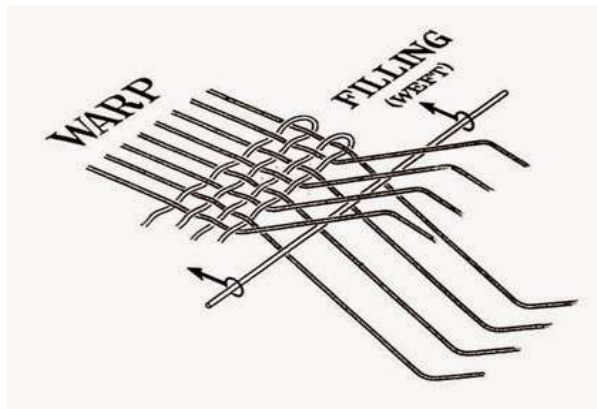
Picking motion inserts a pick (weft) from one side to the other side of the fabric.

In **Hand** looms, pick is inserted with the help of a shuttle through the shed opened by the shedding mechanism. i.e. between the two layers of warp shed.



#### Beating-up:

The function of beat up mechanism is to push the weft thread that has been inserted across the warp threads in a shed, up to the fell of cloth. Fell of the cloth is the position of the last pick in cloth woven on the loom. The beating-up of the weft to the fell of cloth is carried out by the beater.



## Secondary motions:

### **Take-up motion :**

Take- up motion winds the fabric as being manufactured.

It means after the beat up of the weft, woven cloth is drawn away from the reed. After weaving a suitable length, the weaver roll the fabric on the cloth roller with the help of take up motion handle and continue the weaving.

### **Let-off motion**

Let- off controls the amounts of warp delivered and maintains the regional tension during weaving. This motion delivers warp to weaving area at the required rate and at a suitable constant tension by unwinding it from a warp roller.

The weaver has to manually adjust the weight on the tension lever to maintain the tension of warp sheet.

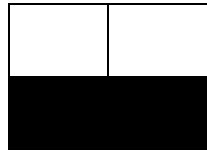
### **Some basic weaves:**

1. Plain weave
2. Twill weave
3. Satin weave

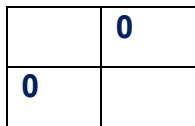
The handloom can be used for making the complicated designs with the help of dobby and jacquard. Examples: damask, weft back cloth, patent satin etc.

“All products which can be produced on powerlooms, the same can be produced on handlooms. But there are many products which can be produced by handloom only.”

Example: Banarsi saree



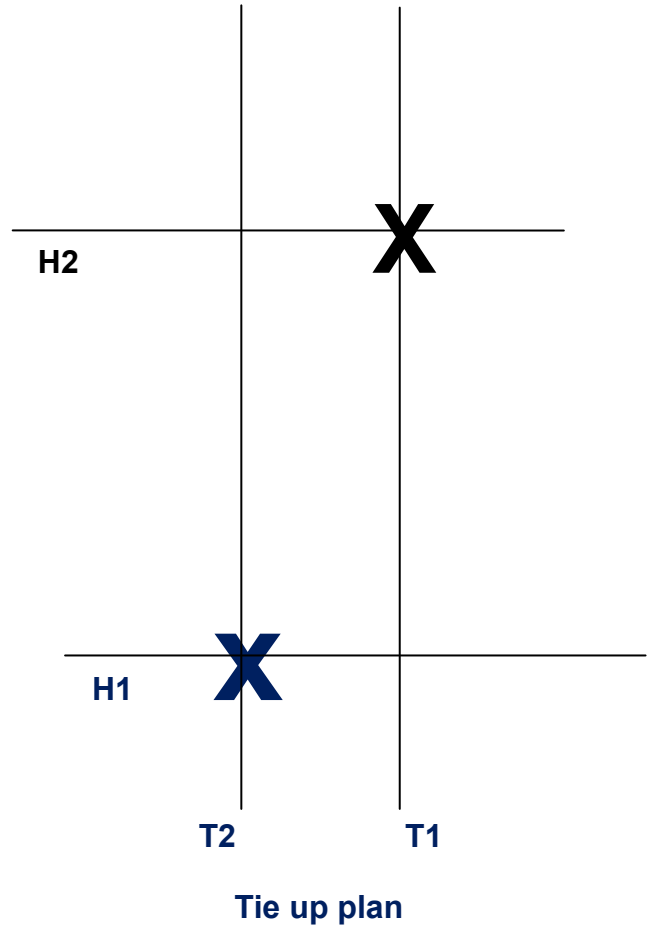
**Denting plan**



**Drafting plan**



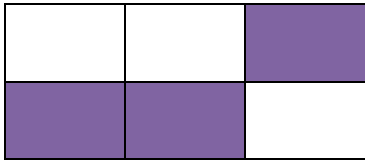
**Plain weave**



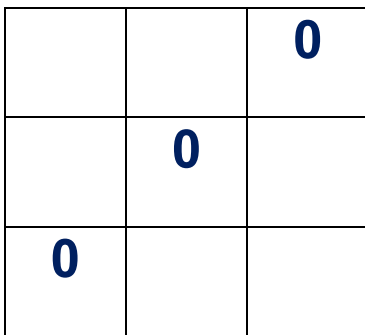
(T1: Treadle 1; T2: Treadle 2;  
H1: Heddle 1; H2 Heddle 2  
X: Heddle is tied with treadle)

**Figure 1: Plain Weave**

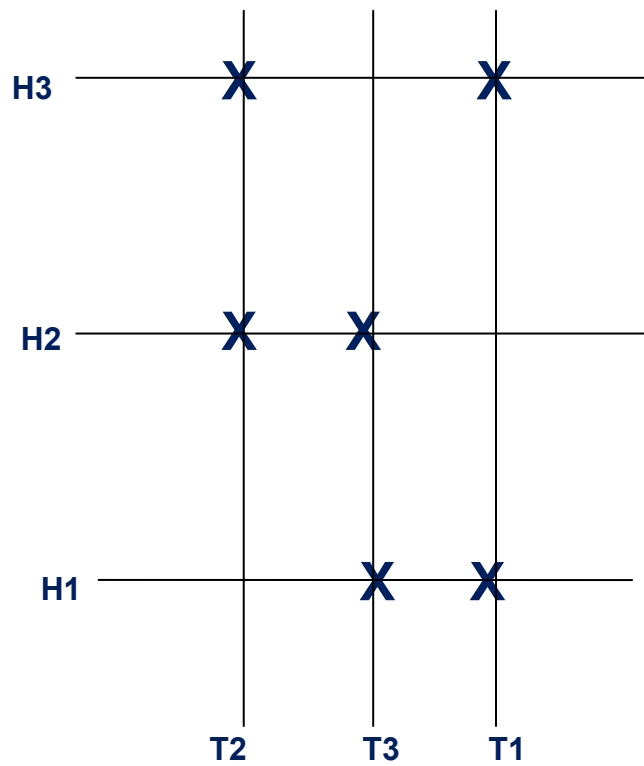
**FIGURE:2**



**DENTING PLAN (2ENDS PER DENT)**

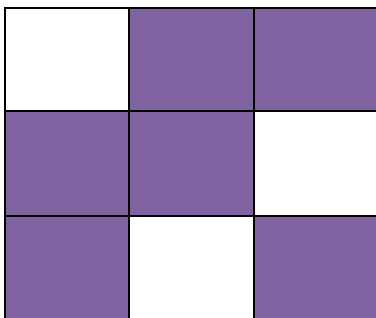


**DRAWING IN (DRAFTING)**



**2/1 TWILL WEAVE**

**TIE UP PLAN**



## Mounting of Loom:

First of all it has to be decided how many heddles and treadles need to be used to make a particular design or weave. It is decided by drawing one repeat of the weave as shown in figure 1&2. How many different warp and weft interlacements are there that will decide the number of treadles and heddles required. as shown in the figure, the plain weave is having only two different interlacement for warp and weft so only two treadles and heddles are required.

In the handloom weaving, weaver has to do drafting, denting, as well as the tying up of the treadles with the heddles according to the design required. The related terms are explained as below:

**Drafting or drawing in:** After getting the warp beam the weaver has to pass the warp through the heddles (heald eye) according to the required weave. This is called drafting or drawing in. As shown in the above figure 1 the 1<sup>st</sup> end will be passed through the first heald and 2<sup>nd</sup> through the second heald. the 3<sup>rd</sup> end will again pass through the first heald and so on.

**Denting:** it is the process of passing the drawing in ends through the reed for beating purpose. There can be two ends per dent, three ends per dent as per the requirement. More clearly the number of ends per dent depends upon the number and warp count . In the above figures two ends per dent has been shown. In case of selvedge the denting order may be different as compared to the main body of the fabric.

**Tie up:** Once the weaver finishes the drawing in and denting, the next process he/she has to do is to tie the healds with the treadles. As shown in figure 1 the first treadle is tied with second heald and second treadle is tied with first heald.

Number of heald and treadles to be used depends upon the weave. In figure 2 only two healds are required as it is a plain weave. Likewise for weave 2/1 twill 3 healds and 3 treadles will be required.

While working on jacquard handloom the process of drafting is not done because in that case the healds are not used instead the harness are used. But to understand the basics of handloom a little discussion on handloom drafting is introduced in this module.

## **Preparation of the loom:**

To check the looms parameter like warp tension, proper opening of shed, reed movement etc, whether the loom is compatible for weaving or not. Adjustments have to be done by the weaver accordingly, the weaver should take precautions, to minimize or avoid the yarn breakages. Weaver should check the shed opening by false picking and reed movement by false beating.

**Pirn Winding:** A simple machine shown in the figure below is used for pirn winding in handloom.

There is a wheel and a metallic shaft, which are connected with each other with the help of rope for transferring motion. the hank is mounted on the wheel and the pirn is mounted on the shaft. then the yarn from the hank is transferred on to the pirn by rotating the wheel.

**Precautions:** 1. While winding the care should be taken that, it should be filled in small bunches throughout its length.

2. Same tension should be maintained till the pirn get filled.

3. The groove of the pirn should be kept empty.

4. The yarn should be filled on the pirn in optimum amount.



**Pirn Winding Machine**



#### 4. Operations for Handloom

##### ➤ Attending to Warp Break:

- Find out broken warp ends.
- Find out the location of the broken end by visual examination.
- Mend the broken warp end in the sized beams with the thrums of the same count of the sized beams, using " weavers ' knots"
- Draw the mended warp yarn through the heddles properly as per the drawing order prescribed.
- Draw the mended warp yarn through the beater properly as per the denting order prescribed.
- See that the sley has been brought to the back centre.
- See that the shuttle is inserted fully in the shuttle box.
- Run the loom by using proper hand and foot movements on the appropriate parts of the loom designed for the purpose.



Broken Warp Ends



**warp yarn break**



**weaver detects warp end**



**weaver pick broken end**



**put the weavers knot**



**weaver draw broken end through heald eye**



**end draw through reed**

➤ **Attending to Weft Break:**

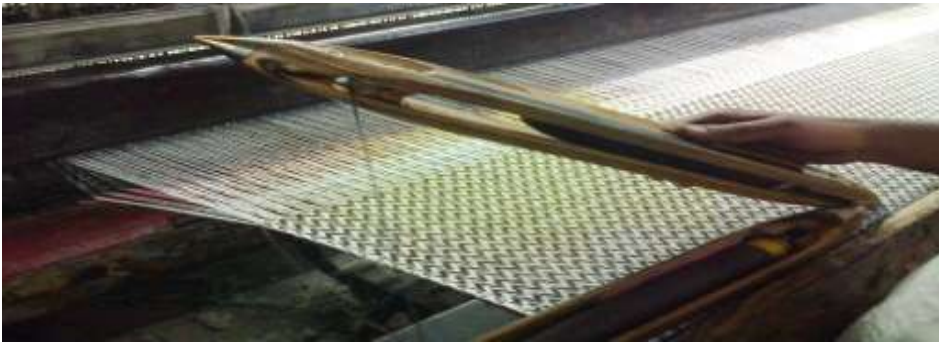
- See that the beater to be brought the back centre.
- Take out shuttle from shuttle box.
- Find out the broken pick. Check whether the pick has covered halfway or less.
- Take out the broken pick.

- Carefully do the piecing of the weft yarn with the shuttle yarn (Do not do knotting).
- See that the shuttle is inserted fully in the correct shuttle box.
- Run the loom by using proper hand and foot movements on the appropriate parts of the loom designed for the purpose.

### CHANGING PIRN IN THE SHUTTLE / MENDING WEFT BREAK







**HANDLOOM JACQUARD:**

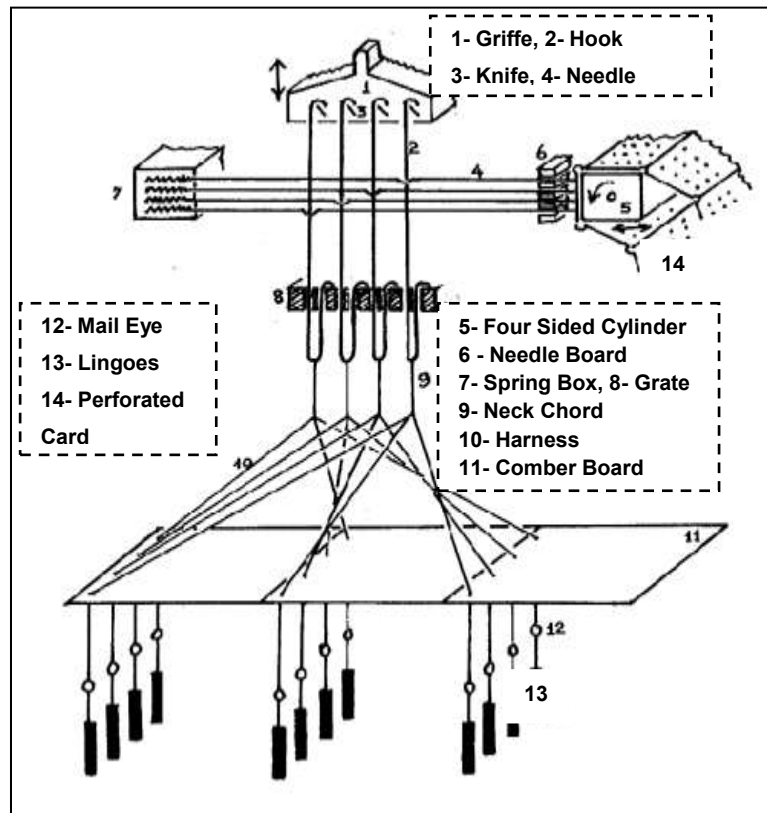


## WORKING OF JACQUARD:

Jacquard is a shedding device attached to the top of a handloom [Pit/Frame] and controls a large number of warp threads with a view to produce the maximum variety of sheds for ornamenting the fabrics.

### Details of a Handloom Jacquard:

In figure, upright wires are hooks [2] and the bent horizontal wires are needles [4]. The needle board [6] is a perforated board through which the needles pass. The back end of the needles pass through springs in the spring box [7]. The hooks rest on the cross wires of the fixed grate[8].



At the bottom end of the hooks there are strong chords of twine called neck chord [9]. The neck chords are connected with strong and long chords called harness chords [10] which pass through a perforated board called comber board [11]. Harness chords hold small metallic eyes called mail eyes [12] which are connected with dead weights called lingoes [13]. Warp threads which are to be lifted in accordance with the design pattern to be woven, pass through the mail eyes. Top of the hooks [2] rest on metallic plates called knives [3] and the knives rest on a metallic frame called griffe[1]. Hooks are lifted upwards by upward movement of the griffe by means of a system which consists of lever, rope and treadle which is operated by weaver with his/her foot in handloom . When the griffe moves upward, the cards of the perforated four side cylinder [14] is pressed against the needles .And if there is hole in the card, the needle directly opposite to the hole will pass through it and into the perforation in the cylinder, and the knife will take up the hook to which this needle is connected and the corresponding warp thread will be lifted to form shed. If there is no hole in the card against any needle, the corresponding hook will be pushed back and left down. When the griffe comes down, the cylinder is taken away from the needles and the hooks are forced back to original position by small springs in the spring box [7]. Cards are punched in a card puncher in pre planned manner depending on the designs to be

produced on the fabrics. The four side cylinder is turned by a swing lever system of the jacquard to present a fresh card before the needles for fresh selection of hooks for lifting.

**Size and figuring capacity of jacquard:**

<b>SIZE AND FIGURING CAPACITY OF JACQUARD</b>			
<b>Size of the machine</b>	<b>Hooks in a short row</b>	<b>Hooks in long row</b>	<b>Total hooks</b>
<b>100</b>	<b>4</b>	<b>26</b>	<b>104</b>
<b>200</b>	<b>8</b>	<b>26</b>	<b>208</b>
<b>300</b>	<b>8</b>	<b>38</b>	<b>304</b>
<b>400</b>	<b>8</b>	<b>51 or 52</b>	<b>408 or 416</b>
<b>500</b>	<b>10</b>	<b>51</b>	<b>510</b>
<b>600</b>	<b>12</b>	<b>51 or 52</b>	<b>612 or 624</b>
<b>800</b>	<b>12</b>	<b>70</b>	<b>840</b>
<b>900</b>	<b>12</b>	<b>72</b>	<b>924</b>
<b>1000</b>	<b>10</b>	<b>100</b>	<b>1000</b>
<b>1200</b>	<b>12</b>	<b>104</b>	<b>1248</b>

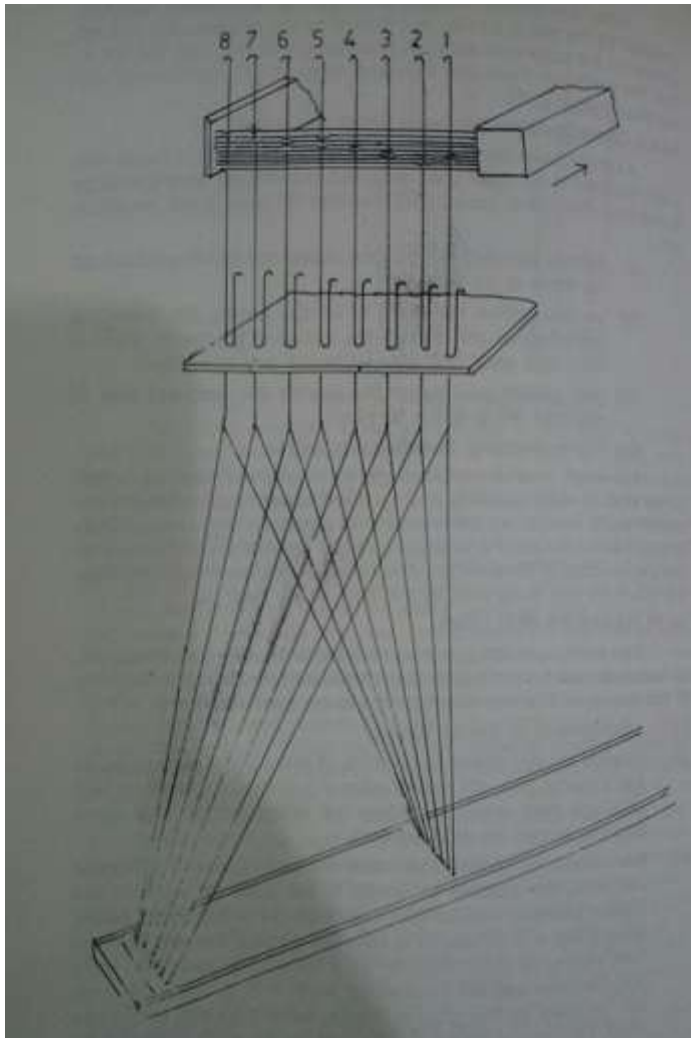
**Harnessing:**

There are two main types of harness ties.

1. Straight or Norwich system.
2. Cross or London system.

**Straight or Norwich system:**

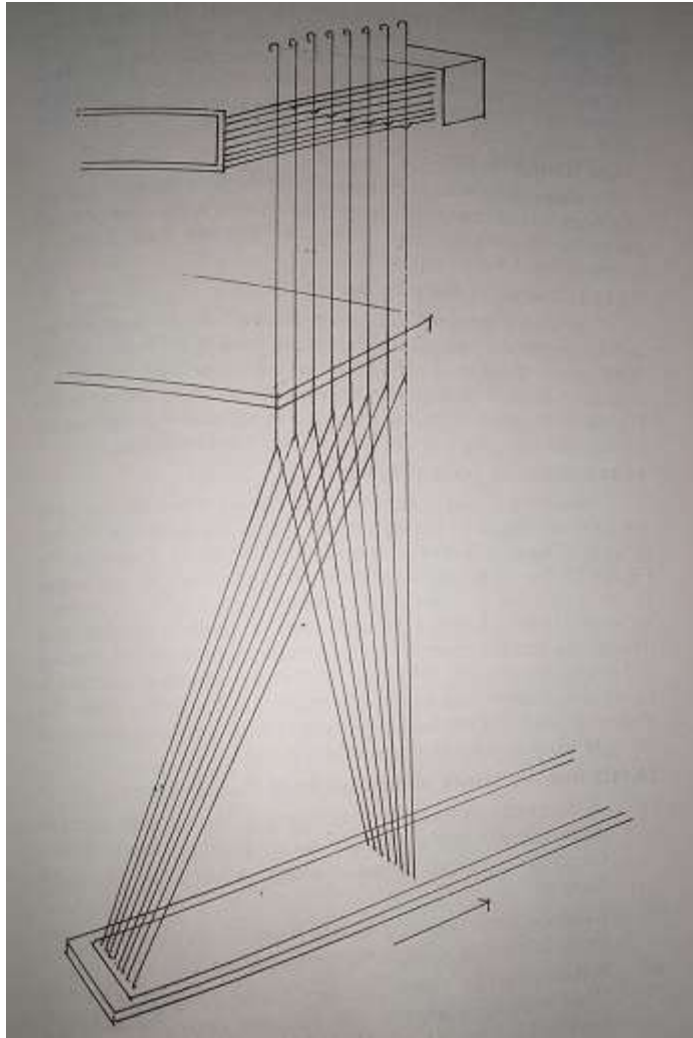
When the jacquard is placed over the loom in such a position that the cylinder is either at the back of the loom over the warp yarn or at the front, above the head of the weaver, the harness is said to have a straight or Norwich tie which is shown in the figure below. In this method, the long rows of hooks in the machine are parallel with the long rows of holes in the comber board.



**Cross or London system:**

When the jacquard machine is so placed above the loom that the cylinder is either to the right or left side of the loom, the harness is said to have cross or London tie as shown in figure below. The long rows of hooks in the machine are at right angles to the long rows of holes in the comber board and the harness receives a quarter turn or a partial crossing in passing from the hook through the comber board.

The only difference between this method of harness tie and the straight tie, is that the jacquard machine is turned one quarter way round with relation to the loom. When this method is used, the cards of the jacquard machine hang either over the right hand or left hand side of the loom.



Instead of the two methods shown above there are some methods like centre or point tie, border tie, combination or complex tie. These methods of harness tie are not so commonly used as the London and Norwich system.

**Summary of Calculations:**

Assuming the figure given below (in which lines represent exactly one repeat 6 x4.8 cm) is required to be woven in a cloth that counts, when finished, 50 ends and 38 picks per centimetre, and has shrunk 8% from the reed width to the finished width, while the ground weave repeats upon 20 ends and 12 picks—the particulars may be ascertained as follows.





- a) Number of ends and picks (or cards) in one repeat of the design.
- b) Number of ends per inch in the reed.
- c) Suitable capacity of jacquard and set of harness to produce the design exactly in the size.
- D) Counts of design paper.

- a) The repeat is 4.8 cm in width and 6 cm in length. The number of ends in the repeat— $50 \times 4.8 = 240$   
The number of picks in the repeat---  $38 \times 6 = 228$
- b) Number of ends per cm in the reed---  $50 \div 1.1 = 46$
- c) A suitable standard capacity of jacquard in an 8-row 304-tie which will require to be cast out:  $304 - 240 = 64$  hooks

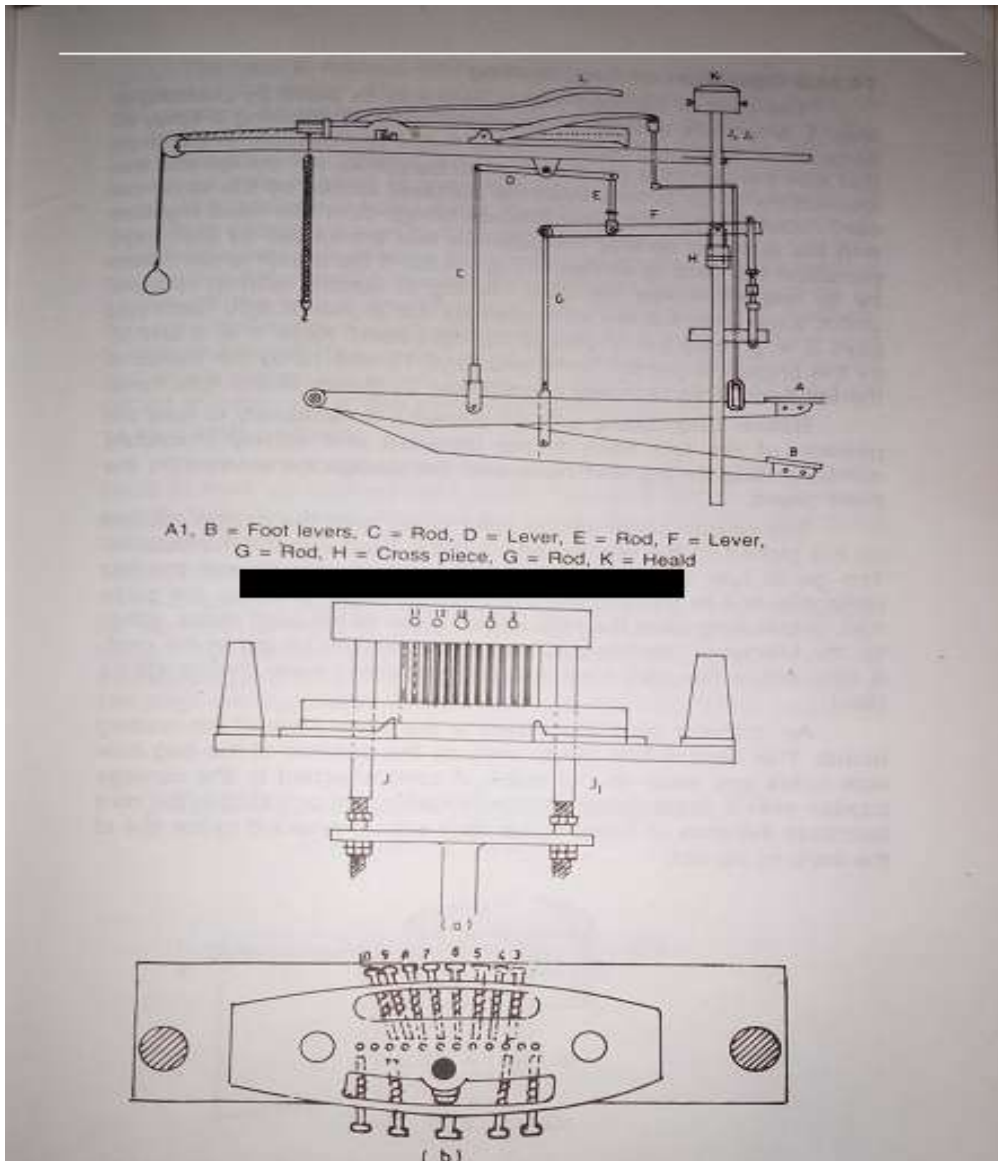
The set of the harness requires to be finer than the set of the warp, because 304 harness cords have to occupy the same width in the comber board as 240 ends in the reed , and the proportion is therefore:  
 $240 \text{ ends} : 304 \text{ hooks} :: 50 \text{ ends per cm} : 63 \text{ harness cords per cm}$

**Card Cutting:** The purpose of the jacquard weaving is to produce designs that are too expensive to be woven with tappets or dobbies. Any design that can be painted can be woven on loom with jacquard. Card cutting is an important work for a weaver working on handloom jacquard. At present card cutting can be done through some external agency to save the time and to increase the production. Even though the weaver should have some basic knowledge about card cutting and card lacing which is discussed as below.

First a design is drawn on a plain paper and then repeated a sufficient number of times vertically and horizontally to see the overall and general effect of the repeating pattern. The design is then transferred and enlarged on a suitable graph paper. The vertical lines on the graph will show the warps and the horizontal lines will show the picks. The design is enlarged on the graph paper with exact number of ends and picks as it will appear on the fabric.

Before starting the card cutting it is necessary to divide the graph paper by heavy vertical lines into a number of hooks in a short row. The design paper is guide to the card cutter. In case of a 8 hook in the short row of the jacquard, the design paper should be marked with heavy lines after every 8 small squares horizontally. This is essential because the working of all the hooks in each row is read at a time for punching a card. Thus, in a 400-machine with 8 hooks in each short row, 50 operations are required to transfer the working of 400 ends from the graph paper to the pattern card. In ordinary jacquard each card represents only one pick of the design. Thus, if a repeat is completes on 300 picks then it is essential to cut 300 cards.

**Card cutting machine:** The most common type of manually operated card cutting machine is known as **Piano card cutting machine**. A figure of card cutting machine is shown below with different views.



**Operation of card cutting machine:** The card is inserted and is held into its place by pressing a lever which lifts a catch to insert the card for securing it firmly into its position. The card cutter with his finger tips presses in the keys that lock the punches for the holes to be cut as per design and the card cutter presses the lever B which brings down the heads together so that the punches that are locked by their keys penetrate the card. Keys 1 and 2 are controlled by the thumb of right hand and keys 3,4,5,6 by the fingers of the right hand. Keys 7,8,9 and 10 by the fingers of the left hand and key 11 and 12 by the thumb of the left hand. Peg hole is controlled by the thumb of the right hand. In this way the cards are punched according to the required design on the graph paper

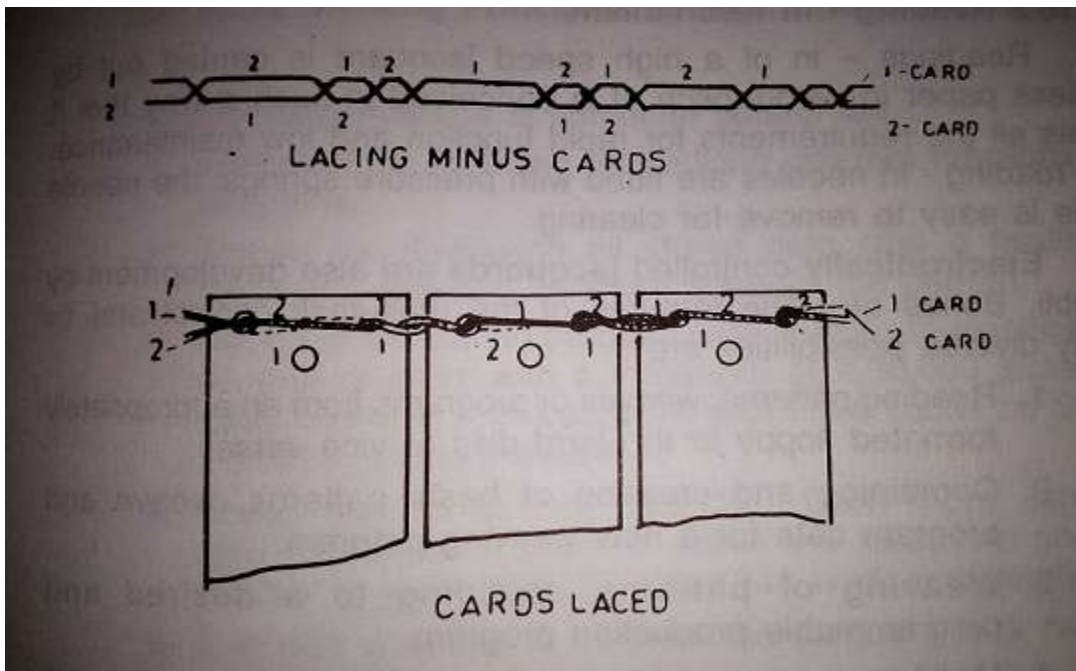
mounted on the reading board. The holes on the card will represent a warp up while the blanks will represent a warp down.

### Card Lacing:

The next operation after the cards are cut is the lacing of the cards to form an endless card chain. The card lacing is usually done by hand in case of handloom weaving.

### Hand lacing:

A wooden lacing frame consisting of two long narrow supports for the cards is used to place about 30 to 50 cards at a time for lacing. The wooden lacing frame is studded with small metal or wooden pegs representing the pegs of the cylinder of the jacquard. The cards are placed in the serial order in the frame. A needle, threaded with a lacing twine, is used to lace the cards. The manner in which the cards are laced is shown in figure below. It is clear from the figure that the lacing cords are crossing between two consecutive holes and also between two consecutive cards.



➤ **Other Work Practices:**

- Before starting the loom the weaver should ensure optimum tension in the warp sheet so as to avoid wrong beat up and lessen the yarn breakages.
- Correct the fabric defects like wrong drawing, wrong denting, end out, double end etc., immediately and also ensure that the other fabric defects too are corrected at the earliest, before continuing further production.
- Clean the machines & work area, so as to ensure good working atmosphere, without damaging the fabrics in the looms where the cleaning work is carried out as well as in the adjacent & opposite looms
- Run the machine without " starting mark or crack"
- Ensure that the loose threads are hanged in higher length (not more than 4 mm). Accordingly, and trimmed, after attending to the warp breaks.
- Ensure that the correct weft yarn is used
- See that the weft yarn is completely used, without giving room for additional wastage of raw materials.
- Ensure correct quality of thrums are there & see that the same are properly tied
- Check the knotted loom for knotting quality etc. double ends have to be removed should report to supervisors for any deviation in the same & for any other quality issue
- Ensure that no raw material/ cloth/ spare/ tool / any other material is thrown under/ near the machines or in the other work areas.
- Check for the reasons for the frequent warp/ weft breaks. The reasons that could be corrected by himself/ herself should be corrected. Otherwise, the same has to be reported to the mechanics/ fitters/ supervisors.

## 5. WEAVERS KNOT

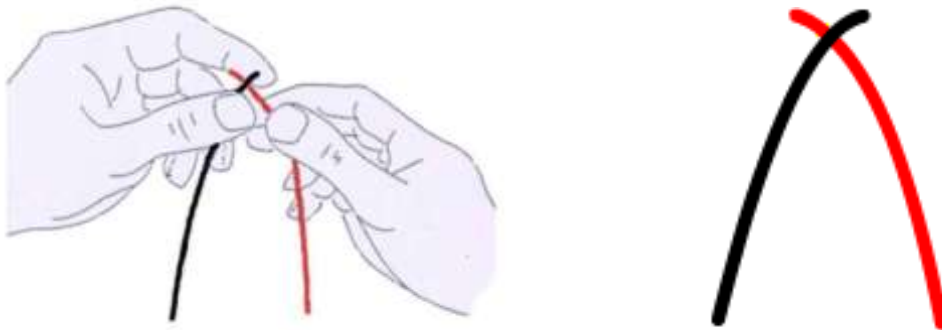
The following illustration explains the procedure for putting weavers knot.

1.



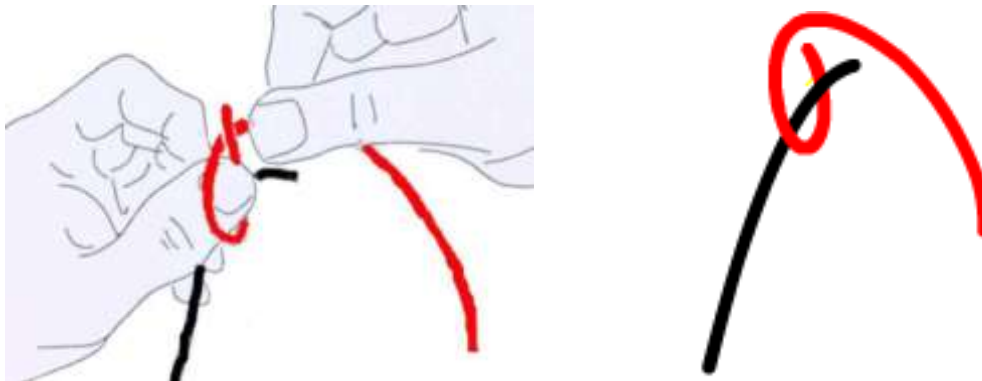
Pick up the broken end 6 mm from its end with the left hand thumb and second (middle) finger.

2.



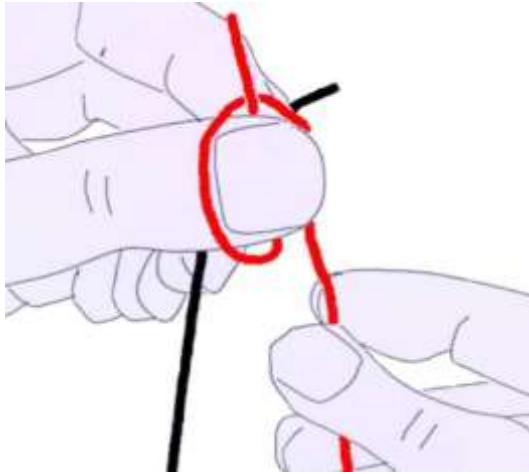
Then tie thread is then placed under the broken end by the right hand.

3.



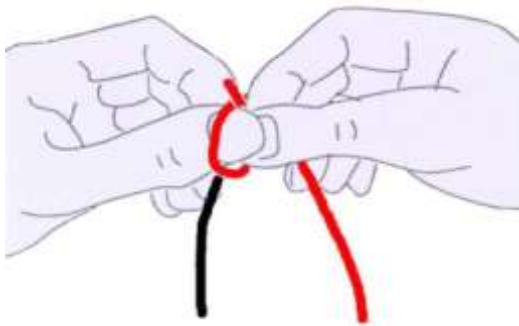
A loop is made with the tie thread around the left hand thumbnail, and tie thread passed behind the tie thread end.

4.



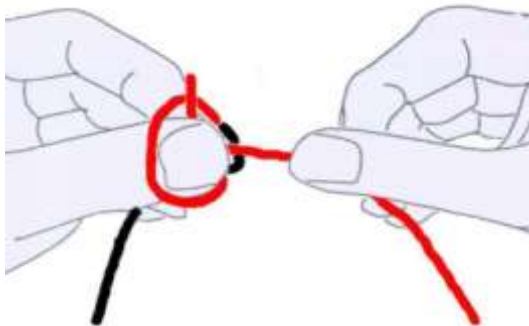
The first finger of the left hand is moved down against the thumb to hold the loop in position on the thumb.

5.



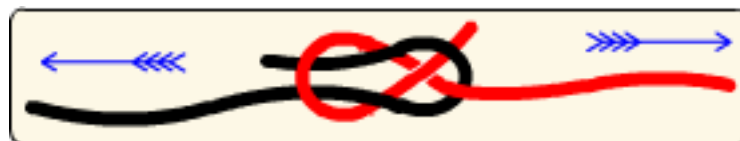
Right hand thumb is used to push the tail formed by the broken end, under the left hand thumb.

6



To form the knot, the right hand pulls the tie thread, while the left hand holds the knot stationary. They should be no pulling by the left hand.

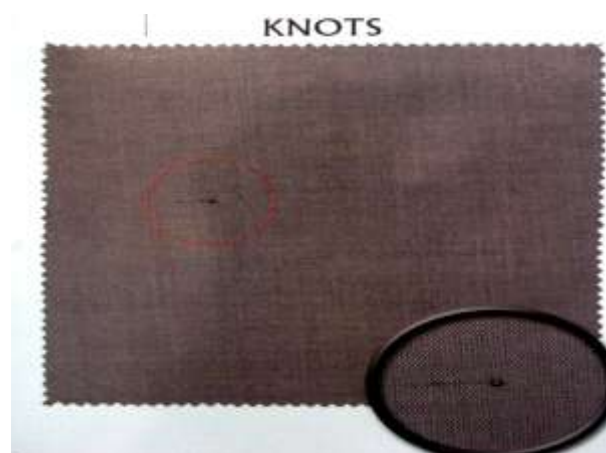
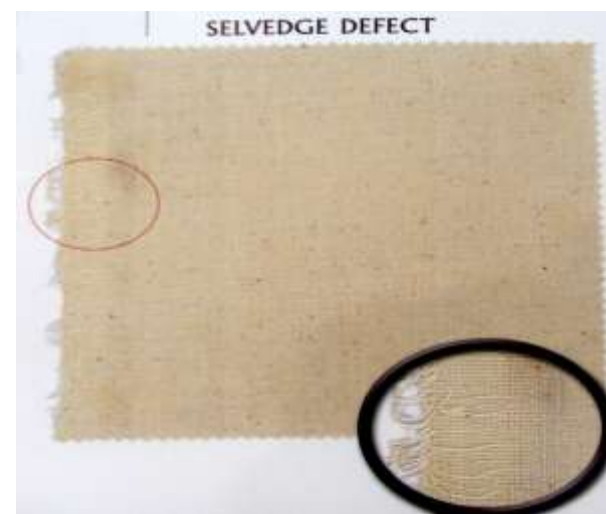
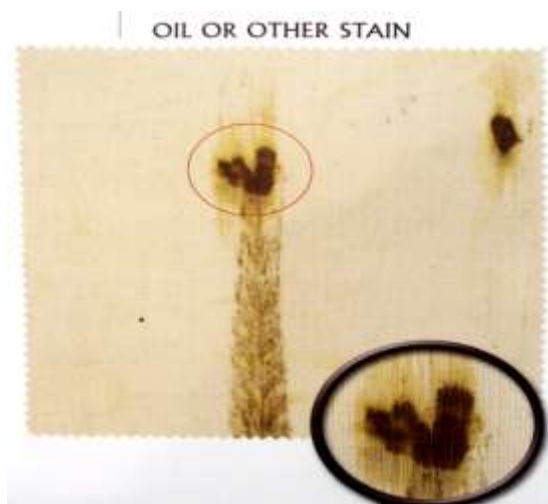
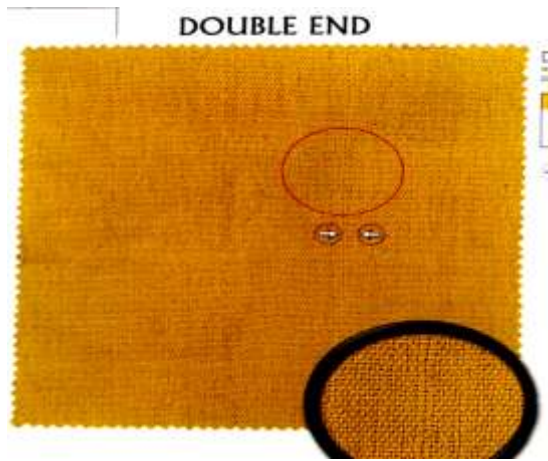
7





## 6. FABRIC DEFECTS:

Defect is an unwanted structure on the fabric due to many reasons. The following are the some of the type of the fabric defects e.g. missing ends, missing picks, reed mark, double end, weft crack, weft bar, temple mark, starting mark, float, slubs etc





## 7. FABRIC DEFECTS TABLE:

Defect is an unwanted structure of the woven fabric.

**Fabric Defect Tables**

<b>Name</b>	<b>Appearance</b>	<b>Cause</b>	<b>Prevention</b>
Thick Place in weft Direction.	Bars of denser woven fabric across cloth	Faulty let-off or take-up motion.	Cloth inspection.
Slack End.	A warp end gathering in the cloth.	1. End run out on the warp beam. 2. End not in drop wire.	Cloth inspection.
Floating End.	Un-woven warp end	1. End not drawn into heald. 2. Broken heald.	cloth inspection
Starting Place.	Light gap weft way in the cloth	1. Incorrect machine setting. 2. Not shed levelling when machine stopped	Cloth inspection.
Slubs.	Thick lumps of yarn weft way	1. Faulty weft yarn. 2. Not removing broken weft correctly.	Cloth inspection. Good methods.
Wrong Dent.	Thin line warp way in the cloth.	End or ends drawn into the wrong dent.	Know correct denting order.
Wrong Draft.	Irregular pattern warp way in the cloth.	End or ends drawn into the wrong heald.	Know correct drafting order.
Broken Pick.	Visible line weft way in the cloth.	1. Broken weft not completely removed. 2. Loose pick not found.	Always use correct weft repair methods. cloth inspection.
Thin Place	Light bar across the cloth due to low weft density.	1. Faulty let-off or take-up motion. 2. Cloth wrapped around rollers. 3. Faulty weft yarn.	Cloth inspection.
Double Pick.	Thick line running across the cloth.	1. Not having found the loosing pick. 2. Reserve cone caught and running in.	Correct weft repair methods. Correct weft

			creeling method.
Thick Place weft way	Thick bar in weft way	1. Double weft running in. 2. Thick/wrong weft yarn. 3. Double weft from winding department.	Correct weft creeling method.
Warp Way Stitching	Unwoven ends warp way in the cloth.	1. Fluff or knot behind the reed. 2. Spare end weaving in. 3. Not removing broken warp end from shed. 4. Too long tails on weaver' knot.	Cloth inspection.  Correct methods for weaver's knot and warp break repair.
Faulty Design	Repeat of the design not matching or design break	Wrong pick insertion.	Before starting the weaving the shed should be checked. It should be clear through out the width.

### Remedial measures for controlling the defects

Defects can be reduced by using good quality of yarn, good weaving preparations; proper loom settings at various stages of fabric manufacturing

### PRECAUTIONARY MEASURES:

#### Back of Loom (Warp Alley)

##### ➤ Slubs:

A thick place in the warp: slubs in the warp yarn sheet can cause problems when passing through the heald wires or beater. Once spotted it is the weaver's responsibility to remove it, to avoid warp breaks if the slub does not pass the reed; or to avoid a fault if the slub goes into the cloth.

##### ➤ Extra end:

Guide it through the guide eyes to the winding device.

##### ➤ Missing end:

Take the nearest positioned extra end and guide it through the guide eyes to the missing end position.

➤ **Crossed end:**

To be corrected by the weaver.

➤ **Lap end on warp beam:**

It can be an extra end coming up, or a previously missing end coming back.

➤ **Thick end or wrong yarn count (Ne):**

Take out, guide to the winding device, identify the end as incorrect with a label, and replace with a normal end from the extra end reserve.

➤ **Stuck ends / sizing fault:**

Separate the ends with the help of the guides.

➤ **Spare end bobbin:**

The extra ends provided on the warp beam need to be guided through the guides provided on the spare end bar, to the side of the loom and then wound onto the spare end bobbin. These need to be kept tidy otherwise a tangled mess will quickly result. When the bobbin is full it needs to be stripped.

➤ **Fluff and fly:**

When pieces of fluff or fly have settled on the warp they should be removed immediately to prevent them from being woven in. Fluff and fly attached to machinery should be removed before it becomes detached and also weaves into the cloth.

➤ **Waste / wild yarn:**

Extra piece of yarn, which have either been left on a beam or have dropped onto a loom, remove them immediately before they become entangled or woven in.

### **Precautionary Measures while jacquard weaving:**

- The lacing of the cards should be done properly keeping in mind that each card is having similar tension and no card should overlap each other.
- The card chain should be mounted on the jacquard carefully.
- Whenever a new weaver comes to start weaving he or she should carefully notice the clear shed formation otherwise they should find the last card whose pick is inserted by reversing the card chain.
- If any defect is coming in the design then the weaver should stop weaving and check all possible point from where the defect could come line breakage in lacing, cards overlapping, fluff or fly blocks the holes of the cylinder etc.

## Front of Loom (Cloth Alley)

### 1. Cloth Quality

- **Short picks:**  
Is the weft being inserted properly?
- **Kinks and snarls:**  
Is the weft too lively or not enough tension?
- **Weft bars:**  
Is this a variation of weft; or take-up or left-off motion malfunction?
- **Uneven yarn:**  
Has the weft quality deteriorated and the pirn needs to be changed?
- **Broken pick:**  
Has the weft been inserted for the whole width of the cloth, either breaking in its insertion or not being held at the receiving side?
- **Stitching:**  
This is usually associated with a slack warp end, or too low warp tension.
- **Double end:**  
Two ends weaving as one in the same heald break out the extra end.
- **Wrong draft:**  
An end or ends have been inserted into the wrong heald eye, resulting in a break in the cloth pattern.
- **Wrong dent:**  
An end has been drawn incorrectly in the reed resulting in a warp line down the cloth or a break in the cloth pattern.
- **Selvedge**  
Is the selvedge complete and correct, resulting in a correct edge to the fabric?  
Are the cut-off selvedge being removed correctly? Is the selvedge construction correct?
- **Warp Yarn Guides**  
Are all the catch cord guides clean and in good conditions?
- **Reed Marks**  
Is there any warp way lines caused by a damaged beater?

## CONTINGENCIES

### Warp related:

- **Extra end:** guide it through the spring to the winding device.
- **Missing end:** take the nearest positioned extra end and guide it through the spring into the missing end position.
- **Crossed end:** to be corrected by the weaver during his patrol.
- **Lap end on warp beam:** it can be an extra end coming up, or a previously missing end coming back.
- **Thick end:** take out, guide to the winding device and replace by a normal end from the reserve.
- **Stuck ends (sizing fault):** separate ends, with the help of the guide spring.
- **Slub (thick place in the yarn):** once spotted it is the weavers responsibility to remove it, to avoid warp breaks (if the slub does not pass the reed), or to avoid a fault (if the slub goes into the cloth).
- **Warp beam cleanliness:** dust and extra ends on the warp beam cause warp breaks. The weaver has to keep the beam clean.
- **Heddle change:** when a heald breaks the weaver has to change it. If there are several healds to change the weaver should call the fitter in order to avoid stopping his patrolling for a long time.
- **Wrong draw in the reed:** the weaver must correct it immediately.

### Weft related:

- **Weft variation:** when weft mixing small variations between cones is hidden. However, if a particular thick or thin yarn is introduced, an irregular appearance will result. The offending cone needs to be replaced and the supervisor informed.