BASIC TEXTILE OPERATIONS

NTQF Level - I

LEARNING GUIDES -78

Unit of Competence: -Produce a Simple Textile Product
Module Title: - Producing a Simple Textile Product
LG Code: - IND BTO1 M21 LO1-LG78
TTLM Code: - IND BTO1 TTLM-0919 v1

LO1.Planning for product production

Instruction Sheet	○ Planning for product production

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Planning for product production
- Preparing for production
- Producing product
- Completing production process

Includes regulatory and legislative requirements, and licensing and environmental requirements, and may relate to

- Standard operating procedure
- PPE
- Safe material handling
- Housekeeping
- Reporting accidents and incidents
- Environmental practices
- Design elements and principles
- Identify and check tools and equipment
- Prepare required materials ,Tools and Equipment’s
- Load products to the machine
- Monitor production according to defined procedures and against plan
- Rectify product faults

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide,

you will be able to –

- Plan for product production
- Prepare for production
- Produce product
- Complete production process

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2 .Follow the instructions described below
3 Read the information written in the “Information Sheets”.
4 Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
5. Accomplish the “Self-checks”.in each information sheets.
6. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

Information Sheet-1	Planning for product production

1.1. OHS practices

Use of Workplace personal protective equipments /PPE/

Personal protecting equipment's are any materials that are used to cover body parts to protect the worker from different disease causing organisms, direct sun radiation and any other physical damages. This equipment's may be provided by purchasing from markets or by making from local materials.

The following are some of personal protecting materials

No	Materials	Description
1		**Body safety cloth (tuta): -** This cloth is a type of cloth which covers all the body part except the head and the fingers**.** It is used to protect the body from dirty.
2		**Sun hat:-** is the material, that is used to protect head from direct sun radiation
3		**Eye protecting device: -** it is used to protect the eye from different damages
4		**Boot:-** it is used to protect leg from sharpen and other damaging
5		**Hand glove: -** which is made of leather or strong flexible plastic rubber, it used to cover fingers to protect from sharpen materials**.**

1.2.Identify Design and method of product

- **Method of production**

Textile manufacturing is a major industry. It is based in the conversion of different types of fiber in to yarn, then fabric, then textiles. These are then fabricated in to clothes or other application. Cotton remains the most important natural fiber, so is treated in depth. There are many variable processes available at the spinning and fabric-forming stages coupled with the complexities of the finishing and colorations processes to the production of wide ranges of products. There remains a large industry that uses hand techniques to achieve the same results.

- **Preparatory processes for preparation of yarn**

When the cotton comes out of a bale, it is all packed together and still contains vegetable matter. The bales broken open using a machine with large spikes. It is called an Opener. In order to fluff up the cotton and remove the vegetable matter, the cotton is sent through a picker, or similar machines. A picker looks similar to the carding machine and the cotton gin, but is slightly different. The cotton is fed into the machine and gets beaten with a beater bar, to loosen it up. It is fed through various rollers, which serve to remove the vegetable matter

- **Spinning- yarn manufacture**

The spinning machines take the roving, thins it and twists it, creating yarn which it winds onto a bobbin. In mule spinning the roving is pulled off a bobbin and fed through some rollers, which are feeding at several different speeds. This thins the roving at a consistent rate. If the roving was not a consistent size, then this step could cause a break in the yarn, or could jam the machine. The yarn is twisted through the spinning of the bobbin as the carriage moves out, and is rolled onto a cop as the carriage returns. Mule spinning produces a finer thread than the less skilled ring spinning

- **Weaving-fabric manufacture**

The weaving process uses a loom. The length way threads are known as the warp, and the cross way threads are known as the weft. The warp which must be strong needs to be presented to loom on a warp beam. The weft passes across the loom in a shuttle that carries the yarn on a pirn. These pirns are automatically changed by the loom. Thus, the yarn needs to be wrapped onto abeam, and onto pirns before weaving can commence.

- **Knitting- fabric manufacture**

Knitting by machine is done in two different ways; warp and weft. Weft knitting is similar in method to hand knitting with stitches all connected to each other horizontally. Various weft machines can be configured to produce textiles from a single spool of yarn or multiple spools depending on the size of the machine cylinder (where the needles are bedded).In a warp knit there are many pieces of yarn and there are vertical chains, zigzagged together by crossing the yarn.

- **Finishing- processing of textiles**

The grey cloth, woven cotton fabric in its loom-state, not only contains impurities, including warp size, but requires further treatment in order to develop its full textile potential. Furthermore, it may receive considerable added value by applying one or more finishing processes.

- **Design elements and principles**

The elements and principles of design are the building blocks used to create a work of art. The elements of design can be thought of as the things that make up a painting, drawing, design etc. Good or bad - all paintings will contain most of if not all, the seven elements of design.

The Principles of design can be thought of as what we do to the elements of design. How we apply the Principles of design determines how successful we are in creating a work of art. Note - the hyperlinks within the text of this page will open information in a new browser window. After you have read that information the window can then be closed leaving this window open.

1.3.The elements of design

- **Line**

Line can be considered in two ways. The linear marks made with a pen or brush or the edge created when two shapes meet.

- **Shape**

A shape is a self-contained defined area of geometric or organic form. A positive shape in a painting automatically creates a negative shape.

- **Direction**

All lines have direction - Horizontal, Vertical or Oblique. Horizontal suggests calmness, stability and tranquility. Vertical gives a feeling of balance, formality and alertness. Oblique suggests movement and action

- **Size**

Size is simply the relationship of the area occupied by one shape to that of another.

- **Texture**

Texture is the surface quality of a shape - rough, smooth, soft hard glossy etc. Texture can be physical (tactile) or visua.

- **Colour** Also called Hue
- **Value**

Value is the lightness or darkness of a colour. Value is also called Tone

1.4.The principles of design

- **Balance**

Balance in design is similar to balance in physics

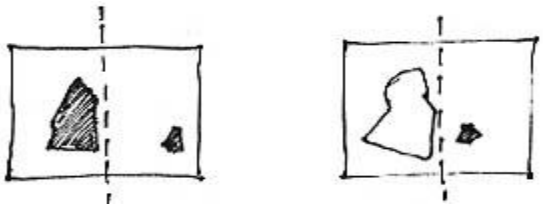
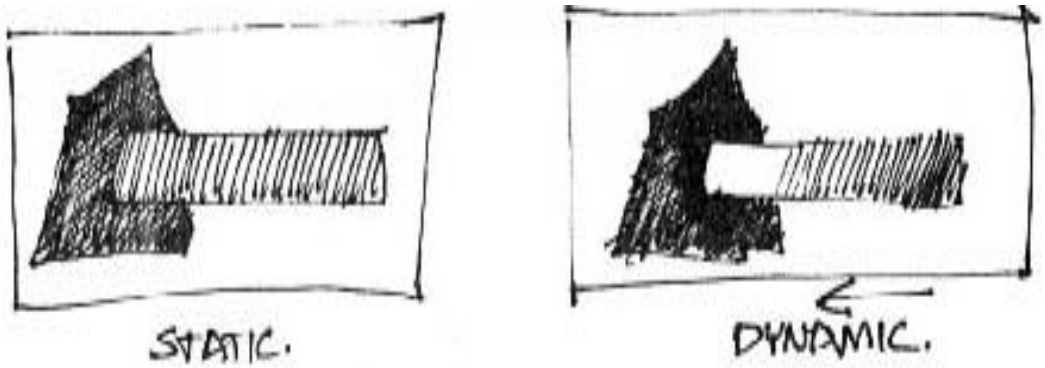


Fig 1.4.1 balance

A large shape close to the center can be balanced by a small shape close to the edge. A large light toned shape will be balanced by a small dark toned shape (the darker the shape the heavier it appears to be).

- **Gradation**

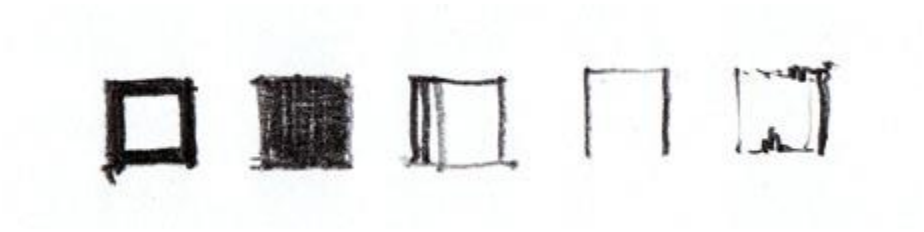
Gradation of size and direction produce linear perspective. Gradation of colour from warm to cool and tone from dark to light produce aerial perspective. Gradation can add interest and movement to a shape. A gradation from dark to light will cause the eye to move along a shape.



- **REPETITION**

Repetition with variation is interesting, without variation repetition can become monotonous.

The five squares above are all the same. They can be taken in and understood with a single glance.



When variation is introduced, the five squares, although similar, are much more interesting to look at. They can no longer be absorbed properly with a single glance. The individual character of each square needs to be considered. If you wish to create interest, any repeating element should include a degree of variation.

- **Contrast**

Contrast is the just apposition of opposing elements eg. Opposite colours on the colour wheel - red / green, blue / orange etc. Contrast in tone or value - light / dark. Contrast in direction - horizontal / vertical.

The major contrast in a painting should be located at the center of interest. Too much contrast scattered throughout a painting can destroy unity and make a work difficult to look at. Unless a feeling of chaos and confusion are what you are seeking, it is a good idea to carefully consider where to place your areas of maximum contrast.

- **Harmony**

Harmony in painting is the visually satisfying effect of combining similar, related elements. eg. Adjacent colors on the colour wheel, similar shapes etc.

- **Dominance**

Dominance gives a painting interest, counteracting confusion and monotony. Dominance can be applied to one or more of the elements to give emphasis

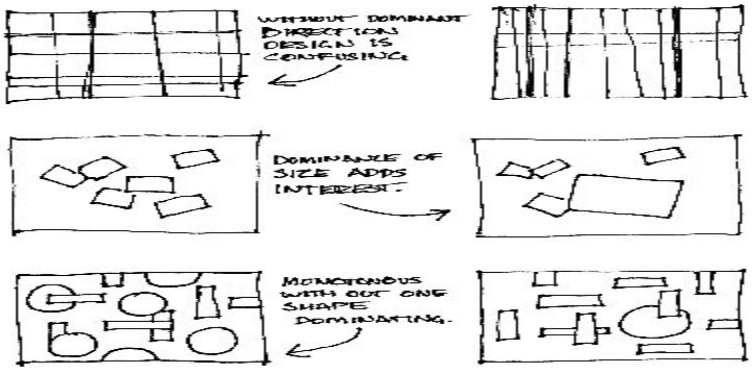


Fig 1.4.4 Dominance

- **Unity**

Relating the design elements to the idea being expressed in a painting reinforces the principal of unity.eg. A painting with an active aggressive subject would work better with a dominant oblique direction, course, rough texture, angular lines etc. whereas a quiet passive subject would benefit from horizontal lines, soft texture and less tonal contrast.

Unity in a painting also refers to the visual linking of various elements of the work

1.5.Yarn types, combinations

- Staple spun yarns
- Continuous filament yarns
- Composite yarns

Filament core core:-core spun (filament or staple fibers forming the core) and staple fibers as Staple the sheath of a non-effect staple yarn

- Folded/plied/doubled Filament staple two or more yarns twisted together.

1.6.Tension and type of weave

Fabric formation by weaving requires a tension balance between the top and bottom sheds of the warp prior to warp insertion. Common fabrics such as many twills, satins and plain weave variants utilize differences between top and bottom shed tensions to produce more dramatic face or back effects on a fabric surface. These types of shed geometry variations are

sometimes colloquially known as "weaving in a sack" because the tension differences are reminiscent of a sack held open at the top while the bottom is allowed to be slack.

1.7.Color theory

Color theory is a science in itself. Studying how colors affect different people, either individually or as a group, is something some people build their careers on. And there's a lot to it. Something as simple as changing the exact hue or saturation of a color can evoke a completely different feeling. Cultural differences mean that something that's happy and uplifting in one country can be depressing in another.

Color wheel

A color wheel (also referred to as a color circle) is a visual representation of colors arranged according to their chromatic relationship. Begin a color wheel by positioning primary hues

equidistant from one another, then create a bridge between primaries using secondary and tertiary colors.

Color terminology

- **Primary Colors:**

Colors at their basic essence; those colors that cannot be created by mixing others.

- **Secondary Colors:** Those colors achieved by a mixture of two primaries.

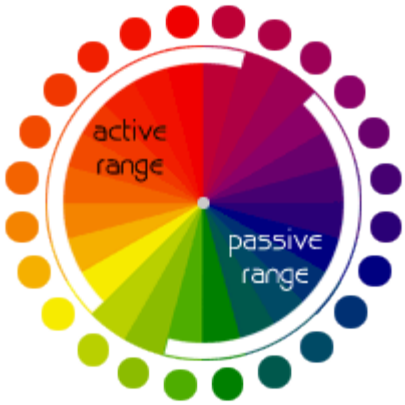
- **Tertiary Colors:** Those colors achieved by a mixture of primary and secondary hues.

- **Complementary Colors:** Those colors located opposite each other on a color wheel.

- **Analogous Colors:** Those colors located close together on a color wheel.

1.8.Active & passive colors

The color wheel can be divided into ranges that are visually active or passive. Active colors will appear to advance when placed against passive hues. Passive colors appear to recede when positioned against active hues.



Advancing hues are most often thought to have less visual weight than the receding hues. Most often warm, saturated, light value hues are "active" and visually advance. Cool, low saturated, dark value hues are "passive" and visually recede. Tints or hues with a low saturation appear lighter than shades or highly saturated colors.

Some colors remain visually neutral or indifferent.

1.9.Color relationships

Color relationships may be displayed as a color wheel or a color triangle.

1.10.The Painter's color triangle consists of colors we would often use in art class those colors we learn about as children. The primary hues are red, blue and yellow.

1.11.The Printers' color triangle is the set of colors used in the printing process. The primaries are magenta, cyan, and yellow.

Nine-part harmonic triangle of Goethe begins with the printer's primaries; the secondaries formed are the painter's primaries; and the resulting tertiaries formed are dark neutrals.

Harmony can be defined as a pleasing arrangement of parts, whether it be music, poetry, color, or even an ice cream sundae.

In visual experiences, harmony is something that is pleasing to the eye. It engages the viewer and it creates an inner sense of order, a balance in the visual experience.

1.3. Identify and check tools and equipment

- **Miniature machine**

The textile industry and market is continuously producing new types of materials in addition to new styles of clothing. High precision and high quality components are needed to grow with the ever-changing demands of textile machines. Year after year, NMB has provided top-of-the-line components to create and maintain a variety of textile manufacturing equipment.

Motors for textile machinery are the back bone of any quality production. Motors keep the production lines in motion and profitability at a high. NMB's ball bearing, motors, fans, and blowers are all critical parts of any quality textile machine. Design your textile machines and motor to meet all of your specific needs with NMB components.

- **Reeling machine**

Silk yarn is the 'QUEEN OF TEXTILES yarn '. Despite the popularity of synthetic fabrics in recent years. silk continues to hold a unique place in the textile world, by virtue of its aesthetic appeal, luster, feel, suppleness combined with softness, resilience etc.

Raw silk is formed by combining the required number of silk filaments drawn from individual cocoons. The raw silk quality varies according to the cocoon characters, reelers' skill as well as reeling appliances.

India is a traditional Seri cultural country and mainly multivoltine cocoons are produced for commercial exploitation.

Therefore the traditional reeling systems like country charkha and cottage basin are still existing

OBJECTIVES:

1. Improvement in raw silk quality.
2. Improvement in working conditions of charkha reelers.
3. Suitability of the machine for reeling both inferior and superior quality cocoons.
4. Economy in cost of machine and production of raw silk.
5. Easy availability of the machine and its spares.
6. Higher earnings for the reelers per unit quantity of raw silk produced.

- **Flat bed hand screen**

In the textile industry, this process is an automated version of the older hand operated silk screen printing. For garments such as t-shirts, sweatshirts, sweatpants, and caps, the hand-operated process is often used. For each color in the print design, a separate screen must be constructed or engraved. If the design has four colors, then four separate screens must be engraved. The modern flat-bed screen-printing machine consists of an in-feed device, a glue trough, a rotating continuous flat rubber blanket, flat-bed print table harnesses to lift and lower the flat screens, and a double-blade squeegee trough. The in-feed device allows for precise straight feeding of the textile fabric onto the rubber blanket.

As the cloth is fed to the machine, it is lightly glued to the blanket to prevent any shifting of fabric or distortion during the printing process. The blanket carries the fabric under the screens, which are in the raised position. Once under the screens, the fabric stops, the screens are lowered, and an automatic squeegee trough moves across each screen, pushing print paste through the design or open areas of the screens. Remember, there is one screen for each color in the pattern. The screens are raised, the blanket precisely moves the fabric to the next color, and the process is repeated. Once each color has been applied, the fabric is removed from the blanket and then processed through the required fixation process.

- **Weighing balance**

Equipment measure weights of the fabric, chemical etc.

- **Manual spinning wheel**

- ✓ Adjust the spinning wheel
- ✓ Check all part of the wheel and move the wheel
- ✓ Insert the sliver an proportional speed

- **Hand looms**

Floor looms

Large looms that sit directly on the floor and use foot pedals called treadles that open and close the sheds (the temporary separations in the warp) by raising and lowering the harness. Frame sizes vary and may be an option even if you have limited space as some floor looms fold and are portable so you can take them to workshops and classes. Other floor looms are too large to take out of the house regularly as they can be 100 inches or more wide. There are three types of floor looms that differ from each other in how they mechanically work (not in the way you weave):

- **Jack Looms**:

As pressure is applied to the treadle (foot pedal), the harnesses rise as they are connected by jacks. This is why they are sometimes called "rising shed" looms. Speaking with more experienced weavers, I was informed that many like jack looms because you only have to tie up the part of the warp that goes up, so it can cut your prep time in half when warping the loom.

- **Table looms**

Table looms are often smaller than floor looms. They can rest on a table or a stand. Come in 4, 8, 12 and 16 harness (or more!) options and are often portable, which makes them good for workshops, travel and storage. Table looms differ from floor looms in that the shed is changed by hand instead of with a foot by treadle.

- **Rigid Heddle looms**

Self-Check 1	Written Test

Directions*:* Answer all the questions listed below. Key answer you're seen before of the references book

1. List and identify the element of design (4 point)
2. What are the principles of design?(2 point)
3. What is reeling machine?(1 point)
4. Write the advantage of reeling machine? (3 point)

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____

_____

_____

_____

2._____

_____

_____

_____

3_____

_____

_____

_____

_____

4._____

BASIC TEXTILE OPERATIONS

NTQF Level - I

LEARNING GUIDES -79

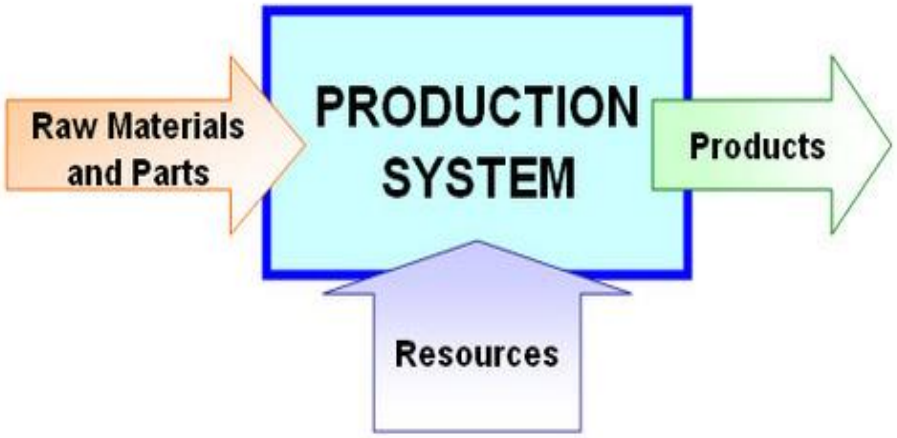
Unit of Competence: -Produce a Simple Textile Product
Module Title: - Producing a Simple Textile Product
LG Code: - IND BTO1 M21 LO2-LG79
TTLM Code: - IND BTO1 TTLM-0919 v1

LO2.prepare for production

Information Sheet 2	prepare for productionLO2

2.1. Prepare required materials ,Tools and Equipment's

The conventional view is to regard raw materials or parts as input into the production system which converts them into the products.



2.1.1 Equipment's/ machine

- ✓ **Spinning machine,**
- ✓ **Power loom,**
- ✓ **handloom,**
- ✓ **weft knitting,**
- ✓ **dyeing machine,**
- ✓ **hand screen printing and**
- ✓ **heat press printing machine**

2.1.2.Material

- ✓ Fiber,
- ✓ Yarn,
- ✓ wax yarn,
- ✓ dye stuffs and
- ✓ pigment

2.1.3Make minor adjustments

- ✓ Apply OHS practices
- ✓ Adjust the machine
- ✓ Clean the machine, greasing, oiling
- ✓ Lubricant
- ✓ Check the machine

2.1.4. **Prepare and organize work space**

- ✓ **Time management**

one useful time management trick is distinguishing between events and ordinary to-do items. An event needs to take place at a specific time on a specific day, whereas another type of to-do, such as a follow-up call with a networking contact, can be taken care of on a more flexible schedule.

- ✓ **Space**

Small business owners "wear so many hats, they usually have pretty limited support staff, and they're idea factories," says Julie Morgensten, a productivity consultant and the author of organizing from the inside *out*. "Your workspace has to be organized in a way that accommodates that Morgenstern calls her system for organizing a workspace the kindergarten model: items and documents are organized by roll into what she calls activity zones.

Self-Check 2	Written Test

Instructions: Perform the following tasks. Key answer you're seen before of the references book

1. How to organize work places?(2point)
2. What is the differences between equipment and tools (3point)

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

_____

_____

_____

_____

_____

_____

_____

_____

2. _____

_____

_____

_____

BASIC TEXTILE OPERATIONS

NTQF Level - I

LEARNING GUIDES -80

Unit of Competence: -Produce a Simple Textile Product
Module Title: - Producing a Simple Textile Product
LG Code: - IND BTO1 M21 LO3-LG80
TTLM Code: - IND BTO1 TTLM-0919 v1

LO3.Produce product

Information Sheet 03	Produce product LO3

3.1 Load products to the machine

All the machines which is mentioned above should be loaded according to the manufacturer specification and standard.

3.2.Use equipment's to produce fabric

- **Night knitted gown**
  - ✓ Flat knitting machine
  - ✓ V-bed knitting machine
- **Process of night gown making**

Step1.Select raw materials(yarn) select the design to be used
Step2 Develop design and draft the pattern
Step3 Prepare and sett machine, tools and materials
Step4 Prepare (wind) the yarn according to the developed design
Step5.Load the knitting machine and operate knitting machine
Step6.Check the quality requirement according to the customers need
Step7.sewing
Step8.seaming
Step9.Apply finishing
Step10.Apply standardized packaging

- **Socks**
  - ✓ Single cylinder knitting machine
  - ✓ Double cylinder knitting machine
- **Process of socks mak**

We have categorized the manufacturing process into five steps. We begin the process with knitting, and then seaming, wet finish, board pairing, and packaging respective

- Making of a Sock
  - ✓ Process 1: Knitting
  - ✓ Process 2: Seaming
  - ✓ Process 3: Wet Finish
  - ✓ Process 4: Board Pairing
  - ✓ Process 5: Packaging

❖ **Woven scurf**

- **Process of woven scurf making**

  Step1.Select raw materials(warp yarn & weft yarn) select the design to be used

  Step1Develop design and draft the pattern

  Step2.Prepare and sett machine, tools and materials

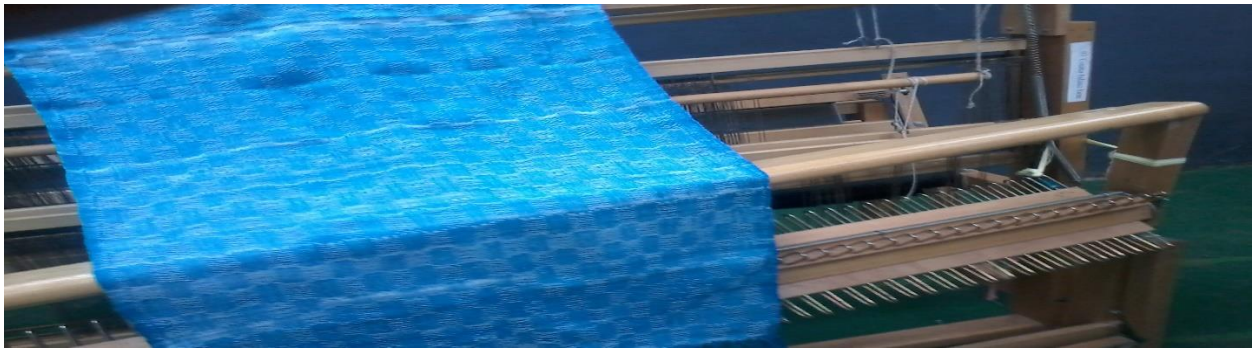
  Step3.Prepare (wind and warp) the yarn according to the developed design

  Step4.Load the loom and operate the loom(weaving)

  Step5.Check the quality requirement according to the customers need

  Step6.Apply finishing

  Step7.Apply standardized packaging

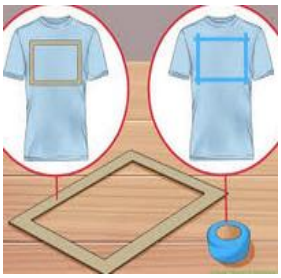


Equipment's us power loom

Several types of Handkerchiefs are popular (fashion) in the market. This includes the one in check (self-weaving) and printed and the other of polyester in check printing or all over printing. Handkerchiefs are mainly manufactured by two methods. In the first method, it is manufactured in big power loom sector and thus coloring, sizing and winding of threads is done on looms. The second method envisages coloring, sizing and winding by hand while weaving is done on power loom.

❖ **Print shirts**

- ✓ Flat screen



- ➢ Lay your shirt on a flat surface and iron it
  - Insert a piece of foam core or cardboard into your shirt
  - Create a frame where you want to place the image
  - Pour your Ink dye into a bowl
  - Apply the Ink dye to your shirt.
  - Remove the frame to see the painted area

Produce printed bed sheet

Step1.select the design to be used

Step2..prepare screen

Step3..burn screen

Step4..Select raw materials(fabric, paste and pigment)

Step5.Develop design and draft the pattern on the fabric

Step6.Prepare tools and materials

Step7.printing the fabric according to the developed design

Step8.Check the quality requirement according to the customers need

Step9.Apply finishing

Step10.Step1Apply standardized packaging

Produce Tie dyeing different purpose cloth

Step1.Select raw materials(fabric and dye stuffs) select the design to be used

Step2.Develop design and draft the pattern

Step3.Prepare tools and materials

Step4.Tie the fabric according to the developed design

Step5.Apply dyeing

Step6.Check the quality requirement according to the customers need

Step7.Apply finishing

Step8.Apply standardized packaging

- **Table cloth**

A tablecloth is a cloth used to cover a table. Some are mainly ornamental coverings, which may also help protect the table from scratches and stains. Other tablecloths are designed to be spread on a dining table before laying out tableware and food.

3.3 Monitor production according to defined procedures and against plan

- use quality standards and practices

- **Same quality indicators**
  - ✓ Strength pilling
  - ✓ fabric resilience
  - ✓ workability
  - ✓ wash testing
  - ✓ shade
  - ✓ tensile properties
  - ✓ handle

- Textile standards provide the specifications and test methods for the **physical**, **mechanical**, and **chemical properties** of textiles, **fabrics,** and **cloths**, as well as the natural and artificial fibers that constitute them. The textiles covered by these standards are commonly formed by **weaving, knitting**, or **spinning** together fibers such as **glass fiber strands**, **wool** and other **animal fibers**, **cotton** and other **plant-derived fibers**, **yarn, sewing threads,** and **mohair**, to name a few. These textile standards help fabric and cloth designers and manufacturers in testing textiles to ensure acceptable characteristics towards proper end-use.

Self-Check 3	Written Test

Directions: Answer all the questions listed below. Key answer you're seen before of the references book

1. Write the process of woven scurf making.
2. Write the process of knitted gown making.
3. Write the process of printed bed sheet making
4. What are the quality indicators for making simple textile product?

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____

2._____

3._____

4._____

_____

_____

Operation Sheet 3	Produce the following projects

1. Produce woven scurf.

2. Produce night knitted gown

3. Print shirt.

4. Produce printed bed sheet.

5. Produce different purpose tie dyeing cloth.

BASIC TEXTILE OPERATIONS

NTQF Level - I

LEARNING GUIDES -81

Unit of Competence: -Produce a Simple Textile Product
Module Title: - Producing a Simple Textile Product
LG Code: - IND BTO1 M21 LO4-LG81
TTLM Code: - IND BTO1 TTLM-0919 v1

LO4.Complete production process

Information Sheet 4	Complete production process

4.1 unload/ remove products from the machine

4.1.1.In textile industry product include

- ✓ **Yarn is** the final product of ring spinning
- ✓ Woven fabric the final products of looms
- ✓ Knitted fabric the final products of knitting machine

4.2. Remove products from the machine

- ➢ Apply OHS practices
- ➢ Use un load equipment
- ➢ Remove product from the machine

4.3. Assess product against plan

- ➢ **As in any other industry, to remain competitive manufacturers need to:**
  - Deliver on time
  - Improve productivity
  - Respond quickly
  - Deliver to a price
  - Reduce excess costs
  - Introduce best practices
  - Achieve accurate and consistent information

4.5. Rectify product faults

4.6. Clean equipment and work place

Apply OHS practices

Clean the work area and machine after, before and during every activity to prevent product contamination.

4.7.Store tools and equipment's properly

The tools and equipment store based on the manufacturing kaizen system

To before store clean and maintain

4.8 Maintain accurate records

Maintain the equipment according to the standard

If there the maintain equipment record based on specification

Self-Check 4	Written Test

Directions: Answer all the questions listed below. Key answer you're seen before of the references book

1. List the parameters to compete other similar product manufacture.
2. List faults and remedies for making of weaving, knitting, dyeing and printing.
3. Why to maintain accurate records for product completion

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

   _____

2. _____

   _____

3. _____

   _____

   _____

LAP Test 3	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions*:* Given necessary templates, workshop, tools and materials you are required to perform the following tasks within 3 hours.

Task 1: develop design

Task 2: prepare screen

Task 3: burn the design

Task 4: prepare the paste

Task 5: printing shirt

Task 6: dry printed shirt

Task 7: Iron, fold and packed

Operation Sheet 1	Operating and knitting on the machine

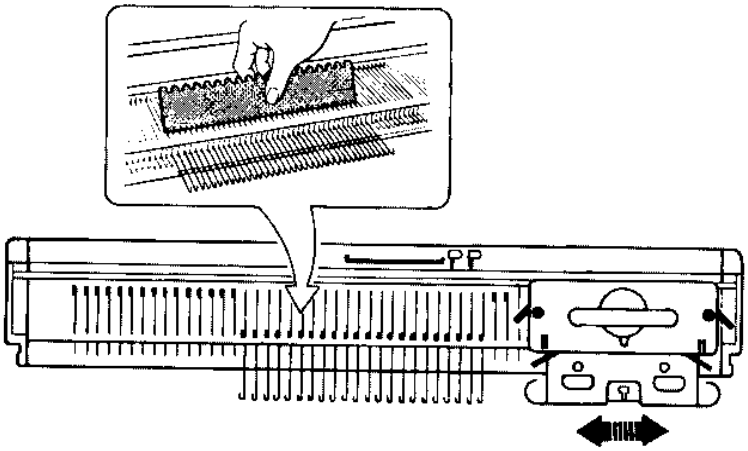
Cast – on and knitting

1.1 Cast – on

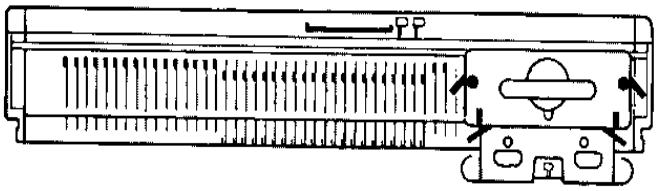
- To cast- on push the required number of needles from **A** to **D** Position using the straight side of the needle pusher.
- For practice, use 35 needles on both sides of center (0), 70 needles in total.

1.2 **Set the carriage as follows**

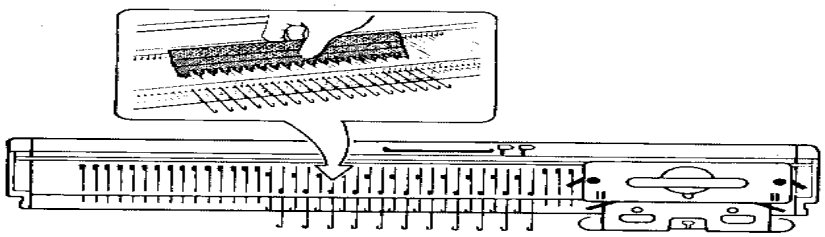
- Cam lever ---------- 0
- Side Levers ----------
- Russuel Levers ---------- II
- Weaving Knobs ---------- 0



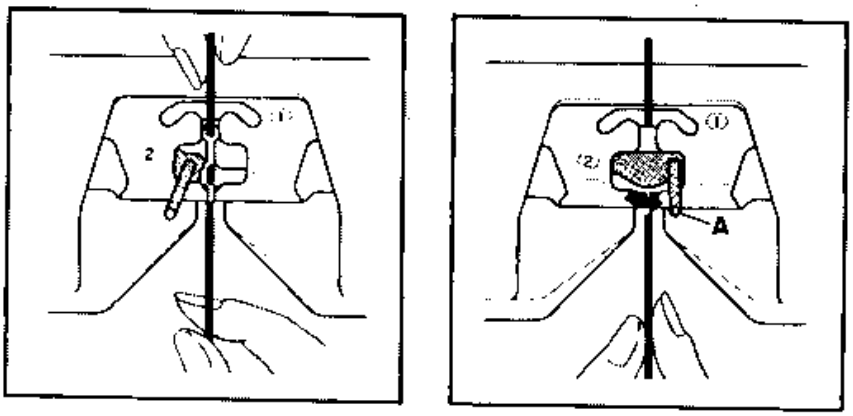
1.3 Slowly move the carriage across the needles bed until it has passed all the needles



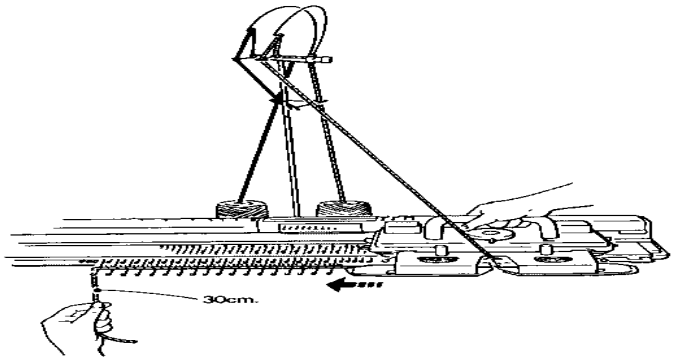
1.4 Using the 1/1 side of the needle pusher; push every alternate needle from B to D Position and set the weaving in to down position weaving knobs -------



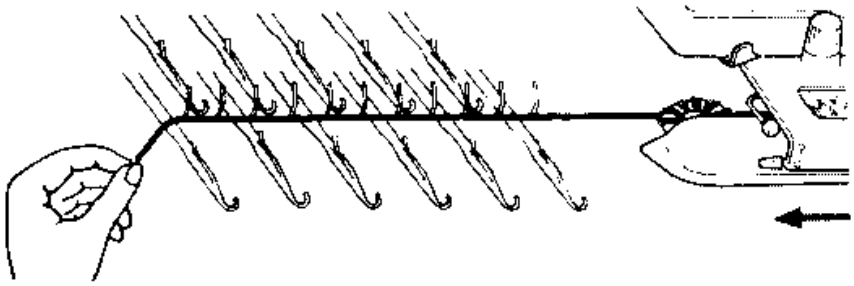
1.5 Open the yarn feeder by moving the yarn feeder gate A to the left. Hold the yarn with both hands and slides it into the yarn feeder. Close the yarn feeder by moving the yarn feeder gate to the right.



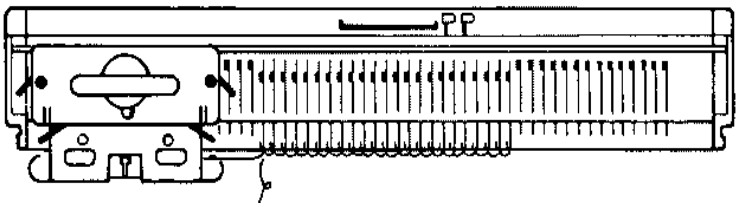
1.6 Pull the yarn end from underneath the arm and lay it over all the needles in D position. Hold the yarn loosely at the left about 30 cm down from the needle bed. Eliminate slack yarn by pulling the yarn down at the back of the yarn rod until the Tension Spring is almost horizontal.



1.7 Slowly move the carriage from right to left until it has passed all the needles to knit one row.

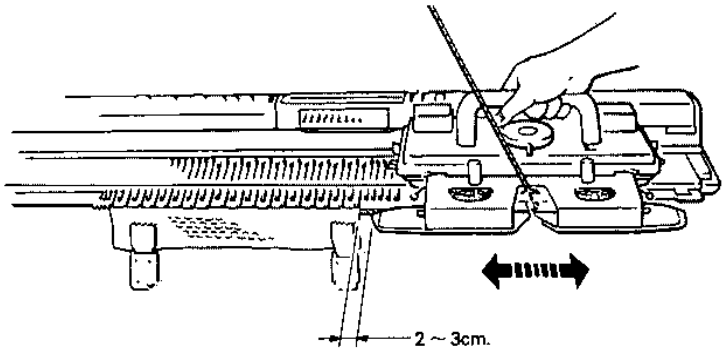


1.8 Ensure that the arm has passed the last knitting needles by 2-3 cm. before beginning the next row. Continue to knit 2 – 3 rows cast – on has been finishe



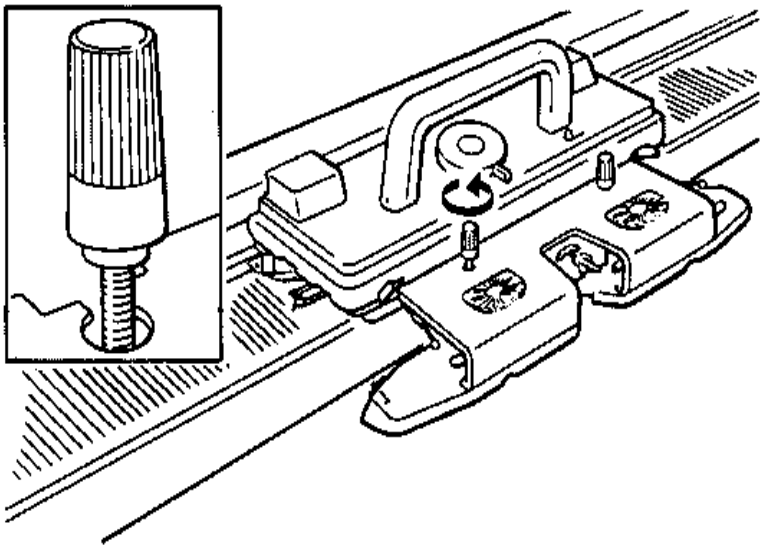
1.9 Knitting stockinet

- Set the side levers at -V--
- Weaving knobs at o. knit 4-5 rows
- Hang the claw weights at both edges of the knitting.
- Move the carriage from side to side to knit stockinet.

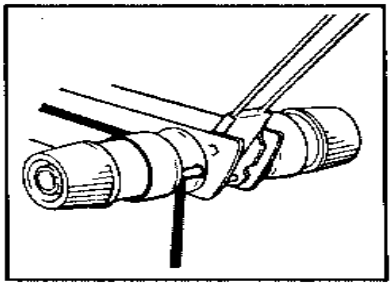


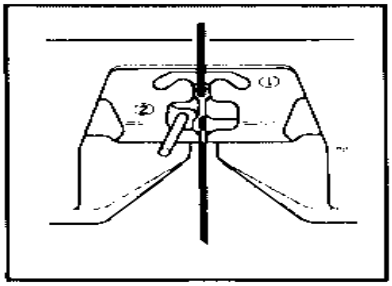
Check point

2.1 Arm is attached to the carriage correctly.

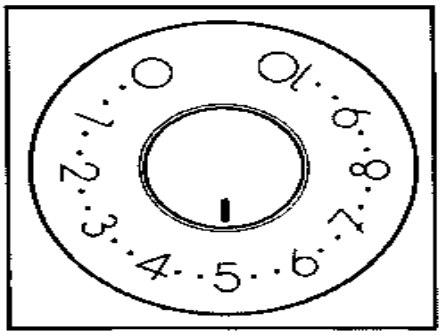


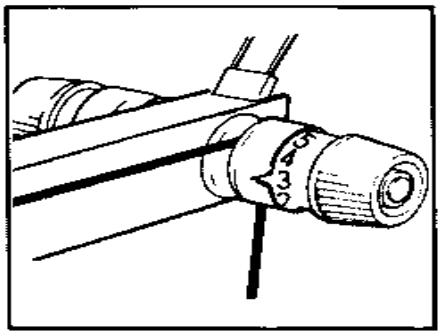
2.2 Yarn is threaded correctly through the auto tension and yarn feeder.



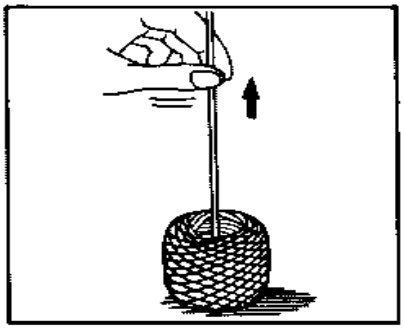


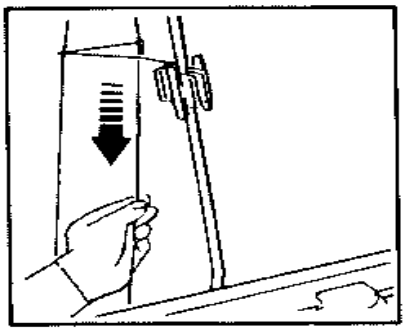
2.3 Tension dial and stitch dial are set correctly



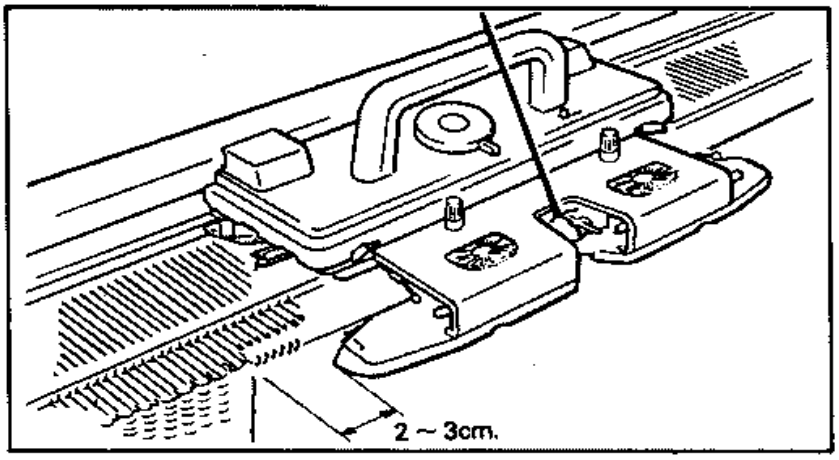


2.4 Yarn is wound correctly and Slack yarn is eliminated and Tension spring is almost horizontal.





2.5 Arm has passed the last knitting needles by 2-3cm before knitting the next row



LAP Test 2	Practical Demonstration

Name: _____ **Date:** _____

Time started: _____ **Time finished:** _____

Instructions: You are required to perform the following individually with the presence of your teacher.

1. Identify the parts and their function winding machine?

2. Demonstrate the necessary steps how to wind thread per required specifications?

3. Demonstrate how you apply safety procedure during winding process?

4. Demonstrate how wound package is developed?

5. Demonstrate how load and remove/doff the input material and output material respectively?

6. Demonstrate how to handle the output product and approve quality requirements per customers need?

- Your teacher will evaluate your output either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work. But if satisfactory, you can proceed to the next topic.

LAP Test 2	Practical Demonstration

Name: _____ **Date:** _____
Time started: _____ **Time finished:** _____

Instructions: You are required to perform the following individually with the presence of your teacher.

1. Identify the parts and their function warping machine?
2. Demonstrate the necessary steps how to warp thread per required specifications?
3. Demonstrate how load and remove/doff the input material and out put material respectively?
4. Demonstrate how to handle the output product and approve quality requirements per customers need?

- Your teacher will evaluate your output either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work. But if satisfactory, you can proceed to the next topic.

Operation Sheet 2	Wind yarn or thread using warping machine

"This sequence is very important"

Safety Instructions:

- Observe the following safety guidelines when operate warping machine:
- Be sure that your warping machine set in good condition
  If your warping machine working with electric power check the voltage
- Locate your warping frame near an easily accessible. { if you use manual warping m/c}
- Place warping m/c on a solid surface and treat it carefully.
- Never use your warping machine if the power cable has been damaged. If use electric power.
- Clean and oil/lubricate the moving parts of winding machine after the completion of winding.
- Handle the output/product carefully to protect it from raveling and keep it in clean area.
- Apply OHS i.e. use proper PPE
- Read, interpret and follow information on work specifications, standard operating procedures and work instructions and other
- Check manufacturer's specifications for machine or equipment

Steps to set up warping machine

1. Check the type of yarn to be wind
2. Check the belt / rotating parts of warping m/c arranging in good manner
3. Sett and check all parts of the warping machine before using it
4. Securely attach your warping frame. Square edges are best. To avoid damage to your counter/table, you may want to place a piece of cloth between the ball winder and the counter.

5. Find multiple end of your yarn. This can be tricky. Have patience
6. Attach the ends of your yarn to warping beam. (Refer to your item's directions to see how to do this. Every warping machine is a little bit different!)
7. Slowly begin winding. You will want to do this slowly at first to get used to how the yarn winds. Different fibers react different ways.
8. Continue winding, always in the same direction, slowly. If you go too fast, the yarn may get caught in the gears below (on some models.)
9. Monitored yarn and operation in accordance with operational manual

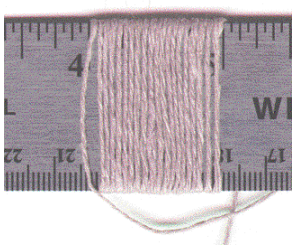
Steps in details

Step 1 – Choose Your Project and Yarns

First, you will need to determine how wide and long you want your project to be and what type of yarn you

will be using. For beginners, it is advisable to choose a pre-determined pattern so that some of the calculations will be done for you already. There are many hand weaving books and magazines on the market. Hand woven is a great source for ideas. Check with your local library, take a class through a local weaving guide . And of course, if you have questions, stop will all be happy to help you get started.

Step 2:How to Warp a Loom - The Correct Sett



Once you have chosen your yarns, you will also need to determine the set of your cloth, or how many threads per inch the fabric will be. If your pattern does not give you this information, or you are using an alternate yarn or are creating your own design, wrap the yarn around a ruler, so that each wrap of the yarn is just touching. Wrap the yarn over a space of 1 inch. Then count the number of wraps. This will give you an approximate set.

*Note: - 1 inch = 2.54cm

In this example, this hemp yarn is best sett at 20 ends per inch (epi).

The sett may be adjusted up or down depending on the type of cloth that you are making, the yarn, the pattern structure and the desired drape of the fabric.

Step 3: How to Warp a Loom -The Reed

A reed is usually made of metal and sits in the beater. It looks much like a comb with small teeth. Its purpose is to keep the warp threads spread across the web, at an even distance, and is used to beat the weft threads into place while weaving. Reeds come in several standard sizes such as 6, 8, 10 or 12 epi. Metric size reeds are also popular. This table gives some of the more common Inch and Metric size reeds.

Dents per Inch	Dents per Centimetre
4	1.5
5	2
6	2.5
8	3
10	4
12	5
15	6
18	7
20	8

Once you have decided on the set of your project, you will need to choose an appropriate reed. Choose the reed that best distributes your yarn to the appropriate set.

For example, if your sett is 8 epi then use an 8 dent reed, threading one end into each dent. If your sett is 20 epi, choose a 10 dent reed, threading 2 ends into each dent. If you do not have a selection of reeds to choose from, try to space your yarn evenly in the reed that you have, by doubling up ends into the same dent if necessary

Step 4: How to Warp a Loom - Calculating the Yarn

Even if you have a pre-determined pattern, it is a good idea to double check that you have sufficient yarn to complete your project.

Take-up and Shrinkage

To calculate the length of warp required, take the length of your finished project and add 10% – 15% for take-up and shrinkage.

e.g.

- Finished project: = 36″ + 2 inch hems = 40″
- Take up and shrinkage 15% = 6″
- Total length = 46″

Loom Waste

You will need additional warp length to be able to tie the warp ends to the back and front of the loom. This is called loom waste. Loom waste is generally about 27″ but I add a full yard for loom waste. This gives me a few additional inches of warp for sampling and playing with new designs or colors.

So, for this project you would need:

46″ + loom waste 36″ = Total 82″ or 2.3 yards warp length.

Make More

Because there is always a considerable amount of loom waste in a weaving project, it is usually advisable to make more than 1 item at a time.

To make 2 table runners, the warp length would be:

2 x 46″ = 92″ + loom waste 36″ = 128″ or 3.5 yards

Width of Project

Next, you will need to know the desired width of your project. Add 10% – 15% for take-up and shrinkage.

- Project width: 17″
- Takeup and shrinkage – 15%: 2.5″
- Total width: 19.5″ EPI

You will now need to calculate how many ends of yarn you require. Using the sett that you figured out above, multiply the sett (number of ends per inch) times the total width of the project.

- Sett: 20 epi
- Total width: 19.5″
- 18 x 19.5″ = 390 ends

  Total Warp

Each warp end will be 3.5 yards long and you will need 390 ends. To calculate the total warp length, multiply the total warp length x the total number of ends.

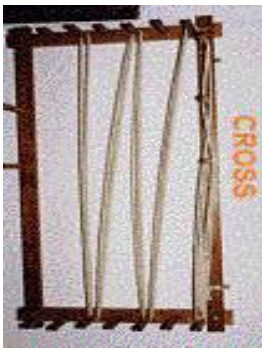
- warp length: 3.5 yards
- # ends: 390
- 3.5 x 390 = 1365 yards

YPP

Yarn is usually sold by weight, in number of lbs. or grams. The yardage measurement is sometimes shown on the cone of yarn, or you can ask your yarn supplier how many yards per pound there are in the yarn you purchased. The hemp yarn shown above has 1500 yards per pound (ypp). So you would need 1365/1500 = .9 lb. of yarn for the warp

Step 5: How to Warp a Loom - Wind the Warp

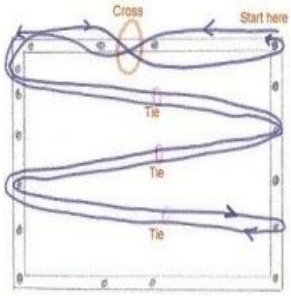
From the previous example, or from your project plan calculations, you will have determined that you will need to prepare a warp of 390 ends, each 3.5 yards in length.
Special tools have been created that will help you to do this – Warping Boards and Warping Mills. If you don't have access to a warping board or mill, you can thread your yarn by wrapping it around anything that is the correct distance apart, such as the backs of 2 chairs, making sure that you create a cross in the yarn with each revolution.
Warping Board



Warping Boards are generally used for projects up to 13 yards in length. Longer warps require a Warping Mill. On a Warping board, the distance between each peg is generally 1yard. If your project is shorter than 12 yards, it is usually easier to thread your warp using the full length of the board.

This photo shows a 5 yard warp length.

The example given above required a 3.5 yard warp length. Usually round up 1/2 yards to the nearest yard (if there is sufficient yarn) i.e. 4 yards. To begin warping, tie the yarn to the first peg on the top Right side of the warping board. Going Left, I run the yarn



Over the first peg and Under the following peg, then Over the far Left peg and reverse direction. Then to the next peg on the Right side of the board, reverse direction

and on to the next peg on the Left side of the board and so on until there is a length of 4 yards on the warping board.

Then reverse direction and work your way back up to the top of the warping board. At the top, go over the Left peg, Over the next one, Under the following and back to the Far Right peg. This creates a Cross in the warp

chain. The Cross is very important, as it keeps the warp yarns in the order that you threaded them.

Warp Chains

In the above example, you would repeat this procedure until you have 390 ends. A warping

board doesn't generally hold 390 ends, so you will need make several warp chains. do chains of 50 – 100 ends depending on the thickness of the yarn.

Counter Thread To keep track of the number of ends that wound onto the board, use a counting thread; a contrasting piece of yarn and lace the ends in groups of 10

Keep Even Tension

As you are winding the warp, you might find that the tension on the warp may tend to get tighter. If this is occurring, you will notice that the pegs are drawing in. For this reason, many warping boards do not have the pegs glued in. If the warp is tightening too much, the pegs will come loose rather than breaking on you. Try to keep an even tension while winding on.

Otherwise, as the tension increases, each successive warp end is shortening and you will end up with a warp of different lengths

Step 6: How to Warp a Loom- Warp Chains

Using a different colored yarn than your warp, tie a loop around the Cross. Then secure the rest of the warp with additional ties in 1 or 2 yard intervals.

To remove the warp from the warping board, a warp chain is made. Starting at the bottom of the board put your hand through the loop that is formed. Bring your hand through and take hold of the warp, drawing it through the loop. Then put your hand through the new loop that is formed and pull the warp through again, forming a new loop. Repeat until you reach the end of the warp.

If you want to start weaving right away, you can place the warp chains onto lease sticks and take it to your loom. If you aren't ready to weave yet, the warp chains can be safely stored until you wish to use them. If I am storing them for some time, I attach a note to the chains. I record details of the project I have planned.

Step 7: How to

Warp a Loom - Slay Reed

Once you have removed the warp chain from the warping board it is ready to be transferred onto the lease sticks on your loom. The lease sticks are 2 long sticks that hold the warp threads in order while you are threading the loom. Usually support the lease sticks by placing 2 other long sticks (string) at both ends of the loom, running them from the front to the back beam

Put the lease sticks into the two loops that are formed by the cross.

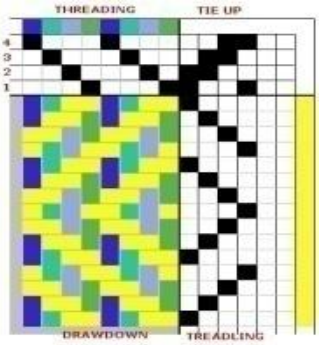
It is best to centre the warp on your loom. In order to do this, measure and find the centre of your loom. mark the centre of the beater bar with a permanent marker. If your finished project is going to be 20″ wide, then measure over from the centre 1/2 of this amount i.e. 10″. This will be the starting point of your threading the reed.

Usually thread starting from the left and work to the right. Using the lease sticks as the guide, select the thread on the most left-hand position and pick it up with left hand. Holding the threading hook right hand, place it behind the reed and bring the hook through the reed dent. With the hook, then pull the thread through the dent. then move the hook into the next dent, pick up the following thread in the sequence and repeat.

Step 8: How to Warp a Loom - Threading the Heddles

When all of the warp ends have been sleyed through the reed, move to the back of the loom. To make it easier to reach the heddles, the back beam on most looms can be removed or moved forward. tape a copy of the threading draft to the loom for reference and thread the heddles

Thread starting from the right hand side of the loom and work to the left. Following the draft, select the next 4,6 or 8 heddles in the pattern sequence and move them to the right. then reach through the heddles and select the next 4,6 or 8 threads from the back of the reed. To keep the threads in order, slip them through the four fingers of your left hand and hold them under tension (to the left of the selected heddles). The threading hook is held in right hand. Slip the threading hook through the first heddle in the pattern sequence and pick up the rightmost

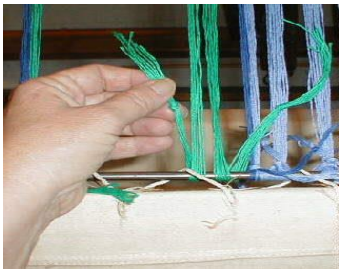


thread of your left hand and draw it through the heddle. Move the threading hook into the next heddle of the pattern sequence, pick up the next rightmost thread of your lefthand, and draw through the heddle eye. Repeat for the remaining 2 threads in your left hand.

Select the next 4 heddles of the pattern sequence and move them to the right. Pick up the next

4 threads from the reed and repeat.After each pattern group, double check the threading, trying to catch any threading errors
might have made. As some yarns can be quite slippery, also tie each group of ends that have
been threaded with an overhand knot.

Once all the ends have been threaded, they are then tied to the apron rod of the back beam. Pick up a group of threads (about 1 inch) and slip them over the back rod. Split the bundle in two and bring the ends under and back up. Tie a knot and secure it with another knot.

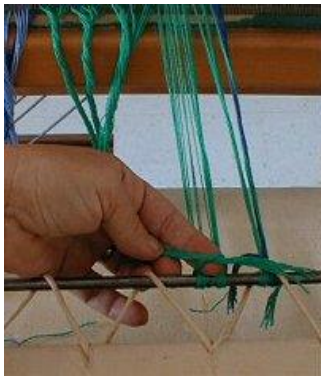


Step 9: How to Warp a Loom - Beaming

Once the warp threads have been securely tied to the back apron rod, you are ready to begin to wind the remaining warp on to the back beam. This part of the task is a bit easier when you have another person to help hold the warp tension while you wind on to the back, however, it isn't always easy or convenient to find another weaver that is available to assist. However, it is possible to beam by yourself, though the process is a bit slower. You may follow the following method: Starting at the front of the loom, even the tension on the warp threads by tugging at them in about 1 – 2 inch intervals, until all the threads are straight. Then go to the back of the loom, and turn the back beam about 1/2 a revolution. go back to the front and again adjust the tension. go to the back and again wind another 1/2 a revolution.

Once the warp has gone around once, place a lease stick (or dowel, paper, or old venetian blind slats) in between the warp beam and the threads. The lease sticks keep the tension even, smoothing out any lumps, bumps and knots in the warp. The sticks also prevent the warp threads from tangling into each other as they wind around the beam.Again, repeat the procedure of going to the front of the loom, and straightening out thethreads and tightening the tension all along the warp. After 1 1/4 revolution, place another lease stick into the back beam.

Step 10: How to Warp a Loom - Tying Warp onto Front Beam



When the warp has been evenly wound on to the back beam(warp beam), you are almost ready to weave. All
that remains is tying on to the front apron rod and checking your tension.

The warp threads are tied to the front apron rod in about 1 inch sections. Bring the bout of threads over the rod, split the bundle in two, and tie a single overhand knot and tighten the tension. Repeat this all the way across the warp threads.

Once all the threads have been tied, run your hand lightly across the threads. You should be able to feel for loose spots – if any of the threads have an uneven tension. Again tighten all the threads, adjusting any that are loose.

Once you feel that the tension is even, then tie a second overhand knot on each thread tosecure them in place. The next step is to go under your loom and tie the pedals according to the tieup plan in your draft.

Then release the brake and advance the warp forward so that the rod is over the breast beam. Put the brake back on, and tighten the tension on your loom. You are ready to weave!

Using a contrasting weft color, weave a header – a couple of inches of both tabby and your pattern. Check for crossed threads and errors in threading. If there are any, you will have to untie those threads, make the necessary threading corrections, and retie.

to 

Congratulations! You are done and your warp is ready go! Happy weaving!

LAP Test 2	Practical Demonstration

Name: _____ **Date:** _____

Time started: _____ **Time finished:** _____

Instructions: You are required to perform the following individually with the presence of your teacher.

1.Identify the parts and their function warping machine?

2.Demonstrate the necessary steps how to warp thread per required specifications?

3.Demonstrate how load and remove/doff the input material and out put material respectively?

4.Demonstrate how to handle the output product and approve quality requirements per customers need?

- Your teacher will evaluate your output either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work. But if satisfactory, you can proceed to the next topic.

Introduction	Wind yarn or thread in the machine

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Preparing /develop design for weaving
- Identifying the steps to develop design for fabric structure per requirements
- Setting up and operate computer to develop design using CAD
- Apply CAD to develop woven fabric structure per specifications and customers need
- Check the design against quality criteria

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Check and sett tools equipments required to develop design.
- Monitor Operation in accordance with operational manual
- Handle tools and materials according to the specifications
- Checking device based on the OHS standards.
- Identify different methods to develop design for fabric structure
- Check design to ensure conformity to specifications
- Operate computer according to the procedure and specification procedure
- Check Products against quality standards

Learning Activities

1. Read the specific objectives of this Learning Guide.
2. Read the information written in the “Information Sheet 1”.
3. Accomplish the “Self-check 1”
4. If you earned a satisfactory evaluation, proceed to “Operation Sheet 1”. However, if your rating is unsatisfactory, see your teacher for further instructions.
5. Read the “Operation Sheet 1” and try to understand the procedures discussed.
6. Submit your accomplished Self-check 1. This will form part of your training portfolio
7. If you earned a satisfactory evaluation proceed to LAP Test.
   However, if your rating is unsatisfactory, see your teacher for further instructions.
8. Do the “LAP test” in page (if you are ready) and show your output to your teacher.

*Your teacher will evaluate your output either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work. But if satisfactory you can proceed to the next topic.

OPERATION SHEET	Develop design for weaving (Fabric structure)

Woven Fabric Patterns

In the simplest weaving arrangement, alternate warp yarns are over or under the shuttle as it moves in one direction and the warp yarn positions are reversed for the return stroke of the shuttle. This weave can be made on a loom with only two harnesses. In other arrangements, several warp yarns may be moved upward or downward together, or several filling picks may take place before the warp yarns change position.

Classification of Weave Patterns

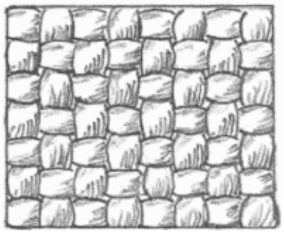
The two major categories based on the types of weaves are Basic or Simple weave and Compound or complex weaves which are further categorised in the following categories:

Basic/Simple Weaves

1. Plain Weave
2. Twill Weave
3. Satin Weave

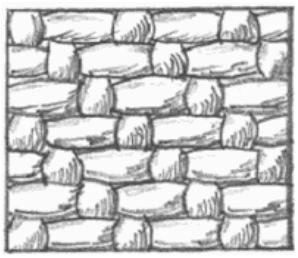
Basic/Simple Weaves

Plain weave, also called taffeta



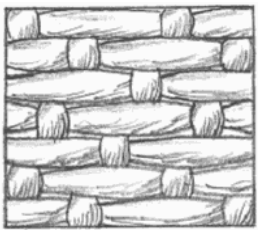
Filling yarns pass over and under alternate warp yarns. Other plain weaves are broadcloth, muslin, batiste, percale, seersucker, organdy, voile, and tweed.

Twill weave.



Filling yarns pass over two warp yarns and under a third, and repeat the sequence for the width of the fabric. The next filling yarn repeats the sequence but shifts one warp yarn sideways, creating a diagonal pattern. Herringbone, serge, jersey, foulard, gabardine, worsted cheviot, and drill are twill weaves.

Satin weave.



Filler yarns pass over a number of warp yarns, four in this illustration, and under the fifth. Damask, sateen, and crepe satin are satin weaves. Exposed yarns reflect light and give the weave its sheen.

Plain Weave

Simplest weave requiring a 2 harness loom, formed by yarns at right angles whereby each warp yarn interlaces with each weft yarn Properties: least expensive to produce, reversible unless surface design, wrinkles more, firm & wears well, less absorbent, abrasion resistant, used as background for printing/embroidery

- Rib Weave fabrics: Rib effect is produced by using heavy yarns in the filling direction or by more warp than filling yarns per inch. Eg Bengaline, ottoman, faille, poplin, broadcloth, taffeta.
- Basket Weave fabrics: Basket weave is made by treating two or more yarns as one in either the warp or weft or both the directions and interlacing them in plain weave. It is not as firm as plain weave, have more yarn slippage, shrinks easily. Eg 2X1, 2X2, 2X4, 3X2, 4X4. Oxfordcloth is 2X1 & monk cloth is 4X4. Flat duck, hopsacking, panama are other examples.

Twill Weave

Each warp or weft yarn floats across two or more weft or warp yarns with a progression of interlacing by one to the right or to the left, forming a distinct diagonal line or wale. Direction of diagonal may be formed from right to left, from left to right or a combination of both. Soil resistant, softer & pliable, good wrinkle recovery, durable & wears well. The direction of the twill on the back of the cloth is opposite to the twill line on the face. 3 harness are required for twill weave.

Right Hand Twill - diagonals run upwards to the right

Left Hand Twill - diagonals run upwards to the left.

Balanced Twill – same number of warp pass over filling yarns. It is reversible. 2X2, 4X4

Unbalanced Twill – have uneven number of warp or filling yarn. It has a right or wrong.

Broken Twill – combines right or left hand twills

Herringbone Twill – a series of inverted V's are formed resembling the backbone of the herringbone fish. Most commonly used in suiting fabrics.

Twill Angles – according to the angles of the diagonal line, Regular twill - 45° °

Reclining twill – with smaller angles, Steep twill – with larger angles. E.g.: denim, herringbone, hound's-tooth

Satin Weave

Each warp/ filling yarn floats over 4 filling/ warp yarns & interlaces with 5th filling/ warp yarn, with progression of interlacing by 2 to right or left (warp faced/ weft faced). Luster (long floats), firm, durable (yarns packed closely together), pliable, wrinkle resistant, yarn slippage. Satin is warp faced. Sateen is weft faced. 5 harness are required for satin weave.

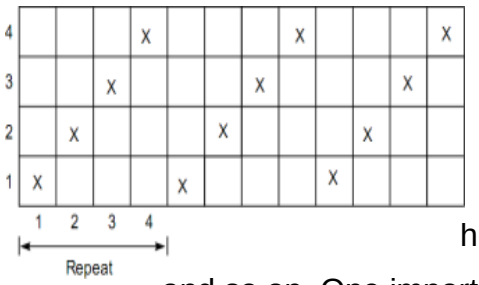
<u>Drafting Plans</u>

A draft indicates the number of heald shafts used to produce a given design and the order is which warp ends are threaded through the heald eyes of the heald shaft. The principle of drafting (i.e. putting of ends on different healed shafts) is that ends which work in different order require separate heald shafts. To keep matters simple, we can also say that the ends that work alike are put on the same heald shaft.

Types of Draft Plans

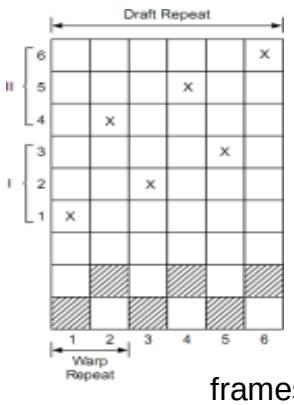
The various drafts are classified as fol

Straight Draft

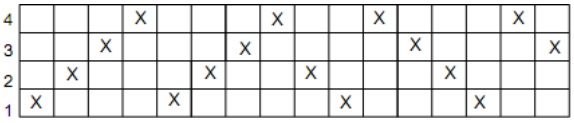


This is the most commonly used draft. It is the simplest of all the types of draft plans. In this kind of draft the drafting order progresses successively from first to the last heald frame. Thus the first warp end of a weave is drawn through the first heald shaft, the second warp through the second heald frame and so on. One important feature of the straight draft that distinguishes it from other types of draft plans is that the peg or lifting plan is same as the design. Hence it is sufficient to indicate only the design

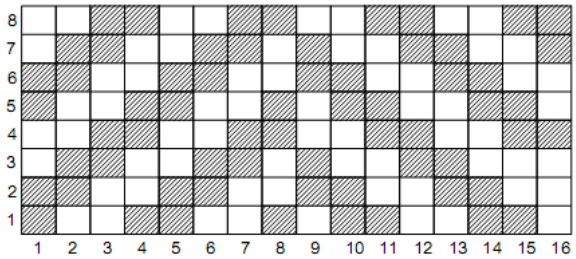
Skip Draft



The skip draft is suitable for weaving fabrics having heavy warp thread density. In this kind of draft plan the number of heald frames may be twice or more than the minimum required for a weave. The purpose of using more heald frames than the minimum recommended is only to distribute the warp threads more uniformly so as to prevent abrasion of the threads due to overcrowding. The heald frames are divided into two groups. All even numbered warp threads are drawn through the first group of heald frames and all odd numbered warp ends are drawn through the second group of heald frames. The sateen draft serves the same purpose as the skip draft. A skip draft is normally employed for weaves such as plain and twill upto a repeat of 4. Whereas the sateen draft is used for weaves having repeat size of more than 5.Broken Draft

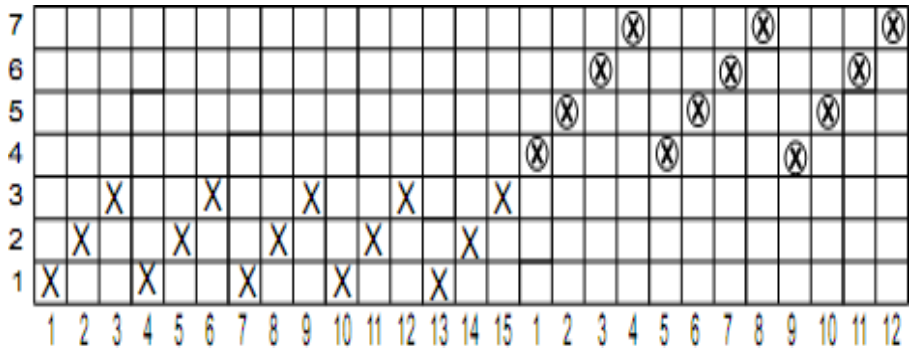


A broken draft almost resembles the pointed draft. However the pointed effect is broken. This type of draft is suitable for weaves such as herringbone twills



Grouped Drafts

These drafts are employed for the production of stripe and check designs, in which the stripes have different weaves or their combinations. This draft is used for producing the fabric with two different stripes. The repeat of the draft is determined by the number of stripes and the number of threads in each stripe. The number of shafts in the draft depends upon the number of stripes and the warp repeat of weave of each stripe



Self Check 3	Written Test

Name: _____ **Date:** _____

Directions*:* Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers.

1 List the down basic weaves? (6pts)

-
-
-

2. Mention basic weave derivatives? (8pts)

-
-
-
-

3. Determine reed count and reed width within a given reed and thread? (10)

4. Sketch for basic and their derivative weaves using the following methods of draft(8 pts)
   - Straight draft
   - Skip draft
   - Broken draft
   - Grouped drafts

5. Solve crimp percentage with in a given specifications? (8 pts)

Note:- Satisfactory rating – 20.5points above / Unsatisfactory - below 20 points. You can ask you teacher for the copy of the correct answers.

Operation Sheet 3	Develop design for weaving (Fabric structure)

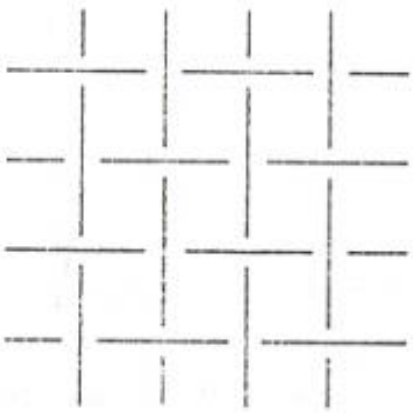
"This sequence is very important"

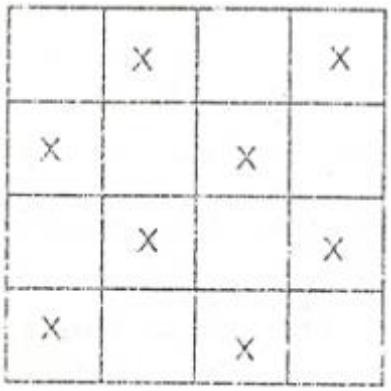
Safety Instructions:

- Follow the rules in developing fabric structure:
- Be sure that your all necessary raw materials are available
- Locate your working materials and instruments easily accessible.
- Apply OHS i.e. use proper PPE
- Read, interpret and follow information on work specifications, standard operating procedures and work instructions and other
- Check manufacturer's specifications for machine or equipment

Methods of weave representation

There are two practical methods of weave representation:





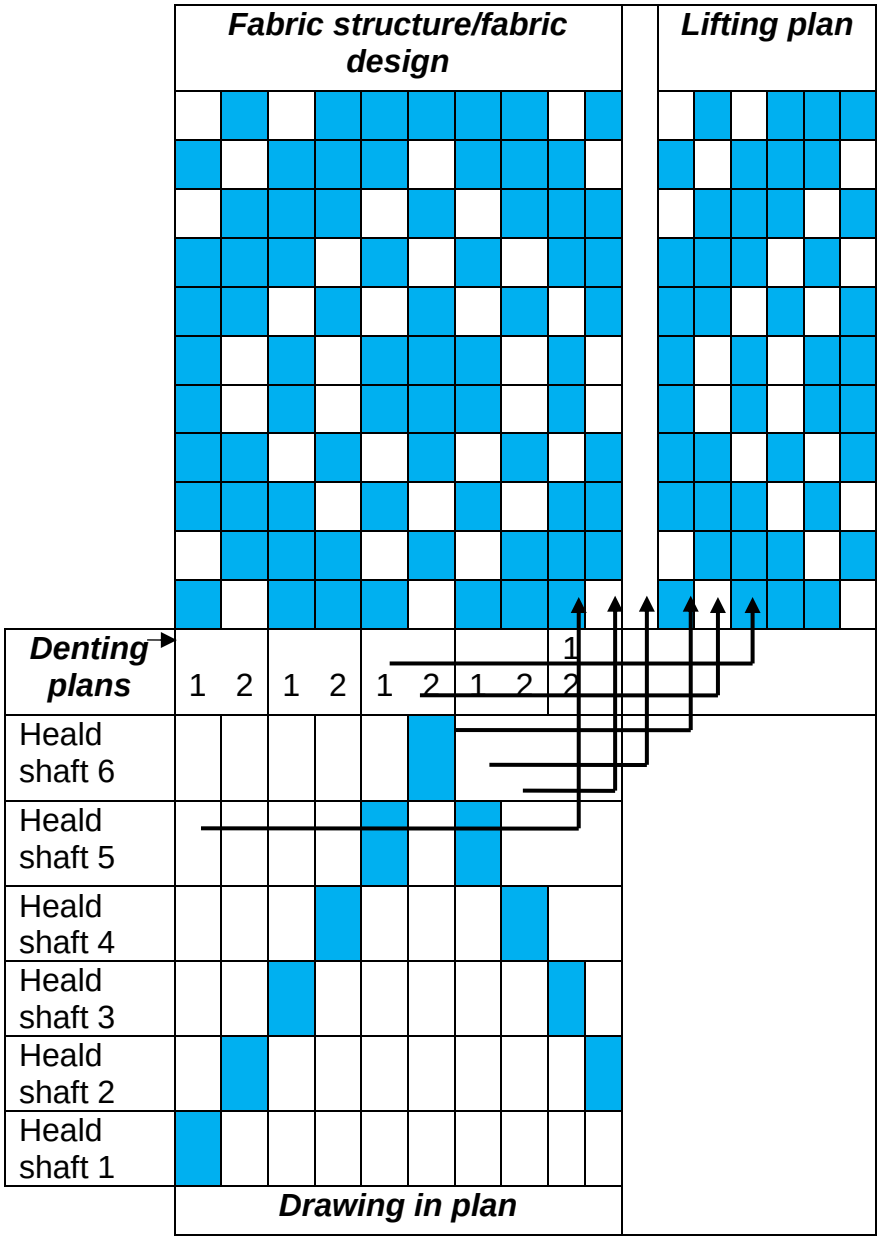
these are very closely dependent upon one another. A thorough knowledge of this interdependence is very valuable to the designer upon whose skill several mechanical

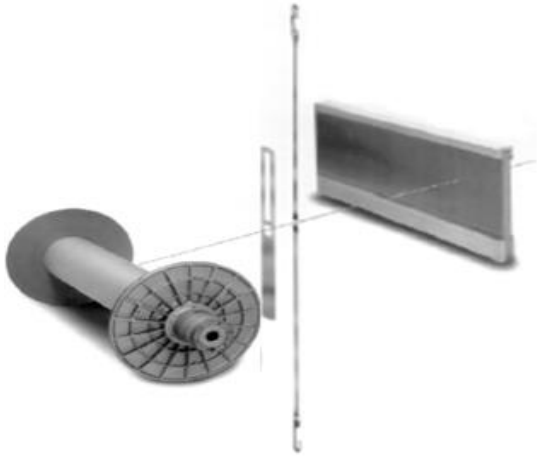
limitations of the loom may be imposed. In many cases it is only his innate acquaintance with the drafting systems and the possibilities of manipulating the lifting orders which enables him to introduce variety into apparently rigid mechanical systems of operation. In normal practice the designer has to produce a range of designs for looms with a known pattern scope.
This usually involves the draft and the lifting plan construction. A similar procedure is adopted when the designer is asked to reproduce a specific design from asample. The weave in the sample is analysed and a suitable draft and lifting plan is derived

Drawing in plan Indicate the order in which the warp ends are drawn through the eyes of the heddles, which are mounted in heald frame in a loom. Healds control the movement of the warp threads to form a shed.

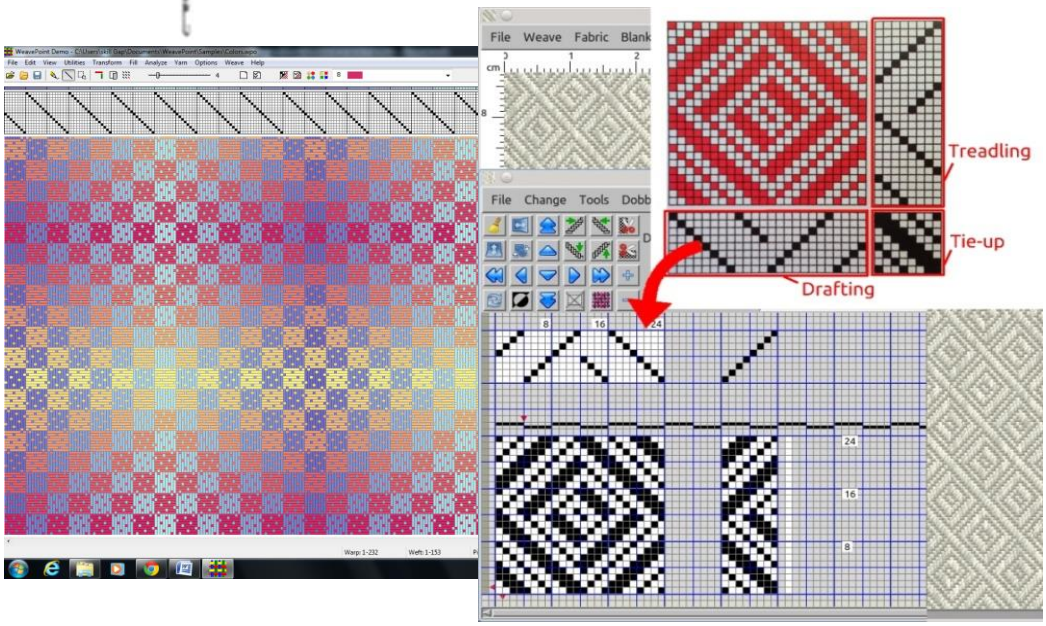
Denting plan Describes the arrangement of the warp ends in the reed (dents are the gap between the metal reed wirs) denting plans are entirely dependent on the end density and the number of dents per cm in the reed, through there are some fabrics that require precise positioning of the dent wires in relation to the weave

Lifting plan Lifting plans indicate how each heald shaft is lifted on each pick in the edge.

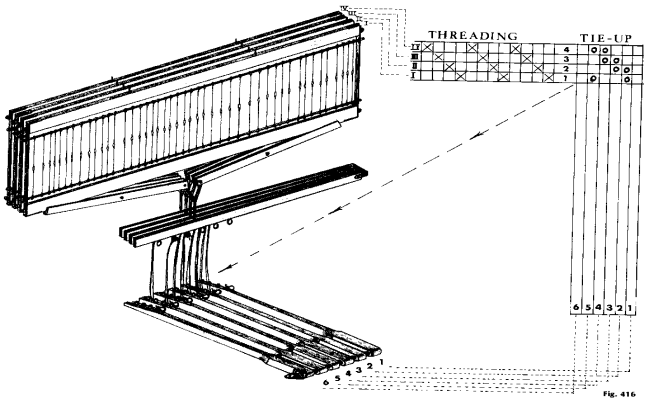




Computer aid designs



Relation between loom and draft



LAP Test 3	Practical Demonstration

Name: _____ **Date:** _____
Time started: _____ **Time finished:** _____

Instructions: You are required to perform the following individually with the presence of your teacher.

1. Demonstrate methods of weave representation?
2. Develop basic weave and their derivatives design using the first method of weave plan?
3. Develop basic weave and their derivatives design using Drawing - in, denting and lifting plan?
4. Demonstrate weave representation using Drawing - in, denting and lifting for 4, 6 and 8 heald shaft looms?
5. Develop fabric structure design using weaving software?

- Your teacher will evaluate your output either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work. But if satisfactory, you can proceed to the next topic.

Introduction	Setting Up and Operate Weaving Looms

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Preparing loom for weaving
- Identifying the parts and parameters to operate weaving loom
- Setting up and operate weaving machine/ loom
- Apply operating weaving loom and remove/doff the product from machine and handling the output/products/packages

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Check and sett weaving machine / loom.
- Monitor Operation in accordance with operational manual
- Handle machine and materials according to the specifications
- Checking device based on the OHS standards.
- Operate hand loom and power loom to produce woven products per specifications
- Maintain broken yarns during operation
- Check woven product to ensure conformity to specifications
- Load and doff input and output products according to the specification procedure
- Check Products against quality standards

Learning Activities

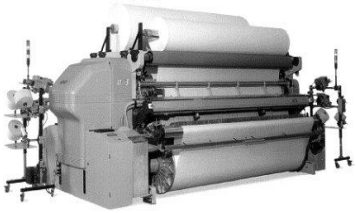
1. Read the specific objectives of this Learning Guide.
2. Read the information written in the “Information Sheet 1”.
3. Accomplish the “Self-check 1”
4. If you earned a satisfactory evaluation, proceed to “Operation Sheet 1”. However, if your rating is unsatisfactory, see your teacher for further instructions.
5. Read the “Operation Sheet 1” and try to understand the procedures discussed.
6. Submit your accomplished Self-check 1. This will form part of your training portfolio
7. If you earned a satisfactory evaluation proceed to LAP Test.
   However, if your rating is unsatisfactory, see your teacher for further instructions.
8. Do the “LAP test” in page (if you are ready) and show your output to your teacher.

*Your teacher will evaluate your output either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work. But if satisfactory you can proceed to the next topic.

Information Sheet – 4	Develop design for weaving (Fabric structure)

Evolution of Looms

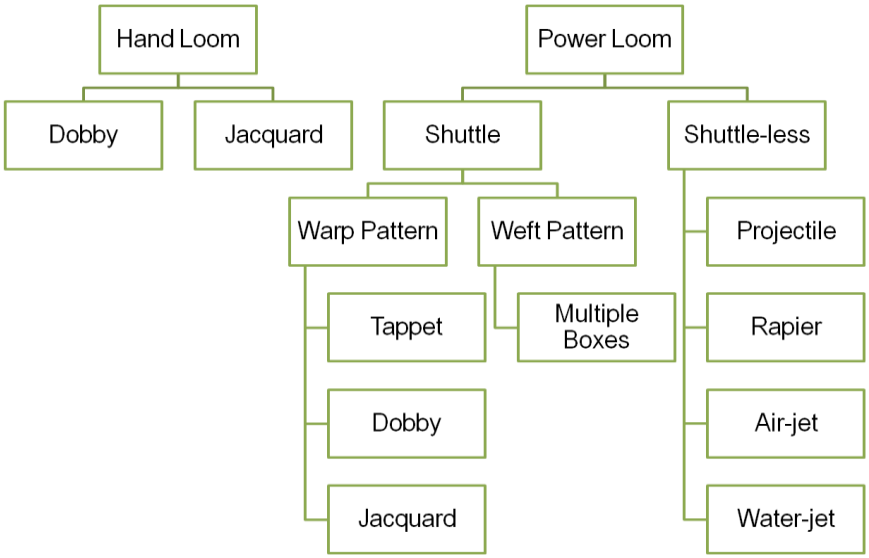
A loom is a device that causes interlacement two sets of threads, namely, warp and weft threads, to form a fabric. The very first loom in history is the pit loom. Subsequently the handloom was developed and then the power loom. After the advent of power looms, a number of developments have taken place. The very first power looms that had been developed were of the non automatic type. These looms had neither a positive let off device warp stop mechanism nor a weft changing mechanism. This demanded a great deal of attention from the weaver. The semi automatic loom was then developed which incorporated two out of the above three mentioned mechanisms. Then the automatic loom was developed which had all the three essential mechanisms, namely, positive let off device, warp stop mechanism and weft replenishment mechanism. The last century saw the development of shuttle less weaving mechanisms.



Loom Mechanisms

A loom is a device that causes interlacement two sets of threads, namely, warp and weft threads, to form a fabric.

Classification of Looms



Weaving Operations

The basic mechanisms in any type of loom can be classified as follows:

The hand loom was operated by the weaver using his hands to propel the shuttle from one end to another. The weaver used his foot to operate the healds. The production in this type of loom was obviously very less and thus varied from weaver to weaver

The power loom was operated by power. This reduced the strain of the weaver. Considerable automation has taken place which resulted in lesser strain of the operatives and increasing the production and efficiency of the loom. The shuttle less looms are good example

The tappet, dobby and jacquard are warp patterning mechanisms.

Among the shuttle looms, the tappet loom is the simplest. It is suitable for weaving up to 8 heald shafts. The dobby loom is suitable for figuring upto 40 heald shafts and the jacquard is suitable for elaborate designs running to several picks. The advantage of the jacquard mechanism is that it can control individual warp ends and hence has a large figuring capacity.

The primary motions can further be divided as shedding, picking and beat up motions. The shedding opens the warp sheet into layers to facilitate passage of shuttle. The picking motion causes the shuttle carrying weft to be propelled from one end of loom to another. The beat up motion lays the previously laid weft to the fell of the cloth.

The secondary motions comprise of take up and let off motions. The take up motion helps to wind the cloth on to the cloth roller and also influences the pick density in the cloth. The let off motion helps to let the warp from the weaver's beam at an uniform rate thus maintaining the warp tension constant throughout the weaving process.

The auxiliary motions consist of the warp stop motion, weft stop motion and warp protector motion. The warp stop motion is used to stop the loom in the event of warp breakages. This is necessary to prevent fabric defects such as missing ends and floats. The weft stop motion is used to stop the loom in the event of weft exhaustion or weft breakages. This is necessary to prevent missing weft threads called cracks, in the fabric. The warp protector is used to prevent multiple warp thread breakages in the event of shuttle getting trapped in the middle of the warp sheet.

Parts of Loom

Weaving looms can range from quite simple to very complex. Looms have been used to produce cloth for thousands of years, and while technology has improved the loom, the basic strategies and practices remain much the same. Understanding the parts of the loom can help you learn to weave or simply learn a bit more about how weaving works

Important Parts of Loom

This part is related to the shedding mechanism. The heald shaft is made of wood or metal such as aluminium. It carries a number of heald wires through which the ends of the warp sheet pass. The heald shafts are also known as ‘heald frames’ or ‘heald staves’. The number of heald shafts depends on the warp repeat of the weave. It is decided by the drafting plan of a weave. The main function of the heald shaft is as follows:

Heald shaft

1. It helps in shed formation
2. It is useful in identifying broken warp threads
3. It maintains the order or sequence of the warp threads
4. It determines the order of lifting or lowering the required number of healds for a pick. In other words it helps in forming the design or pattern in a fabric.
5. It determines the warp thread density in a fabric, i.e. the numbers of heald wires per inch deter- mine the warp thread density per inch.

Sley of Lay It is made of wood and consists of the sley race or race board, reed cap and metal swords carried at either ends. The sley mechanism swings to and fro. It is responsible for pushing the last pick of weft to the fell of the cloth by means of the beat up motion. The sley moves faster when moving towards the fell of the cloth and moves slower when moving backwards. This unequal movement is known as ‘eccentricity of the sley’. It is needed in order to perform the beat up and also to give sufficient time for passage of shuttle to pass through the warp shed. The beat up of the lastly laid pick of weft is accomplished through a metal reed attached to the sley.

Shuttle It is basically a weft carrier and helps in interlacement of the weft with the warp threads to form cloth. The shuttle which is made of wood passes from one end of the loom to the other. It travels along the wooden sley race and passes between the top and bottom layers of the warp sheet. The shuttle enters a shuttle box fitted at either ends of the loom, after passing through the warp shed. A shuttle normally weighs about 0.45 kgs

Shuttle Box It is the housing for the shuttle and is made of wood. It has a spindle and a picker. It may also accommodate the picker without spindle. The top and side of the box towards the sley race are open. The shuttle dwells inside the box for theintermediate period between two successive picks.

Picker The picker is a piece made either of leather or synthetic material. It may be placed on a spindle or grooves in the shuttle box. It is used to drive the shuttle from one box to another. It also sustains the force of the shuttle while entering the box.

Reed It is a metallic comb that is fixed to the sley with a reed cap. The reed is made of a number of wires and the gap between wires is known as dents. Each dent can accommodate one, two or more warp ends. The count of the reed is decided by the number of dents in two inches. The reed performs a number of functions which are enumerated as follows:

1. It pushes the lastly laid pick of weft to the cloth fell
2. It helps to maintain the position of the warp threads
3. It acts as a guide to the shuttle which passes from one end of the loom to the other.
4. It determines the fineness of the cloth in conjunction with the healds.
5. It determines the openness or closeness of the fabric. There are various types of reed such as ordinary reed, gauze reed, expanding reed, V reed etc.Warp Beam

This is also known as the weaver's beam. It is fixed at the back of the loom. The warp sheet is wound on to this beam. The length of warp in the beam may be more than a thousand metres

Back Beam This is also known as the back rest. It is placed above the weaver's beam. It may be of the fixed or floating type. In the first case the back rest merely acts as a guide to the warp sheet coming from the weaver's beam. In the second case it acts both as a guide and as a sensor for sensing the warp tension.

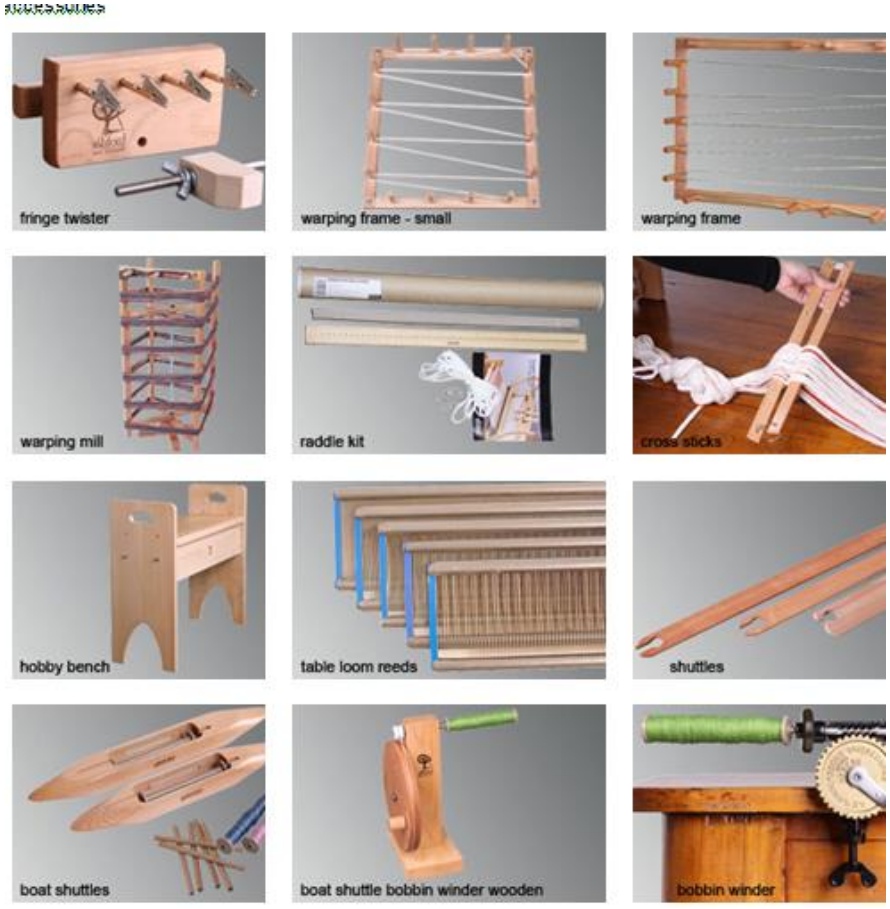
Breast Beam It is also known as the front rest. It is placed above the cloth roller at the front of the loom and acts as a guide for the cloth being wound on to the cloth roller. The front rest together with the back rest helps to keep the warp yarn and cloth in horizontal position and also maintain proper tension to facilitate weaving

Cloth Beam It is also known as the cloth roller. The woven cloth is wound on to this roller. This roller is placed below the front rest.

Heddles Heddles are made of cord or wire, and are attached to the shaft of the loom. The warp threads pass through the heddles, separating the warp threads to allow the weft threads to pass between them easily.

Harnesses The more harnesses or shafts a loom has, the more design possibilities you will have. Most larger looms have four harnesses, and table looms often only one; however, looms of up to 16 harnesses are available.

Hand loom accessories



Loom Care and Maintenance

1. Metal parts of the loom should be cleaned with a cloth and oiled using sewing machine oil. Use silicone spray on nylon or plastic parts.
** The use of Pam is not recommended as it contains Canola Oil, Alcohol and Lecithin. This adds up to a sticky residue sooner or later

2. Rust can be cleaned from reeds with powdered pumice. Using a stiff brush and pumice, scrub the reed to strip the rust off. Then oil the reeds well.
** Pumice should be kept well away from brakes and bearings, it is an abrasive and not to be breathed in.

3. Tighten all bolts and screws securely. If bolts are loose, this can cause permanent damage to the loom, with the excessive beating that a loom has to withstand. The wood can be crushed, screws stripped and bolt holes enlarged.

4. In warm or changing climates, it is especially important to clean and wax or oil hardwood regularly to prevent drying and cracking of wood. Varnished surfaces can be dusted and cleaned with lemon oil.

For stained or unvarnished wood, use boiled linseed oil or lemon oil. Rub it on with a soft cloth and let dry.
** Linseed Oil - Boiled or raw, one should be an expert to use it, you can end up with a sticky mess, depending upon the temperature, humidity and the old finish underneath.

Lemon oil has a more pleasant odour.
** Lemon Oil - Lemon Oil is Mineral oil with 1 percent of synthetic lemon scent, you're paying more for the same oil and mineral oil is almost odorless anyways (it used to be called paraffin oil years ago), smell a baby ! Bill Koepp recommends: Johnson's paste wax.
5. If using loom tie cords (not texsolv) coating them with beeswax can protect them from drying out.

Self Check 4	Written Test

Name: _____ **Date:** _____

Directions*:* Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers.

1. Write down The basic mechanisms in any type of loom (4pts)
   i.
   ii.
2. List The primary motions (3pts)
   i.
   ii.
   iii.
3. The secondary motions (2pts)
   i.
   ii.
4. The auxiliary motions (3pts)
   i.
   ii.
   iii.
5. Mention important parts of loom and their function? (16pts)
   i.
   ii.
   iii.
   iv.
   v.
   vi.
   vii.
   viii.

Note:- Satisfactory rating – 14.5points above / Unsatisfactory - below 14 points. You can ask you teacher for the copy of the correct answers.

Operation Sheet 4	Operate and monitor weaving loom

"This sequence is very important"

Safety Instructions:

- Follow the rules in operating weaving loom:
- Be sure that your all necessary tool equipments are available
- Locate your working materials and instruments easily accessible.
- Apply OHS i.e. use proper PPE
- Read, interpret and follow information on work specifications, standard operating procedures and work instructions and other
- Check manufacturer's specifications for machine or equipment

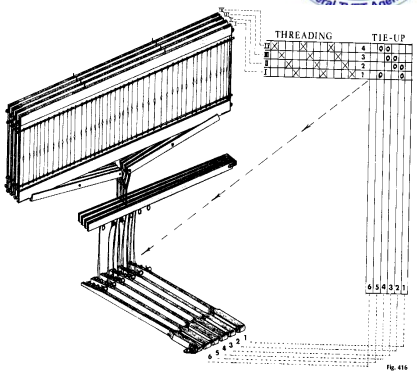
A typical loom operation (weaving)

Steps to operate loom

Step1. Check material specification against machine setting to ensure correct operation.

Identify, check yarns and tied into the loom according to manufacturer specification

Step2. Check the tie up (lifting plan) design against the loom.



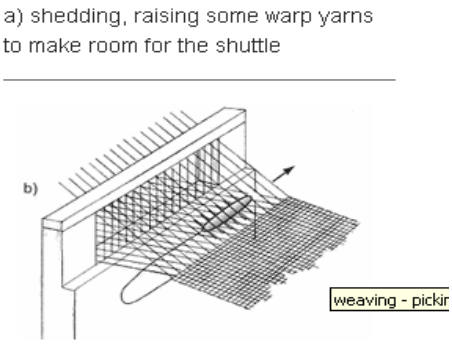
Step3. Practice operating hand loom

- When starting to weave first weave a heading to close the spaces between the groups of threads .use the tabby treadles for weaving. Weave it with plan cotton thread for about 4-5 cm.
- Open the shed by depressing a treadle and through the shuttle the shed. Catch the shuttle on the other side. Depressed the next treadle at the same time as you push the beater back in order to change to shed sometimes, on every slippery or sticky warp , it is advisable to change the shad before pushing the beater back
- To prevent the selvage threads from drawing in too much or curling on the first few shots, you can take a turn around the end of the road at each end several times
- When you have woven a few centimeters roll the cloth beam to get enough space for shuttle passage. Just to give the warp a chance to become smooth and return to the same tension as when you started weaving at the entail or previously.
- Move your cloth forward frequently; don't weave more than 6 to 8 cm. before winding web on the cloth beam. This helps to maintain even beating action.

Step4. Make sample to check it against the standard (customers need)

Step5. Check the selvages against quality standard make correction if variation/defect occur

Step6. Perform weaving with 4,6 and 8 harness / shaft looms



Shedding, raising some warp yarns to make room for the shuttle and to beat the last inserted weft thread. picking, laying the weft (filler) yarn across and between warp yarns

Step7. Check the quality of product and Supervise loom operation while operating the loom

Step8. Assess product faults and non-conformances. Product faults are rectified or reported.

Step9. Complete Cleaning of area to ensure work environment is maintained in a safe productive manner.

Step10. Complete production records and other documentation accurately

LAP Test 4	Practical Demonstration

Name: _____ **Date:** _____

Time started: _____ **Time finished:** _____

Instructions: You are required to perform the following individually with the presence of your teacher.

1. Demonstrate the steps to operate hand loom
2. Produce product/gray fabric according to specification and quality criteria *(refer the project) with necessary steps

- Step1. Check material specification against machine setting to ensure correct operation.
- Step2. Check the tie up (lifting plan) design against the loom.
- Step3. Practice operating hand loom
- Step4. Make sample to check it against the standard (customers need)
- Step5. Check the selvages against quality standard make correction if variation/defect occur
- Step6. Perform weaving with 4,6 and 8 harness / shaft looms
- Step7. Check the quality of product and Supervise loom operation while operating the loom
- Step8. Assess product faults and non-conformances. Product faults are rectified or reported.
- Step9. Complete Cleaning of area to ensure work environment is maintained in a safe productive manner.
- Step10. Complete production records and other documentation accurately

II REFERENCE BOOK

1 Kohan, Melvin (1995). Nylon Plastics Handbook. Munich: Carl Hanser Verlag. p. 2.ISBN 1569901899.

2 **Jump up^** American Chemical Society National Historic Chemical Landmarks. "Foundations of Polymer Science: Wallace Carothers and the Development of Nylon". ACS Chemistry for Life. Retrieved 27 January 2015.

3 **Jump up^** Vogler, H (2013). "Wettstreit um die Polyamidfasern". Chemie in unserer Zeit. **47**: 62–63. doi:10.1002/ciuz.201390006.

4 Emery, I. The Primary Structures of Fabrics. Washington, D.C.: The Textile Museum, 1980.

5 Gioello, D. A. Profiling Fabrics: Properties, Performance, and Construction Techniques. New York: Fairchild Publications, 1981.

6 E. hellwag e-textiles come into style: http://www.technologyreview.com.

7 Websites http://web.media.mit.edu/~rehmi/fabric/ http://en.wikipedia.org/wiki/Smart_textile

8 www.google.com http://pg01-fashion tanvi.blogspot.com/2009/10/smart-fabrics-hi-tech-textile.html

9 Weaving conversion of yarn to fabric—Lord and Mohammed, Merrow Publications, London.

10 Weaving machines, mechanisms and management—K. Talukdar, D.B. Ajgaonkar .