SIM GROUP

REPORTS ON INDUSTRIAL ATTACHMENT
AT

SIM FABRICS LTD.

Bulta,Rupgong,Narayangong,Bangladesh

Course Code: TE-418

SUPERVISED BY:

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By the name of **ALLAH**
The most gracious
The most merciful
The lord of all creation

Dedicated to My beloved

My Grandparents

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AKNOWLEDGEMENT

I would like to express the sincerest gratitude to my thesis supervisor **Prof. Dr. Md. Mahbubul Haque**, professor and Head of Textile Engineering Department of Daffodil International University. He always guided me by his valuable advices to gather technical information.

In Factory, I would like to thanks **Mohammad Munawar,** General Manager, Weaving, **SIM Group**, for his supervision for the training and his valuable suggestions, encouragement and for providing all necessary information about the weaving procedure of this factory.

I would also like to express my thanks to **Shuvratha Majumder & Md. Yeamen Sarder** production officer (weaving) **SIM GROUP**. Who helped me in every way to making this repr

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SIM GROUP

Introduction

By means of practical knowledge it's not possible to apply the theoretical knowledge in the practical field. For any technical education, practical experience is almost equaled important in association with the theoretical knowledge.

The industrial attachment is the process, which builds understanding, skills and attitude of the performer, which improves his knowledge in boosting productivity and services. University education provides us vast theoretical knowledge as well as more practical attachment, in despite of all these industrial attachment helps us to be familiar with technical support of modern machinery, skill ness about various processing stages.

It also provides us sufficient practical knowledge about production management, work study, efficiency, industrial management, purchasing, utility and maintenance of machinery and their operation techniques etc. the above mentioned cannot be achieved successfully by means of theoretical knowledge only. This is why it should be accomplished with practical knowledge in which it is based on. Industrial attachment makes us reliable to be accustomed with the industrial atmosphere and improve courage and inspiration to take self-responsibility.

Textile education can't be completed without industrial training. Because this industrial training minimizes the gap between theoretical and practical knowledge and make us accustomed to industrial environment. I got an opportunity to complete two-months long industrial training at**, SIM Fabrics Ltd.** which is a 100% export-oriented composite weaving Industry.

History of company:

SIM Fabrics, a large contributor in manufacturing and economic development of Bangladesh, displays admirable performance in the field of textile.

We entered into business arena as a manufacturer and exporter in the year 2000. Since then we have never looked back. By dint of our hard work and sincerity we have been capable to expand the confidence of highly dignified buyers of USA, UK and other member of European Union. Now we have a number of factories having 700 workers and employees, working in an excellent atmosphere.

In our textile unit we are producing 100% Cotton fabrics of different constructions to meet requirements of overseas buyers interested in G.S.P Certificates. Hope we will meet the challenge of 21st century.

Factory Location is fifteen Kilometer towards the west from the Motijeel C/A, Dhaka, Bangladesh.

SIM Group has been one of the pioneers of the textile industry of Bangladesh. This Group has introduced many new concepts to the commerce and trade industry of Bangladesh. With its diversification policies, SIM Group has conquered many different arenas along with textile, although textile remains the certer focus of the group activity.

New life was injected into the dismantled SIM Fabrics Textile Factory in 2000. Since then this group grew over the years into a full-scale textile factory with SIM Fabrics skilled employees and modern technology.

Managing person:

Chairman:

Mrs. Rahima Hossain wife of Al -Haj Md. Mozzaffar Hossain is the Chairman of SIM Group. Her father name is Mr. Abdur Rahman and mother name is Mrs. Saleha Khatun. She was born in Jamalpur, Bangladesh on 01-Apr-1960

Managing Director:

Engr. Mozaffar Hossain is the Managing Director of SIM Group. His father name is Late Saim Uddin and mother name is Mossammat Matabjan Begum.He was born in Jamalpur, Bangladesh on 01-Jan-1957. He has passed B.Sc. in Textile Technology

In his service life he also served:

- 10 years at Siddique Textile Mills Ltd.
- 2 and half years as project in charge in SACM-3 of Shamsul Al-Amin Cotton Mills Ltd.
- Chairman of SIM Fabrics Ltd. from Feb 2001 to March 2004

Mr. A.S.M. Rakibul Hasan is the Deputy Managing Director of SIM Group. His father name is Al -Haj Md. Mozzaffar Hossain and mother name is Mrs. Rahima Hossain
He was born in Jamalpur, Bangladesh on 31-Jan-1979. He has passed MBA from NSU and serving SIM GROUP since 2004.

Director:

A.S.M Raisul Hasan is serving as Director of SIM Group. His father name is Al -Haj Md. Mozzaffar Hossain and mother name is Mrs. Rahima Hossain.
He was born in Dhaka, Bangladesh on 06-May-1989. He has complited Graduate from NSU, Bangladesh.He has serving SIM GROUP since 2012.

Address:

Head Office: House-315, Road-04, Baridhara DOHS, Dhaka-1206.

Factory Office: Thakurbari Teac, Masumabad, Bhulta, Rupgonj, Narayangonj.

Tel: +88-02-8415961-3, Fax: +88-02-8415964

Email: info@simgroup-bd.com

Web address

http://www.simgroup-bd.com

List of the Sister Concerns

SIM Group

- SIM Fabrics Ltd.
- SIM Fabrics Ltd. (Dyeing Unit)
- SIM Apparels Ltd.
- Authentic Color Ltd.
- Mozaffar Hossain Spinning Mills Ltd.

Owners &Sponsors:

Chairman	: Mrs. Rahima Hossain	[Share 20%]
Managing Director	: Engr. Mozaffar Hossain	[Share 50%]
Deputy Managing Director	: Mr. A.S.M. Rakibul Hasan	[Share 15%]
Director	: Mr. Raisul Hasan Shoaib	[Share 15%]

Mission Statement:

SIM Fabrics will remain an acknowledged leader in providing high quality products & services, to it's customers. SIM Fabrics will continue to provide superior quality of fabrics.

Our Customers see us as:

- Provider of state of the art product.
- Focus on their specific needs.
- Valuable contributors to their Organizations.

Our Employees:

òÑ The reason for us being in business.
òÑ Provide cutting edge, solutions to our customers.
òÑ Acquire skills in anticipation of future needs.

Our Company Leadership Believes:

The Global Textile Market provides a continuous challenge for every stage of manufacturing. The Group's diversified interests include product line catering different market segments.

Corporate Profile

We believe in business relationships on the basis of trust and partnership. This is the maximum for our creative dialogues with clients, business friends and employees for more than five years. Satisfied clients are our top priority. It is our objective to develop and apply new technologies in order that our clients have a competitive edge. Our client support services and product quality are the results of this strategy.

SIM Fabrics Ltd. has starting fabric manufacturing to an Exporter of entire range of fashion. A large number of highly reputed clients are proof to us that we are on the right track. All employees in SIM Fabrics are facing new challenges daily and we will be happy to help you finding a solution for your textile requirements.

Integrated services:

We provide following services to clients at Factory:

- Weaving.
- Dyeing & Printing of Woven Fabrics.
- Designing of new Fabrics.

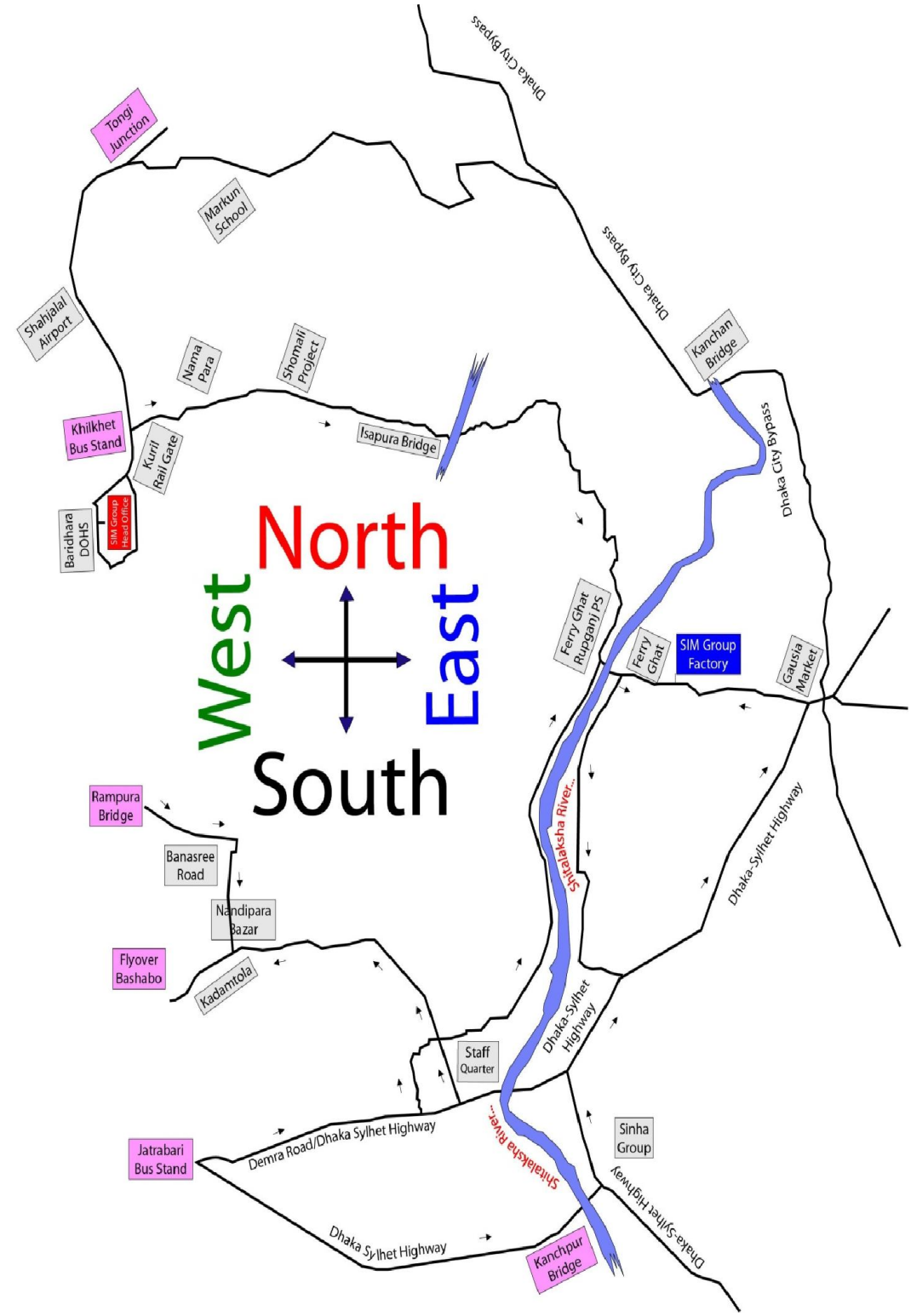
Our profile is summarized below:

- Year of establishment - March 2000.
- Total Area - Over 1 million sqft.
- Human Resources - Over 700

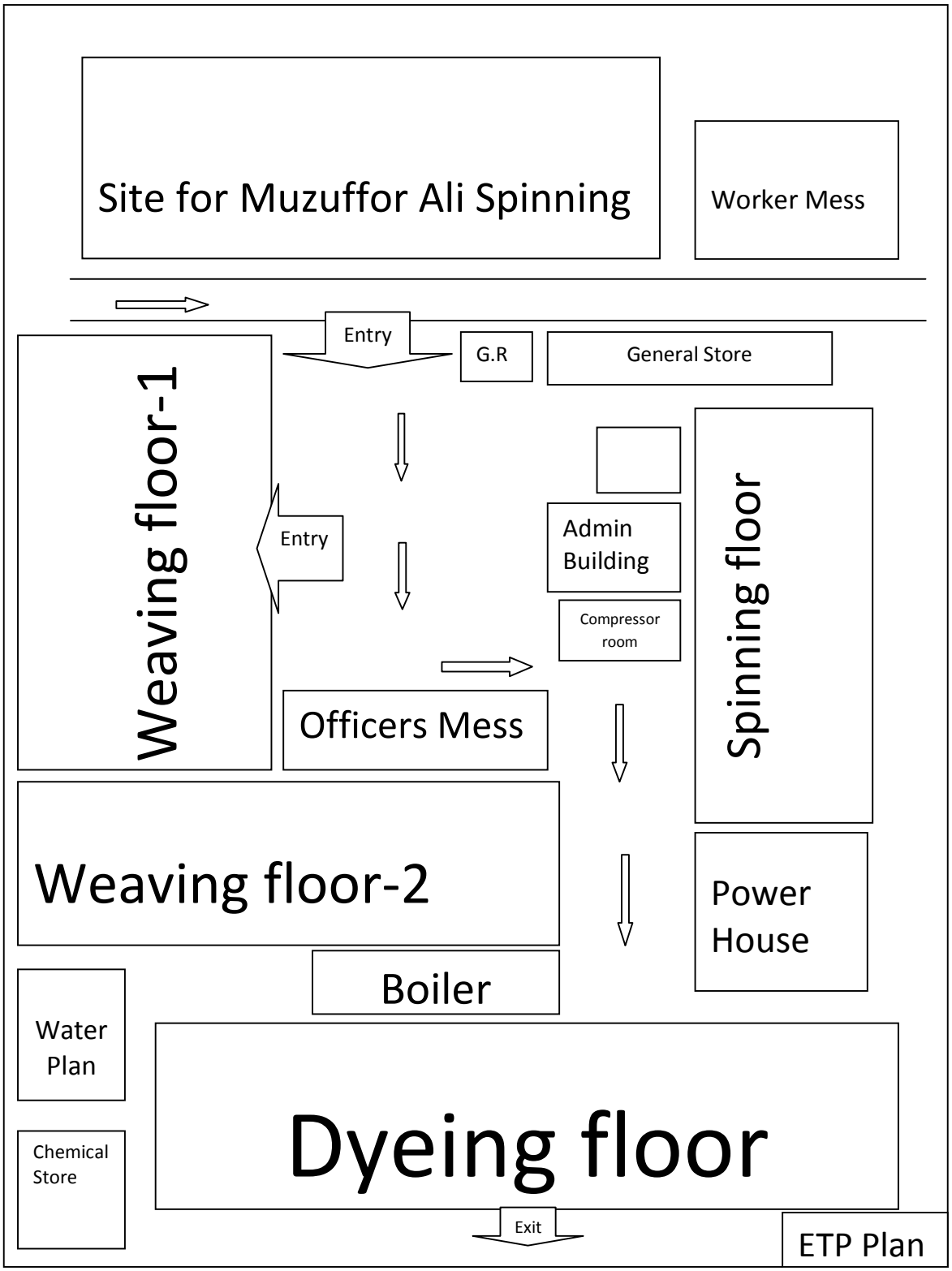
Official News

Very soon we will launch our IPO of Mozaffar Hossain Textile Mills Ltd. We already have got the consent from StockExchange Commission.

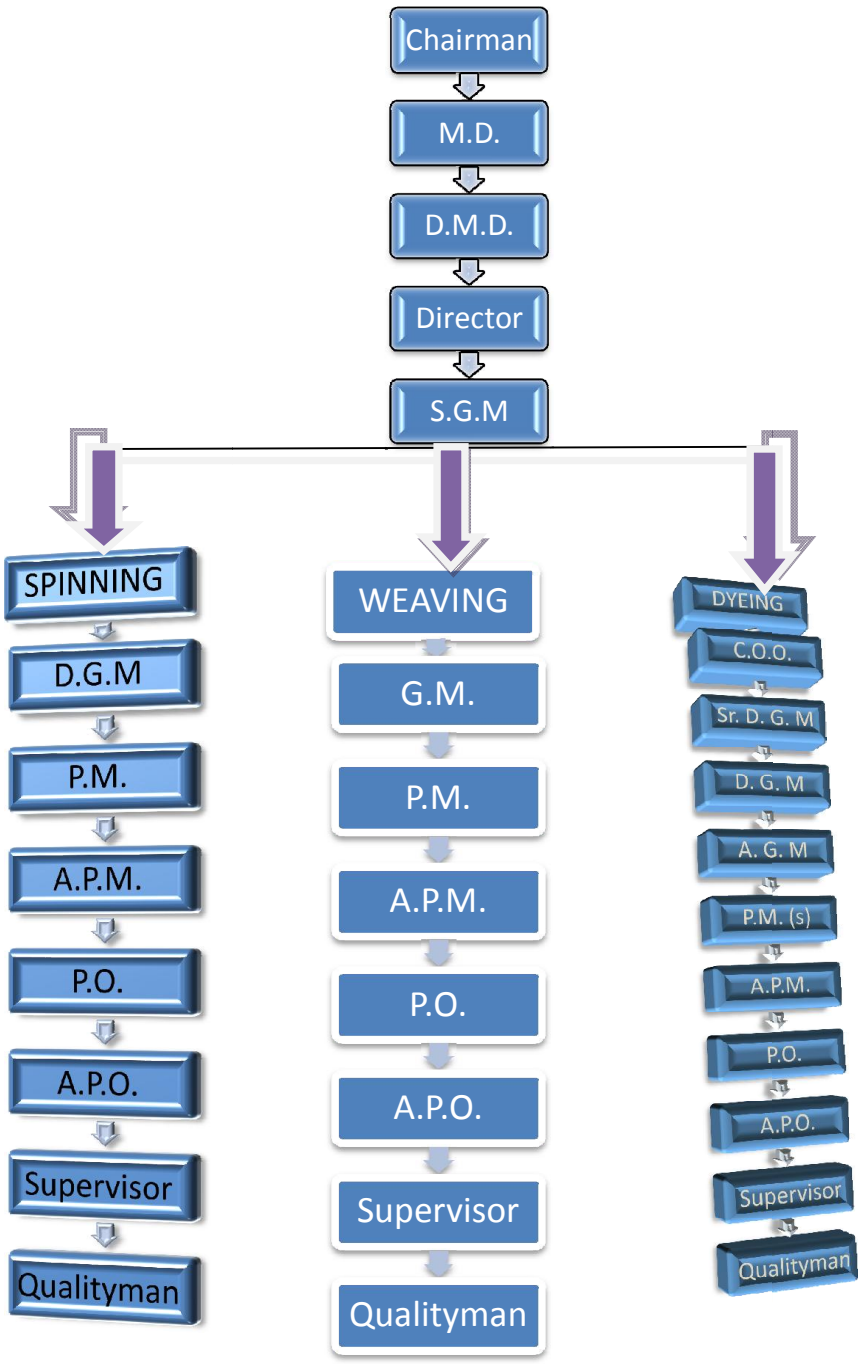
Way route of SIM



Plan layout of SIM:



Organogram of manpower



Shifts: :

Eight hours shift.

A shift	: 06:00 A.M – 02:00 P.M
B shift	: 02:00 P.M – 10:00 P.M
C shift	: 10.00 P.M – 06:00 A.M
General shift	: 09:00 A.M –0 5:00 P.M

WEAVING SECTION

INTRODUCTION

The term **TEXTILE**comes from the Latin word **"Textile"** which means **"To weave".** But now textile is very widely used term which is related to the following subjects-

- All kinds of fibre (cotton, wool, silk, nylon, polyester etc).
- All kinds of process (spinning, weaving, knitting, dyeing, printing, readymade garments).
- All kinds of machinery to convert the fibre into finished product (yarn, fabric, garment etc).

Flow chart of textile processing:

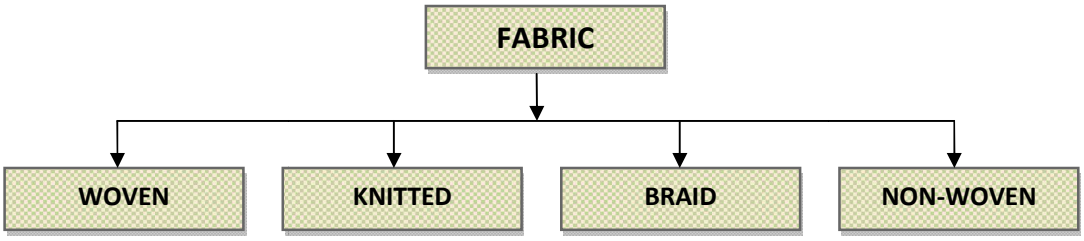
INPUT	PROCESSING STEPS	OUTPUT
Fibres	Yarn manufacturing	Yarn
Yarn	Fabric manufacturing (weaving/knitting)	Grey fabric
Grey fabric	Wet processing (dyeing, printing, finishing)	Finished fabrics
Finished fabrics	Garment manufacturing	Garments

FABRIC:

Fabric is a flexible planar substance constructed from solutions, fibres, yarns or fabrics, in any combination. Textile fabrics can be produced directly from webs of fibres by bonding, fusing or interlocking to make non-woven fabrics and felts, but their physical properties tend to restrict their potential end-usage. The mechanical manipulation of yarn into fabric is the most versatile method of manufacturing textile fabrics for a wide range of end-uses.

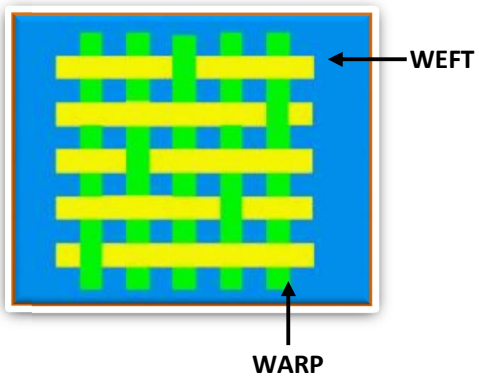
TYPES OF FABRIC:

According to manufacturing fabric is into **four**types-

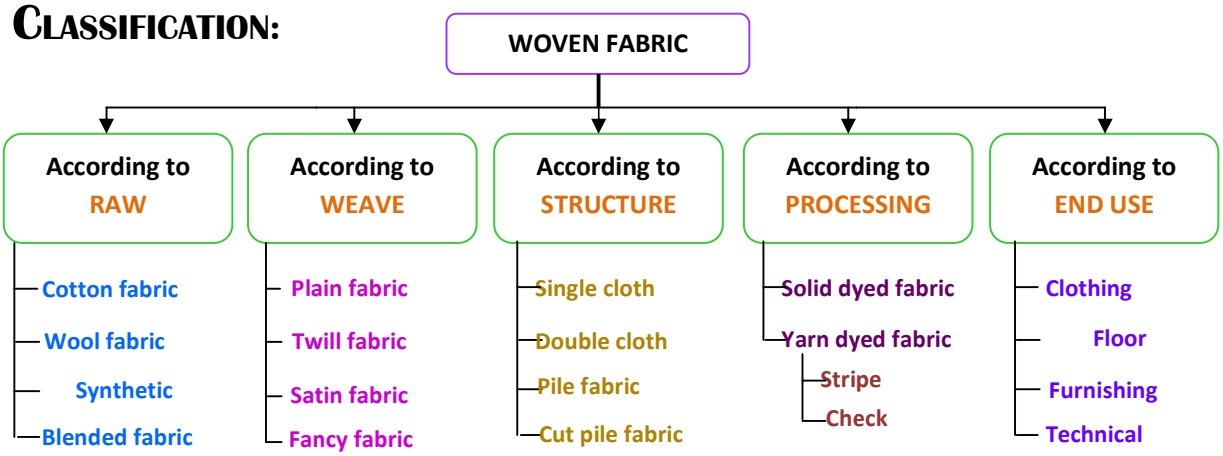


WOVEN FABRIC:

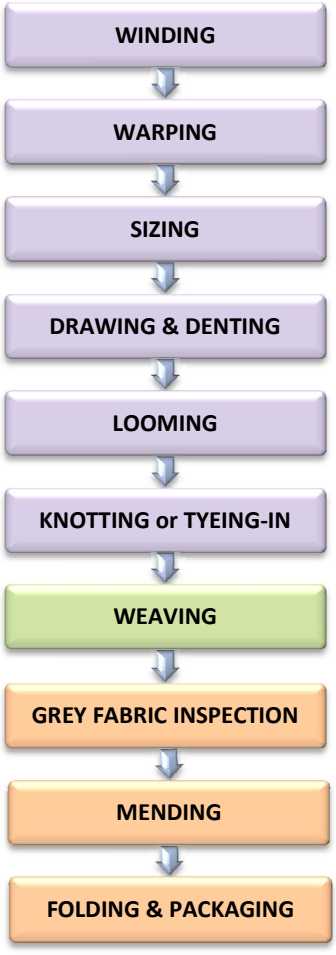
The fabric which is manufactured by interlacing of two sets of yarn namely **"warp"** and **"weft"** at right angle (90°) according to design.



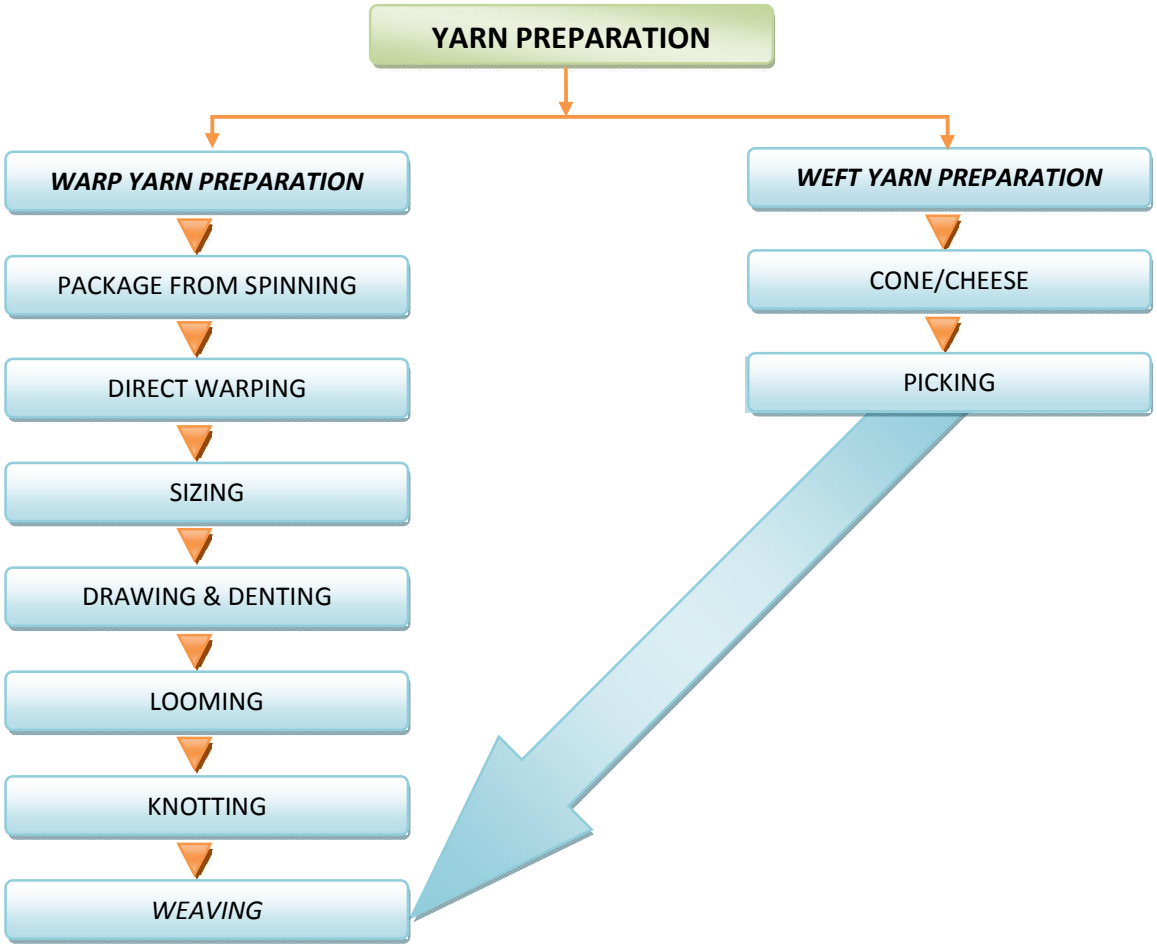
CLASSIFICATION:



SEQUENCE OF WEAVING OPERATION:



OPERATION SEQUENCE OF YARN PREPARATION FOR FABRIC:



WINDING

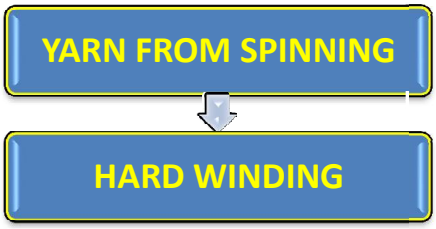
Transferring of yarn from one package to another is called **winding**.

Winding provides an opportunity of cleaning and rewinding the package to a suitable package size, shape and build maintaining a sufficient tension to give the package a required density and stability.

Objects:

- To make a soft package for Yarn Dyeing, so that dyes can penetrate easily in the yarn.
- To produce a Hard Package for warping process or weft for Yarn Dyeing fabric production.
- To make a suitable package for specific end use i.e. warping beam.

Winding Process Involves:



Types of Winding:

- SOFT WINDING:
  - Grey yarn is wound on a special ***Perforated Plastic*** or suitable ***Steel Spring Bobbin***.
  - The package are made soften and bulkier to make it suitable for dye liquor penetration in yarn dyeing.
- HARD WINDING(used in SIM):
  - Yarn dyed package are converted to ***cone/cheese*** by rewinding on paper or plastic bobbin.
  - Yarn package are comparatively hard.

Requirements of Winding:

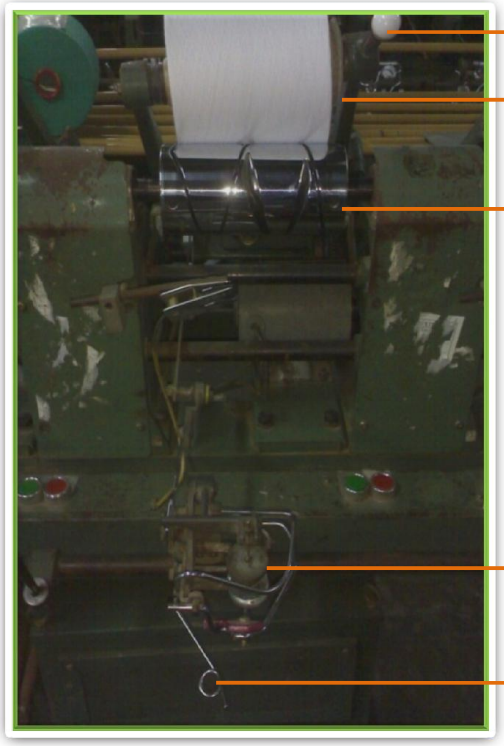
- The fault level in the yarn must be reduced to an acceptable level.
- The yarn must not be damaged in the winding process, so the tension must be kept proper.
- The yarn must be wound in such a way so as to permit unwinding in the following process with minimum difficulty and at the required speed.
- The package size, shape and build must be the most technologically suitable for particular end use.
- The winding operation must be geared to give the best possible economic performed throughout the whole process of the fabric manufacturing.

MACHINE SPECIFICATION

TOTAL WINDING MACHINE **: 1**
CREELING MACHINE : 01

- M/C NAME : Winding machine
  Origin : Chaina
  Type : Hard Winding.
  No. of head : 60X2.
  RPM : 600 (*depends on* ***yarn count***).

FIG: CONE WINDING M/C



TENSIONING DEVICE

WINDING DRUM

CONE HOLDER

Tensioning Device:

During winding for controlling yarn tension, the yarn is passed into the device which is tensioning device.Yarn tension plays an important role in winding. Too high a tension can damage the yarn, where as too low a tension can lead to unstable packages which will not unwound clearly.

IMPORTANCE OR EFFECTS OF TENSIONING DEVICE:

- ***Too high tension-***
  1. Can damage the yarn.
  2. Breakage rate may greater.
  3. Elongation properties may change.

- ***Too low tension-***
  1. Can lead to unstable or loose packages which will not unwind cleanly.
  2. Variation in yarn tension in different parts of a wound package can cause undesirable effects.

REQUIREMENT OF A TENSIONING DEVICE OR FACTORS INFLUENCES FOR SELECTION OF TENSIONER:

- The device must be reliable to control uniformly in tension.
- It must be easily threadable.
- It must neither importance nor magnifies tension variation.
- It must not introduce differences in twist.
- It must not be affected by wear.
- It must not be easily adjustable.
- It must not be affected by the presence of oil and dirt.
- It must not encourage the collection dirt and dust.
- It must be capable of easy cleaning.
- It must be inexpensive or cheap.
- It must be simple in design and operation.
- It must not cause damage for yarn.

VARIATION OF TENSION DEVICE:

ACCORDING TO WORKING PRINCIPLE-

1. Capstan tensioner.
2. Additive tensioner.
3. Combined tensioner.
4. Automatic tensioner.

Winding Procedure:

- The batch of soft spools after being dyed & dried is carried back to the winding section with a different identification paper each showing ***customer name, order no, yarn count, lot no, dyed shade, number of packages &weight.***
- Quality control officers check the dyed yarn for correct shade, any variation in shade within the package or within the batch.
- Winding section record all the information from the form upon their register on order on basis.
- Supervising officers check the form for specific order no & find out the warping the requirement for yarn from the already worked out warp pattern scheme, where they require pieces of cone per each color is shown. The program is made to make desired pieces of cones per each color in the hard winding m/c either by-
  - ✓ One to One rewinding or
  - ✓ One to Two (or more as require) rewinding.
- After a batch of warp yarn of a specific order number is being ready it is placed in the carton as per color and a **Batch Card** is placed over the carton showing ***customer name, order no, yarn count, lot no, dyed shade, number of packages &weight.*** Thus it is ready to deliver in warping m/c.
- After warping card is made the rest of yarn of the specific order is rewinded color wise for use as weft which is also packed & leveled as before. Moreover the left over yarn that is found after warping is completed of a specific order is sent back to the winding area for rewinding into a bigger package & packed for use in the weft as before.

Operator Check List Before Production:

- Correct traverse of yarn.
- Equal and uniform tension applied on each unit.
- Correct shape of spools.
- Any yarn breaks in which case piecing or tying is done accurately.

- Check the predetermined build up of the spools by a gauge. The set value is:
  - Package diameter : >170mm &<180mm.
  - Package weight : 1 Kg (avg).

Production Quality Check:

QUALITY PARAMETER	MEASURED BY
Ribbon Winding	Visual
Back Wind Yarn	Visual
Bell Shape Cone	Visual
Ridge Cone	Visual
Bulging Nose	Visual
Stitch	Visual

Operation Staff:

- PRODUCTION MANAGER.
- SUPERVISOR OFFICER.
- OPERATORS.

Faults in winding:

- Formation of patches on to the yarn.
- Incorrect winding speed.
- Tension variation.
- Soft bobbin.
- Tight bobbin.
- No. of less removal of slubs, neps, dirt loose fibres.
- Incorrect shape of packages.
- The faulty shape may be due to-
  - Faulty traverse motion.
  - Faulty yarn guide.
  - Faulty drum guide.
  - Faulty building device.
- Too much knot in the yarn.
- Excessive full bobbin.
- Two end winding.
- Slack knots or knots with long tail.
- Overlapping.

- Mixing of yarn of difference linear density.
- Ribbon formation.
- Stitching or jail formation.
- Snarl.
- Wild yarn.
- Entanglement of yarn.

Calculation:

- Production Per Spindle $= \frac{\boldsymbol{no.of\ spindle}\ \mathbf{x}\ 60\ \boldsymbol{x}\ 24\ \boldsymbol{x}\ \boldsymbol{RPM}}{\mathbf{1.6933}\ \mathbf{x}\ \boldsymbol{count}\ \mathbf{x}\ \mathbf{1000}}$ Kg/day

- Production $= \frac{\boldsymbol{\pi}\ \mathbf{x}\ \boldsymbol{drum\ dia}\ (\boldsymbol{inch})\ \mathbf{x}\ \boldsymbol{RPM}\ \mathbf{x}\ \boldsymbol{no.of\ drum}\ \mathbf{x}\ 60\ \mathbf{x}\ 24\ \mathbf{x}\ \boldsymbol{efficiency}}{\mathbf{36}\ \mathbf{x}\ \mathbf{840}\ \mathbf{x}\ \boldsymbol{count}\ \mathbf{x}\ \mathbf{2.2046}}$ Kg/ day

WARPING

The parallel winding of a set of warp yarns from many yarn packages (cone/cheese) on a flanged bobbin (warping beam) at uniform specific tension and length is called warping.

Objects Warping:

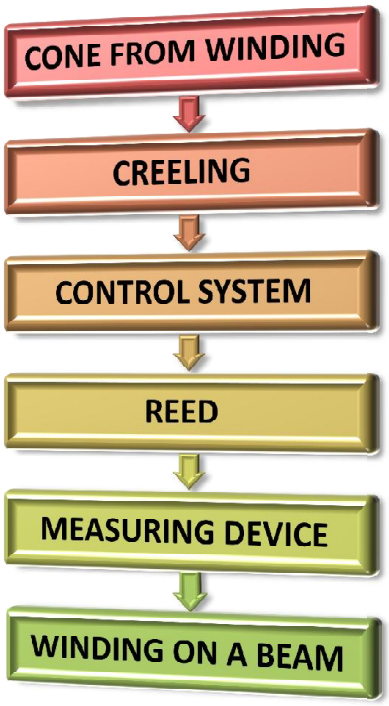
- Wind the warp yarns on the warping beam to make it suitable for sizing.
- In case of designable fabric wind the yarns section wise by sectional warping.

Requirement of Warping:

- The yarns in the sheet should be in uniform spacing.
- The yarns in the sheet should be in uniform tension.
- The yarns in the sheet should be of a predetermined length.
- The sheet should be containing a predetermined number of ends.

There should be no broken ends in the beam.

Warping Process Involves:



TYPES OF WARPING:

- DIRECT OR HIGH SPEED OR BEAM WARPING:
  Direct warpingis used for ***single color***warping. Yarns are directly wound on the wrapers beam so it's called ***Direct warping.***

Raw Material:

- Cone (different count yarn) from **Winding Section.**

Equipment:

- **For Warping :KARL MAYER**(ZM 2000/800)

Check List before Production:

- With the production before data control operator will call-up the following for recording:
  - Warp length shift
  - Down time.
  - Efficiency.
  - No. of thread breaks.
  - No. of warp beam doffed.
  - Time for thread repair.
  - Time for beam change.

- Operator must check yarn quality in term of count, material, and color with customer demand. No mixing is allowed.

- Operator must check yarn quality in term of strength and record yarn break rate. Standard for good quality yarn 10 breaks/1000000 meter

MACHINE SPECIFICATION

TOTAL WARPING MACHINE : 02
SECTION : 01

M/C MAME	**:KARL MAYER.**
MODEL	: ZM2000/800.
ORIGIN	: WESTERN GERMANY.
CREEL CAPACITY	: 840.
CREEL TYPE	: V-SHAPE.
WORKING WIDTH	: 2200mm.
BEAM FLANGE DIA	: 1250mm.
WARPING SPEED	: 1-1200 m/min.
REED TYPE	: ZIG-ZAG REED.
VOLTAGE/FREQUENCY	: 400V/50Hz.
CONTROL VOLTAGE	: 20V/DC.
MAIN FUSE	: 20A.

WARPING MACHINE

Operational Stuff:

- SUPERVISING OFFICER.
- OPERATOR.
- CREEL MAN.
- HELPER.

Operation Procedure:

- As per production program given by Assistant Manager, preparation through the yarn. Warped Record Register; the Supervising Officer collect greige yarn from the store as per required count Lot no. & quality.
- The m/c operators and helpers and helpers open/break the yarn cartons & place the yarn cones on the creel peg as per program & draw the head end of each cone through pretensioner rods feeler wire, yarn guide & then through expanded comb of beaming unit.
- The basic creel data setting& m/c data setting are done according for the required as pr m/c manufacturer instruction.
- An empty beam is set between driving clutch & engaged by means of electric switch.
- All the ends from the creel is warped around the beam manually one round.
- The press roller is moved toward the beam by means of electric switch.
- The m/c is then run slowly and checked for yarn alignment with beam flange on both sides. To ensure perfect alignment the expended comb may be moved either to the Right side or Left side as required by switch.
- Then the m/c is ready & operational & the switch is to be turned on.
- As the present length is achieved the m/c will stop automatically. The beam is doffed by switch. Another empty beam is mounted.
- In this way a set of beam are made to feed the subsequent sizing process.
- Production is recorded in the yarn Warped Record Register. Each beam is set with warping Data sticker for identification in the next process.

Warping Procedure:

- Based on weave plan supervising officer and/or senior operator receive the required dyed yarn from winding section of specific customer order no. as per color and quantity.
-
- As per worked out warp pattern scheme senior operator arrange the yarns on the creel following the color pattern. Quality control officer will check any shade variation within the same color. If any variation is found, necessary steps should be taken to use them lot by lot. Quality control officer will sign on the warping program register.

- The operator & creel man draw the yarn through feeler wire on creel & splits of the leasing reed & then through guide reed & tie in.

- Then the main switch of main control panel is turned on & cone alignment is done by respective switch.

- Senior operator will put necessary data entry on the warping data sheet by taking some figure from yarn warped record register & by calculating some values as per prescribed formula in the m/c manufacturers operating instruction book. He will also input these required figurers in the control data unit of the m/c.

- Hook warp section on to the drum by opening & closing the guide roller.

- Start warping by pressing foot pedal at the head stock. Machine will run slowly at crawl speed. After 15 meter being wound on, stop the m/c and insert leasing threads. Then again start m/c with run switch at the head stock and finish warping of the section.

- Then by section alignment switch set the m/c ready for next section. Repeat step-7, and 8 to finish the warping.

- All the section thatare wounded up over the drum is doffed in the beam from by beaming process as follows:

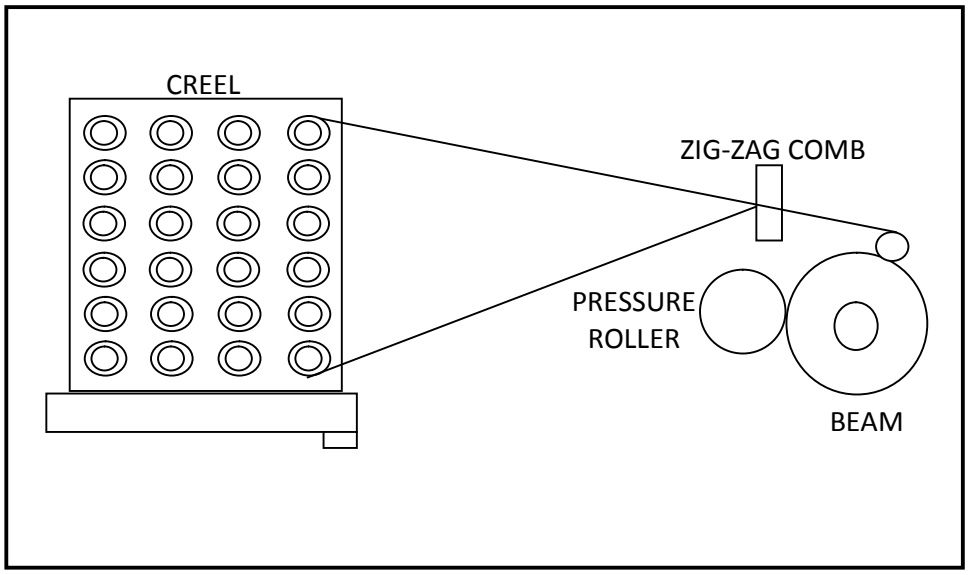
    - Turn the switch from warping to beaming.
    - Set an empty beam in the beam during unit by beam barrel by an adhesive tape and rotate the beam manually.
    - Set beam flange with measured warp width.
    - Set winding tension value range from 1-6 (calculated value as attached).
    - Run at crawl speed to see alignment either left side or right side by drum alignment switch.
    - Set the winding speed within a range of 1-160 m/min, depending on yarn quality.
    - Run the m/c with run switch.
    - Doff the beam by unloading switch.
    - Warping data sheet is failed as a production record. Each beam is set with a warping data sticker for identification in the next process.

Machine Setting For Direct Warping:

SET UP PARAMETER	RANGE	SET UP VALUE
Cone number in the creel	400 – 640	Based on customer fabric construction.
Warping speed	1 – 800m/min	Based on yarn count & quality.
Warping length	1 - 1999999	Based on yarn count & order quantity.
Shift selection	1 – 5	3
Beaming pressure	0 – 11 mm Scale	5 mm on scale.

Product Quality Check:

QUALITY PARAMETER CHECK	RESPONSE
Beam surface smoothness	No ridge beam allowed, clean the yarn guide & check the tension for uniformity.
Homogeneous beam diameter	Check the alignment of beam & drum, drum and creel etc.
Yarn exhaustion	Replace exhaustion cone with new one.
Yarn break	Tying the head end with tail end with standard with fail size <3 mm.



Components of Warping Machine:

- **CREEL:**
  - ConeHolder : Hold the cone or arrange the cone in the creel.
  - Yarn Guide : To guide the yarn.
  - Tension Rod : Maintain yarn tension by *upper & lower disc tensioner.*
  - Ceramic Guide Disc : To guide the yarn from creel to warping m/c.
  - Auto Stop Sensor : To sense the breakage yarn.
  - Creel Panel Board : Display where the yarn break.

- **HEAD STOCK:**
  - Guide Reed : Uniformly spread the yarn over the warp width.
  - Adjustable V-Reed : Guides the yarn to follow the fixed path.
  - Speed Controller : control the speed, crawl speed or full speed.
  - Pressure Roller : Exert required pressure to the warp yarn.
  - Measuring Device : Measures the length of the yarn.
  - Beam Bracket : Holds the warp beam.
  - Emergency Stop Device: For emergency stop.
  - Automatic Knock Off : Stop m/c at achieving required length of beam or in case of Yarn breaks.
  - Electrical Panel Board : To give the automatic controlled function.

Difference between Direct & Sectional Warping:

PARAMETERS	DIRECT WARPING	SECTIONAL WARPING
Object / Use	It is generally used to produce warp beam for grey fabric or solid color fabric.	It is generally used to produce warp beam for yarn dyed (check/stripe) fabric.
Method of production	Several Warpers beam are produced here for getting one weavers' beam.	One Warpers beam is produced here for getting one weavers' beam.
No. of Ends/beam	Ends/beam is less here. Direct warping beams contain 1/n no. of ends of weavers' beam. (n=no. of warping beam/set).	Ends/beam is higher here. Sectional warping beam contains equal no. of ends as weavers' beam.
Stage of Production	One stage Production.(Yarns are directly wound on Warpers' beam).	Two stage Production. (Yarns are directly wound on warping drum section by section; then the sheet is transferred to warpers' beam).
Yarn Tension	Yarn tension is comparatively higher than sectional warping.	Yarn tension is comparatively lower than sectional warping.
Yarn length on beam	Higher length of yarn is wound on a beam.	Length of yarn in the beam is comparatively lower than direct warping.
Creel Capacity	Usually lower than sectional warping.	Usually higher than sectional warping.
Efficiency	Efficiency is higher than sectional warping. (Single stage operation).	Efficiency is comparatively lower than direct warping. (One additional operation beaming-off is required).

Faults & Remedies of Warping:

- **Warp off centre of the beam:**
  - Due to not carefully placing of creel wraith and flanged beam.
  - Remedy: Beam and wraith placed properly.
- **Ridgy or uneven warp beam:**
  - This effect due to
    - ✓ Winding of small no of ends on larger beam.
    - ✓ When the dents are bent or the spacing between dents is uneven.
    - ✓ Mixed count.
  - Remedy: Higher no of ends be used.
- **Crossed ends:**
  - Due to
    - ✓ Faulty knotting after yarn breakage.
    - ✓ Tying of broken ends.
    - ✓ Loose warp.
  - Remedy: Knotting and tension controlled.
- **Snarl formation in the warp:**
  - Due to
    - ✓ Over tension.
    - ✓ Improper twist.
    - ✓ Position of guide.
  - Remedy: By proper tension and twist.
- **Missing ends:**
  - Due to
    - ✓ Faulty stop device.
    - ✓ Exhausted cone or bobbin.
    - ✓ Absence of cone or bobbin on creel.
  - Remedy: By correct stop device is used.
- **Hard beam:**
  - Due to high tension.
  - Remedy: Tension and pressure maintained.
- **Unequal length :**
  - Due to faulty measuring device.
  - Remedy: correct measuring device.
- **Broken ends:**
  - Remedy: To be joined carefully the yarn.
- **Warp ends round the creel peg.**
- **Unequal length of warp.**
- **Unequal size or weight of cone or cheese in the creel.**
- **Lapped ends.**
- **Piecing.**

- Soft end on the warping beam.
- Warp ends round the creel peg(spindle) and results broke.

Calculation:

For $\frac{20\times20}{102\times78} \times 71$ construction (6815yds fabric)

Total number of yarn =7344 ~ 7250

Length of ordered fabric = 6815yds

- Gray fabric length = 6815 + 7%
  ~7276yds
- Required loom production = 7276 + 1%
  ~7326yds
- Now Required warp length = 8140 + 12%
  ~9250yds
- No. of warping beam = $\frac{total\ ends}{creal\ capacity(suitable)}$

$$number\ of\ warp\ beam = \frac{7250}{625} = 12$$

- Breakage% = $\frac{Break \text{ x } 1000000}{Total\ ends \text{ x } fabric\ length}$

Breakage calculation:

Number of total ends: 7500

Number of yarn per warper beam: 625

Number of creel: 12

Length: 9250 yards

Total breakage: 162

Now, total length: number of total ends × length

: 7500 × 9250

: 72150000

Breakage in 72150000 yards length = 16

$\therefore$ Breakage in 1000000 yards length = $\frac{162 \times 1000000}{72150000}$

$= 2.24$

Giving some example of breakage rate whose are classified depending on yarn manufacture company name and their yarn count and warping machine speed.

COMPANY NAME	COUNT	SPEED	BREAKAGE RATE
MHT	16/1	350	1.68
MHT	20/1	350	2.78
MHT	20/1	350	1.39
MHT	16/1	350	2.4
MHT	20/1	350	3.05
MHT	20/1	350	2.01
MHT	20/1	350	1.03
MHT	20/1	350	2.27
MHT	20/1	350	2.28
MHT	20/1	350	2.03
20/1	350	3.05	1.03

COMPANY NAME	COUNT	SPEED	BREAKAGE RATE
AKIJ	40/2	350	1.01
AKIJ	40/2	350	1.8
AKIJ	30/1	350	1.92
AKIJ	30/1	350	1.95
AKIJ	30/1	350	2.65
AKIJ	60/1	350	2.1
AKIJ	30/1	350	1.25
AKIJ	16/1	350	2.13
AKIJ	60/1	350	3.31
AKIJ	30/1	350	1.13
AKIJ	30/1	350	2.13

COMPANY NAME	COUNT	SPEED	BREAKAGE RATE

COMPANY NAME	COUNT	SPEED	BREAKAGE RATE

MHT	20/1	350	1.96	AKIJ	30/1	350	1.24
MHT	20/1	350	1.75	AKIJ	40/2	300	0.45
MHT	20/1	350	1.33	AKIJ	30/1	350	0.73
MHT	20/1	350	2.26	AKIJ	40/2	350	4.04
MHT	20/1	350	1.88	AKIJ	30/1	350	1.41
MHT	20/1	350	2.05	MOSHRAF	30/1	350	1.48
MHT	20/1	350	2.81	MOSHRAF	30/1	350	5.21
MHT	20/1	350	1.79	MOSHRAF	30/1	300	3.6
MHT	16/1	250	3.12	MOSHRAF	30/1	350	8.13
SQUARE	10/1	300	3.07	NAHID	30/1	350	1.85
SQUARE	10/1	200	5.02	NAHID	30/1	350	1
SQUARE	10/1	200	5.62	NAHID	30/1	350	1.28
SQUARE	10/1	350	3.68	NAHID	20/1	350	4.66
SQUARE	10/1	250	2.83	NAHID	30/1	350	2.56
SQUARE	10/1	350	5.62				
SQUARE	10/1	350	4.56	SL: JAMUNA	20/1	250	2.57
SQUARE	10/1	200	6.53	SL: JAMUNA	20/1	300	1.2
SQUARE	10/1	200	10.04	SL: JAMUNA	20/1	350	0.99
SQUARE	10/1	300	2.1	SL: JAMUNA	20/1	350	0.82
SQUARE	10/1	200	5.36				
SQUARE	10/1	200	4.51	RK	30/1	350	1.87
SQUARE	7	350	7.61	RK	30/1	350	1.83

- Production $= \frac{warping\ speed \text{ x } 60 \text{ x } 24 \text{ x } efficiency}{average\ no.of\ beams\ per\ set}$ m/min
- Efficiency $= \frac{actual\ production}{calculated\ production} \times 100$

Warping efficiency:

Efficiency is calculated depended on worker working shift

Actual Production: (20000×3) +14000 = 74000 yards

Machine speed= 350 yards/min

Production time= 74000 yards ÷ 350 =3.32 hour (total length ÷ speed)

Creel time= 1.00 hour

Breakage= (96×2) =3.23 hour

Cleaning time =0 hour

Electrical =0 hour

Mechanical=0 hour

Total time used= 7.44 hour

Idle time=0.16 hour

∴Calculated production= total time× machine speed

= 8.00hour × 350 yards/ min

= 480 min × 350 yards/ min

=168000 yards

We know,

$$\text{efficiency} = \frac{\text{actual production}}{\text{calculated production}} \times 100$$

$$= \frac{74000}{168000} \times 100$$

$$= 44.04\ \%$$

SIZING

Sizing is the process of giving a protective coating on the warp yarn to minimize yarn breakage during weaving.

Sizing is the most important operation in preparing warp yarn for weaving especially with cotton yarn. The smallest error in sizing process may be very harmful. This may increase warp breakage rate on the looms and consequently reduce weaving production and quality. Therefore sizing is termed as the ***"Heart of Weaving".***

Objects:

- ✓ To increase the smoothness of the warp yarn.
- ✓ To reduce hairiness of warp yarn.
- ✓ To increase the strength of warp yarn.
- ✓ In some cases sizing is now done to modify the character of the warp yarn. i.e. to have an effect on fabric weight on fabric weight, stiffness, handle properties etc.

Requirement of sizing:

- ✓ Sized warp must be strong and elastic.
- ✓ Yarn strength and loss in elongation should be within admitted limits.
- ✓ The process must ensure the applications of required amount of size on the yarn.
- ✓ The tension of warp yarn must be constant all the time.
- ✓ The weavers beam must have a cylindrical shape, necessary winding density and the yarn length.
- ✓ The sizing process must be efficient, economical and must ensure the production of high quality size warps.

SizingProcessInvolves:

Types of sizing:

Sizing may be classified into ***Four***types on the basis of size% on the yarn.

1. **Light Sizing** : 10% to 15%.
2. **Pure Sizing** : 16**%** to 25%.
3. **Medium Sizing** : 26% to 50%.
4. **Heavy Sizing** : 50% to 100%.

Equipment:

- ✓ BENINGER ZELL SIZING M/C (SINGLE SIZE BOX).
- ✓ BEN SIZEMIX (COOKER).

These sizing machines are equipped with BEN SIZEMIX size cooking & storage apparatus. A total of 12 (max^{m}) direct warped beams can be combined & sized to make weaver's beam. Moreover an additional unwinding frame provides the facilities to size sectional warped beam.

Key Accessories:

- ✓ REFRACTOMETER.
- ✓ VISCOSITY CUP.

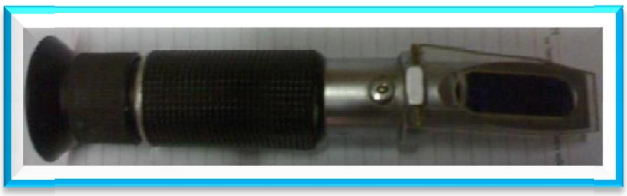


FIG: REFRACTOMETER

Material/Chemical:

- ✓ Adhesive.
- ✓ Chemical.
- ✓ Acrylic sizing agent.
- ✓ Lubricant softener.

Operation Staff:

- ✓ PRODUCTION MANAGER.
- ✓ SUPERVISOR OFFICER.
- ✓ SIZER.
- ✓ ASSISTANT SIZER.
- ✓ HELPER.

MACHINE DESCRIPTION

TOTAL SIZING M/C : 01

SECTION : 01

- **M/C NAME : *ZELL PROCOMAT*.**

ORIGIN : GERMANY.
MODEL : BEN PROCOMB ZB-20 SWATKECT 4/4/4.
SPEED : 45m/min.
SIZE BOX : 1.
BEAM CREEL : 12.
VOLTAGE/FREQUENCY : 400V/50Hz
CONTROLED VILTAGE : 20V/DC.
MAIN FUSE : 20 A.
WORKING WIDTH : 2200 mm (between the flanges).
SIZING BATH : Working Width 2200mm, Roller Width 2400mm, 2 Dip Rolls,
2 high pressure nip rolls with automatic regulation of the squeezing pressure,
Size Bath in Stainless Steel,
Automatic Size Supply Driven By Handy Mat, Pleva.

DRYER : Cylinder dryer type ZT4/4 with 4 Teflon coated drums dia 800mm + 4 drums dia 800mm (possibility for adding 2 more drums),
Steam Pressure 3.5-5 bar-147°C,automatic tension regulation by PC,
Stainless Steel aspiration top with 2 ventilators.
Automatic speed control MAHLO, dry separator, unroll device SWA.

FIG: SIZING M/C

- **M/C NAME : BEN-SIZEMIX.**

ORIGIN : GARMANY.
CAPACITY : 600 Liter with Temperature regulation.

STORAGE TANK : 1.45 Liter.

PROCESS : SEMI-AUTOMATIC driven by PCBEN-SIZEMIX (quantity of water, temperature & cooking time).

FIG: BEN-SIZEMIX

The Important Features to be remembered During Sizing:

- ✓ If the hairiness of the yarn is high then the concentration of the size would be high.
- ✓ If the twist is high in the yarn then the concentration of the size would be high.
- ✓ If the yarn (finer) count is high then the concentration of the size would be high.
- ✓ If the yarn (coarser) count is high then the concentration of the size would be low.
- ✓ If the temperature of the bath is high then the viscosity of the size would be less and vice versa.
- ✓ If the cooking time is more than the viscosity would be less.

Effects of Sizing on Yarn:

The amount of ***size add-on*** depends on ***yarn structure, sizing recipe, squeezing roller pressure, m/c speed.***

As the size add-on is increased—

- ✓ The yarn becomes stiffer.
- ✓ The yarn becomes less extensible.
- ✓ The yarn becomes more difficult to weave.

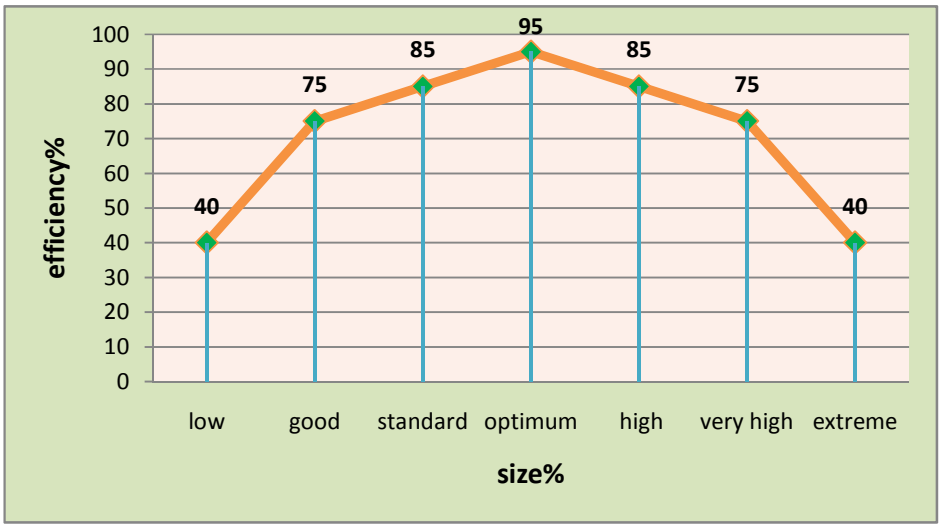
If a low add-on—

- ✓ The yarn becomes hairy.
- ✓ The yarn suffers from lack of strength.
- ✓ The yarn becomes more difficult to weave.

GRAPH:

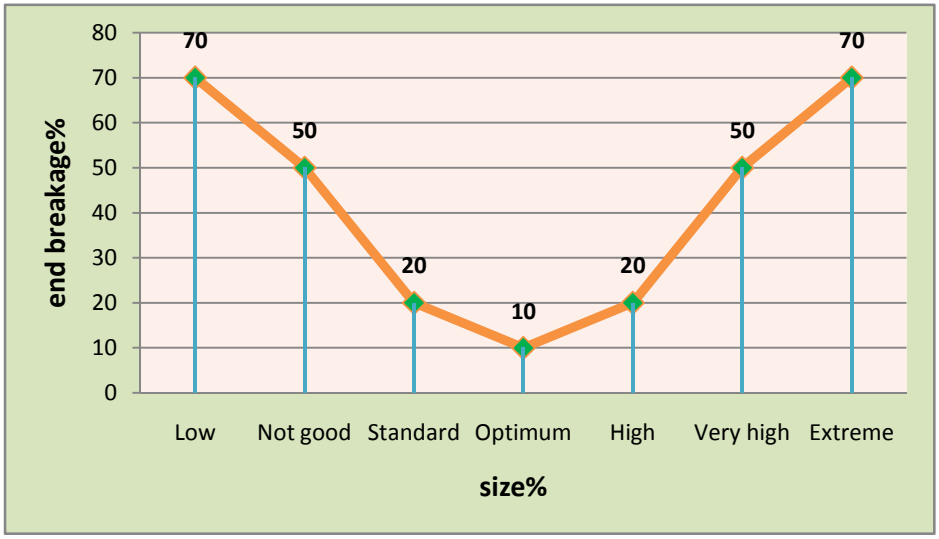
- IfSizing increase, Efficiency also increase ***upto optimum level.***

SIZE %	EFFICIENCY%
Low	40
Good	75
Standard	85
Optimum	95
High	85
Very high	75
Extreme	40



- If Sizing increase, End Breakage% also increase ***upto optimum level.***

SIZE %	End Breakage%
Low	70
Good	50
Standard	20
Optimum	10
High	20
Very high	50
Extreme	70



Sizing Material & Chemical Used:

Sizing Ingredients-

- Starch.
- Binder.
- Softener.
- Anti-septic agent.
- Anti-static agent.
- Weighting agent.

Starch:

Starch is the main sizing ingredients. They coat the warp yarn with a film & impart smoothness by binding the projecting fibres to the yarn surface. The viscosity of the size solution is controlled by the amount of starch, the recipe, degree of mechanical mixing, temperature & time of boiling.e.g. Potato, CMS(Carboxy Methylated Starch),PVA (Polyvinyl Alcohol)

Binder:

These materials penetrate into the yarn & contribute in increasing yarn strength. These materials can be used as an independent gum & substitute of starch products.
e.g. Polyacrylamide, Polyacrylonetrile etc.

Softener:

The hard fragile film is softened by addition of softener. They increase flexibility of yarn after sizing; e.g. Tallow, Soap, Japanese wax, Modified wax, Artificial wax.

Anti-septic agent:

The size recipe consist starch which the protein substances in the favorable medium for the development of the micro-organism (Fungi, Mouldetc). The sized warp or grey cloth is stored for long time; the anti-septic agent is used to prevent the growth of micro-organism in the grey cloth.

Weighting agent:

These agents are used to increase the weight of the fabric. The fabrics are to be sold at grey stage or require the special type of finishing to get fuller appearance are sized with the weighting agent.

THE FACTORS IN CHOOSING SIZE INGREDIENTS ARE-

- The recipe should be that which gives fewer end breaks.
- It should be that which gives the least exfoliation.
- It should be that which permits easy *de-sizing.*
- It should give good fabric characteristics.
- It should be compatible with machinery (e.g. it should not cause size build-ups during weaving or blockages during slashing).
- It should not cause any degradation of the textile material.
- The cost of sizing plus the cost of weaving and finishing should be minimum.

Sizing Recipe:

Sizing recipe depends on ***yarn type, total ends.***

Typical sizing recipe-

In 500 Liter Water

- Starch : 10-20% of water.
- Binder : 2-4% of water.
- Softener : 0.5-1% of water.

SIZING RECIPE FOR A SPECIFIC FABRIC CONSTRUCTION USED IN SIM FABRICS LTD. -

Ne=10/1

Total ends= 4000
Length = 5000yds
Warping beam= 5
Water= 600l
Barley= 45kg
Globe Starch = 45kg
Dalda = 1kg
Citex = 2kg
Cizeca = 1kg

		yarn						chemical			
count	no of yarn	length	yarn wt		WATER	BARLEY G	DALDA	SIZEY	JET SIZE	TOTAL SIZE	SIZE %
10	4350	6000	3107.14286		1200	100	4	2		106	7.518933
10	4350	6000	3107.14286		1200	100	4	2		106	7.518933
10	4850	7500	4330.35714		1440	120	6	4		130	6.616544
10	4350	4750	2459.82143		933	70	3	2		75	6.72
10	5550	7500	4955.35714		2196	183	7	14		204	9.073332
10	4250	4300	2175.59524		1200	100	2	2		104	10.53578
10	4850	7500	4330.35714		1800	165	6	6	6	183	9.314059

Ne=20/2

Total ends= 3550
Length = 2500yds
Water= 600l
Globe starch = 45kg
Dalda = 1kg
Citex = 1kg
Cizeca = 1kg

	yarn						chemical			
count	no of yarn	length	yarn wt	WATER	BARLEY G	DALDA	SIZEY	JET SIZE	TOTAL SIZE	SIZE %
20	7250	10150	4380.208	1800	165	7	8	9	189	9.50
20	7000	7470	3112.5	1396	128	5	5	7	145	10.26
20	3350	12000	2392.857	990	66	3	0	0	69	6.35
20	6000	6550	2339.286	1200	110	4	4	0	118	11.11
20	7250	10150	4380.208	1953	179	8	8	10	205	10.31
20	6300	9250	3468.75	1373	119	5	7	7	138	8.768
20	7000	7470	3112.5	1363	125	5	3	5	138	9.771
20	7260	10150	4386.25	2467	227	8	10	8	253	12.71
20	6300	8300	3112.5	1380	115	6	5	4	130	9.205
20	6300	8280	3105	853	126	5	5	7.5	143.5	10.18596

Ne=30/1

Total ends= 7500
Length = 9200yds
Warping beam= 10
Water= 1400L
Barley= 204 kg
Sizey 34kg

Dalda = 6kg
Citex = 6kg
Cizeca = 14kg
Wax = 3 kg
Pva = 14 kg

		yarn							Ch:					
Ne	no of yarn	Len:	Ya:wt	WAT	BARLEY G	BARLEY M	SIZ	PVA	DAL:	CMC	WAX	JET SIZE	TOTAL SIZE	SIZE %
30	7500	9200	2738.09	1400	98	126	34	14	6	6	3	14	301	24.230
30	7600	9100	2744.44	1000	70	90	24	14	4	0	2	10	214	17.187
30	8650	9200	3157.93	1690	135	170	41	28	7	3	4	17	405	28.268
30	7500	11100	3303.57	1500	105	135	36	19	6	0	3	15	319	21.284
30	8650	9200	3157.93	1313	105	117	31	23	5	0	3	16	300	20.939
30	3500	21900	3041.66	1375	110	28	14	0	6	0	3	0	161	11.667
30	7000	10900	3027.77	1500	105	120	30	15	6	0	3	15	294	21.402
30	7500	9250	2752.97	1300	91	117	31	14	5	0	3	13	274	21.938
30	8350	9250	3064.98	1850	165	127	39	16.5	3.5	10	3.5	13	377.5	27.148
30	4000	11500	1825.39	733	54	41	8	5	4	3	2	0	117	14.127
30	7400	13500	3964.28	2255	203	180	45	23	10	9	5	0	475	26.410

FACTORS AFFECTING THE SIZE TAKE UP PERCENTAGE-

- Viscosity of the size recipe: If viscosity of the size liquor is not proper, it is difficult to penetrate for the size material to the core of the yarn.
- Lubrication: Lubricant can exist at the surface or exist inside the structure and later work itself to the surface as the yarn rubs over a friction surface.
- Degree of size penetration: It determines the stiffness for a given yarn bearing a given size. So if Degree of penetration is not proper, size take up% will be un-uniform.
- Squeeze roller pressure: If the pressure of squeeze roller is not sufficient, size add-on may be increased or decreased.
- M/C Speed: If m/c speed is high or low consequently size take-up% may be less or high correspondingly than the required take-up%.

Machine Setup:

PARAMETER	M/C RANGE	SET VALUE
Sized Speed	1-120 m/min	40-45 for Fine Cotton
		45-50 for Yarn Dyed Material.

50-70 for Solid Dyed Material.

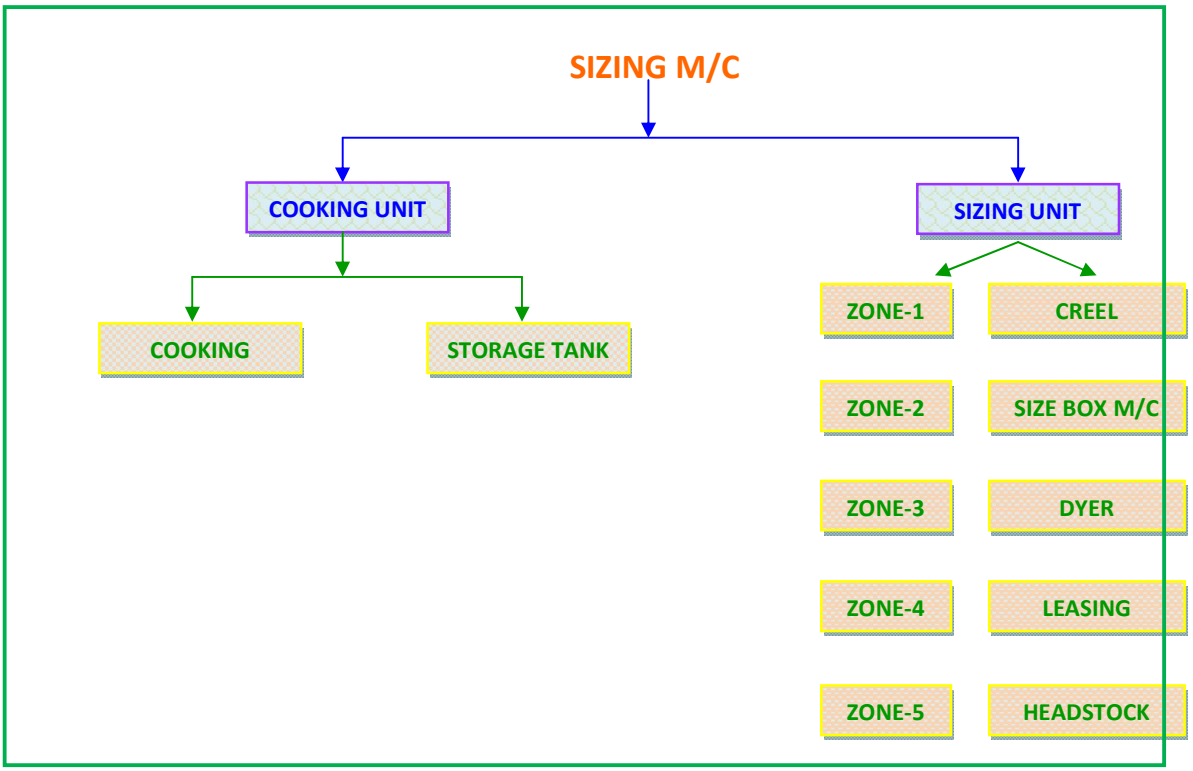
M/C SET-UP FOR SOLID DYED

QUALITY	TOTAL ENDS	COUNT	CREEL TENSION	WINDING TENSION	PRESS TENSION	DRY TENSION	EXCUSING PRESSURE	MOISTURE
20x20/64x54	3900	Cot 20/1	450	1800	1650	1600	6.0 Kn	6%
20x16/128x60	7680	Cot 20/1	500	2175	1950	1850	6.0 Kn	6%
20x20/108x58	6480	Cot 20/1	500	1800	1700	1650	5.5 Kn	6%
30x30/60x60	3600	Cot30/1	350	1400	1350	1300	7.0 Kn	6%
32/2x16/128x60	7680	Core 32/2	650	2200	2100	2000	8.0 Kn	6%
32x16/148x60	9120	Core 32/2	650	2100	2000	1900	7.0 Kn	6%
40x40/110x70	6200	Cot 40/1	450	1800	1650	1600	7.0 Kn	6%
40x40/110x70	6660	Cot 40/1	500	1850	1680	1650	6.0 Kn	6%
40x40/133x72	7980	Cot 40/1	550	1900	1800	1700	6.0 Kn	6%
40x80/1/160x62	9720	Cot 40/1	600	2100	1900	1800	6.5 Kn	6%
45x45/110x70	6660	Cvc 45/1	500	1800	1700	1700	6.0 Kn	5.5%
45x45/164x60	9840	Cvc 45/1	550	2000	1800	1600	6.0 Kn	5.5%
45x45/133x72	7980	Cvc 45/1	500	2000	1800	1700	5.5Kn	5.5%
80/2x80/2/164x64	10000	Cot 80/2	700	2400	2000	200	5.5Kn	6%
100x100/2/200x84	12000	Cot 100/1	500	1800	1650	1600	7.0Kn	6%
30x30/90x78	5740	Pc 30/1	450	1800	1650	1600	5.5 Kn	6%

Check List before Production:

- Any break of yarn and formation of ***"lappers"*** in warpers beam at beam creel and roller in sizing center. If such things happen cut them carefully.
- Check the squeezing roller gets too dirty or gets covered with fluff and sticky over during operation. If such things happen wire cut to clean with duster.
- Make sure there is no entanglement of yarn in the zig-zig comb.

SLASHER SIZING PROCESS



Size Cooking:

Before sizing is set to operate sizing liquor needs to be cooked, stored and transferred to the main m/c size box. Preparatory section in charge and/or sizing technologist gives the plan of size liquor quality and quality (recipe), considering the following factors:

- Material to be sized i.e. yarn composition.
- Diameter of material to be sized i.e. total number of ends.
- Total weight of material to be sized.

Size mixing man prepares the size liquor as per instruction and record in the production register. The preparing sequence is as follows:

- Main switch at the main control panel is switch on.
- Enter following set points for cooking process at the panel-

- cooking temperature.
- water quality.
- cooking time.

- Enter temp. set point for storage tank.
- Open water valve with push button, water will come in.
- When Agitator impeller is covered with water then switch on agitator with the push button.
- Change with size powder, liquid size component etc. as per recipe.
- Close and look cooker cover. Automatic cooking program will start-
    - Steam valve will open. Temp. will increase from 55°c to 85°c.
    - Agitator will be switched to higher speed.
- After cooking temp. has been reached-
    - Steam valve will close.
    - Cooking temp. is maintained at a constant valve by temp. controller.
    - Cooking time commence.
- After cooking time is finished-
    - Agitator will be switched from higher to lower speed and continue to run at that speed.
    - Cooker cover can be unlocked and opened to check viscosity and concentration.
- For reservation of cooked size to storage tank-
    - Open manual valve of the corresponding tank.
    - Switched on size delivery pump with push button size is pumped in to the corresponding storage tank.
    - The size delivery pump is stopped automatically when the cooker is emptied or the maximum level in the storage tank is reached.
    - Switch on agitator of the corresponding tank with push button.
- This cooked liquor is transferred in the size box of the main m/c called sizing center. A steam pressure of 3.5 bar (maximum) is required in the sizing center for the following types of steam heating.
    - Direct heating (controlled by pneumatic control valve) for the size feed box and the size box.
    - Indirect heating (controlled by automatic or manual operated valve) for vent in the size and size feed box (water bath). Temperature of water bath must be as close as possible to the boiling point of water.
- The direct heating system should be switched on as less as possible by temp. control to maintain a constant temp. of about 80 to 85°c in order to avoiding diluting the size liquor where by preventing fluctuation in viscosity and hence varying degree of sizing.

Sizing Unit:

ZONE 1-CREEL:

Creel has a capacity up to 20 beams which are placed in groups. Each beam has special break system/tension control system in modern m/cs.

ZONE 2-SIZE BOX:

This zone consists of a ***size box, immersion roller, squeezing roller*** etc. this box is used to apply size solution to the yarn. The size box temp. is controlled by steam. Equal level of solution is maintained during sizing. The size pick up% depend on yarn structure, types and size of ingredients, viscosity of the solution, squeezing pressure, roller hardness, m/c speed etc.

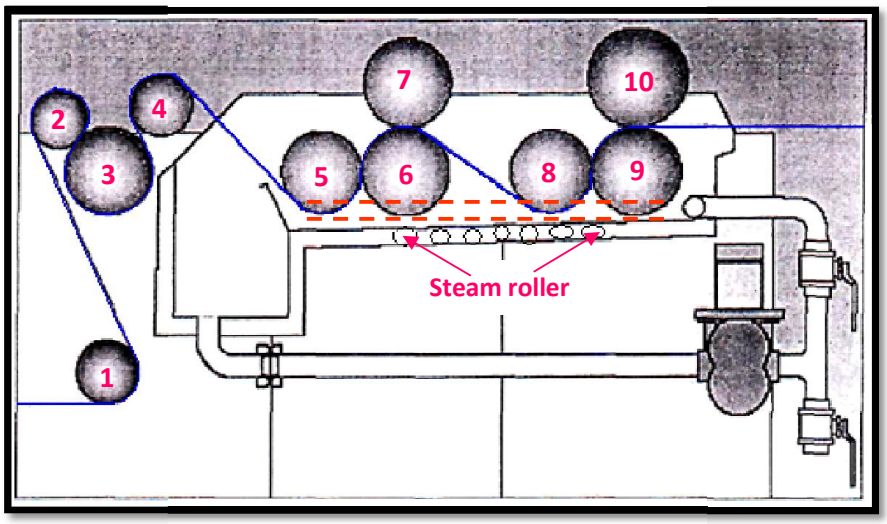


Fig: Size Box

1. GUIDE ROLLER.
2. FEED ROLLER.
3. PRESS ROLLER.
4. CONTROL ROLLER.
5. EMERSION ROLLER.
6. UPPER SQUEEZING ROLLER.
7. LOWER SQUEEZING ROLLER.
8. EMERSION ROLLER.
9. UPPER SQUEEZING ROLLER.
10. LOWER SQUEEZING ROLLER.

ZONE 3-DRYER:

It consists of several heated cylinder over which sized up sheet passes and dried uniformly. Temp. Range: 80-130°c;*depending on yarn type & pick up%.*

ZONE 4-LEASING:

In order to prevent adhesion between yarns, the ends are separated from each other by dividing the sheet into sections.

ZONE 5-HEAD STOCK:

This is the delivery section. The yarns are wound on weavers' beam. A measuring device measuring the length.
A control pane is attached with this section which controls all operations electrically.

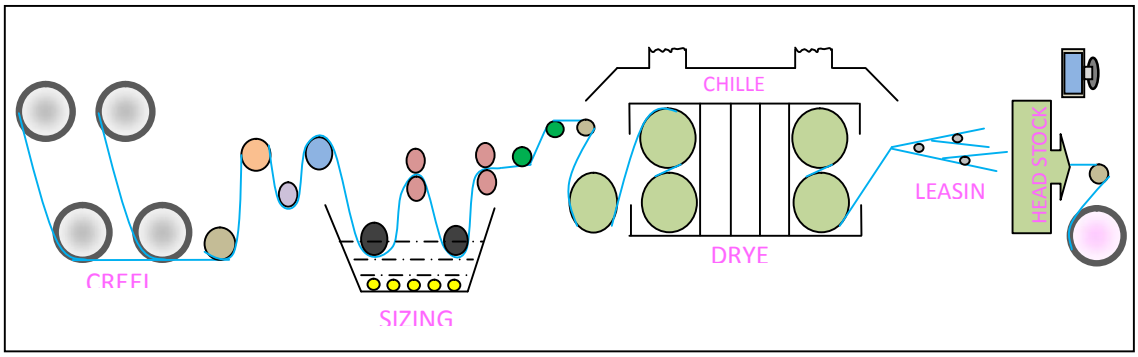
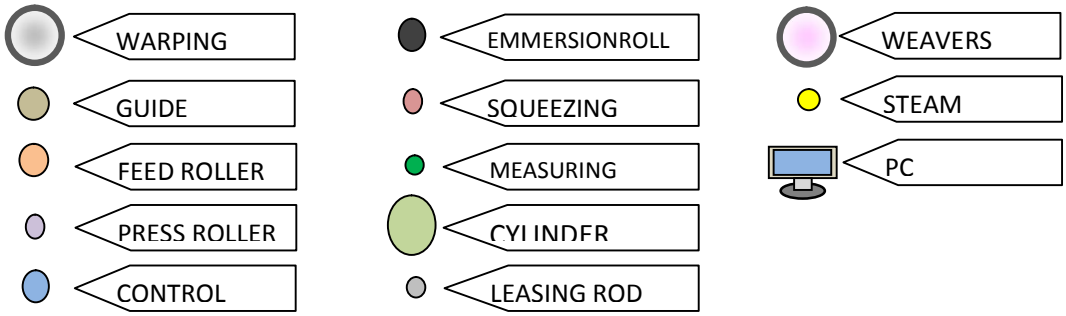


FIG: SIZING M/C



Technological change due to sizing:

- **Increase in breaking strength:**
  During sizing, adhesive material creates bonds between fibres to fibres which increase the strength of yarn. It increases 20-40% breaking strength of the fibre.
- **Increase abrasion resistance:**
  After sizing the gap between fibres are filled with size and coating on the outer surface of the yarn take place.
- **Increase in stiffness:**
  After sizing, flexibility or pliability of yarn is decrease and stiffness is increased.
- **Increase in elasticity:**

As extensibility of the sized yarn decrease, more force has to be applied to extent the yarn. Hence elasticity increases.

- **Increase frictional resistance:**
  Application of size materials makes outer surface of the yarn smooth and hence occurs less friction.
- **Increase yarn diameter:**
  Sizing means coating adhesive on the outer surface of the yarn. Hence sizing causes increase of diameter of yarn.
- **Decrease in extension:**
  After sizing the gap between the fibre does not occur easily. So the extension decreased.
- **Decrease in electrostatic charge:**
  Electrostatic charge is formed due to the friction between yarns and roller. Size materials contain moisture which reduces static friction.
- **Decrease hairiness:**
  During sizing protruding hairs of yarn fix with yarn end so yarn hairiness decreases.

Machine Start up:

As the m/c is on enter all data/production parameter in the BEN PRECOMB unit at the head stock.
Following data is entered-

- Feed length and doff length.
- Sizing degree i.e. pick-up%.
- Tension and stretch over warp in different zone.
- Drying cylinder temp. in different zone.

Faults of Sizing:

- **Sizing spots:**
  Size material should be added gradually to the mixing tank for good mixing. If it is added at once, spots are appeared on the yarn.
- **Repeating warp streaks:**
  This defect is due to uneven tension in the pre beam.
- **Shinnery:**
  This defect due to the friction between the yarn and drying cylinder.

- **Sandy warp:**
  Due to not crushed or grind the size material properly.

- **Ridge beam**:
  This fault occurs due to uneven distribution of yarn in wraith.

- **Hard sizing:**
  If the size materials are applied too much, the size becomes hard which cause hard sizing.

- **Improper drying:**
  Under drying-Bacteria form-Yarn breakage-over drying-Hard sizing.

- **Size dropping:**
  This defect due to not optimum the viscosity of the size solution.

- **Size stitching:**
  Due to improper drying after sizing.

- **Uneven sizing:**
  Due to over or under sizing.
  Due to over or under concentration of size liquor.

Calculation:

- Liquer Pick − up% $= \frac{\boldsymbol{weight\ of\ size\ liquer\ (kg)}}{\boldsymbol{weight\ of\ dry\ yarn\ (kg)}}$ x 100

- Solid add − on% $= \frac{\boldsymbol{dryweight\ of\ size\ materials\ (kg)}}{\boldsymbol{dry\ weight\ of\ yarn\ (kg)}}$ x 100

- Required Starch% $= \frac{\boldsymbol{(sized\ warp\ length + size\ wastage) - warp\ length}}{\boldsymbol{warp\ length}}$ x 100

- Waste $= \frac{\boldsymbol{total\ ends\ x\ wastage\ warp\ length}}{\boldsymbol{warp\ count\ x\ no.of\ cones}\ x\ 2.2046}$ Kg

- **Required Chemical & no. of Mixing of Sizing Recipe:**

$$\textbf{Weight of Total Length} = \frac{warp\ length\ x\ total\ ends}{warp\ count\ x\ 1.6934\ x\ 1000}$$

Required Chemical $= weigth\ of\ total\ length\ x\ (1 + waste\%\ of\ sizing)$

Required Wate $= water\ per\ mixing\ (450\ lit.)x\ 13\%\ \ (for\ steam)\ of\ 450\ lit.$

Required no. of Mixing Sizing Recipe $= \frac{required\ chemical}{required\ water}$

DRAWING, DENTING & KNOTTING

Drawing is the process of passing the warp yarn into the heald eye according to the warp plan or design is known as **Drawing.**

Denting is the process of passing the warp yarn into the reed dent according to the denting plan is known as **Denting.**

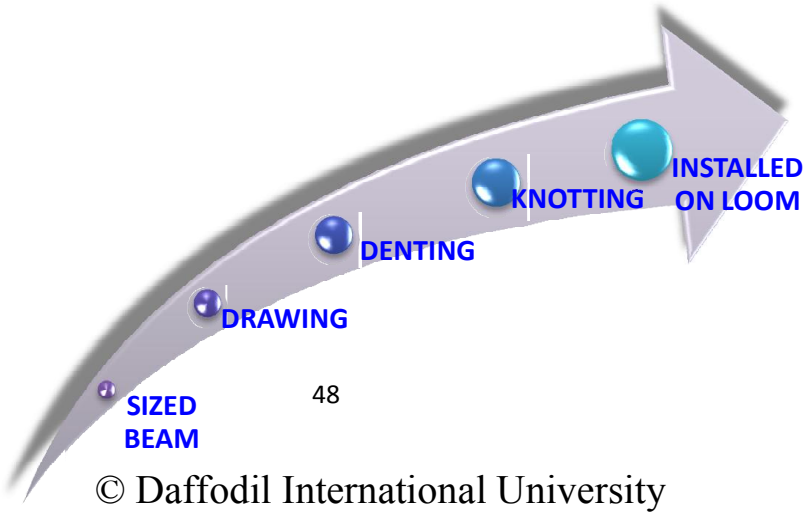
Objects:

- To draw the warp yarn into the heald eye.
- To ensure the production of proper design in the loom.
- To maintain the proper warp yarn spacing in the fabric.

Requirement of Drawing & Denting:

- Proper warp plan in case of yarn dyed fabric.
- As much possible accurate warping in case of sectional warping.
- Keep some extra warp yarn during warping from the required quantity.
- Must use accurate reed.

Process Involves in Drawing, Denting & Knotting:



Key Accessories:

For Drawing-in the following key accessories are used-

- Drawer's hook,
- Heald wire,
- Drop wire,
- Reed.

For Warp tying the following key accessories are used-

- Brush.
- Leasing band.

Method Used to Prepare Weaver's Beam:

1. Warp tying or Knotting (quick style change).
2. Reaching-in/Drawing-in & Beam getting.

- **WARP TYING:**

  This method is limited to use where an exactly same article or quality of fabric is to be mode that is already running is the loom. The following points are considered-

  - The total number of warp ends should be same as that of running.
  - The count of yarn & weave design should be same.

  Before running a new beam with an older one, the new beam is to undergo a process called ***leasing,*** where the adjacent yarns are kept separately by placing a yarn in between them. This is very essential in case of tying a yarn dyed beam; otherwise the warp yarn scheme will be disturbed & lost. Leasing is done manually. For more color beam (solid dyed beam) tying is performed without leasing.

- **DRAWING-IN/RACHING-IN:**

  This method of mounting weavers beam on to loom is adopted is such case which have separate style of working of adjacent warp yarn is called yarn interlacement, compared to that of running in loom.

  In this method, warp yarn are separated individually, as per count or color patterns from the adjacent yarn &hooked to the access of drawer's hook called ***Reaching-in.***

The yarn as it comes to ***reach*** of drawer's hook is then drawn through the ***dropper***& then through the ***eye of heald wire***. All the warp yarns thus drawn in one by one, is then passed through the ***split of reed*** called reed.

Equipment:

FISCHER POEGE WARP TYING M/C

FISCHER POEGE WARP TYING M/C

Production Procedure:

❖ **OPERATION STAFF-**

- **WARP TYING:**
  1. Knotting in-charge.
  2. Knotting operators.
  3. Knotting helpers.

- **DRAWING-IN/REACHING-IN:**
  1. Production manager.
  2. Drawing in-charge.
  3. Drawer.
  4. Reacher.

❖ **CHECK LIST BEFORE PRODUCTION-**

- Check the correctness of the knots.
- Check whether there are any crossings.
- Check there are any empty droppers.

- Check the number of ends in each reed whether there are required number of ends.
- Check the repeats whether the required number of ends are there.

❖ OPERATION PROCEDURE-

- **WARP TYING:**

1. Production manager monitor the following on a daily basis.
   - ✓ Everyday beam production record & the style of fabric to be made from these beams.
   - ✓ Check the number of looms running out of beams at each day & check that loom specification relating to designing scope. i.e. ***number of healdframes, reed count, weft insertion capacity*** etc.
   - ✓ Make a list of tying-in accordance with the marketing priority & availability of looms that are running out of beam.
2. According to that plan, knotting In-Charge & drawing In-Charge jointly arrange leasing of beams, the respective beams being identified from the sizing data sticker.
3. As leasing is completed, the beam is transferred to a specific loom & mounted on loom beam bracket. The tying frame is set on proper position.
4. The ends of the old beam & the ends of the new beam are accurately brushed & gripped by the frame so that older & newer ends make an upper and lower set of yarn placed in proper tension.
5. The warp tying end is mounted over the tying frame. In case of ***Staubli m/c,*** number of knots per repeat of color pattern is entered into the m/c.
6. Then the m/c is started. After the programmed number of knots per color pattern is reached, knotting will stop. Operator will check the correctness of the knot and start again by switch.
7. Thus knotting will be completed up to the end of set, tying upper set of older yarn with lower set of new warp.
8. As knotting is completed, the knotting operator make a quality card, mentioning ***customer name, work order number, beam number, beam length, knotting operators name &the date or date of knotting.***
9. The sizing data sticker is set over the quality (or Doffing) card & the card is set over the loom.
10. The knotting operator also makes a work record in his resister book.
11. As knotting is completed tying head & framer removed the old piece of knotted yarn is pulled through the m/c, i.e. through heald wire and reeds and the new warp set is allowed to pass and make ready to run.

- **DRAWING-IN & REACHING-IN:**

1. The customers' fabric swatch is sent to the weaving section, generally after warping is done, either enclosed to the order sheet form or separately.

Assistant Manager, Weaving; analyzes the swatch for reproduction. In this stage he determines-

- ✓ The design of sample, i.e. whether ***dobby*** or ***tappet*** or combination of two.
- ✓ The Drawing-in, Denting and lifting or tappet/cam setting plan.
- ✓ The required number of heald frame and reed count, draw width etc.

2. Then whenever the sized beam is ready, the work out drawing–in plan, reed count etc. against on order number is given to the drawing in-charge for production. Drawing in-charge make a work programme considering the following-
   - ✓ The availability of run out loom for beam.
   - ✓ The availability of reed no. of reed count.
3. Drawing In-Charge and senior drawer find out the desired sized beam number from the sizing production record, check against the specific work order number and transport these to the drawing section by trolley& start working there.
4. According to the working order number each design/drawing-in plan is record in the register book. The production sample being attached thereafter.
5. After drawing-in/denting is completed each beam is set with quality/doffing card, the sizing data sticker is being attached on the card on the quality card and the following information are written-
   - ✓ Customer name.
   - ✓ Work order number.
   - ✓ Beam number.
   - ✓ Beam length.
   - ✓ Loom number where the beam is to be set.
6. During the loom number, the drawing in-charge takes in to consideration the designing scope & color insertion scope of the respective loom.
7. Finally beam gaiters carry this beam along with dropper, healds& reed with trolley on to the specific loom & mount.
8. They pull the new yarn from the beam & set in the loom with dropper, healds& reed properly positioned & tie the yarn with old piece of warped around surface roller with a number of small knots.
9. Daily beam gating report with every information is made & filed.

❖ **RESPONSE TO EQUIPMENT FAULTS-**

EQUIPMENT FAULTS	RESPONSE
Fault in the knotting m/c	Call in the electrical/electronic engineer.

❖ **DOCUMENTS FLOW-**

- ✓ Thecustomer's fabric swatch is sent to the weaving section; generally after warping is done, either enclosed to the grey fabric. Request form for yarn dyed fabric or separately. Assistant Manager, weaving then analyzes the swatch for reproduction.
- ✓ Knotting in-charge & Drawing in-charge jointly arrange leasing beams that are being identified from the sizing data sticker.
- ✓ As knotting completed, the knotting operator make a Doffing/Quality card, mentioning ***customer name, work order number, beam number, beam length, knotting operators name &the date or date of knotting.***
- ✓ The sizing data sticker is set over the quality (or Doffing) card & the card is set over the loom.
- ✓ The planning dept. raise the grey fabric report form & sends a copy each to the yarn dyeing, winding & weaving section.

Product Quality Check:

QUALITY PARAMETER	RESPONSE
If there are any empty droppers.	Warp that dropper with cellophane-tape.
Number of ends in a repeat is less than what is should be.	Fill the repeat with yarn from both the side.
The number of ends in a reed does not match the design pattern.	Cut off the ends from that point & do the design once more.

WEAVING

Weaving is the process of manufacturing woven fabric by interlacing at two sets of yarns (warp & weft) at right angle (90°) according to design.

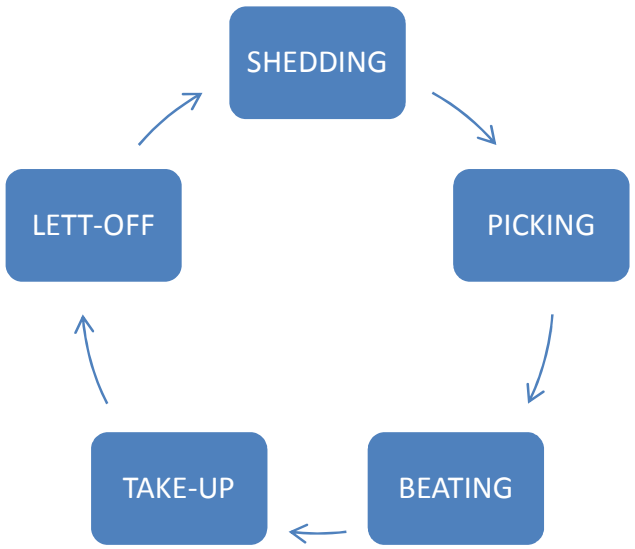
Objects:

- To produce woven fabric.
- To give the final product.

Requirement of Weaving:

- Proper sized warp yarn.
- Required length of warp yarns.
- Accurate drawing & denting.
- Machine setting must be accurate.

Weaving Process:



Key Accessories:

- WEAVERS HOOK.
- PICK COUNTING GLASS.
- MEASURING TAPE.

MACHINE DISTRIBUTION

TOTAL LOOM : 124 & new addition 45

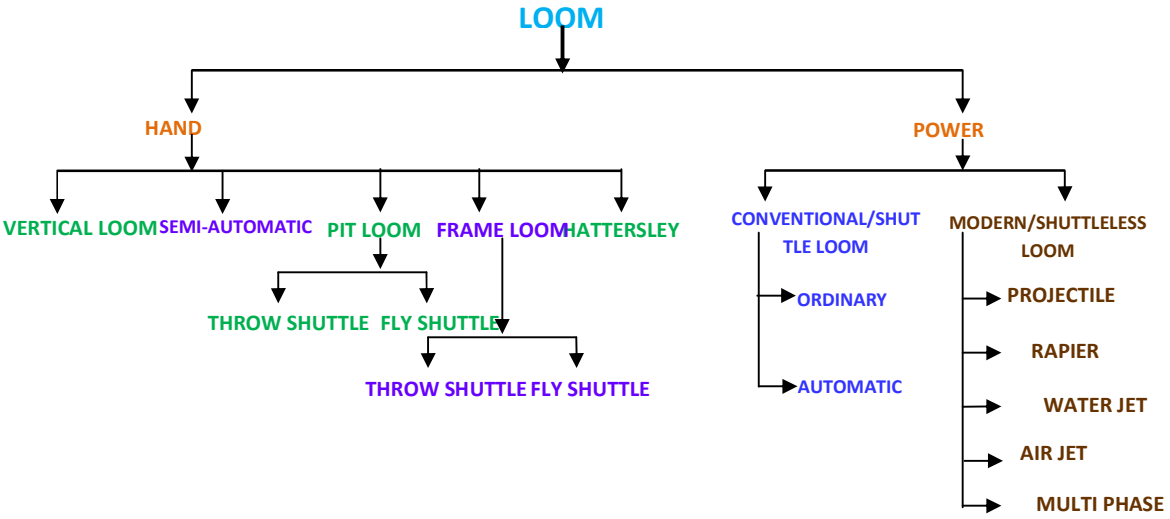
Tsudokoma- ZA205 : 71

Tsudokoma- ZA209 : 18

Loom:

The loom is the contact point of the whole process of cloth production, ginning, opening, carding, spinning, winding, warping, sizing and beaming are done before weaving. A loom cannot be said a machine but it is a device which is used to produce woven fabric. Looms are generally driven either by line shaft or by line shaft or by individual motors fitted with it.

Classification of Loom:



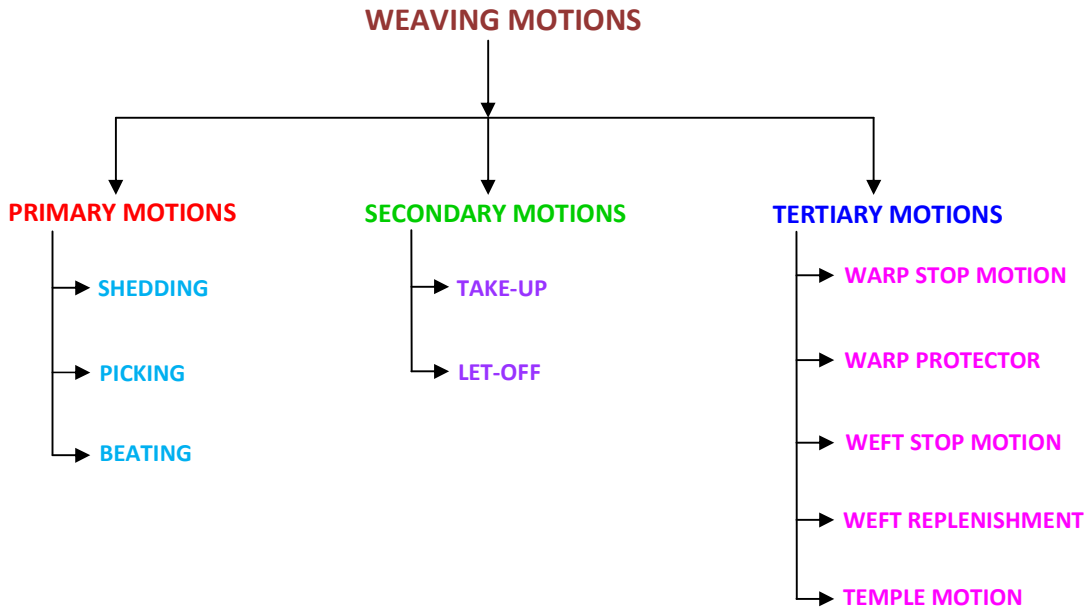
Weaving Mechanism:

Weaving is the process of interlacement between the warp and weft in fabric according to a design of fabric.

Basic principal or weaving mechanisms are:

- The yarn form the weavers beam passes round the back rest and comes forward through the drop wire of the warp stop motion to the heald eye of heald shaft which is responsible for the purpose of shade formation.
- It then pass through the dent of reed which holds the thread at uniform spacing and it is also performed the beating up the weft thread that has been left in the triangle warp sheet form by the two warp sheet and reed.
- In this way, weft yarn is meshes with last pick of fabric or cloth. Temple holds the cloth firm at the feed position and assist in the formation of a uniform fabric width. Then the fabric passes over the rest, take up roller, pressure roller and finally wind on to the cloth roller.

Weaving Motions:



Every m/c has certain motions. By these motions weaving mechanism is occurred. A weaving m/c is distinguished from other m/c by its specific motions. These motions are generally divided into ***three*** classes-

1. Primary Motion.
2. Secondary Motion.
3. Tertiary Motion.

PRIMARY MOTIONS:

Primary motions are fundamental & essential motions of weaving. Absence of any of them weaving is not possible.
Primary motions are:

- Shedding.
- Picking.
- Beat up.

SECONDARY MOTIONS:

Secondary motions are next in importance to primary motions. Their presence is also necessary for continuous & proper weaving mechanism.
Secondary motions are:

- Take-up.
- Let-off.

TERTIARY MOTIONS-

Tertiary motions are used for producing defects free fabric without hampered the production, within in a less time & labor by using some extra device.
Tertiary motions are:

- Warp stop.
- Weft stop.
- Warp protector.
- Weft replenishment.
- Temple motion.

Check List before Operation:

- Check all necessary setting gauging & operating values.
- Check loom function by slow running or inching.
- Check all pattern setting, drawing & denting, fabric width, warp- weft density & other cloth defect.
- Check the air pressure to correspond with the picking timing.

Operation Procedure:

- As a new beam is set to a loom either by drawing cam getting or tying, it is the task of loom technician to check & set all necessary setting, gauging & operating values through loom function panel & mechanical means. After all setting has been done, the loom function is checked by slow running or inching. The first meter of fabric is made normal running & cut off from the loom & checked over an inspection box against light.
  The fabric is checked visually for-
  - Any wrong pattern setting.
  - Any wrong drawing & denting.
  - Fabric width, warp & weft density.
  - Any other cloth defect.

  Any fault found in the fabric is corrected over the loom & it is handed over to the operator for normal running.
- For all type of yarn dyed fabrics & special designed fabric of S/D class, the first meter of fabric is to the Quality Dept. for subsequent test & upon getting quality approval from

Quality Dept. Head weaving is started. The approval sheet is filed in weaving as a record.

The Technicians Procedures are as Follows:

- From the ***quality card*** the technician find out the respective greige fabric layout instruction sheet for setting.
  - Pick density.
  - Woven design & Lifting plan.
  - Weft color pattern.
  - Beam length.
  - Cut length.
- Beam length & cut length is also set in the weaver mode.
- Depending on the yarn count, weave design& sizing beam condition, the loom RPM is decided to & set by changing motor pulley.
- Yarn count, weave design, drawing-lifting, RPM etc is set to the initial condition setting mode of loom computer. In this state some important valve like picking timing, valve timing let off tension etc is set automatically.
- According to the drawing width, measuring band position is set mechanically using the "Help" switch of Basic Operation Mode.
  Weft feeler's setting, shed angle & shed timing setting, sub-nozzle setting, temple setting, reed space, cuttersetting done mechanically as per m/c manufacturer operating manual.
- The weft patterning, as worked out by design analyst or loom section in-charge is set to pattern setting mode and in case of dobby design the worked out lifting plan is set to the dobby basic setting mode.
- All the setting is executed by switch.
- Then the m/c is run slowly by inching mechanism on run set mode. If there is no fault found, the m/c is set at normal operating speed. The air pressure is checked to correspond with the picking timing.
- Sometimes to achieve higher efficiency & cloth quality, the initial condition setting values (standard) like picking timing, shedding timing, start & stop timing, let off tension etc are changed.
- Regular checking is also carried out during operation & different parameters are fine tuned as required to achieve highest possible loom running efficiency.

The Operators Responsibilities are:

- To run the m/c in the systematic way of ***"patrolling"*** shown & achieved by Department Head & by Shift officers/In-charge & senior operators.
- To repair the broken the warp & weft yarn during operation in the quickest possible time so that down time for short stops are minimized & hence running efficiency is increased.
- To use the correct yarn as weft that is supplied by helpers.
- To produce defect free fabrics that may come as result of missing ends, wrong drawing/denting, pick finder failure, miss selection of weft yarn etc.

The Senior Operators Responsibilities:

- Checking the article.
- Allowing operators & pulling shift sticker to loom, loom wise quality checking, guiding & motivating the operators to achieve target efficiency.

The Shift Officers/In-charge Oversee That:

- All the activities are performed satisfactorily.
- The error for waste control.
- Good housekeeping.
- Check the attendance.

MACHINE SPECIFICATION

No. of this loom= 71

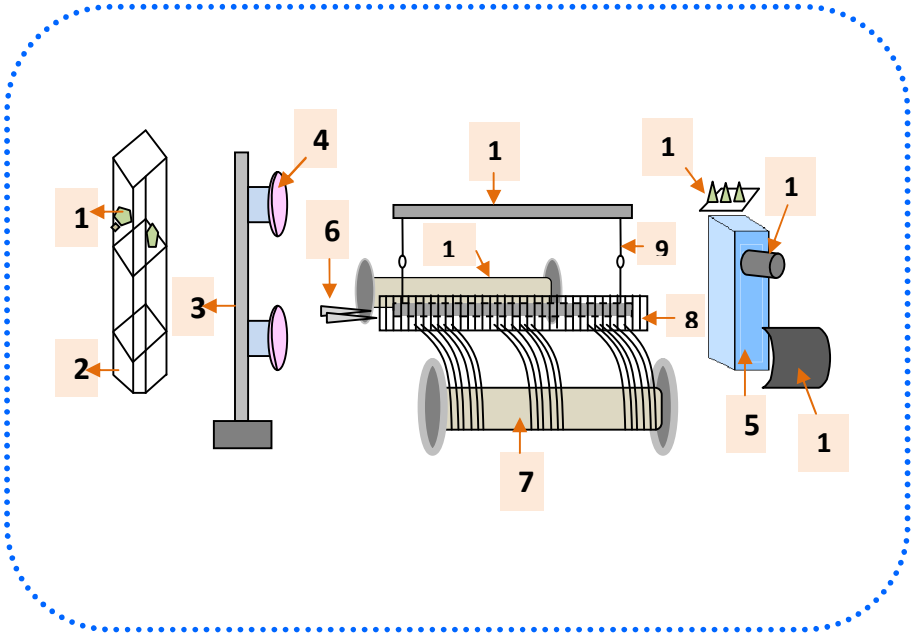
M/C PARAMETERS	SPECIFACATION
NAME	TSUDAKOMA JET LOOM
BRAND	TSUDAKOMA
*** ORIGIN	KANAZAWA, JAPAN
TYPE	ZA205
MANUFACTURING DATE	February, 1989
WEFT INSERTION LIMIT	2 to 4
RPM	Up to 600
CAM	Tappet, Positive
HEALD FRAME CAPACITY	7Heald Shaft
SELVEDGE TYPE	Leno
REED TYPE	Profile
AVAILABLE REED COUNT	24 S; 45 S; 46 S; 58 S; 62 S; 64 S; 70 S; 86 S; 92 S; 96 S; 99 S; 106 S; 116 S; 129 S.
REED SPACE	190cm
NO.OF RELAY NOZZLE	25
AIR PRESSURE (MAIN VALVE)	6 bar
BEAM DIAMETER	1000 mm

No. of this loom= 18

M/C PARAMETERS	SPECIFACATION
NAME	TSUDAKOMA JET LOOM
BRAND	TSUDAKOMA
ORIGIN	KANAZAWA, JAPAN

TYPE	ZA209
MANUFACTURING DATE	April, 1990
WEFT INSERTION LIMIT	2 to 4
RPM	Up to 600
CAM	Tappet, Positive
HEALD FRAME CAPACITY	7Heald Shaft
SELVEDGE TYPE	Leno
REED TYPE	Profile
AVAILABLE REED COUNT	24 S; 45 S; 46 S; 58 S; 62 S; 64 S; 70 S; 86 S; 92 S; 96 S; 99 S; 106 S; 116 S; 129 S.
REED SPACE	190cm
NO.OF RELAY NOZZLE	25
AIR PRESSURE (MAIN VALVE)	6 bar
BEAM DIAMETER	1000 mm

Reed count**is expressed by **Stockport system (**dent per 2 inch**)



01: WEFT YARN	08: PROFILE REED
02: CONE HOLDER	09: HEALD WIRE
03: E.D.P. STAND	10: HEALD SHAFT
04: E.D.P.	11: CLOTH ROLLER
05: ELECTRIC	12: MOTOR
06: MAIN NOZZLE	13: CAM BOX
07: WEAVERS'	14: SELVEDGE

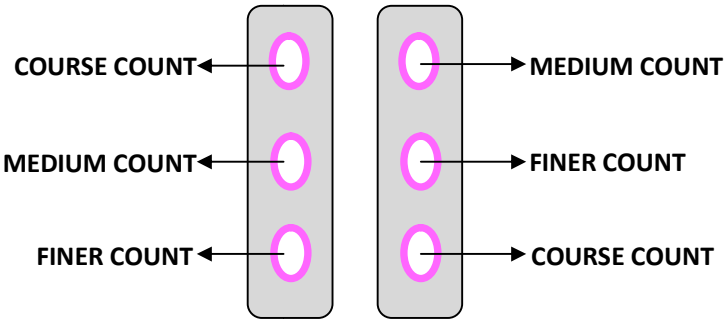
Image Air jet loom

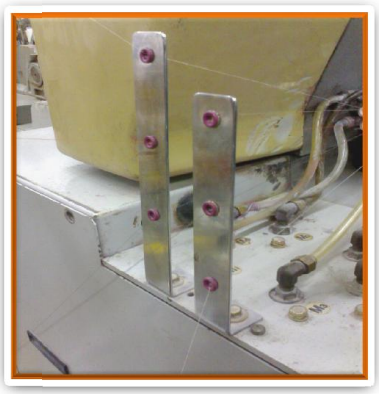
F.D.P.

FDP is used for deliver weft yarn form storage according to weft pattern. After every supply of yarn again yarns are stored in the drum. A pin is used to release the yarn from drum which is controlled electrically. It is possible to change the dia of drum. A sensor is used to sense the yarn. If any yarn breaks it stop the yarn supply.

Yarn Guide-

Yarn guides are to supply the weft yarn from EDP to Main nozzles. No. of guides depends on number of weft insertion capacity and different guide is used for different count of yarn.





Nozzle:

In air jet loom two types of ***Nozzle***s are used.

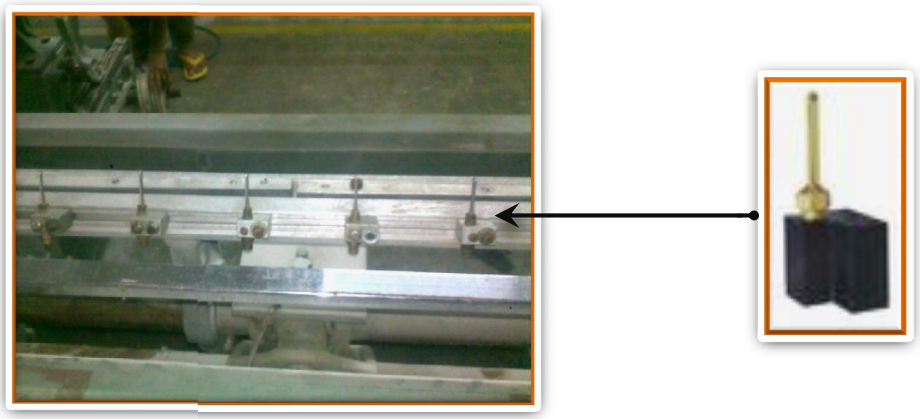
- Main nozzle.
- Sub-nozzle.

MAIN NOZZLE-

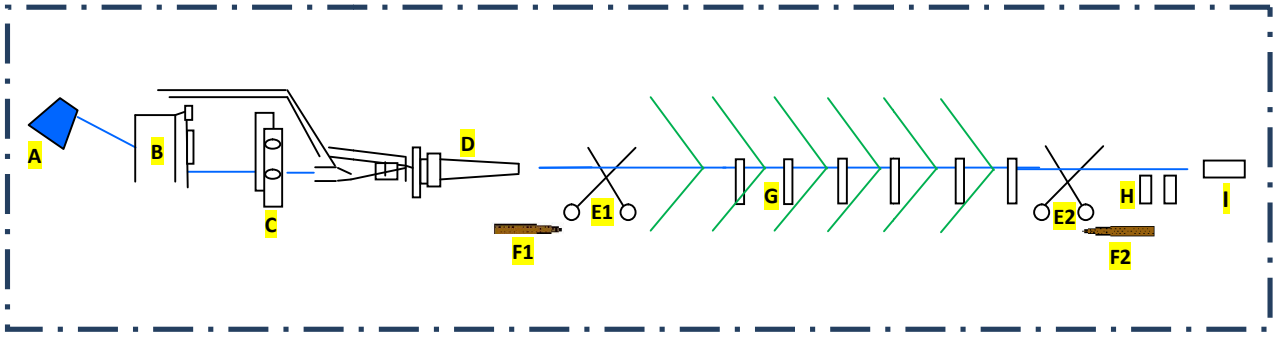
It's the main parts for ***weft insertion***. High air pressure is used to pass the yarn from left to right side of the loom with 620 to 720 picks per minute. Compressed air is supplied from the main valve with 6 bar.No of main nozzle depends of weft insertion limit. Main nozzles are set at 180° angle relative to slay race.

33SUB-NOZZLE-

It's impossible to pass the weft yarn from one side to another side of the loom. So that too many sub-nozzles is used to help to pass the yarn. It's air pressure is less than main nozzle. The head of the sub-nozzles are fitted at 5° angle relative to reed.



Weft incretion ofAir-jet Loom:



A	= Weft Yarn Cone.	**E1**	= Weft Cutter.
B	= EDP.	**F1, F2**	= Temple.
C	= Yarn Guide.	**G**	= Sub-nozzle.
D	= Main Nozzle.	**H**	= Weft Detector.
E1	= Weft cutter.	**I**	= Sensor.
———	= Weft Yarn.	———	= Warp Yarn.

Reed:

Reed is an assemble of thin still wires soldered by plates. It is very sophisticated parts of a loom and needs proper attention for ***handling*** & ***storage.***

Objects of using Reed-

- To control the no. of ends per unit space.
- To beat-up the weft up to the fell of the cloth.

Types of Reed-

- Flat reed : Used in ***Direct warping.***
- V-reed : Used in ***Sectional warping.***
- Profile reed : Used for ***Jet-type loom*** (e.g. Air Jet, Water Jet loom).

al Univ

DENT

PROFILE REED

Reed Count-

Reed count is defined as *number of dents* or *groups of dents* per unit space of reed. Therefore reed count may be expressed by one of the two ways-

- No. of Dent Per Unit space of reed:

SYSTEM	COUNTING METHOD
Stock port	No. of dent per two inch
Red cliff	No. of dent per inch
Metric	No. of dent per decimeter
Hudderfield	No. of dent per inch

- No. of Groups of Dent Per Unit space of reed:

SYSTEM	COUNTING METHOD
Bolton	No. of groups of 20 dent per 24.50 inch
Bradford	No. of groups of 20 dent per 36 inch
Blackburn	No. of groups of 20 dent per 45 inch
Leeds	No. of groups of 19 dent per 9 inch

In sim fabrics Stock port reed count system is used

$$reed\ count = \frac{EPI - shrink\ \%}{number of\ yarn\ per\ dent} \times 2$$

Shrink % depend on fabric design and EPI

NO	WA-COUNT	WE-COUNT	EPI	PPI	DESIGN	REED COUNT	YARN PER DENT	SHRINK %

1	20	16	128	60	3/1 TWILL	58	4	9.375
2	20	16	124	60	3/1 TWILL	78	3	5.645161
3	20	16	128	60	3/1 TWILL	78	3	8.59375
4	20	16 LY	128	60	3/1 TWILL	50	4	21.875
5	16	12+70D	130	46	3/1 TWILL	51.5	4	20.76923
6	20	10	120	60	3/1 TWILL	56	4	6.666667
7	10	10	120	60	3/1 TWILL	54	4	10
8	20	16+70D	128	60	3/1 TWILL	51.5	4	19.53125
9	20	16+70	130	60	3/1 TWILL	51.5	4	20.76923
10	10+10 SLUB	7	82	48	3/1 TWILL	38	3	30.4878
11	20	20	108	58	3/1 TWILL	50	4	7.407407
12	10+10 SLUB	7	84	48	3/1 TWILL	38.3	4	8.809524
13	10	16+70 D	96	56	3/1 TWILL	52	3	18.75
14	7	7	74	40	3/1 TWILL	46	3	6.756757
15	10+10	7	76	48	3/1 TWILL	32	4	15.78947
16	10	7	76	38	3/1 TWILL	46	3	9.210526
17	42/2	20	138	82	3/1 TWILL	64	4	7.246377
18	42/2	20/2	128	64	3/1 TWILL	58	4	9.375
19	16	12	108	56	3/1 TWILL	50	4	7.407407
20	16	10	120	60	3/1 TWILL	56	4	6.666667
21	20	20	108	58	3/1 TWILL	50	4	7.407407
22	16	12	108	56	3/1 TWILL	50	4	7.407407
23	20	20	108	58	3/1 TWILL	50	4	7.407407
24	10	16+70D	96	56	3/1 TWILL	51.5	3	19.53125
25	20	20	104	58	3/1 TWILL	66	3	4.807692
26	10+10S	7	72	48	3/1 TWILL	32	4	11.11111
27	16	12	112	54	3/1 TWILL	52	4	7.142857
28	20	20	112	64	3/1 TWILL	51.5	4	8.035714
29	20	20	108	50	HBT	50	4	7.407407
30	10	10	84	48	RHT	38.3	4	8.809524
31								

32	20	20	100	50	CANVAS	46	4	8
33	16	16	96	43	CANVAS	44	4	8.333333
34	20+20	30+30	140	92	PANAMA CANVAS	64	4	8.571429
35	20+20	10+10	102	54	P-CANVAS	46	4	9.803922
36	60	60	90	58	VOIL	78	2	13.33333
37								
38	20	20	60	60	SHEETING	48	2	20
39								
40	10	10	32	26	SHEETING	60	1	6.25
41								
42	30	30	124	60	2/1 TWILL	56	4	9.677419
43	30	16	132	70	2/2 TWILL	60	4	9.090909
44	20	20	140	84	2/2 TWILL	64	4	8.571429
45								
46	20+20	7	100	38	OXFORD	48	4	4

Selvedge:

In yard goods, the outer edges are constructed so they will not ravel. This finished edge are called ***selvedges (self-edges)*** & for made with heavier & more closely spaced warp yarns than are used in the rest of the fabric by using more or stronger warp yarns or by using a stronger weave.
Selvedge provides strength to fabric for safe handling of the fabric. It does not curl.

Types of Selvedge-

- Plain selvedge.
- Tucked-in selvedge.
- no selvedge.
- Tape selvedge.
- Fused selvedge.

In air jet loom ***Leno selvedge***is mostly used

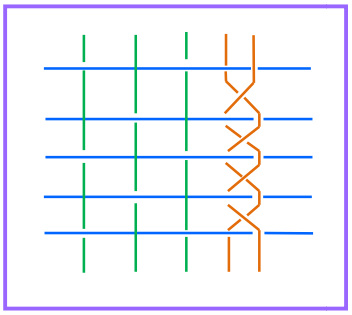
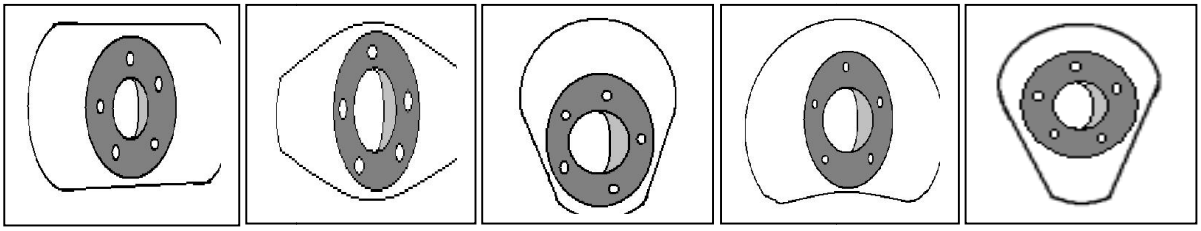


FIG: LENO SELVEDGE

FIG: LENO SELVEDGE DEVICE

Shedding Cam:

Cams are very important device for loom.Its helps to make shade according to drafting plan. According to arrangement of cams on the cam shaft, the heald shafts are lowered and the lifting is done by spring; so the cams are known as negative cam. In case of positive cam ***lifting & lowering*** is done by cam.

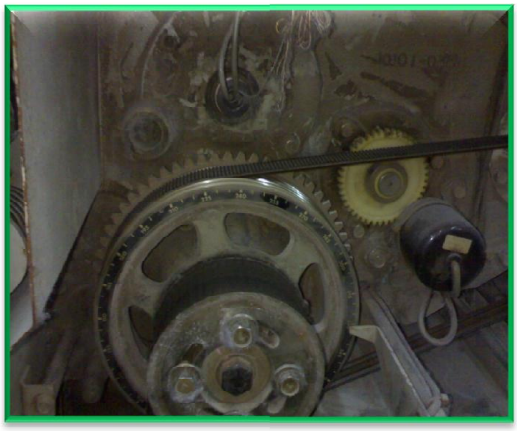


1/1 CAM | 2/1 CAM | 2/2 CAM | 1/4 CAM | 4/1 CAM

The cams are driven by motor by means of a flat belt. When the cams rotate its nose push the shafts which are connected to the heald shaft through some strap.

There are some other devices which need to set before the m/c run.
Like-

- M/C pulley.
- Neck position



M/C PULLEY

DISC CAM

Response to Equipment Faults:

EQUIPMENT FAULTS	RESPONSE
The m/c is locked	Call the maintenance people for loom selection & reject the fabric.

Machine Area Check:

The m/c is cleaned with compressed air in each shift.

Applicable Forms & Documents:

- **FORMS & DOCUMENTS USED-**

  The necessary forms & documents used in weaving department are listed below:
  - Quality Approval Sheet (F53-205-01).
  - Shift Sticker (F53-205-02).
  - Daily weaver wise production & efficiency report (F53-205-01).
  - Doffing/Quality Card (F53-204-01).
  - Grey fabric layout instruction sheet (R43-303-01).

- **DOCUMENT FLOW-**

Document flow for the above document is as follows:

- For all type of yarn dyed fabric & specially designed fabric of solid dyed class, the first meter of fabric is sent to the Quality Assurance Dept. for subsequent test. The Quality Assurance Dept. fills out the Quality Approval Sheet & sends copy to the weaving section after keeping a copy for themselves.
- The shift sticker is used to check loom wise quality, in order to guide motivate the operators to achieve target efficiency.
- Daily weaver wise production & efficiency report is used to calculate the weaver wise
- After knotting is completes the knotting operator make a Doffing/Quality Card, monitoring , name, work order number, beam number, beam length, knotting operators name & date& time of knotting.
- The planning dept. raises the greige fabric layout instruction sheet (Datatex generated) and sends a copy each to the yarn dyeing, winding & weaving section.
- According to the form of the technicians calculate the required setting of pick density, woven design i.e. lifting plan, weft weight, patterning, beam length, cut length etc.

Product Quality Check:

The first meter of fabric is made with normal running & cut off from the loom & checked over an inspection box against light.

The fabric is checked visually for-

- Any wrong pattern setting.
- Any wrong drawing & denting.
- Fabric width, warp and weft density.
- Any other cloth defect.

Any fault found in the fabric is corrected over the loom & it is handed over to the operator for normal running.

Quality Assurance Sample Test:

The first meter of fabric produced is matched with fabric swatch by the customer in terms of design etc.

For all type of yarn dyed fabrics & specially designed fabric of solid dyed class the first meter of fabric is sent to quality control dept. for subsequent test & upon getting quality approval from Quality Control Manager, weaving is started. The Quality Approval Sheet is filled in weaving as a record.

Calculation:

- REQUIRED WARP $= \frac{EPI*Width(inch)*Length(m)*1.0936*(1+crimp\%)*(1+waste\%)}{840*Ne*2.2046}\ KG$

- REQUIRED WEFT = $\frac{PPI*Length(m)*Width(inch)*39.37*(1+crimp\%)*(1+waste\%)}{36*840*Ne*2.2046}\ KG$
- GSM = $\left[\frac{EPI*(1+crimp\%)}{warp\ count}+\frac{PPI*(1+crimp\%)}{weft\ count}\right]23.25$
- GSM = $\left[\frac{EPI}{warp\ count}+\frac{PPI}{weft\ count}\right]24.6\ (Finished\ fabric)$
- GSM = $\left[\frac{EPI}{warp\ count}+\frac{PPI}{weft\ count}\right]25.6\ (Bleached\ fabric)$
- GSM = $\left[\frac{EPI}{warp\ count}+\frac{PPI}{weft\ count}\right]26.6\ (Grey\ fabric)$
- oz per yd^2 = $\left[\frac{EPI\times(1+cimp\%)}{warp\ count}+\frac{PPI\times(1+crimp\%)}{weft\ count}\right]\times 0.686$
- FABRIC WEIGHT = $\left[\frac{EPI*(1+crimp\%)}{warp\ count}+\frac{PPI*(1crimp\%)}{weft\ count}\right]*\left[\frac{Length*Width*23.25*(1+waste\%)}{1000}\right]KG$
- PRODUCTION = $\frac{Picks\ Per\ Meter}{Picks\ Per\ Inch}*Time*no.of\ looms*efficiency*\frac{1}{36}*0.9144$ meter per unit time

Consumption calculation

SIM FABRICS LTD.
Monthly Production Wise
Consumption
July'2014

SL NO	CONSTRUCTION	WIDTH	FABRICS TYPE	TOTAL PRO:(YDS)	Rate	Total Amount	Warp Consumption in Lbs	Weft Consumption in Lbs	Remarks
				.					
1	20x16/128x60	61	TWILL	221,528.90	16.80	3,631,006.51	108,833.98	66,072.97	
4	10x7/80x44	60	TWILL	62,212.92	15.00	923,910.15	39,327.45	31,102.65	
10	20x20/100x50	60	TWILL	458.31	15.00	6,874.65	172.84	91.13	
11	30x20/152x58	62	Canvas	75.45	120.00	9,054.00	30.04	17.40	
12	20x20/100x50	61	Canvas	51,078.29	14.00	702,274.44	19,230.37	10,156.37	
24	20x16/130x60	58	TWILL	66.70	120.00	8,004.00	33.72	19.89	
25	16x12/112x54	60	TWILL	78,356.20	15.12	1,172,976.03	43,282.47	28,044.52	
32	40x40/150x100	59	TWILL	82,378.37	28.00	2,256,717.68	23,752.43	16,380.06	
34	20x20/128x54/56	61	Twill	7,561.97	15.68	115,142.32	3,682.50	1,684.05	
35	16x16+12/112x48	60	Ox ford	663.80	120.00	79,656.00	363.51	211.18	
41	20x20/122x58	61	Canvas	108.26	120.00	12,991.20	51.57	24.97	
53	20x20/84x50	61	TWILL	120.00	120.00	14,400.00	38.11	23.86	
57	30x20/130x70	61	TWILL	58,486.21	19.60	1,098,060.80	19,797.70	16,281.10	
59	20x20+70D/108x58	59	TWILL	60.14	120.00	7,216.80	24.08	15.57	
64	16x10/112x53	60	TWILL	86.39	15.00	1,295.85	48.54	36.42	
67	20x20+16/128x56	61	Ox ford	568.65	120.00	68,238.00	279.37	158.30	

72	20x20+70D/108x58	61	Ly.Twill	217.62	120.00	26,114.40	87.14	56.34	
76	30x20/152x53	62	Canvas	88.58	120.00	10,629.60	35.26	18.67	
78	20x10/118x58	60	H.B. Twill	207.78	120.00	24,933.60	99.79	95.85	
82	30x10/130x60	61	TWILL	4,395.09	16.80	72,496.54	1,533.22	2,097.40	
85	20x20+70D/110x50	67	Ly. Canvas	201.21	120.00	24,145.20	81.65	44.90	
87	20x20/122x60	61	Canvas	6,471.87	16.80	107,680.27	3,082.92	1,544.23	
88	20x12/128x64	60	TWILL	349.94	120.00	41,992.80	174.94	148.44	
89	20x20/100x50	61	TWILL	14,230.98	15.00	211,036.50	5,367.11	2,829.68	
90	20x16/132x62	61	TWILL	277.75	120.00	20,338.80	137.65	85.60	
91	20x20+16/128x60	61	Ox ford	309.48	120.00	37,137.60	152.04	92.01	
			TOTAL:-	**590,560.86**		**10,684,323.74**	**269,700.40**	**177,333.56**	

Date:- 07/08/14

Costing:

In SIM GROUP COSTING RATE 0.28/Pick.

SIM FABRICS LTD
Weaving Dept. At a Glance - Mar '14

Categories	Weaving Shed- 01	Weaving Shed 02	July'14
Avg. RPM	480	425	469
Total Loom	97	23	120
Total Hrs	72,168	17,112	89,280
Possible Pick @ 100% Eff.	2,078,438,400.00	436,356,000.00	2,514,794,400.00
Possible Production in yds @100 % Utilization	910,924.58	213,510.66	1,114,121.21
Possible Weaving Charge in Tk. @100% Utilization	16,583,024.61	3,481,509.14	20,064,533.75
Actual Production in Pick	1,335,198,813.48	136,574,956.08	1,471,773,769.56
Actual Production in Yds	585,203.68	66,824.43	652,028.11
Average Pick	63.38	56.77	62.7

Actual Efficiency	64.24%	31.30%	58.52%
In yds	585,203.68	66,824.43	652,028.11
In Taka	10,653,014.68	1,089,676.68	11,742,691.36
Production Loss	35.76%	68.70%	41.48%
In yds			

	325,742.25	146,684.01	462,086.05
In Taka	5,930,009.93	2,391,832.46	8,321,842.39
Efficiency Loss			
Electrical	2,680 'Hrs	1,452 'Hrs	4,132 'Hrs
	3.71%	8.49%	4.63%
In yds	33,827.71	18,116.96	51,563.05
In Taka	615,820.11	295,415.57	928,613.95
Mechanical (Maintenance+Parts Short)	1,902 'Hrs	688 'Hrs	2,590 'Hrs
	2.64%	4.02%	2.90%
In yds	24,007.57	8,584.35	32,320.50
In Taka	437,048.45	139,976.52	582,069.25
Knotting/Gaiting/Article	2,412 'Hrs	590 'Hrs	3,002 'Hrs
	3.34%	3.45%	3.36%
In yds	30,444.94	7,361.58	37,461.83
In Taka	554,238.10	120,038.01	674,660.96
Beam Short	1,546 'Hrs	520 'Hrs	2,066 'Hrs
	2.14%	3.04%	2.31%
In yds	19,514.04	6,488.17	25,781.52
In Taka	355,245.48	105,796.21	464,306.98
Air Pressure/Generator	1,850 'Hrs	1,276 'Hrs	3,126 'Hrs
	2.56%	7.46%	3.50%
In yds	23351.21489	15920.96765	39,009.22
In Taka	425099.71	259607.62	702,528.37
Weavers Short	482 'Hrs	402 'Hrs	884 'Hrs
	0.67%	2.35%	0.99%
In yds	6,083.94	5,015.85	11,031.40
In Taka	110,755.71	81,788.61	198,667.65
Weft Yarn Short	872 'Hrs	250 'Hrs	1,122 'Hrs
	1.21%	1.46%	1.26%
In yds	11,006.63	3,119.31	14,001.39
In Taka	200,371.32	50,863.56	252,155.09
Friday Prayer	600 'Hrs	150 'Hrs	750 'Hrs
	0.83%	0.88%	0.84%

	In yds	7,573.37	1,871.59	9,359.22
	In Taka	137,870.17	30,518.14	168,552.87
Others (Process Loss in every Issues)		2,865 'Hrs	1,254 'Hrs	4,119 'Hrs
		3.97%	7.33%	4.61%
	In yds	36,162.83	15,646.47	51,400.82
	In Taka	658,330.08	255,131.63	925,692.37
Total =		21.07%	38.46%	24.41%
	In yds	191,972.23	82,125.24	271,928.94
	In Taka	3,494,779.14	1,339,135.88	4,897,247.48
Running Efficiency		78.93%	61.54%	75.59%
	In yds	718,952.35	131,385.41	842,192.28
	In Taka	13,088,245.47	2,142,373.26	15,167,286.27
Possible Warp & Weft Mending Time		14.69%	30.24%	17.07%
	In yds	133,770.02	64,558.77	190,157.11
	In Taka	2,435,230.79	1,052,696.58	3,424,594.91

INSPECTION

Inspection means check accurateness of anything to ensure its desired quality. It's most important stage in woven fabric manufacturing process.

Objects:

- To know the faults of woven fabric.
- To assign penalty points for each fault.
- To take accept or reject decision.

Grey Fabric Inspection

Process Definition:

- Grey fabric inspection is the process of identifying weaving faults in the fabric just after the grey
- fabric production in the loom.

Equipment:

- 1. Inspection table
- 2. Fabric inspection machine(Nazer, L 90P, Pakistan)

Key Accessories

- Nipper, Pointer, Cutter, Comb etc.

Safety measures:

- 1. Smoking inside the inspection area is strictly prohibited.
- 2. Fire extinguishers are placed in the inspection area and all are trained to use it.
- 3. No fabric stack is placed in front of electric panels.

Inspection procedure

Operation staff:

- Cloth doffer, cloth mender, inspector

Machine set up:

Machine set up	Parameter range	Set value
1) Roller speed	100-1500 rev/hour.	590-600 rev/hour.
2) Light	N/A	Artificial light
3) Length measuring meter	N/A	Attached with the machine.

Checks list before inspection:

1. Machine parameters are set
2. Man power is made available
3. All the tools/accessories are made available
4. Fabric is made ready for inspection.

Method:

1. As the fabric reaches its "set cut length" in the loom the cloth is cut and the cloth roll is doffed off from the loom.
2. The cloth roll might also be cut and doffed off before the preset length as and when it is needed.
3. According to set rule the "cloth doffer" cuts and doffs off cloth roll and record the doff lengthen the loom quality/doffing card and also sticks a doffing stickers over the cloth roll for identification.

4. The roll is then unrolled over the inspection table where it is visually checked yard to yard(100%) against light and repaired or mended for any smaller extent of faults like protruding or projecting yarn, yarn naps, slubs, crack, floats, oil stains which can't be repaired, the fault area is identified by putting yarn tails or laces in the selvedge area.
5. The mended fabric is then inspected over the grey fabric inspection machine visually against light in a pre-set speed (m/min).

Investigation:

In the inspection table the operator finds out faults in the fabric and analyses their intensity by visual inspection. Some of the common weaving faults are:

1. Stop mark
2. Pick faults, e.g.-miss pick and double pick.
3. Wrong density /drawing
4. Pattern or design break
5. Selvedge faults, e.g.-lashing in, cut selvedge.
6. Oil stain.
7. Crack, hole
8. Missing ends
9. Slubs.

As per standard, designed and set by Q.C. department of SIM, the intensity of some of the major and common weaving faults are marked with points (Numerical value) ranging 1 to 6,6being the highestpoint for every faults. The defects found and the points given against them are recorded in the grey fabric inspection sheet in the case of solid dyed fabric and in yarn dyed fabric inspection sheet for yarn dyed fabric. The measured length, fabric sort, yarn lot, machine number etc. are also written down at the tail end of each fabric piece. Apart from these two forms another from called grey fabric inspection daily production sheet is filled to keep the record of total inspected grey fabric in the shifts in a day. At the bottom of this sheet total amount of rejection is also shown. All the data entered in this form are done according to various sort, construction and quality.

Acceptance of fabric:

- Any piece of fabric with the rating of total 36 points faults per 100 linear meter is allowed topass as 'A' grade fabric. 36-50 is the point range for 'B' grade fabric.
- Any piece having more than 50 points is graded as 'C' which is rejected.
- A minimum of 20 meter 'A' grade fabric is allowed to pass with other long pieces. Pieces less than 20 meter is recorded as cut pieces.

Rejection of fabric:

Any area of the fabric that contains-

1. Objectionable (too frequent) presence of weaving faults like stop/starting mark and pickfaults.
2. Oil or grease spot.
3. Crack/holes, floats and warp end miss etc. are cut to a separate pieces and recorded asrejected.

Any fabric having points more than 50 is graded as "C" and also rejected.

Q.C. Sample test:
Q.C department of BTL monitors all these checks and recording systems.

Response to weaving faults:

As a response to any weaving faults and rejection , cloth inspector directly contacts with the head orin charge of the weaving department along with his report for immediate remedial measures.

Response to equipment faults:

Faults	Response
1) Pin faults 2) Disturbance in roller tape 3) Disturbance in motor belt 4) Failure in the digital monitor 5) Fuse malfunction 6) Any electrical disturbance.	To inform maintenance, Mechanical Engineer

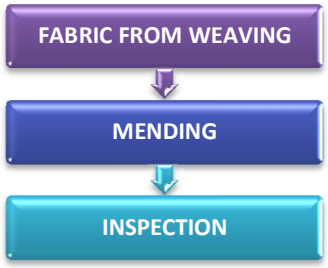
Machine area cleaning:

Inspection area is cleaned twice a day by the helpers.

Storage:

The grey fabrics thus inspected are piled separately according to lot and sort/quality or constructionand to store; store upon receiving the production sheet physically checks and receives the fabric.

Inspection procedure:



Equipment:

- **M/C NAME : NAZER FABRIC INSPECTION M/C.**
  ORIGIN : PAKISTAN.
  M/C RPM : 17.
  M/C PARTS :
  - ✓ Inspection board.
  - ✓ Counting meter.
  - ✓ Light.

FABRIC INSPECTION M/C

4 – Point Grading System:

In this system a maximum of four penalty points can be assessed for a defect & that no linear meter can be assigned no more than four points regardless of number of defects within that piece.

Penalty Point Evolution:

DEFECT RANGE	PENALTY POINT
Up to 3 inches	1 point
>3 inches upto 6 inches	2 point
>6 inches upto 9 inches	3 point
Above 9 inches	4 point

Grading System:

- Linear yard basis-
  Acceptable tolerance = 20 points per 100 linear yard.
- Square yard basis-
  Points/100 sq. yd = (Total points X 100 X 36)/(Width of roll in inch X inspected length in inch)

Types of Fault:

- **Spinning Or Yarn Faults-**
  - ✓ Slubs.
  - ✓ Yarn contamination (coarse yarn, thick-thin place).

- **Weaving Faults-**
  - ✓ *Warp way defect:*
    - Straight mark.
    - Long float.
    - Missing warp.
    - Double yarn.
    - Loose warn.
    - Tangle warp.
    - Reed mark.
    - Defective selvedge.
  - ✓ *Weft way defect:*
    - Starting mark.
    - Stop mark.
    - Miss pick.
    - Double pick.
    - Crease mark.
  - ✓ *Others defect:*
    - Loss yarn.
    - Hole/Tear.
    - Oil spot.
    - Design fault.
    - Size stained.
    - Mending.
    - Float/Zhala.
    - Rib card.
    - Patta.
    - Dirty mark.
  - ✓ *Yarn dyeing defect:*
    - Shade variation.

Points for Different Faults:

FAULTS	RESPONSE
Stop/Starting mark	4 Points
Thick/Thin warp or weft yarn	4 Points
All holes regardless the size	4 Points*
Slub: 0-3” of length	1 Points
Slub: 3”-6” of length	2 Points
Oil spots**:up to 5 mm dia	1 Points
Oil spots : 6 to 10 mm dia	2 Points

Oil spots : More than 10 mm dia	4 Points
Loose or tight warp	Point will be consider according to fault size
Miss pick/Double pick	4 Points
Cut pick/Broken pick	Point will be consider according to fault size
Yarn contamination : up to 0.5 of length	1 Points
Yarn contamination : above to 0.5 of length	2 Points
Neps	1 Points
Smash	1 Points
Knot	1 Points
Crease mark	Fabric with crease mark will be rejected but light crease may be acceptable.
Dirty mark : up to 5 mm dia	1 Points
Dirty mark : up to 10 mm dia	2 Points
Dirty mark : above 5 mm dia	4 Points
Design fault	4 Points
Patta	4 Points

=two or more broken yarn in same place is considered as Hole.
****=oil spot should be removed using the spot lifter if possible.***

QUALITY CONTROL

SIM has more concern about quality. In this factory quality assurance is more preferred than quality control, but both are in advancement. The Quality Assurance Department is assigned to maintain consistently uniform quality of the material in process and various stages of its manufacturing.

Object of Quality Control:

- RESEARCH.
- SELECTION OF RAW MATERIALS.
- PROCESS CONTROL.
- PROCESS DEVELOPMENT.
- PRODUCT TESTING.
- SPECIFICATION TEST.

Scope of Quality Control:

- TESTING LAB.
- MACHINE AUDITING SYSTEM.

- A GOOD TRAINING SYSTEM.
- EXCELLENT ANALYTICAL BACKUP.
- TECHNICAL EXPERTISE.

Quality Management System:

Quality Assurance-

1. On Line Quality Assurance.
2. Off Line Quality Assurance.

ON LINE TEST:

- oz/yd^2 of the Fabric;
- Exact Length and Width;
- Grey Fabric Inspection (4 point);
- Skew and Bow;
- Visual appearance;
- Design of the fabric.

OFF LINE TEST:

All the Off Line tests for finished fabrics can be grouped as follows-

1. Physical Tests.
2. Chemical Tests.

Physical Tests:

- Rubbing Fastness or Crocking;
- Pilling test;
- Diameter and Width;
- Tensile strength;
- Tearing test;
- Light Fastness test;
- Drape, Stiffness, and Handle;
- Picks per inch;
- Ends per inch.

Chemical Tests:

- Shrinkage;
- Fastness to Washing;
- Fastness to Perspiration;
- Fastness to Chlorine;

Quality Assurance Items:

ITEM NO	DESCRIPTION.
01	ALPHA TEN.
02	1000N LOADCELL.
03	ACCUDRY.

04	ELMATEAR.
05	ELMADROP.
06	INCUBATOR OVEN
07	HAND CROCKMETER
08	MIELE ROTARY IRON
09	NU MARTINDALE
10	PERSPIROMETER
11	ELECTROLUX WASCATOR
12	GYROWASH
13	TITAN

MAINTENANCE

MAINTENANCE OF WINDING

Maintenance Points:

1. Gear and gear box.
2. Motor and motor belt.
3. Different sensor.
4. Lubrication.
5. Cleaning different parts which are covered by fibre and dust.

Types of Maintenance:

- CLEANING:
  During winding there gathered so many fly of fibre on the m/c. This fly will hamper the smooth running of the m/c. If those fly present in the winding zone the quality of the fabric will decrease. So cleaning is preformed on the whole m/c after a short time frequency.

- OILING:
  In rapier m/c there are so many gear boxes. Those gears are impregnated in the oil bath. During rotation there will be produce heat. To remove this heat and friction oil is used. It is special type of oil. If oil is not used the gear will broken after a certain time. Oiling is done automatically in the m/c.

- REPLACEMENT:

After smooth running there will be possibility of damage on broken of m/c parts. Many parts during winding will be broken on damaged because of high speed rotation. So, replacement is preformed after certain time.

- OVERHAULING:
  After several days of production the over hauling is performed. Over hauling is performed by a skilled maintenance personnel, maintenance is done in every frictional points, every damaged parts will replaced by a new parts. Overhauling helps the smooth running of the m/c.

- GREASING:
  There are so many frictional points in the machine. During high speed rotation there is decay of rotating parts and heat may produce. To minimize the decay and heat Grease is used which minimize the heat and provides smooth running of the parts.

MAINTENANCE OF WARPING

Maintenance Points:

1. Gear and gear box.
2. Motor and motor belt.
3. Different sensor.
4. Lubrication.
5. Cleaning different parts which are covered by fibre and dust.
6. Tension device & guide.

Types of Maintenance:

- CLEANING:
  During warping there gathered so many fly of fibre on the m/c. this fly will hampered the smooth running of the m/c. If those fly present in the warping zone the quality of the fabric will decrease. So cleaning is preformed on the whole m/c after a short time frequency.

- OILING:
  In warping m/c there are some gear boxes. Those gears are impregnated in the oil bath. During rotation there will be produce heat. To remove this heat and friction oil is used. It is special type of oil. If oil is not used the gear will broken after a certain time. Oiling is done automatically in the m/c.

- REPLACEMENT:
  After smooth running there will be possibility of damage on broken of m/c parts. Many parts during warping will be broken on damaged because of high speed rotation. So, replacement is preformed after certain time.

- OVERHAULING:

After several days of production the over hauling is performed. Over hauling is performed by a skilled maintenance personnel, maintenance is done in every frictional points, every damaged parts will replaced by a new parts. Overhauling helps the smooth running of the m/c.

- GREASING:
There are so many frictional points in the machine. During high speed rotation there is decay of rotating parts and heat may produce. To minimize the decay and heat Grease is used which minimize the heat and provides smooth running of the parts.

- MAINTENANCE ON CREEL:
There is used special type creel in sectional warping. The creel has so many guides. These guides will fill up with fly which prevents the smooth passing of yarn through it. As a result ends breakage increases. So the guides and stop motions are always keep clean by air flow.

MAINTENANCE OF SIZING MACHINE

Maintenance Points:

1. Gear and gear box.
2. Motor and motor belt.
3. Different sensor.
4. Lubrication.
5. Cleaning different parts which are covered by fibre and dust.

Types of Maintenance:

- CLEANING:
During sizing there gathered so many fly of fibre on the m/c. This fly will hamper the smooth running of the m/c. If those fly present in the sizing zone the quality of the fabric will decrease. So cleaning is preformed on the whole m/c after a short time frequency.

- OILING:
In sizing m/c there are so many gear boxes. Those gears are impregnated in the oil bath. During rotation there will be produce heat. To remove this heat and friction oil is used. It is special type of oil. If oil is not used the gear will broken after a certain time. Oiling is done automatically in the m/c.

- REPLACEMENT:
  Broke gear or bearing will changed by a new one. In sizing m/c there are squeezing rollers, which are made of iron with rubber or special types of coated.In contact of heat the coating of the roller may damaged. So this roller will be replaced after a bulk production. The cylinder in drying unit after a certain time also be replaced.

- OVERHAULING:
  After several days of production the over hauling is performed. Over hauling is performed by a skilled maintenance personnel, maintenance is done in every frictional points, every damaged parts will replaced by a new parts. Overhauling helps the smooth running of the m/c.

- GREASING:
  There are so many frictional points in the machine. During high speed rotation there is decay of rotating parts and heat may produce. To minimize the decay and heat Grease is used which minimize the heat and provides smooth running of the parts.

MAINTENANCE OF AIR JET

Daily Electrical Maintenance Task List:

- Loom to loom walk around & observation of any wrong thing i.e. cable misplacing etc.
- Cleaning of pre winder.
- Checking & observation of any abnormal sound in motor etc.
- Checking of burnt indication.

Types of Maintenance:

- Daily.
- Monthly.
- Yearly.
- Preventive maintenance.

Responsible Department/Staff:

- Foreman.
- Technician.
- Assistant technician.
- Oil man.

Preventive Maintenance Planning:

- EARLY NOTIFICATION:

  No early notification is given.

- PREVENTIVE MAINTENANCE SCHEDULING:

A daily, monthly & yearly scheduling maintained. Every time a beam is changed a routine maintenance is carried out on each beam. Besides oiling & greasing of different days of the week, a monthly schedule of oil change is maintained. Oil is changed for the first time when the m/c is new. Three months after that is the second time oil is changed on the same m/c, an interval of six months after that is maintained which is the third time for changing oil on the same m/c. having completed this phase an interval of one year is the standard time for changing dismantling, checking & cleaning f different parts of the air jet loom m/c

Information Collection for Additional Preventive Maintenance (APM):

REPORT FROM SHIFT TECHNICIANS-
General shift & shift technician write down their report on the problems that they face. The logbook is checked &signed by Senior technician & Asst. Manager; maintenance for further checking & necessary action.

Material/Spare Parts Checking List:

Any uses or spare parts as replacement of the damaged ones are recorded in a register. The Asst. Manager checks the stock level of consumable items &makes plan for procurement when the minimum ordering quantity level is reached.

Safety Measures for Preventive Maintenance:

Engineer team takes a following safety measure before or during a preventive maintenance or repair work-

- Know how to treat victims of electric friction.
- Before working on electrical component ensures power is off &earthling check is done.
- In case of emergency, if work is necessary on power-on-lines (i.e. Hot line), use rubber shoe & gloves.
- Pair to the electrical work on the m/c informs the production or any one working in the area.
- While electrical work is going on post a sign stating "*do not switch on power*".
- Don't bypass any electrical circuit or component that may require to compromise safety, e.g. *thermostat, overload protection safety switches, temperature relay for motors etc.*
- If bypass is done under emergency condition close observations should be done as soon as possible.
- Don't make any wire link in place of fuse.
- Use properly insulated head tools.

- Use appropriate hand tool during work.
- Avoid loose contacts for electrical wiring.

Daily Maintenance Test List:

- Checking the left & right selvedge for looseness due to wrong denting of leno selvedge.
- Fault checking in the woven fabric & working sure that there are no fabric fault like-
  - Double pick.
  - Miss pick.
  - Stop mark.
  - Weft loose.
  - Temple mark.
  - Reed mark.
- Checking the feeler eyes cable, make sure that there is no fluff over the feeler eye & the cable is not loose.
- Checking the warp sheet opening & closing, make sure that the cycle it is following is of the required specific degree (0^0-90^0-170^0-290^0).
- Checking for abnormal noise, also any loose nut & bolt.
- Checking of warp & weft stop. Remove the cause if those are above the standard. The standard stops are **25, 20, 15**for weft feeler 1, warp, and weft feeler 2 respectively.
- Checking oils leakage from cam box, dobby, gear box & let-off box.

Lubrication:

USED OIL IN CAM BOX = G.R. XP-150.
CAM BOX CAPACITY = 7.5 Lit.

Lubrication Position:

- Easing arm.
- Cutter bracket.
- Shedding spring cleaning.
- Leno greasing.
- Jack lever.
- Upper & lower frame guide.
- Intermediate gear.
- Press roller.
- Standard gear.

- Change gear.
- Let-off gear.
- Leno gear.
- Cloth roller chain.
- Cam box.

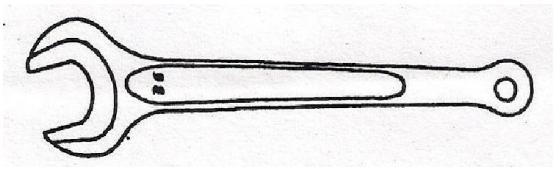
Maintenance Tools:

- Ratchet (6 – 32 No. Nut): To open and tight the screw.
  - Ring.
  - Duly.

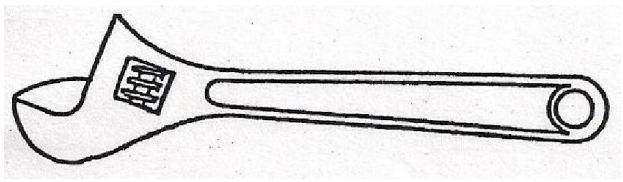
- L-Key (1.5,2,2.5,3,4,5,6,7,8,10,12,22)
  - T-L-key.
  - L-L-Key: To open L-Key Volt.

- Hammer:
  - Plastic Hammer: Use in Reed, Cam.
  - Iron Hammer.

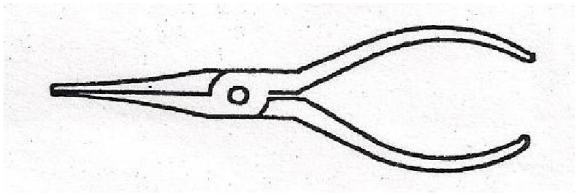
- Pressure gauge: To measure pressure.
- Sub-nozzle gauge.
- Star-Screwdriver.
- Positive Screwdriver.
- Negative Screwdriver.
- Polar : To open the pulley.
- T-Rod : To help other measurement.
- Hydraulic jack : To level the heald shaft.
- Easing rod (Easing amount).
- Spring hanger : To open and close the spring.
- Plus(+,-)
- Combination tools (Spanner) : Tightening & Loosening of Nuts & bolts



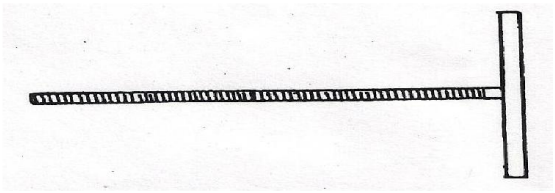
- Wrench: Tightening & Loosening of Nuts & bolt



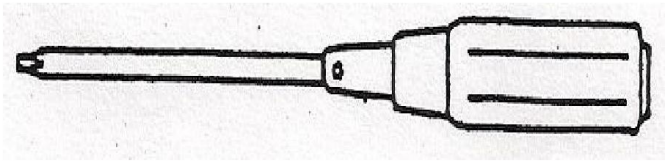
- Pliers: Tightening & Loosening of Nuts & bolts



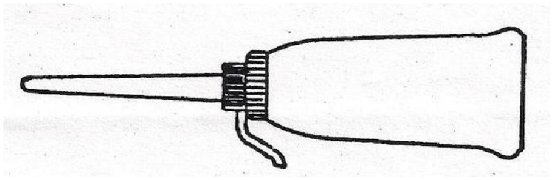
- Pipe Cutting Tools: For Pipe Cutting.



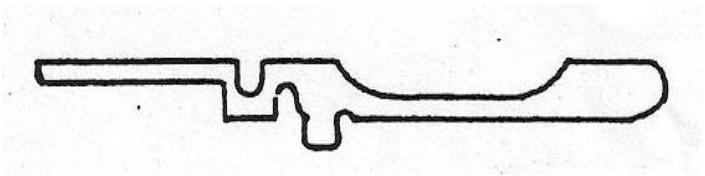
- Divider:For circle marking on metal & wood



- Oil Can: Oiling of moving Parts.



- Hacksaw blade: For metal Cutting. Hacksaw blade



LOOM SETTING FOR A CONSTRUCTION (40X40/110X70)

WEFT RELATED

E.D.P.	COLOR	1	2	3	4	5	6
<PIN >	Opening Angle	80°	80°	90°	80°	80°	80°
	Closing Datum Angle	136°	136°	136°	136°	136°	136°
	Closing delay Angle	45	15	15	45	45	45
	Closing Control Mode	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO
<DRUM>	Turn/Pick	3	3	3	3	3	3
	Base Turns	22	22	22	22	22	22
	Amp Gain	3	2	3	3	3	3
	Winding Sensor	2	2	2	2	2	2

NOZZLE RELATED

COLOR	1	2	3	4	5	6
Main Nozzle	110°-170°	110°-170°	110°-170°	110°-170°	110°-170°	110°-170°
Tendum Nozzle	105°-160°	105°-160°	105°-160°	105°-160°	105°-160°	105°-160°
Magnet Weft Cutter	25°-205°	30°-210°	35°-215°	25°-205°	30°-210°	35°-215°
Cutting Blow	10°-50°	10°-50°	10°-50°	10°-50°	10°-50°	10°-50°
Stretch	0°-0°	0°-0°	0°-0°	0°-0°	0°-0°	0°-0°
Sub-Valve 1	100°-150°	100°-150°	100°-150°	100°-150°	100°-150°	100°-150°
Sub-Valve 2	120°-170°	120°-170°	120°-170°	120°-170°	120°-170°	120°-170°
Sub-Valve 3	137°-187°	137°-187°	137°-187°	137°-187°	137°-187°	137°-187°
Sub-Valve 4	155°-205°	155°-205°	155°-205°	155°-205°	155°-205°	155°-205°
Sub-Valve 5	173°-223°	173°-223°	173°-223°	173°-223°	173°-223°	173°-223°
Sub-Valve 6	186°-236°	186°-236°	186°-236°	186°-236°	186°-236°	186°-236°
Sub-Valve 7	199°-300°	199°-300°	199°-300°	199°-300°	199°-300°	199°-300°
Sub-Valve 8	212°-300°	212°-300°	212°-300°	212°-300°	212°-300°	212°-300°

LET-OFF

Weft Density	68 Per Inch
Warp Tension	180Kg
Beam Dia	1000 mm

BASIC SET

	WAPR STOP	WEFT STOP
Start Angle	300°	300°
Stop Angle	300°	300°
Time Delta On	120 ms	120 ms

Reversing Angle at Weft Stop	170°
Reverse Creep Stop Angle	180°
Machine Speed	510 RPM
Machine Angle	300°

UTILITIES

Production and profit are closely related. In order to get a quality final product, so it needs to input fresh raw materials as well as effective manpower and machinery in good working condition. Utility in conjunction with three M's play a vital role to maximize the production as well as the profit.

Utility Department is related to the following things:

Power supply:

1. By ***Generator.***
2. From ***Rural Electrification Board (REB).***

Water pump.
Gas supply TITAS.
Steam supply (by boiler).
Compressed air supply (by air compressor).
Chiller.

POWER *SUPPLY (GENERATOR):*

One that generates, especially a machine that converts mechanical energy into electrical energy. A function generator is a device that can produce various patterns of voltage at a variety of frequencies and amplitudes. It is used to test the response of circuits to common input signals. Theelectrical leads from the device are attached to the ground and signal input terminals of the device under test.

SPECIFICATION:

Brand	Wartsila-France
Model number	VHP 5904GSID
Cylinder used	16
Overall efficiency	80%
Weight	17600 kg
Rpm	1000
Ignition pressure	90 bar
Source of energy	Natural gas
Stroke of engine	176mm
Cylinder capacity	71.6 dm^3

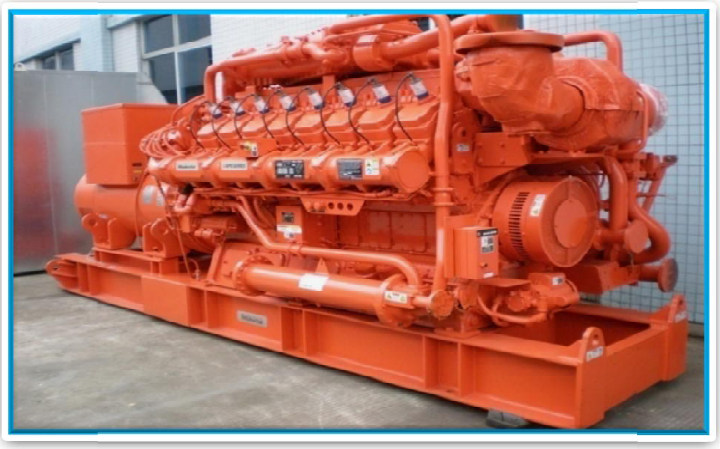


FIG: WARTSLIA GAS GENERATOR

STEAM SUPPLY (BOILER):

A steam generator or boiler is usually a closed vessel made steel for supplying steam. Boiler function is to therefore the heat produced by the combustion of fuel (here gas is used) to water and ultimately to generate steam. The steam produced in the boiler section supplied to different section of mill. They are: Sizing, Finishing, Dyeing unit, washing unit, Chiller.

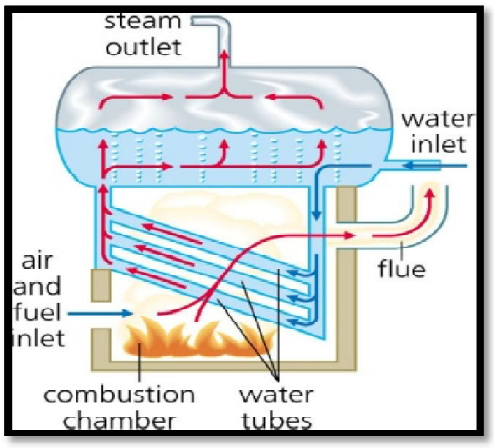


FIG: BOILER SCHEMATIC

SPECIFICATION:

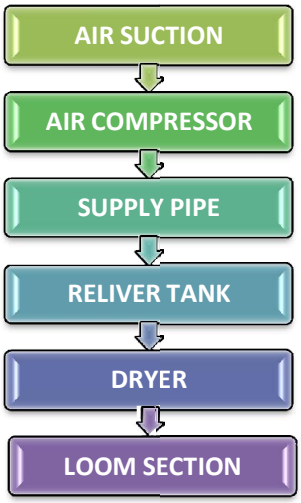
Brand	SHELLMAXl
Type no.	SM 80C/10.54/5
Origin	Thermax Ltd. India
Design production	10.54 kg/cm2
Evaporation	5000kg/hr. F&A 100˚C
Output	3.1375 MW
Fuel	FO/Gas
Maximum temp.	183°c
Year of manufacture	2005

FIG: BOILER

AIR COMPRESSOR:

An air compressor converts electrical power / gas into kinetic energy by pressurizing & compressing air, which is then released in quick bursts. There are numerous methods of air compression, divided into either positive-displacement or negative-displacement. It runs tools and machinery, provides power for material handling system and ensures clean breathable air in contaminated environment. There are two main types of air compressor's pumps: Oil lubed and oil-less.

PROCESS SEQUENCE OF AIRCOMPRESSOR:



SPECIFICATION:

MACHINE	AIR COMPRESSOR
Brand	Screw, Shanghai, Chaina
Model	SGR1000-8/SLS
Rated power of motor	75kw
Rated power of exhausting air	0.8 MPa
Maximum working pressure	10 bar
Volume of flow	13m3/min
Net weight	1870 kg
Year of manufacture	2009-09-29
Dimension	2200*1360*1755
Energy	Electricity

FIG: AIR COMPRESSOR

CHILLER:

A chiller can be generally classified as a refrigeration system that cools water. Similar to an air conditioner, a chiller uses either a vapor compression or absorption cycle to cool. Once cooled, chilled water has a verity of application from space cooling to process use.

There are two types of chiller:

1. Vaporization Chiller
2. Absorption Chiller

In **SIM**"***Absorption"***type of chiller is used.

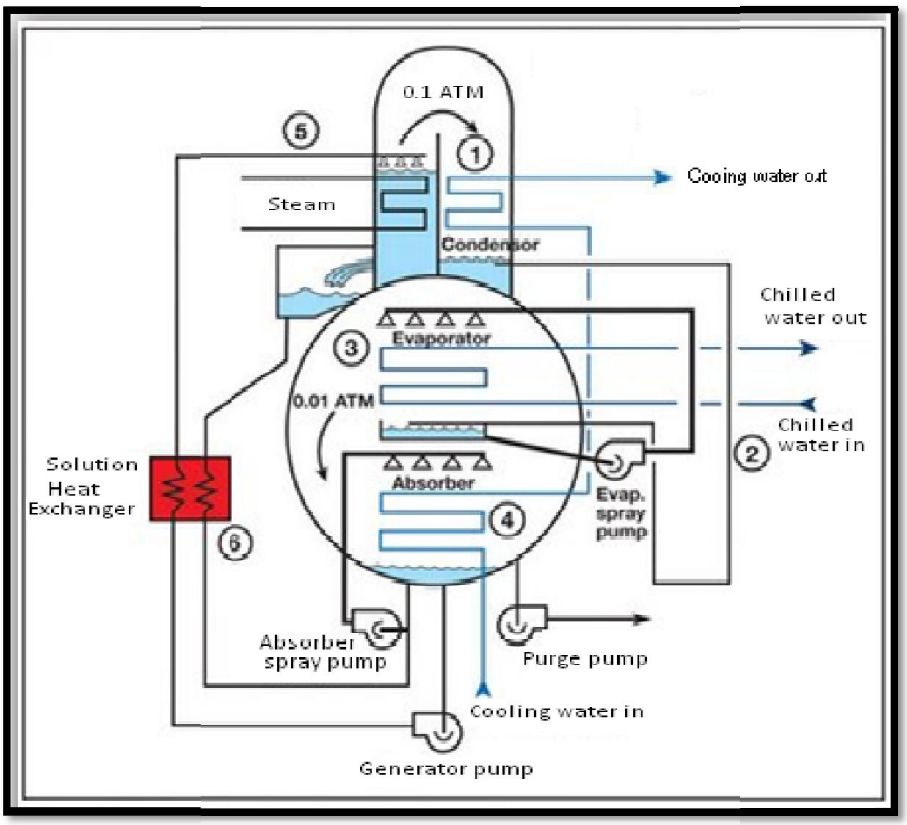


FIG: CHILLER SCHEMATIC

SPECIFICATION:

Brand	Thermaxabsorption chiller, India
Model	N_G-13 ml
Chiller water flow rate	90.7 m^3/h
Max^{m}water pressure for chilled water system	0.8 Mpa
Cooling water flow rate	150 m^3/h
Max^{m}water pressure for cooling water system	0.8 Mpa
System consumption	645 Kg/h
Refrigeration capacity	527 KW
Chiller water inlet/outlet temp.	12-7^{o}C
Cooling water inlet/outlet temp.	32-37^{o}C
Electric source	3 amp, 400V, 50Hz
Manufacturing date	June, 2006
Chemical used	Shell Turbo-T-68 Grease Naclo 7328 & 7330

FIG: CHILLER

STORE & INVENTORY CONTROL

Frequency of inventory control:

- Monthly inventory control
- Annual inventory control

Scope of inventory control:

- Raw materials
  - Dyes store
  - Others chemicals store
  - Grey fabrics
- Finished fabric
- spare parts
- General store

  Capital equipment

  Accessories

  Stationary

  Maintenance parts.

Inventory system for raw materials:

- Raw materials partially received from production planning & directly from head office.
- Material Receiving & Inspection Report (MRIR) is prepared. Received quantity is mentioned & noted down.
- Submitted to QC department. Some are OK & few rejected.
- Entry of data of goods in DATATEX.
- Goods are arranged according to OK or rejected group.
- Department gives store requisition to warehouse.
- As per requisition materials supplied & this record is noted down.

Stages of grey fabric inventory control:

- After weaving production
- Grey inspection
- Warehouse
- Batch preparation
- Dye house.

Stages of finished fabric inventory control:

- Finishing section
- After final inspection
- Warehouse.

Remarks:

- The inventory system of covers both weaving & dyeing inventories.
- The space is noticed to be insufficient considerably.
- An expansion of space is thus desired for sound inventory.

COST ANALYSIS

Costing of the product:

Costing system mainly describes how the cost of the final product is fixed by the company/benificiar. According to buyers/customers requirement at first the fabric is collected from local and foreign suppliers .then it is calculated how much dyestuff and chemical is required till the end of the processing of that specific fabric. After that, the final cost is fixed including some profit. Then the unit price is offered to the buyer for approval. If the buyer approves it, all the transaction of money is carried out by bank.

Factors of costing of a product:

The following factors are considered for costing any dyed product.

- Total dyes and chemical cost.
- Total utility cost
- Salary
- Lunch
- Entertainment cost
- Government cash incentive
- Yarn cost

Weavingcost :

- Cost of weaving
- Cost of finishing
- Labor cost (direct & indirect)
- Factory cost

- Sales and caring cost
- Others cost

Price of the Product : Are not available.

Cost of different Utilities:

Electricity Cost:

Gas generator = 2.70 TK/KW- HR

Diesel generator = 6.50 TK/ KW-HR

Gas Cost:

4.94 TK/m3 for boiler

3.66 TK/m3 for generator

4.6 TK/m3 for domestic Purpose

Steam Cost:

4.20 TK/ m3 Kg fabric.

Packing

1. Poly bag (6 pcs in 1 poly)
2. Carton sticker.
3. Carton (36 pcs per carton)

Finishing packing

1. Gum tape for dust
2. Gum tape for carton
3. Scotch tape

Remarks:

The costing of the product is a secret matter of the Ind. They are not interested to flash up the cost related data. So we could not collect the price of product & costing of the product.

MARKETING

Consumer of the products:

It is a100% export oriented industry. All the goods produced in this industry are exported into various foreign countries. Name of the main buyers of the products of the industry are given below:

1.JC Penney	8.Sick A
2.Macy's	9.Marks &Spancer
3.Zara	10.ARIZONA
4.Wear me	11.IZOD
5.Warnaco	12.ARROW
6.PVH	13.Calvin Klein
7.River Island	14.YELLOW(Home)
15.H&M.	18. MAX
16.Bershka	19. NEXT
17.C& A	20. POLLEN BEAR

Product label:

Product label differs from buyer to buyer. The product labels are prepared according to fabric criteria and the buyer requirements.

Package size and label:

Package size and label differs from buyer to buyer. The package size and labels are prepared according to fabric criteria and the buyer requirements.

Local Market:

It is a100% export oriented industry. All the goods produced in this industry are exported into various foreign countries. So, goods are not supplied into local markets.

Importing countries:

The countries which are importing goods are given below:

1. USA.
2. Canada.
3. Germany.
4. Europian countries.

Marketing Strategy:

Marketing strategy is a very important factors to sale the products to the buyer. Mainly senior marketing officers, merchandiser and higher deal with buyer. There are some fixed buyers of the industry. The buyers give their orders continuously all over the year. The marketing officers and by both side understanding the rate and the order quantity are fixed.

Duties& responsibilities of marketing officer:

The main duties and responsibilities of marketing officer are given bellow:

- To prepare cost sheet by dealing with the buyer.
- To take different steps by discussing with the high officials and merchandiser.
- To maintain a regular & good relationship between commercial officer & merchandiser.
- To maintain a regular communication with the buyers & buying houses.
- Communicate with the new buyer.
- Display the criteria of the products.

Actually the responsibilities & duties of marketing officer begins from getting order of buyer & ends after receiving goods by the buyer. so he should be always smart, energetic & sincere.

Remarks:

It has a well learned marketing & merchandising team. They always communicate with the buyers. The marketing section also looks for the quality & quantity buyers.

Major Buyers:

Calvin Klein

VAN Heusen

Springfield

C&A

J.C. Penny

Arizona

GeofforyBeene

Zara

IZOD

Next

St. Johns Bay Mother Care Arrow

H & M J. Ferrar Decree

Bershka ESPIRIT CHAPS

Tom Tailor DKNYLevis

Industrial attachment program gives me to the expected destiny of practical life. After completing of seven weeks industrial training at Sim Fabrics Ltd.I have got the impression that the factory is one of the largest modern weaving projects in Bangladesh.

During my industrial attachment program I had tried my best to do my duty properly. My supervising officer was also satisfied with me & offered co-operation in every steps. It was completely a new experience in my life which will be very effective in my service life. During my training period I realized that practical experience is valuable for service life.

In our industrial attachment program contents some secret subject of factory is included. To collect this information like history of project development, costing of products, marketing strategy etc every student face a great problem as it is a secret. so we proposed our college authority to exclude these topics from the contents.

Limitation of the Report:

- I had a very limited time. In spite of my willing to study more details it was not possible to do so.
- Some of the points in different chapters are not described as they were not available.
- This whole process is not possible to bind in such a small frame like this report, hence my effort spent on summarizing them.

Lastly:

The special in this report is that the information, data and description is very much subjective and practical. So, one can easily have an idea about the whole weaving unit of SIM at a single look on it. The new comer can use this report for further details study or

can know without much work. But what should be remembered the chemicals, some process steps may be modified within the period this paper goes to the reader.

Conclusion:

I have completed our Industrial Training successfully by the grace of Allah.

Industrial Attachment sends us to the expected destiny of practical life. SIM Fabrics LTD is a well-known factory in the textile field of Bangladesh. The completion of the 6 weeks industrial attachment at SIM Fabrics LTD gave us the inspiration that factory is one of the appropriate destiny to implement the theoretical knowledge. From this industrial attachment we got the details idea about the factory environment, production process, total management, store & inventory process, maintenance, utility etc.

SIM Fabrics LTD is well equipped and the working environment is excellent. The relation between top management to bottom level is so nice. We are lucky to get the opportunity of having training in this mill. The factory runs by a number of efficient Textile Engineers, Skilled technical & Non-technical persons. All the Textile Engineers, technical & Non-technical persons are very sincere, co-operative and helpful. We wish good luck of them and also for this factory.

It was really a productive practical learning besides our four years academics, so we wish we will be able to implement our learning and methodological knowledge successfully in the textile industry and the betterment of the economy of our country.

THANK YOU