TC HLM 01

HANDLOOM WEAVER (FRAMELOOM)

RSA DOCUMENT

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Textiles Committee
Govt. of India
Ministry of Textiles

Course material under ISDS for
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.

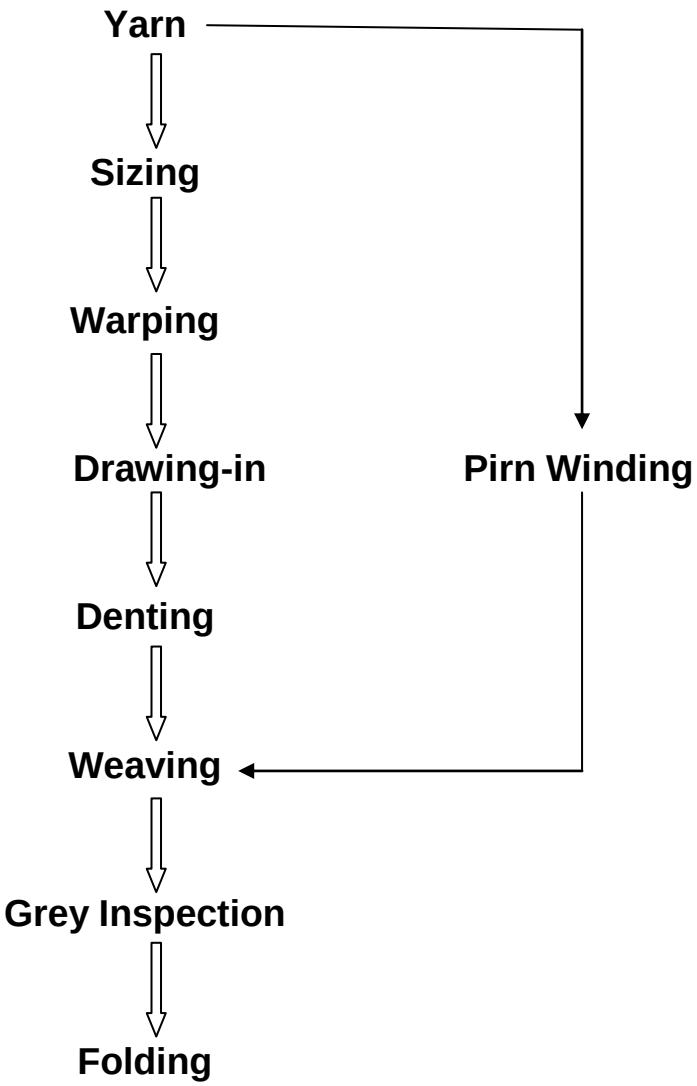
- The lengthwise yarns are called the warp yarn and the widthwise yarns are called the weft yarn.

- **Selvedge:** The length wise running edges of woven fabric are known as selvedges. It prevents unraveling of warp yarns.

3.What is HANDLOOM.

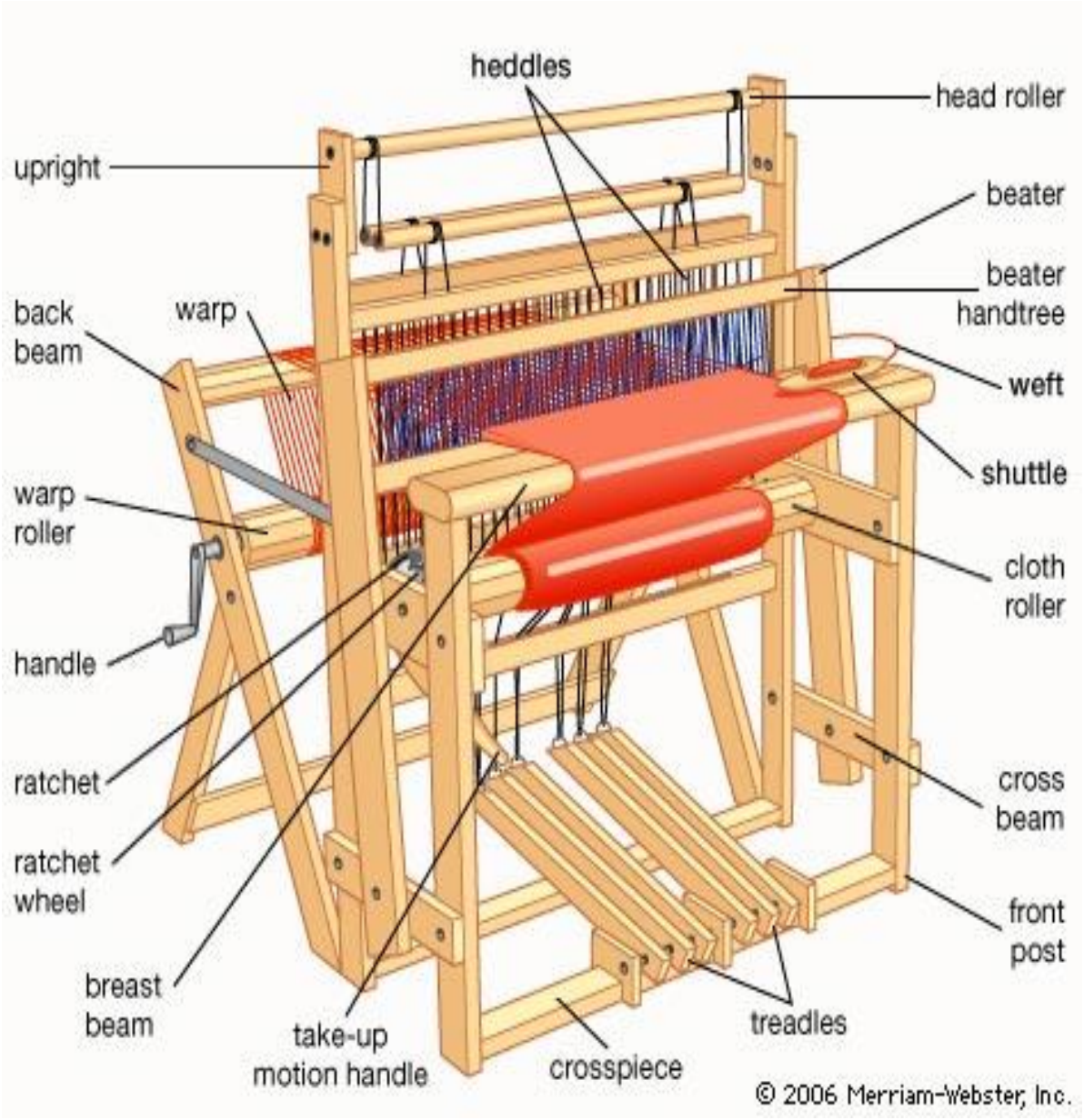
Hand loom
1. A hand loom is a simple machine used for weaving. In a wooden vertical-shaft looms, the heddles are fixed in place in the shaft. This loom is powered by hand. The warp threads pass alternately through a heddle, and through a space between the heddles (the shed), so that raising the shaft 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 pressing the treadles pedal and picking and beating is done manually. 4. Hand looms yield less production compared to power loom. 5. It can be operated at slow speed only compared to high speed of power looms. 6. Initial investment is very low compared 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.

4.SEQUENCE OF OPERATIONS IN WEAVING (HAND LOOM):



5.IDENTIFICATION OF HAND LOOM PARTS:

Frame Loom



6. IMPORTANT PARTS OF HAND LOOMS:

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 is a wire with a hole or eye in its centre through which a warp yarn is threaded. In some cases heald wires made out of cotton or synthetic yarn 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 which has a Reed frame mounted on it. The weaver holds the beater and gives 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. After completion of weaving the woven fabric is wound on it.

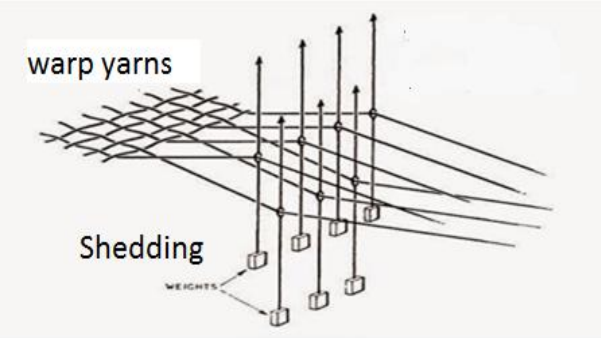
Treadles: These are located at the bottom of the loom and are designed to control warp shed formation by controlling the up and down movement of the heddles. The weaver presses the treadles by their feet for shed formation. The shed on a handloom is controlled manually by giving proper movement to the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

7.MOTIONS OF LOOM:

Primary motions:

Shedding motion:

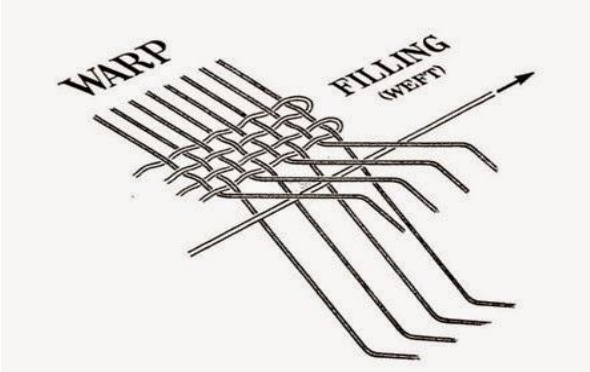
Shedding separates the warp yarns into two layers for the insertion of a pick. The function of shedding mechanism is to raise & lower the heddles. Which carry a group warp ends drawn through heald eye. There are different kinds of shedding mechanism like Tappet, Jacquard etc.



Picking motion:

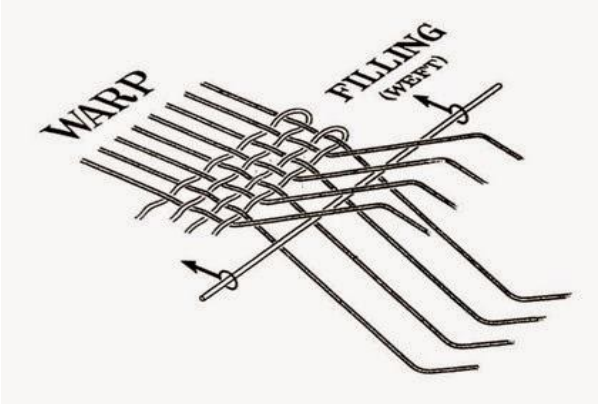
Picking motion inserts a pick (weft) from one side to the other side of the fabric.

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 rolls the fabric on the cloth roller with the help of take up motion handle and continues 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 warp roller.

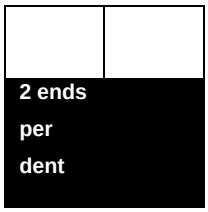
The weaver has to manually adjust the weight on the tension lever to maintain the tension of warp sheet.

8.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 power looms can also be produced on handlooms.But there are many products which can be produced by handloom only.” Example: Banarsi saree



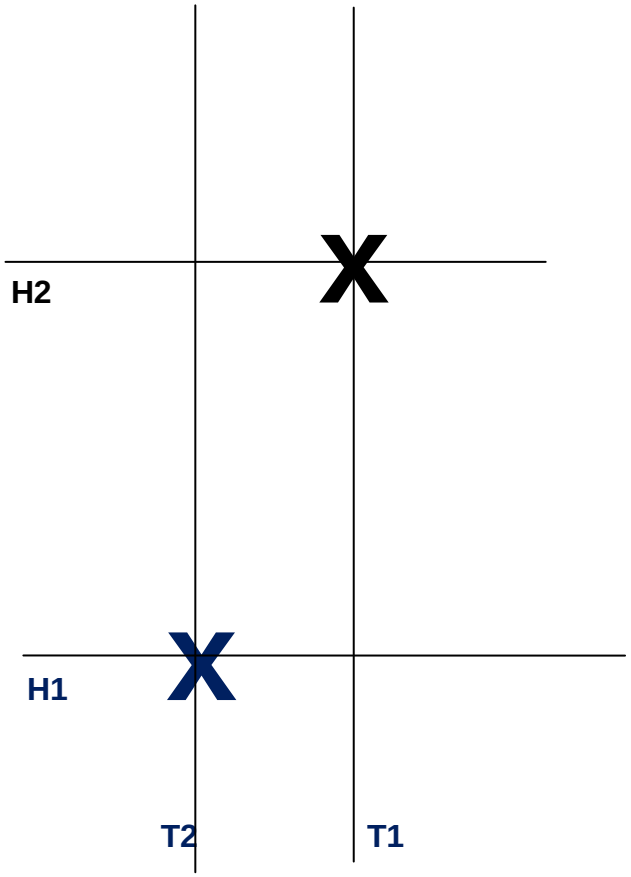
Denting

	0
0	

Drafting plan

WEFT UP	WARP UP
WARP UP	WEFT UP

Plain weave



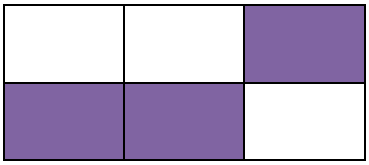
Tie up plan

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

0: Warp end passed through heddle 1&2 respectively.

Figure 1: Plain Weave

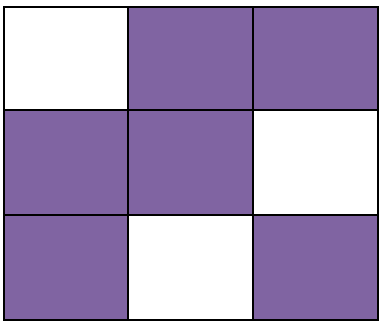
FIGURE:2



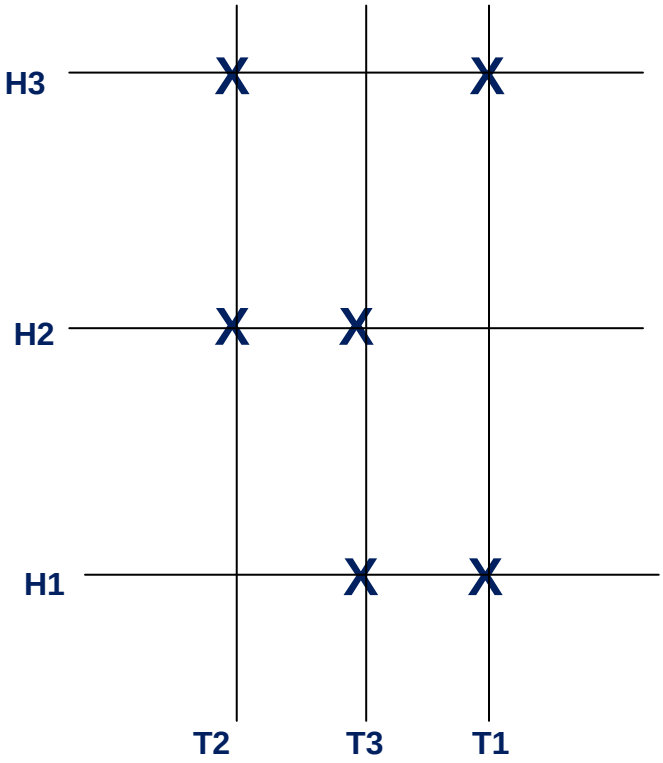
DENTING PLAN (2ENDS PER DENT)

		0
	0	
0		

DRAWING IN (DRAFTING)



2/1 TWILL WEAVE



TIE UP PLAN

9.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. The number of different warp and weft interlacements in the weave will decide the number of treadles and heddles required. As shown in the figure, the plain weave requires only two different interlacement for warp and weft hence 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 other related terms are explained 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 weave planned. This is called drafting or drawing in. As shown in the above figure 1 the 1^{st} end will be passed through the first heald and 2^{nd} through the second heald. the 3^{rd} end will again pass through the first heddle 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 or three ends per dent as per the requirement. More clearly the number of ends per dent depends upon the number of threads required and the warp count. In the above figures two ends per dent is shown. In case of selvedge the denting order may be different 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.

10.PREPARATION OF HAND LOOM FOR WEAVING:

The loom parameters like correct warp tension, proper opening of shed, reed movement etc, is to be checked to ensure whether the loom is compatible for weaving or not. If not the weaver has to make adjustments in the above as required and should take precautions, to minimize or avoid the yarn breakages. It is the weaver's responsibility to 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. The yarn from the hank is transferred on to the pirn by rotating the wheel.

Precautions: While winding care should be taken and ensure

1. Uniform tension is maintained till the pirn get filled.

2. the groove of the pirn should be kept empty.

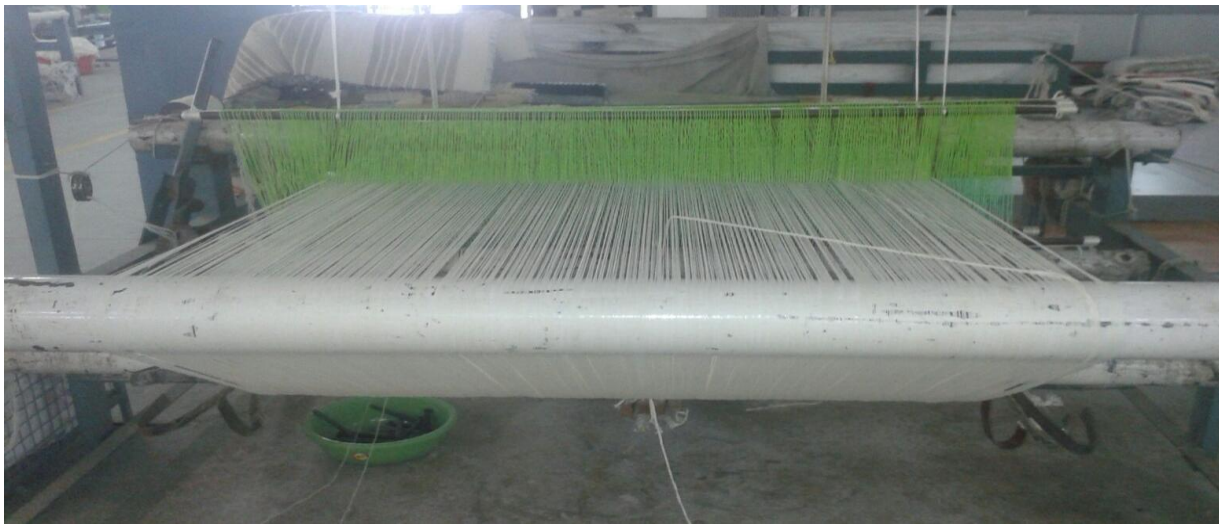
3. the yarn should be filled on the pirn to optimum level.

Pirn Winding Machine

11.OPERATING HANDLOOM

➢ **Attending to Warp Break:**

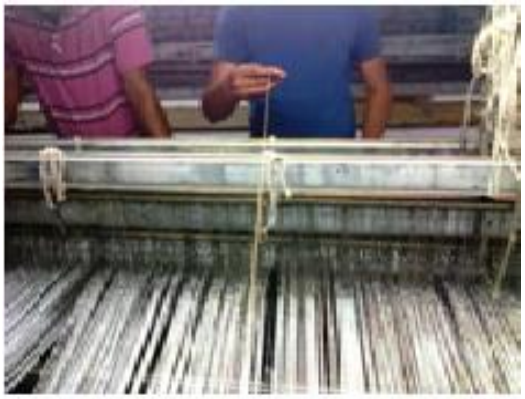
- Find out broken warp ends.
- Find out the location of the broken end by visual examination.
- Mend the broken warp end in the sized beams with the thrums of the same count of the sized beams, using " weavers ' knots"
- Draw the mended warp yarn through the heddles properly as per the drawing order 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 the broken end



Weaver picks the broken end

Puts the weavers knot

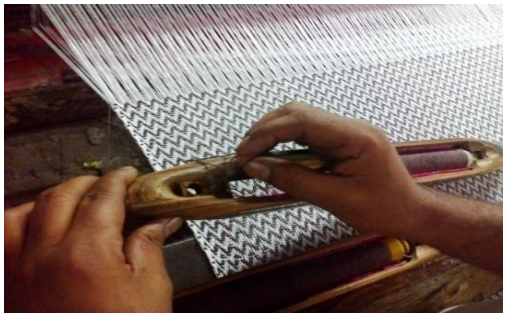
Weaver draws broken end through heald eye

Drawing end through Reed

➢ **Attending to Weft Break:**

- See that the beater is brought to 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



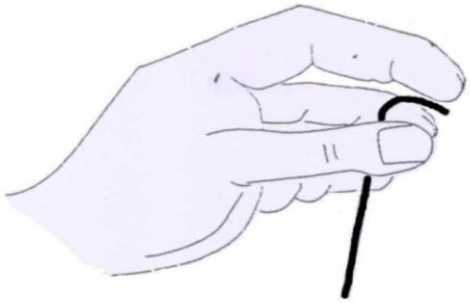
- **Other Work Practices:**

- Before starting the loom the weaver should ensure optimum tension in the warp sheet so as to avoid wrong beat up and to avoid 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,
- While cleaning ensure not to damage the fabrics in the looms as well as in the adjacent & opposite looms
- Operate the loom without " starting mark or crack"
- Ensure that the loose threads are hanged at higher length (not more than 4 mm) and trimmed, after attending to the warp breaks.
- Always 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.
- Remove double ends if any.
- Ensure that no raw material/ cloth or any other material is thrown under loom.
- Check the reasons for the frequent warp/ weft breaks and correct in the loom.

12.WEAVERS KNOT

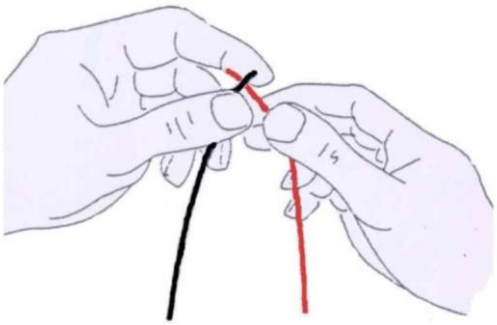
The following illustration explains the procedure for putting weavers knot.

1.



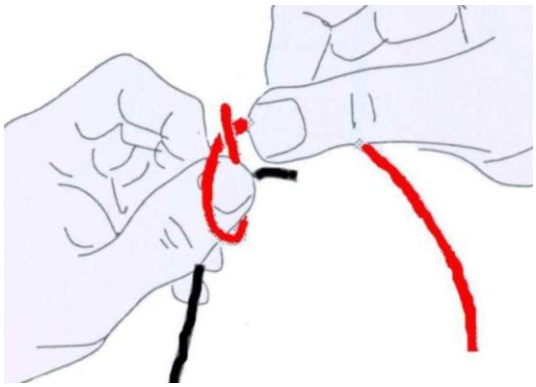
Pick up the broken end 6 mm from its end with the left hand thumb and second (middle) finger.

2.



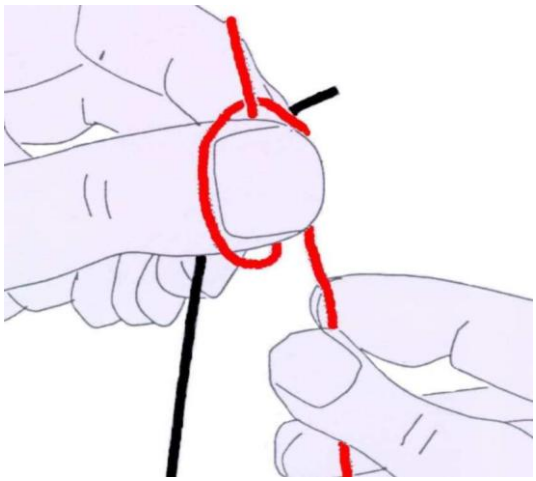
Then tie thread is then placed under the broken end by the right hand.

3.



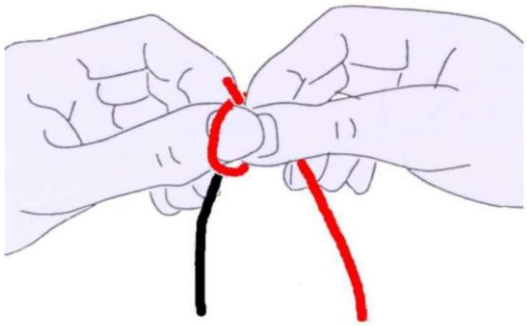
A loop is made with the tie thread around the left hand thumbnail, and tie thread passed behind the tie thread end.

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.

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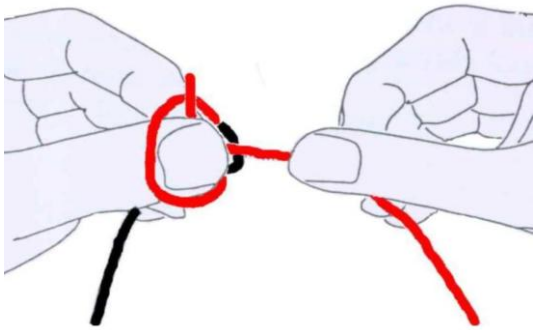
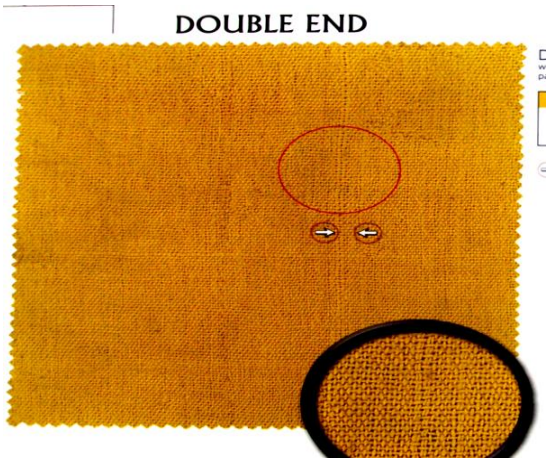


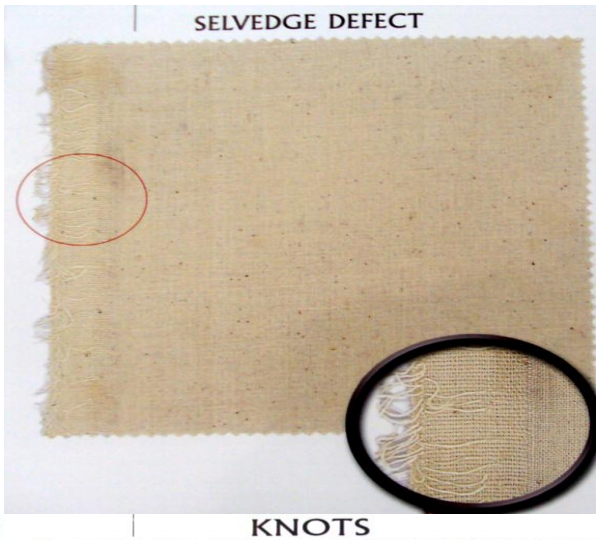
To form the knot, the right hand pulls the tie thread, while the left hand holds the knot stationary. They should be no pulling by the left hand.

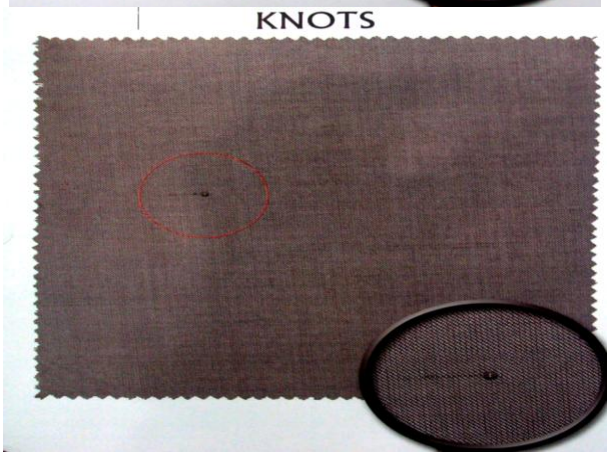
7

13.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







FABRIC DEFECTS TABLE:

Fabric Defect Tables

Name	Appearance	Cause	Prevention
Thick Place in weft Direction.	Bars of denser woven fabric across cloth	Cloth roll take-up and let off of warp rolls not done properly	Cloth inspection.
Floating End.	Un-woven warp end	1. End not drawn into heald. 2. Broken heald.	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.
Double Pick.	Thick line running across the cloth.	1. Not having found the loose pick. 2. Wrongly wound weft in the pirns.	
Thick Place weft way	Thick bar in weft way	1. Double weft running in. 2. Thick/wrong weft yarn.	Correct weft in the pirn

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

14.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 eye s to the missing end position.
- **Crossed end:**
  To be corrected by the weaver.
- **Thick end or wrong yarn count:**
  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 roller need to be guided through the guides provided on the spare end bar, to the side of the loom and then wind 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 accumulating on loom should be removed before it becomes detached and gets woven into the cloth.

- **Waste / wild yarn:**
  Extra piece of yarn, which have either been left on warp roller/ sheet or have dropped onto a loom, remove them immediately before they become entangled or woven in.

15. CONTINGENCIES

Front of Loom (Cloth Alley)

1. **Cloth Quality**
   - **Short picks:**
     Is the weft being inserted properly?
   - **Weft bars:**
     Is this a variation of weft; or improperly operated take-up of woven fabric or left-off dead weight.
   - **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?
   - **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? Is the selvedge construction correct?
   - **Reed Marks**
     Is there any warp way lines caused by a damaged beater?