Department of Textile Engineering

Appeal Manufacturing

REPORT

ON

Industrial Attachment

Zaara Composite Textile Ltd

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General Manager

Zaara composite Textile Ltd

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Acknowledgement

At first my gratefulness goes almighty Allah to give me strength and ability to complete the industrial and this report.

Now I wish to take this opportunity to thank a lot of people who have assisted and inspired me in completion of my training period.

Engr. Abdullah Al-Mamun my supervisor , to whom I am extremely indebted for his tremendous support and guidance throughout my training period. Being working him I have not only earned valuable knowledge but also inspired by his innovativeness which helped enrich my experience to greater extent. His idea and way of working was truly remarkable.

We are also express our gratitude to **prof. Dr. Mahbubl Haque** Head, Department of Textile Engineering, for his support and continuous guidance throughout our long journey in Daffodil International and industrial training.

We should like thank the management of **Zaara composite Textile Ltd**, for giving me opportunity to do the industrial training successfully and also their valuable suggestions.

My heartiest thank to **Eng.Moklasur Rahman** General manager Zaara composite Textile Ltd, who supervised me & all production officers in all section for their information and cooperation. We are graceful to all other Sr.Executive of different departments for assisting me to gather information about various process and term.

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INTRODUCTION

Practical knowledge is very much essential for the education of textile engineering and technology. Practical knowledge makes us capable and perfect to apply theoretical knowledge in practical life.

The Textile Sector has the capability to offer a complete product range for the export textile markets. The goal of the Textile Sector is to become the preferred partner for sourcing high quality fabrics and clothing from Bangladesh. With highly advanced technology and an emphasis on developing local human resources.

That is why B.Sc. in textile technology course is extruded over four years followed by two mounts industrial training in mills. It is attached to our study curriculum to achieve adequate practical knowledge and develop adoption power with industrial environment.

I preferred this attachment in **Zaara Composite Textile LIMITED,** which is a 100% export oriented composite Knit dyeing industry. It is fully approved by several multinational inspection firms.

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CHAPTER- 1

COMPANY PROFILE

1.1 AT A GLANCE:

Name of Company : **ZAARA COMPOSITE TEXTILE LTD**

Address : Surabari, Kashimpur

Gazipur, Bangladesh.

Telephone: 880-2-8915038, 8917750, 8916766,

Fax: 880-2-8915805, 88-0666-2606161

E-mail :info@zaaracomposite.net,

zaara.composite@bracnet.net

Corporate Office : House # 05, Road # 10, Sector-4, Uttara
Dhaka-1230, Bangladesh.

Telephone: 880-2-8915038, 8917750, 8916766

Fax: 880-2-8915805

E-mail: zaara.composite@bracnet.net

jvel@bdcom.com

Name and address of bank : National Bank Ltd.
48, Dilkusha C/A, Dhaka, Bangladesh
Telephone : 880-2-9563081-5, 7168729-31

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Fax: 880-2-9564356, SWIFT: NBLBBDDH001

1.2 Factory information

Nature of business : 100% Export-oriented composite knit Garments factory.

Name of the contact persons **:** Eng. Moklasur Rahman

General Manager

Total employees **:** 1437 persons

Number of machine: Sewing : 775

Knitting : 16

Dyeing : 13

Garments production capacity **:** 3,000 Dozens per day

Knitting Capacity : 5 Tons per Day

Dying/ Finishing capacity : 5 Tons per Day

Item of Product:

Basic T-Shirts, Polo Shirts, Tank Top, Fancy, Knit, Wears, Polar Fleece etc.

1.3 Buyers:

1. G-Star
2. Tesco
3. S.Oliver
4. Puma
5. Golden Pfenning
6. Marks & Spenser
7. Next

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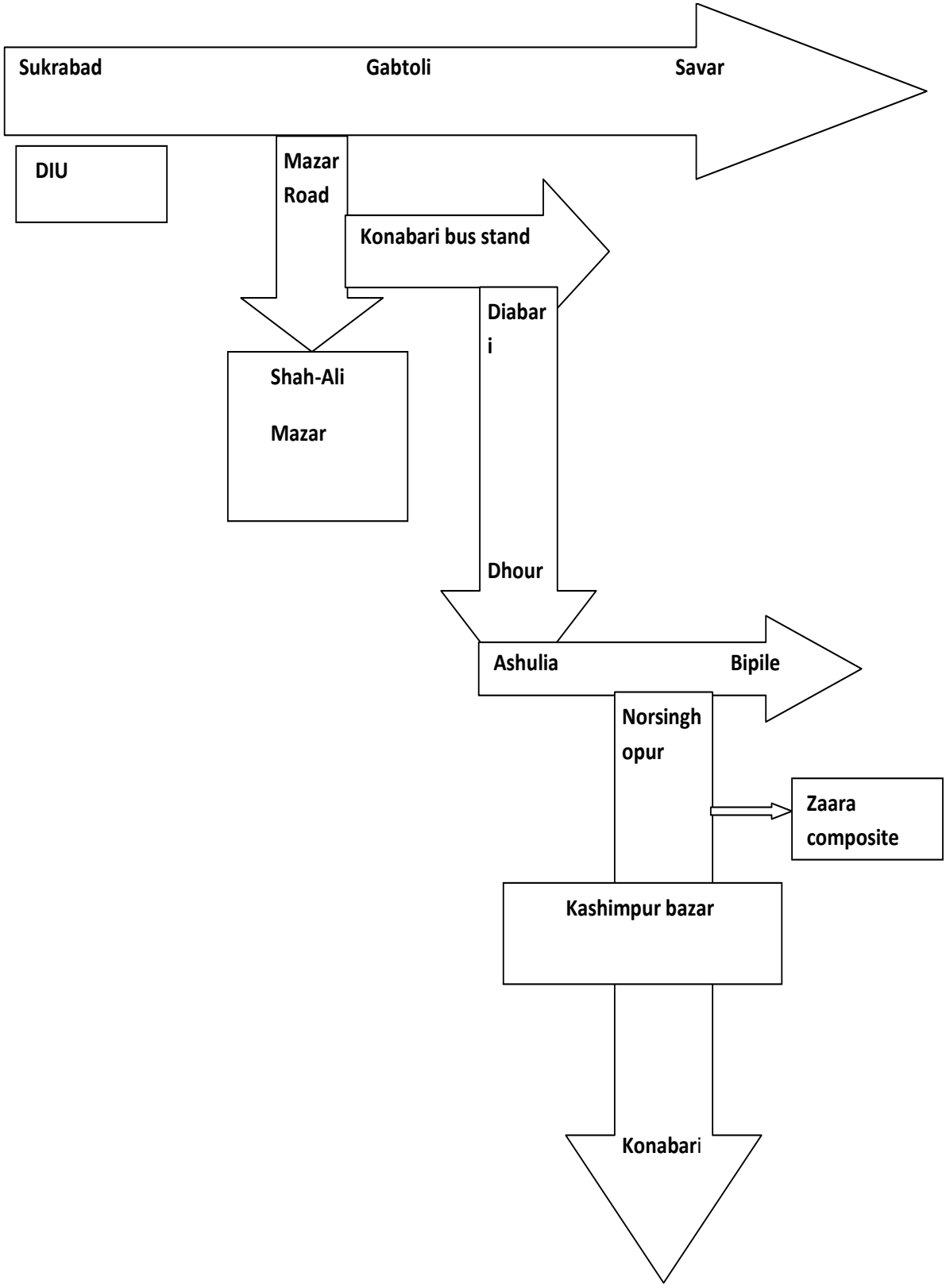
1.4 Factory Location:



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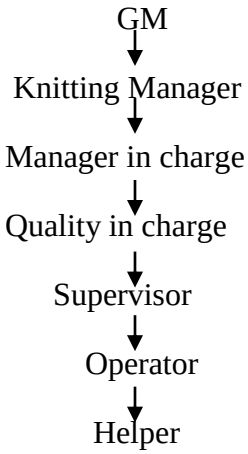
1.5 MAN POWER MANAGEMENT OF ZAARA COMPOSITE LTD.

ORGANOGRAM OF KNITTING SECTION:



ORGANOGRAM OF DYEING AND FINISHIG

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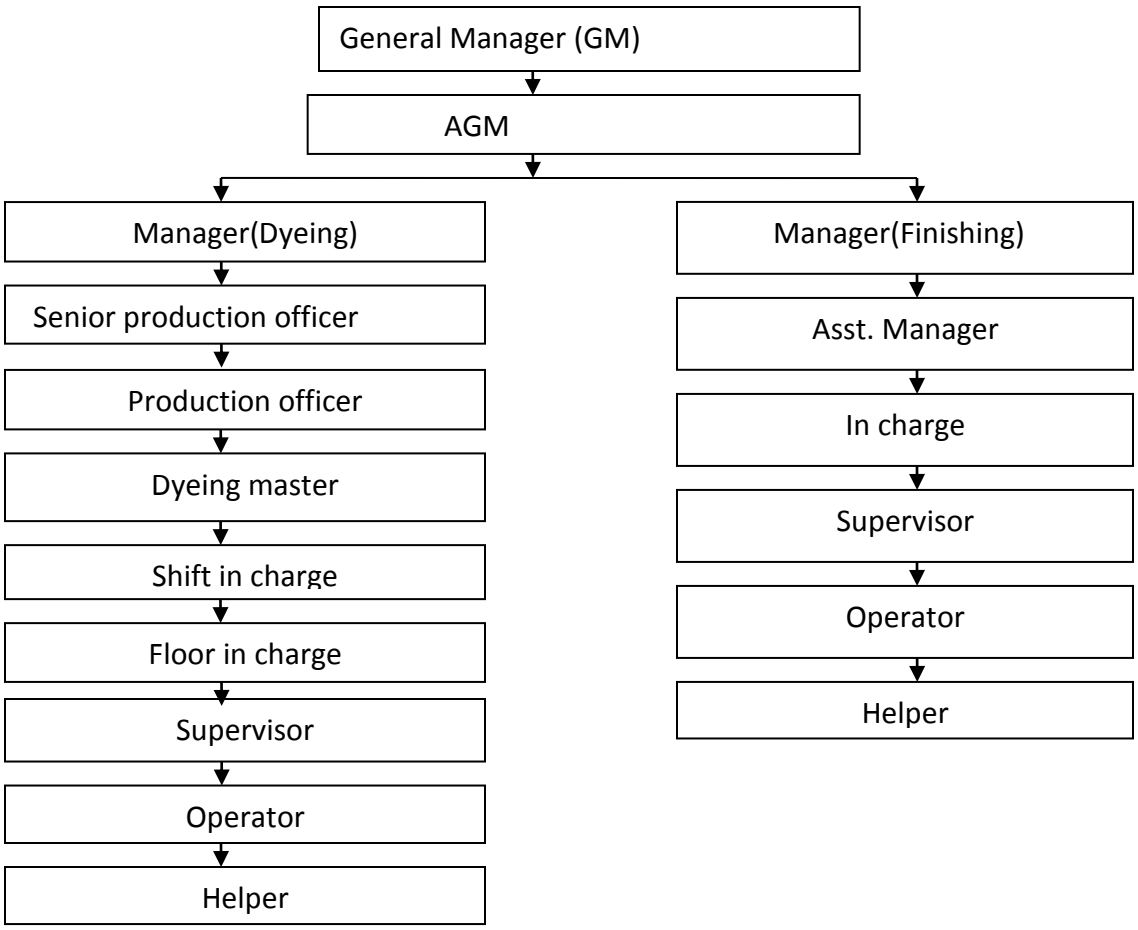

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CHAPTER- 2

KNITTING SECTION

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2.1 Process Definition:

Knitting is a method by which thread or yarn may be turned into cloth or other fine crafts. Knitting consists of consecutive loops , called stitch. As each row progresses, a new loop is pulled through an existing loop. The active stitches are held on a needle until another loop can be passed through them. This process eventually results in final product , often a garment.

2.2 Raw materials for Knitting:

• Yarn
• Lycra

2.3 SOURCE OF YARN FOR KNITTING:

• Makson spinning Ltd
• Out pace spinning
• Matam spinning mill
• Tara spinning mill
• Karim spinning mill
• Paradise spinning mill

2.4 CLASSIFICATION OF KNITTING SECTION:

Knitting section is divided into two section

1.Circular knitting section.

2.Fabric inspection section .

2.4.1 CIRCULAR KNITTING SECTION.

There are two types of machines available in.These are

•Single jersey and

• Double jersey.

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2.4..2 MACHINE DESCRIPTION OF CIRCULAR KNITTING SECTION

Circular Knitting Machine : Single Jersey, Double Jersey

Single Jersey : 08

Double Jersey : 04

Total no of M/C : 12

Brand+ Machine no.	**origin**	**Gauge In Inch**	**Dia In Inch**	**Feeder**	**Job Suitability**	**Prod/ day**
Year China-01	Taiwan	24	24	72	Single jersey	260
Year China-02	Taiwan	24	24	72	Single jersey	260
Year China 03	Taiwan	24	24	72	Single jersey	260
Year China 04	Taiwan	24	24	72	Single jersey	260
Year China-05	Taiwan	24	24	72	Single jersey	260
Year China-06	Taiwan	24	24	72	Single jersey	260
Year China-07	Taiwan	24	24	72	Single jersey	260
Year China-08	Taiwan	24	24	72	Single jersey	260
Year China-09	Taiwan	18	34	68	Double jersey	300
Year China-10	Taiwan	18	34	68	Double jersey	300
Year China-11	Taiwan	18	34	68	Double jersey	300
Year China-12	Taiwan	18	34	68	Double jersey	300

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2.5 FABRIC INSPECTION SECTION:

There is one machine in cloth inspection section. Specification of this machine is given below:

Brand	HWANG SHIN Machinery Co.
Country	Taiwan
Manufactured date	2006
Type	HS-125

2.6 PROCESS FLOW CHART OF KNITTING IN ZAARA

Sample fabric

↓

Design analysis

↓

Machine selection

↓

Setting the machine for the specific design

↓

Yarn in cone form

↓

Feeding the yarn cone in the creel

↓

Feeding the yarn in the feeder via trip-tape

positive feeding arrangement and tension devices

↓

Knitting

↓

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Withdraw the rolled fabric and weighting

↓

Inspection

↓

Numbering

2.6.1 DESCRIPTION OF PRODUCTION PROCESS:

In every mill, there maintains a sequences in production processing. It is also followed in this mill where we were in industrial attachment. The process sequences are in list below:

1) Firstly, knitting manager gets a production shit from the merchandiser as accordance as consumer requirements then he informs or orders production officer about it.
2) Production officer informs technical in charge and knows about machine in which the production will be running.
3) Technical in charge calls for leader of mechanical fitter troops, they two take decision about machine for production considering machine condition, production capacity, maintenance complexity, etc.
4) Production officer with experienced mechanical fitter adjusts required stitch length and grey GSM for required final GSM.
5) Supervisor checks daily production regularity and make operator conscious about finishing tin due time.
6) Operators operate machine in high attention as if there were no faults in the fabrics. If he thinks or sure about any fabric fault, then he calls for the mechanical fitters in duty. Mechanical fitter then fixes it if he can or he informs technical in charge. Then he comes in spot.
7) After required production and final inspection in 4-point system, they sent in dyeing section.

2.7 PRODUCTION PARAMETER

1. Machine Diameter;
2. Machine rpm (revolution per minute);
3. No. of feeds or feeders in use;
4. Machine Gauge;

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5. Count of yarn;
6. Required time (M/C running time);
7. Machine running efficiency.

2.8 RELATIONSHIP BETWEEN KNITTING PARAMETERS:

1. Stitch length increase with the increase of GSM.
2. If stitch length increase then fabric width increase and WPI decrease.
3. If machine gauge increase then fabric width decrease.
4. If yarn count increase (courser) then fabric width increase.
5. If shrinkage increases then fabric width decrease but GSM and WPI increase.
6. For finer gauge, finer count yarn should use.
7. Grey GSM should be less than finish GSM.

2.9 PRODUCTION CALCULATION:

A. Production/shift in kg at 100% efficiency

$$= \frac{RPM \times No.of\ Feeder \times No.of\ Needle \times SL(mm)}{3527.80 \times Yarn\,count}$$

B. Production/shift in meter

$$= \frac{Course/\min.}{Course/cm}$$

$$= \frac{RPM \times No.of\ Feeder \times 60 \times 12 \times Efficiency}{Course/cm \times 100}$$

C. Fabric width in meter:

$$= \frac{Total\ no.of\ wales}{Wales/cm \times 100}$$

$$= \frac{Total\ no.of\ Needles\ used\ in\ knitting}{Wales/cm \times 100}$$

2.10 CONSIDERABLE POINTS TO PRODUCE KNIT FABRICS

When a buyer orders for fabric then they mention some points related to production and quality. Before production of knitted fabric, these factors are needed to consider. These includes-

•Type of Fabric or design of Fabric.

•Finished G.S.M.

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•Yarn count

•Types of yarn (combed or carded)

•Diameter of the fabric.

•Stitch length

•Color depth.

2.11 G.S.M.

It is technical term that indicates the weight of the fabric per square meter.

Point considered while setting grey GSM:

•Level

•Enzyme Color

•Suided or non- suited

Changing of GSM:

- Major control by VDQ pulley.
- Minor control by stitch length adjustment.
- Altering the position of the tension pulley changes the G.S.M. of the fabric. If pulley moves towards the positive directive then the G.S.M. is decrease. And in the reverse direction G.S.M will increase.

2.12 Factor that should be changed in case of fabric design

- Cam setting
- Set of needle
- Size of loop shape

2. 13 EFFECT OF STITCH LENGTH ON COLOR DEPTH:

If the depth of color of the fabric is high loop length should be higher because in case of fabric with higher loop length is less compact. In dark shade dye take up% is high so GSM is adjusted then. Similarly in case of light shade loop length should be relatively smaller.

2.14 Responsibilities of production officer:

•Monitor and control shift wise production, plant utilization, waste generation etc, implement

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correct work methods and maintain all records related to production.

• Responsible for systematic planning and execution of production programs.

•Adequate control over process in order to achieve quality of product, better waste management.

•Monitor shift wise production, utilization etc and take corrective action for any shortfall.

•Maintain all the procedure of his department and shall incorporate amendments as and when required in procedure.

•Responsibilities for monitoring the performance of manpower under him and identification of training needs.

2.15 METHODS OF INCREASING PRODUCTION:

By the following methods the production of knitted fabric can be increased –

1. By increasing m/c speed:

Higher the m/c speed faster the movement of needle and ultimately production will be increased. But it has to make sure that excess tension is not imposed on yarn because of this high speed.

2. By increasing the number of feeder:

If the number of feeder is increased in the circumference of cylinder, then the number of courses will be increased in one revolution at a time.

3. By using machine of higher gauge:

The more the machine gauge, the more the production is. So by using machine of higher gauge production can be increased.

4. By imposing automation in the m/c:

a) Quick starting & stopping for efficient driving system.

b) Automatic m/c lubrication system for smoother operation.

c) Photo electric fabric fault detector.

5. By imposing other developments:

a) Using creel-feeding system.

b) Applying yarn supply through plastic tube that eliminates the possibilities of yarn damage.

C) Using yarn feed control device.

2.16 FAULTS & THEIR CAUSES IN KNITTING

1. Hole

Causes:

•Holes are the results of yarn breakage or yarn cracks.

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•During loop formation the yarn breaks in the rejoin of the needle hook.
•If the yarn count is not correct on regarding structure, gauge, course and density.
•Badly knot or splicing.
•Yarn feeder badly set.

Remedies:

•Yarn strength must be sufficient to withstand the stretch as well as uniform.
•Use proper count of yarn.
•Correctly set of yarn feeder.
•Knot should be given properly.

2. Needle Mark

Causes:

•When a needle breaks down then needle mark comes along the fabrics.
•If a needle or needle hook is slightly bends then needle mark comes on the fabrics.

Remedies:

•Needle should be straight as well as from broken latch.

3. Sinker Mark

Causes:

•When sinker corrode due to abrasion then some times can not hold a new loop as a result sinker mark comes.
•If sinker head bend then sinker mark comes.

Remedies:

•Sinker should be changed.

4. Star

Causes:

•Yarn tension variation during production.
•Buckling of the needle latch.
•Low G.S.M fabric production.

Remedies:

•Maintain same Yarn tension during production.
•Use good conditioned needles.

5. Drop Stitches

Causes:

•Defective needle.
•If yarn is not properly fed during loop formation i.e. not properly laid on to the needle hook.
•Take-down mechanism too loose.

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•Insufficient yarn tension.
•Badly set yarn feeder.

Remedies:

•Needle should be straight & well.
•Proper feeding of yarn during loop formation.
•Correct take up of the fabric & correct fabric tension.
•Yarn tension should be properly.

6. Oil stain

Causes:

•When oil lick through the needle trick then it pass on the fabrics and make a line.

Remedies:

•Ensure that oil does not pass on the fabrics.
•Well maintenance as well as proper oiling.

7. Rust stain

Causes:

•If any rust on the machine parts.

Remedies:

•If any rust on the machine parts then clean it.
•Proper maintenance as well as proper oiling.

8. Pin hole

Causes:

•Due to break down or bend of the latch, pin hole may come in the fabric.

Remedies:

•Change the needle

9. Cloth fall- out

Causes:

•Cloth fall- out can occur after a drop stitch especially when an empty needle with an empty needle with closed latch runs into the yarn feeder and remove the yarn out of the hook of the following needles.

Remedies:

•Make sure all the latches of needle are closed with feeding yarn after a drop stitch.

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10. Fly dust:

Causes:

•In knitting section too much lint is flying to and fro that are created from yarn due to low twist as well as yarn friction. This lint may adhere or attaches to the fabric surface tightly during knit fabric production.

Remedies:

•Blowing air for cleaning and different parts after a certain period of time.
•By cleaning the floor continuously.
•By using ducting system for cleaning too much lint in the floor.
•Over all ensure that lint does not attach to the fabric.

11. Yarn contamination

Causes:

•If yarn contains foreign fiber then it remains in the fabric even after finishing,
•If lot, count mixing occurs.

Remedies:

•By avoiding lot, count mixing.
•Fault less spinning.

12. Yarn Faults:

•Neps.

•Subs.

•Yarn count variations.

•Thick/Thin place in yarn.

•Hairiness.

•Dead Fiber

2.17 Fabric Inspection system

Before batching the fabric is required to check. In this section fabric is check out. In this industry 4-point system is used for inspection. By using this system-

• The defect are identified in the roll and marked by red arrows

• Individually the length of defect is measured and record

• Then measure penalty point

2.18 DIFFERENT FABRIC GSM AND THEIR YARN COUNT

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S/J without lycra -

Fabric G.S.M	Yarn Count
110 - 120	40 ^{S} – 36 ^{S}
120 - 130	36 ^{S} - 32 ^{S}
130 - 140	32 ^{S} – 28 ^{S}
140 - 150	28 ^{S}
150 - 160	26 ^{S}
170 - 210	24 ^{S}

Rib without lycra -

Fabric G.S.M	Yarn Count
180 - 190	36 ^{S} - 32 ^{S}
190 - 200	30 ^{S}
200 - 215	28 ^{S}
215 - 230	26 ^{S}
230 - 250	24 ^{S}
250 - 300	24 ^{S}

Interlock without lycra -

Fabric G.S.M	Yarn Count
200 - 220	34 ^{S}
220 - 230	32 ^{S}
230 - 250	30 ^{S}
250 - 300	26 ^{S}

Lacoste without lycra -

Fabric G.S.M	Yarn Count
180 - 190	30 ^{S}
190 - 210	28 ^{S}
210 - 230	26 ^{S}
230 – 250	26 ^{S}

40D Lycra Rib -

Fabric G.S.M	Yarn Count
230 - 240	32 ^{S}
240 - 250	30 ^{S}
250 - 280	26 ^{S}
280 - 300	24 ^{S}

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40D Lycra S/J –

Fabric G.S.M	Yarn Count
180 - 190	34 S
190 - 210	32 S
210 - 220	30 S
220 – 240	28 S
240 - 250	26 S

2.19 Figure of knitting machine:

Fig: Circular Knitting m/c

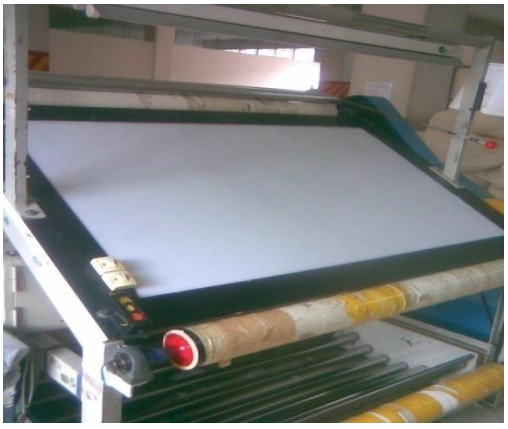

Fig: Flat-bed m/c **Fig: Fabric inspection m**

2.20 DIFFERENT PARTS OF KNITTING MACHINE

No	Parts name	Function of the parts

01	Creel	All the side of machine, it holds the yarn package
02	Tube	Yarn is drawn through this for security and avoiding mixing waste.
03	Positive feeder	Wind the yarn from package and send to needle for reducing tension
04	Toothed belt	All the feeders are driven by it.
05	VDQ pulley	Change the stitch length .So the G.S.M is maintained.
06	Thread guide	Supply yarn to needle from very short distance.
07	Needle	Main part of the machine, it helps to form loop.
08	Needle bed	It can be cylinder or dial which holds the needle
09	Cam	Direct the needle, sinker to form different kinds of loops.
10	Needle detector	It can detect the needle breakage, jamping etc
11	Take up roller	Draw the formed fabric at downwards.
12	Pressure roller	Press the fabric with take up roller.
13	Batch roller	Wind the fabric into its surface to form roll.
14	Blower	Removes the dirts, flocks from the machine
15	Air nozzle	Clean the needle, sinker trick plate etc.
16	Lubricating parts	Lubricate the cam, sinker, needle and other gearings.

2.21 QUALITY ASSURANCE SYSTEM OF KNITTING DIVISION:

2.21.1 INTRODUCTION TO QUALITY ASSURANCE SYSTEM:

After collecting fabric rolls from different machines, these fabrics need to inspect thoroughly by the quality inspectors to assure required quality before dyeing. Quality assurance of knitted grey fabric is described here.

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2.21.2 SOME POINTS ARE NEEDED TO MAINTAIN FOR HIGH QUALITY FABRIC:

1) Brought good quality yarn.
2) Machines are oiled and greased accordingly.
3) G.S.M, Stitch length, Tensions are controlled accurately.
4) Machines are cleaned every shift and servicing is done after a month.
5) Grey Fabrics are checked by 4 point grading system.

2.21.3 LIST OF EQUIPMENT FOR QUALITY CONTROL:

The list of equipments to assure quality:-

1) Inspection m/c.
2) Electronic balance
3) GSM cutter.
4) Measuring tape.
5) Scissors.
6) Indication sticker.

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CHAPTER - 3

BATCHING SECTIOIN

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Batching

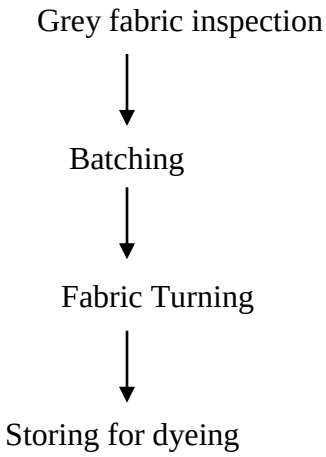
3.1 Batching

Batching is the process to get ready the fabrics that should be dyed and processed for a Particular lot of a Particular order.

3.2 Batch Management:

Primarily Batching is done by dyeing manager taking the above criteria under consideration. Batch section's in charge receives this primary batch plan from dyeing Manager. Some time Planning is adjusted according to m/c condition.

3.3 Batch process follow-up:



3.4 General Instructions for the final inspection:

a. All pieces will be graded on the base of 40 points per 100 linear yards Mapping will be done on each piece to insure proper grading. Do not count more than 4 points per one yard.
b. All defects must be recorded and marked in final inspection and an accurate account of points made to insure proper grading.
c. All fabric must meet specifications.
d. At the end of each piece of fabric, the inspector will add up total points and decide whether the piece can be shipped as first quality or not, reworked, placed in lower quality, or cut and upgraded for shipment. Fifteen yards or more can be shipped as first quality.
e. The quality control supervisor must approve the grading of all quality levels and check the lower quality.

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f. Major or unsightly defects in the first and last yard of a roll or piece will be cut. All defects of one yard length or more will be cut out of the piece. Defects within the first 2 inches or the last 2 inches of a piece will not be cut out or counted in the grading.
g. Open defects on the back of fabric such as drops, runs and hanging picks are to be included in the grading of fabric.
h. Pieces can be connected together, once each piece must be the same shade.
i. All defects such as runs that extend more than a yard in length will be cut out.
j. Fabric up to 70 inches will be allowed a bow of not more than 1 inch and a Bias of not more than 2 inches.
k. Defects within one inch of the fabric edge will not be counted except on tubular fabrics. All defects will be counted in tubular goods.

3.5 GRADING PROCEDURE:

a) All open defects or major defects counted with 4 points per defect.
b) Surface defects over 9 inch length counted with 4 points per defect.
c) Surface defects 6 to 9 inches length counted with 3 points per defect.
d) Surface defects 3 to 6 inches length counted with 2 points per defect.
e) Surface defects up to 3 inches length counted with one point per defect.
f) Running defects, such as tucks, needle lines, barre, crack marks, are judgment defects

Batching is the process to get ready the fabrics which should be dyed and processed for a particular lot of a particular order.

3.6 OBJECT OF BATCHING

•To receive the grey fabric roll from knitting section or other source.
•Turn the grey fabric if require.
•To prepare the batch of fabric for dyeing according to the following criteria –
•Order sheet (Received from buyer)
•Dyeing shade (color or white, light or dark)
•M/C capacity
•M/C available

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•Type of fabrics(100% cotton, PE, PC, CVC)

•Emergency

•To send the grey fabric to the dyeing floor with batch card.

3.7 PROPER BATCHING CRITERIA

•To use maximum capacity of existing dyeing m/c.

•To minimize the washing time or preparation time & m/c stoppage time.

•To keep the no. of batch as less as possible for same shade.

•To use a particular m/c for dyeing same shade.

3.8 BATCH MANAGEMENT:

Primarily batching is done by dyeing manager taking the above criteria under consideration. Batch section in charge receives this primary batch plan from dyeing manager. Some time planning is adjusted according to m/c condition or emergency.

3.9 M/C S IN BATCH SECTION:

No. of M/c	: 01
Machine Name	: Air turning m/c
Origin	: Local

3.10 FORMULA FOR BATCH SELECTION:

Maximum time for loop revolution=3 mins

For one KG loop length, L_1=(Diax2x2.54)/100 m

Loop length=(1000x Gray weight)/(L_1xGray GSM)

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CHAPTER - 4

LAB DIP DEVELOPMENT

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Lab Dip Development

4.1 DEFINITION :

Lab Dip Development means the sample which is dyed according to buyer's requirements (similar shade and so on).Depending on lab dip development sample dyeing and bulk production dyeing planning done.

4.2 OBJECTIVE OF LAB DIP

The main objectives in lab dip are as follows.

- •To calculate the recipe for sample dyeing.
- •To compare dyed sample with swatch by light Box .
- •To calculate revise recipe for sample dyeing.
- •Finally approved Lab Dip(Grade: A B C)

4.3 DEVELOPMENT OF LAB DIP IN ZAARA COMPOSITE:

Receiving standard swatch
↓
Spectrophotometer reading
↓
Recipe start up software
↓
Start up recipe given
↓
Manual dispersion
↓
Pot dyeing
↓
Unload
↓
Normal wash
↓

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Acid wash

↓

Hot wash

↓

Cold Rinsing

↓

Drying

4.5 PREPARATION AND STORAGE OF STOCK DYES AND CHEMICALS:

Preparation of Concentration of stock dye sol^{n} -

Normally 0.1%, 0.5%, 1%, 1.5% and 2% stock solution of dyes are prepared in beakers for daily used.

Preparation of Concentration of stock chemical sol^{n} -

Similarly 25% salt and 25% soda stock solutions are prepared in beakers for daily use.

4.6 DYES AND CHEMICALS MEASURING FORMULA FOR LABORATORY:

The amount of dye solution (ml) is calculated as follow -

$$\text{Amount of dye sol}^{n}\text{ (ml)} = \frac{\text{Fabric weight} \times \text{Shade \%}}{\text{Concentration of stock dye sol}^{n}\ \%}$$

Example –

In recipe, Fabric wt. = 5gm

Shade % = 2%

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[If used 0. 5 % stock sol^{n} of dyes] then ,

$$\text{Amount of dye sol}^{n}\text{ (ml)} = \frac{5 \times 2}{0.5} = 20\text{ml}\ .$$

The amount of chemical sol^{n} (ml) is measured as follow -

$$\textbf{Amount of chemical soln (ml)} = \frac{\text{Fabric wt.} * \text{M : L} * \text{g/l}}{1000 * \text{Conc. of stock sol}^{n}\ \%}$$

Example –

In recipe, Fabric wt. = 5 gm

Salt = 20 g/l

M: L = 10

[if taken 25 % stock sol^{n} of salt] then ,

$$\text{Amount of chemical soln (ml)} = \frac{5 \times 10 \times 20}{1000 \times 0.25} = 4\text{ ml}$$

4.7 PROCEDURE OF LAB DIP:

A. FOR 100% COTTON FABRIC (ALL IN ONE METHOD):

- Fabric weight measured by electric balance.
- Calculate the recipe.
- Keep the fabric in the pot.

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•Then required amount of dyes, water, salt, soda and other chemicals are taken to the pot by pipe ting .
•Start the program for dyeing. The dyeing time and temperature depend on types of dyes being used.

Program – 1: For light shade

Fixed temp. = 60^0c

Time = 60 min.

Program – 2: For dark shade

Fixed temp. = 80^0c

Time = 60 min.

•After finished the dyeing time then cold wash two times.

•Acid wash for neutralization.

•Then soaping by required soap solution for 10 min. at 95^0c.

•Cold wash then drying the lab dip and compare with the standard

CHAPTER - 5

DYEING SECTION

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DYEING SECTION

5.1 ORGANOGRAM OF DYEING AND FINISHIG IN ZAARA COMPOSITE:

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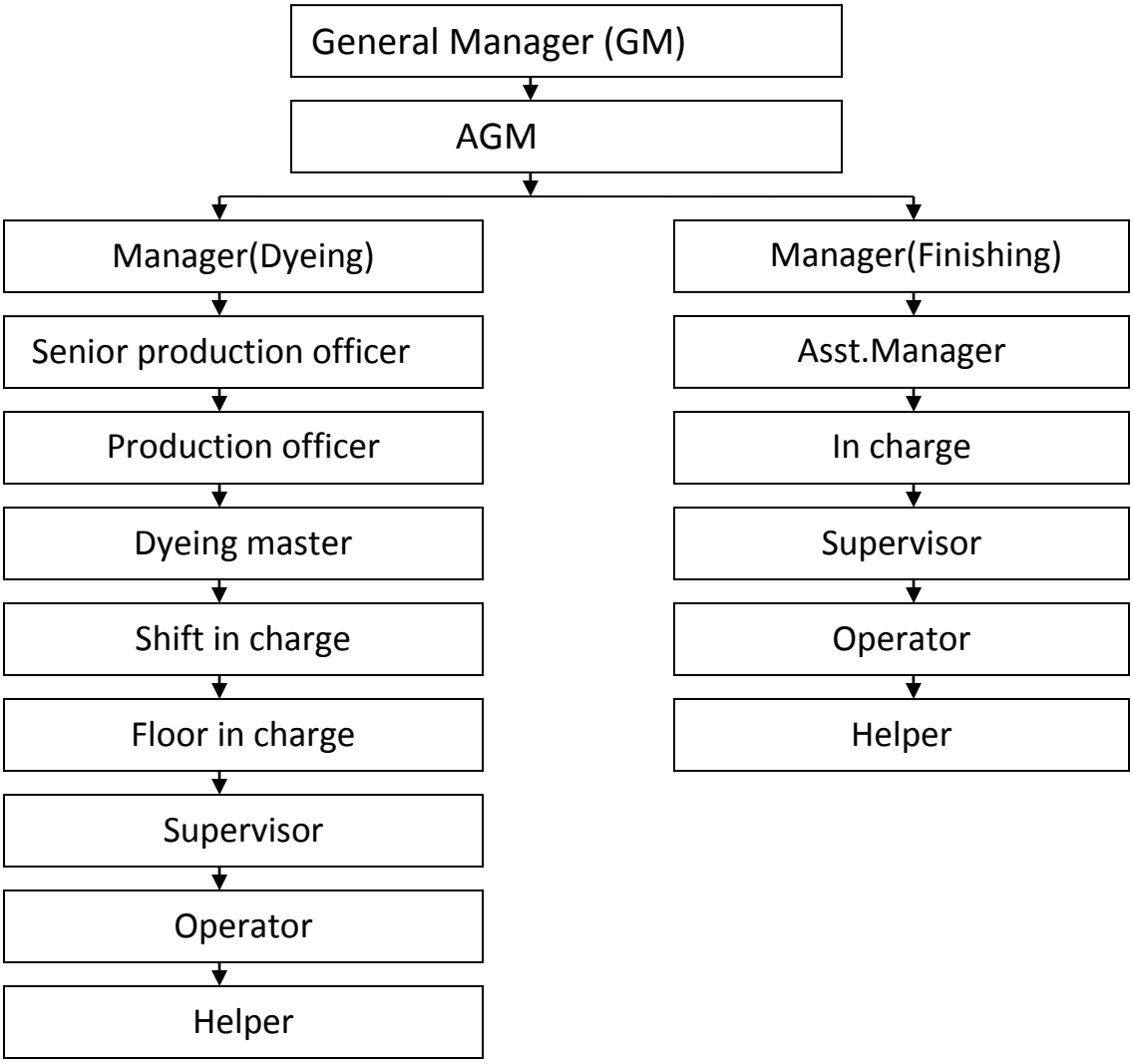

5.2 RAW MATERIALS FOR DYEING:

The raw materials used for production are-

1. Grey Fabric

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2. Dyes and Chemicals

5.2.1 GREY FABRICS:

Following types of grey fabrics are dyed –

- •Single jersey
- •Interlock
- •Lacoste
- •Rib
- •Lycra rib
- •1 x 1 rib & others

Sources:

The required grey fabric is produce in this industry sometimes they dye in sub contact.

5.3 MACHINE DESCRIPTION IN MASCOM FLOOR:

Machine Type	**Quantity**
Dyeing m/c	8

Machine no:1

Machine name	
Brand	Dragon
Origin	
Capacity	400 kg
Temperature range	Up to $100^{O}C$

Machine no:2

Machine name	
Brand	Dragon
Origin	
Capacity	400 kg
Temperature range	Up to $100^{O}C$

Machine no:3

Machine name	Jet dyeing m/c
Brand	Wenvel dyeing m/c
Origin	
Capacity	400 kg
Temperature range	Up to $140^{O}C$

Machine no:4

Machine name	Jet dyeing m/c
Brand	Wenvel dyeing m/c
Origin	
Capacity	400 kg
Temperature range	Up to $140^{O}C$

Machine no:5

Machine name	Jet dyeing m/c
Brand	Wenvel dyeing m/c
Origin	
Capacity	200 kg
Temperature range	Up to $140^{O}C$

Machine no:6

Machine name	Jet dyeing m/c
Brand	Wenvel dyeing m/c
Origin	
Capacity	100 kg
Temperature range	Up to $140^{O}C$

Machine no:07

Machine name	Jet dyeing m/c
Brand	Wenvel dyeing m/c
Origin	
Capacity	50 kg
Temperature range	Up to $140^{O}C$

Machine no:08

Machine name	Jet dyeing m/c
Brand	Wenvel dyeing m/c
Origin	
Capacity	50 kg
Temperature range	Up to $140^{O}C$

5.4 The stages required to complete a whole dyeing process:

- Pretreatment (Scouring & Bleaching)
- Neutral
- Enzyme (If required)
- Dye-stuff

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- Dye bath/Leveling bath (with Salt, Soda)
- After treatment

5.5 RECIPE AT DIFFERENT STAGES IN DYEING COTTON FABRIC:

PRETREATMENT	
Ingredient	Quantity
Wetting agent (Bos)	1.2 g/l
Anti creasing agent (CF)	1.0 g/l
Sequestering agent (FE)	1.0 g/l
Caustic	2.5 g/l
Stabilizer (H-53)	0.5 g/l
Hydrogen per oxide (H_2O_2)	3.0 g/l
NEUTRALIZATION	
Acetic acid	1 g/l
DYEING	
Leveling agent(A 41)	2 g/l
Dyes	
Salt	10 g/l
Soda ash	2 g/l
AFTER TREAMENT	
Acetic acid)	1 g/l
Soaping agent(k-83l PS-60)	1 g/l
SOFTENING	
Acetic acid	0.5 g/l
Softener(Cationic)	1 g/l

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5.6 COTTON DYEING STEPS:

Required amount of water was taken into the machine

↓

The fabric was loaded and run for 5-10 minutes in normal temperature

↓

BOS, FE,CF,H-53 (Scouring Chemicals) were added at a time for 5 minutes

↓

Caustic was added at normal temperature for 5 minutes

↓

Temperature increased at 60^0 C

↓

Hydrogen per Oxide(H_2O_2)was added for 5 minutes

↓

Temperature increased at 95^0C and continue for 1 hrs

↓

Sample check

↓

Cold wash at 40^0C for 5-10 minutes

↓

Hot wash at 95^0C for 5-10 minutes

↓

Required amount of water was loaded

↓

Acetic acid was added

↓

Temperature increased at 80^0C for 15-20 minutes

↓

Cold wash at 40^0C and drain

↓

Water filled and Acetic acid was added

↓

P^H check at 4.5

↓

Leveling agent at 60^0 for 5-10 minutes

↓

Salt at 60^0 for 5-10 minutes

↓

Run time 10 minutes

↓

Dyes at 60^0 for 30 minutes

↓

Run time 10 minutes

↓

Check the sample

↓

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Soda ash at 60^0 for 40 minutes

↓

Run time 10 minute

↓

check the sample

↓

Colour steam

↓

B D (Bathe Drain)

↓

Wash

↓

Hot wash

↓

Acetic Acid

↓

Run for 20 min

↓

Then unload the garments

5.7 Common dyeing faults with their remedies:

1. Uneven dyeing:

Causes:

- Uneven pretreatment (uneven scouring & bleaching).
- Improper color dosing.
- Using dyes of high fixation property.
- Uneven heat-setting in case of synthetic fibers.
- Lack of control on dyeing m/c

Remedies:

- By ensuring even pretreatment.
- By ensuring even heat-setting in case of synthetic fibers.
- Proper dosing of dyes and chemicals.
- Proper controlling of dyeing m/c

2. Batch to Batch Shade variation:

Causes:

- Fluctuation of Temperature.
- Improper dosing time of dyes & chemicals.
- Batch to batch weight variation of dyes and chemicals.
- Dyes lot variation.
- Improper reel speed, pump speed, liquor ratio.
- Improper pretreatment.

Remedies:

- Use standard dyes and chemicals.
- Maintain the same liquor ratio.
- Follow the standard pretreatment procedure.
- Maintain the same dyeing cycle.
- Identical dyeing procedure should be followed for the same depth of the Shade.
- Make sure that the operators add the right bulk chemicals at the same time and temperature in the process.
- The pH, hardness and sodium carbonate content of supply water should check daily.

Roll to roll variation or Meter to Meter variation:
Causes:

- Poor migration property of dyes.
- Improper dyes solubility.
- Hardness of water.
- Faulty m/c speed, etc

Remedies:

- Use standard dyes and chemicals.
- Proper m/c speed.
- Use of soft water

4. Crease mark:
Causes:

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- Poor opening of the fabric rope
- Shock cooling of synthetic material
- If pump pressure & reel speed is not equal
- Due to high speed m/c running

Remedies:

- maintaining proper reel sped & pump speed.
- Lower rate rising and cooling the temperature
- Reducing the m/c load
- Higher liquor ratio

5. Dye spot:
Causes:

- Improper Dissolving of dye particle in bath.
- Improper Dissolving of caustic soda particle in bath.

Remedies:

- By proper dissolving of dyes & chemicals
- By passing the dissolved dyestuff through a fine stainless steel mesh strainer, so that the large un-dissolved particles are removed.

6. Softener Mark:
Causes:

- Improper mixing of the Softener.
- Improper running time of the fabric during application of softener.
- Entanglement of the fabric during application of softener

Remedies:

- Maintaining proper reel sped & pump speed.
- Proper Mixing of the softener before addition.
- Prevent the entanglement of the fabric during application of softener

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CHAPTER - 6

FINISHING SECTION

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6.1 Machine Description for Finishing Section:

Finishing section is consisting of Tube line finishing .
The machines that are used for tube line mentioned in the bellow

- Sqeezer machine
- Dryer machine
- Compactor machine

6.2 Process flow Chart for Finishing Section:

Finishing
↓
Tube line finishing
↓
Squeezing
↓
Drying
↓
Compacting
↓
Inspection
↓
Delivery

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6.3 Tube Line Finishing

Squeezer /De-watering machine:

Ballooning Squeezer M/c

1 Width : 1400mm (ROLLER), 1300mm (WORKING
2. Space : W2400 x L7560 x H5000
3. Production capacity : 3 ~ 12 TON/22H/DAY
4. Machine speed : 10 ~ 70 M/MIN
5. Total electric capacity : 8.55KW

Fig : Ballooning Squeezer M/c

Feature:

•Uniform quality of fabric

•Uneven hydrating and crease mark can be eliminated

• Wet compacting is possible by over stretcher.

•Minimum installation space and man power

•The machine can cover the function of hydro-extractor, wet calendar , so it requires less space and man power.

6.4 Dryer machine: 01

Specification:

1.

Model : DNTD-2400 (3L3CH, GAS TYPE)

2. Width: 2400mm (ROLLER), 2300mm (WORKING)

3. Space : W3710 x L10200 x H2755

4. Production Capacity: 5 ~ 6 TON/22H/DAY

5. Machine Speed : 4 ~ 10 M/MIN

6. Packing Total : 4CASE 8,500KG 76.1CBM

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Fig: Tensionless dryer machine

Feature:

* The machine is specially designed for drying fabrics .

* The machine comprises of over feeder heating chamber , net conveyor drive and folding part which make it possible to control the speed of individual parts.

* Enormous drying capacity derived from hot air circulation by special nozzle.

* Fabric will be dried without tension .

* Machine is controlled by central control system .

6.5 Tube compactor Machine:

Tube compactor Machine: 02

Brand name	:	Fabcon
Manufacturing country	:	U.S.A
Year of manufacturing	:	2006
Maximum speed	:	60 m/min
Minimum speed	:	10 m/min
Production/day	:	8 tons/day
Maximum Temperature	:	70˚C

Operational parameter:-

- Set the temperature at 50-60˚C (as required)
- Set the overfeed % as required; to increase GSM, overfeed need to increase to a certain limit.

Function:

- Shrinkage control

- GSM control
- Width control
- Ironing the fabric

Special feature of Compactor:

- Operating system is computerized.
- Steam bar present which soften the fabric for compacting.
- In compacting zone, edge & retard roller, compacting shoe and steel plates are present.
- A pair of pulley present for fabric dia control.
- Fabric G.S.M, shrinkage and dia control.

6.6 Inspection machine

There is one machine in cloth inspection section. Specification of this machine is given below:

Brand	HWANG SHIN Machinery Co.
Country	Taiwan
Manufactured date	2006
Type	HS-125

6.7 FINISHED FABRIC INSPECTION

The following defects are found in the final inspection.

1. Uneven shade
2. Oil spot
3. Neps
4. Crease mark
5. Machine Stoppage mark
6. Line mark
7. Pick missing
8. Double yarn
9. Dead cotton
10. Fly yarn contamination

CHAPTER - 7

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GARMENT SECTION

7.1 Garments machinery and Equipment:

Description of machine	Brand	Number of m/c

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Plain machine	Typical	235 set
Over lock machine	Typical	176 set
Flat lock machine	Typical	86 set
Button hole machine	Typical	10 set
Feed of the machine	Pegasus	10 set
Lock stitch(2 needle)	Typical	6 set
Chain stitch 2 needle)	Typical	20 set
PMD machine	Typical	6 set
Zig zag machine	Typical	1 set
Straight Knife Cutting machine	Eastman	11 set
Steam Iron	Veit	100 set
Button Stitch machine	Typical	10 set
Rib cutter machine	Typical	4 set
Snab button machine	Typical	12 set
Metal Detector machine	Insta	1 set

7.2 Garments:

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The garment production processing steps and techniques involved in the manufacturing garments for the large scale of production in industrial basis for business purposes is called garments manufacturing technology.

7.3 Total Apparel Manufacturing is Driven in the Following Flow Chart

Apparel design and sketch with measurement sheet
↓
Working Pattern (M size)
↓
Sample making
↓
Approved sample
↓
Pattern grading
↓
Marker making
↓
Fabric Spreading
↓
Fabric cutting
↓
Apparel assembling (sewing)
↓
Inspection
↓
Finishing
↓
Final inspection
↓
Shipment

Here is given below the description of the process sequence of an Apparel Manufacturing-

7.4 Apparel design, Sketch and Measurement sheet :

Apparel design, sketch and measurement sheet is given by the buyer to the sellers. Buyers make a design of required garments with sketch having all the required accessories and trimmings. They also provide a measurement sheet of different sizes. All these including name as merchandising details sheet. After getting these requirements pattern master makes a pattern for sample making of different sizes. In these there are also manufacturing details with the help of all required accessories and trimmings.

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7.5 Pattern:

The individual part of an apparel which is shaped by a hard paper like drawing sheet is called pattern. It is classified into 2 types as follows-

- **Working pattern:** The pattern which is used to make sample garment that is called working or master pattern.
- **Production pattern:** The pattern which is used for bulk production that is called production pattern.

Pattern grading: After developing pattern, pattern master decreases or increases master pattern stepwise, it is called pattern grading. Like this-

S ↔M↔L↔XL

Before making a sample pattern making according to sketch and measurement or directly from sample is a very important. The construction of pattern is done by two methods like-

- Manual construction of pattern
- Computer aided construction of pattern

In Zaara they use manual methods of construction of pattern.

During manual or computer aided construction of pattern the pattern draft is developed by calculation based on the following instructions-

- Actual body size
- Size charts or sample
- Grading increment
- Easy allowances

7.5.1 On pattern the following instructions must be marked-

- Name of the pattern
- Style
- Size
- Grain direction
- CFL & CBL
- Seam allowances
- Balance mark

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7.5.2 The following tools and equipments are used for pattern construction-

- Working surface
- Paper
- Pencils
- Marker pen
- French curves
- Compass
- Set square
- Scissors
- Measuring tape
- Rubber, scale, scotch tape

7.6 Sample Garment:

The patterns are used to cut the fabric. Then the garment component in fabric form are used to sew the garment. Sample garment manufacturing is to be done by very efficient and technically sound person.

- To make sample garment for buyer approval.
- To make pattern sets for bulk production when needed.

7.6.1 Production pattern:

The patterns of the approved sample garment are used for making production pattern. During production pattern making , sometimes it may be modify patterns design if buyer or authority suggests any minor modification.

7.7 Grading:

Normally for large scale of production of any style needs different sizes to produce from asset of particular size of patterns, the patters of different sizes are produced by using grade rule which is called grading.

7.8 Marker Making

Marker is defined as a large thin paper which contents all required patterns pieces of different sizes for a particular style of apparels.

Marker is made by following steps-

- Pattern are placed onto a large thin sheet

- Then marked by pen around the pattern
- First place big part & small part are placed at the end position
- Finally found a marker

7.8.1 Marker is made of fulfill the following objects:

- To get similarities among the apparel
- To save times
- To minimized fabric wastage
- To reduce cost

During making a marker we should consider the marker efficiency –

Marker Efficiency =(Area covered by pattern pcs/Total area of marker) x 100

There is relation –

Marker efficiency ↑ Fabric utilization ↑ Fabric wastage ↓

7.8.2 Marker is made by two methods as follows-

1. Manual method
2. Computerized method

Depending on making of marker it has the following types as follows-

- One way marker
- Two way marker
- Interactive marker
- Auto marker
- Paper marker
- Fabric marker
- Whole garment marker
- Single size marker
- Multi size marker

During marker making the following points should be checked-

- Pattern direction
- Pattern alignment

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- Parts missing
- Mismatched checks or stripes
- Overlapping
- Marker too width than fabric
- Poor line marking
- Double line marking
- Pattern to pattern distance
- Notches and drills marks are omitted

7.9 Fabric spreading :

Fabric spreading means the smooth laying out of fabric with respect marker length and width which is specified.

When spreading is done the following basic requirements maintained-

- Alignment of plies
- Correct or uniform ply tension
- Smooth surface of fabric
- Static electricity free during spreading
- Fusion free for synthetic fabric
- Matching of stripe or check
- Distortion free of plies

7.9.1 There are two methods are used for spreading-

1. Manual method
2. Mechanical method

In Zaara they use manual method of spreading.
Problems may occurs during spreading:

During spreading the following points should be checked-

- Misalignment of plies
- Mismatching checks or stripes
- Wrong direction of plies
- Incorrect tension of plies
- Fabric relaxation
- Narrow width fabric
- Shaded fabrics

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- 100% straight marker
- Proper splicing

7.10 Fabric Cutting:

On the spread fabric the marker is placed carefully and accurately, and pined with the fabric to avoid unwanted movement or displacement of the marker paper. Normally straight knife cutting machine is used to cut iut the garment component as per exact dimension of each patterns , care must be taken to avoid cutting defects.

During cutting of fabric the following flow chart is followed-

Fabric spreading
↓
Place marker
↓
Cutting
↓
Sorting
↓
Numbering & 100%checking
↓
Bundling according to size
↓
Input to sewing sector

7.10.1 List of cutting tools:

There are various types of fabric cutting tools are used as follows-

1. Scissor
2. Straight knife

In Bangladesh as well as in Zaara they use Straight knife and it is so much popular.

7.10.2 During cutting following points should be checked-

- Inaccurate cutting
- Notches – misplaced too deep
- Drill marks omitted, wrong drill
- Prefer test cut than bulk cutting
- Cut panel or bundle cutting
- Numbering
- Checking and parts replacing
- Wrong size in the bundle
- Proper bundling and input for sewing

7.10.3 Cutting Problems:

- Shrinkage :S/J=5%, PK/Terry = 7% Acceptable
- Bowing (deviation of weave from actual position)
- Twisting /Spirality: Low GSM high twisting(5% allowance)
- High GSM low twisting(5% allowance)
- Neps
- Running Shad

7.11 Sewing /Assembling:

Sewing is defined as an operation by an operator through a m/c named sewing m/c which used sewing thread to sew the fabric by forming stitch in the way of interloping, interlacing of sewing thread.

To sew a fabric by sewing m/c needle along with sewing thread is used. So to sew a fabric needle , sewing thread are important elements.

7.12 NEEDLE:

Needle is used to sew the fabric by thread. Way of needle movement is retailed to :

- Seam Strength
- Seam Appearance
- Seam Durability

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7.12.1 NEEDLE SIZE:

Needle size of different types for different fabric sewing is important. It is selected by two systems as follows _

Metric system: Needle Size= Blade dia in mm x 100
=0.8mm x 100

=80Nm

Singer System: By a no. 5, 7, 9, 10, 11, 12, 14, 17, 14

To select needle following factors should be considered as follows :-

- Needle size
- Total needle length Butt of needle eye length
- Shank dia

During sewing needle damage is common fault. The following factors are consider as the cause of needle damage:-

- Needle heat
- Faulty fabric handling
- Improper needle size
- Improper needle point
- During sewing of hard & harsh fabric

During sewing of fabric it could be damages for following factors

- Wrong needle point
- Quality of needle is low
- Damaged needle
- Wrong needle & thread

7.13 Difference between normal thread and sewing thread:

Normal thread or yarn is use to make fabric but sewing thread is especially prepared to sew the fabric which is included with different types of finishes for following purpose _

- To reduce friction between thread & needle
- To reduce damage of synthetic thread with heat

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- To sew easily and properly
- To adjust special purpose
- To reduce sewing thread breakage

7.13.1 To select a sewing thread the following factors should be considered _

- Needle size
- Fabric type
- Weight of fabric
- Stitch type
- Type of seam
- Seam strength
- Desired use of thread

To select sewing thread, thread size or number is very important. The number which is used to express the fineness of a sewing thread is called sewing thread number or ticket number. It has 2 system as follows-

- **Cotton system** : It is derived from English cotton system.
  Cotton ticket number in Ne = (Yarn count in Ne/Number of ply)x3
- **Metric system** : It is derived from Metric count system.
  Ticket number in Nm = (Yarn count in Nm/Number of ply)x3

7.14 Sewing Problems:

There are various types of sewing problems found in sewing floor. Among these problems the following are the main –

1. **Problem of formation**: It has four types as follows _

►Supplied stitch
Causes:

• Loop size of needle is small

- Bent needle
- Tension variation of looper and needle thread

►**Staggered stitch** (Stitch line is not parallel with seam line)
Causes:

- Bent needle
- Wrong needle point
- I mproper needle adjust

►**Unbalanced stitch** (If bobbin thread dose not work, it produces hole & forms this stitch)
Causes:

- Incorrect tension of sewing thread
- Incorrect passage of thread through guide
- Insufficient lubrication

►**Frequent thread breakage**

Causes:

- Improper unwinding
- Higher thread tension
- Excess heating
- Lower quality thread

2. Seam pucker : It is caused for five purposes as follows :-

- Unequal stitch on fabric due to limitation of feed m/c
- Fabric dimensional stability due to unequal shrinkage of one ply then other for washing
- Extension of sewing thread due to tension
- Sewing thread shrinkage after washing or ironing

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- Compact fabric with high EPI, PPI is caused seam puckering during sewing.

3.Fabric damage at the seam line:

It is visible after washing and wear which is mainly caused for needle bending or improper selection of needle size. This is two types of fabric damage with needle as follows :-

- Mechanical damage(m/c speed high)
- Needle heating damage(300-350c)

7.15 Fabric consumption (Basic T-shirt, Trouser) and Thread consumption:

It is very important for calculating the fabric consumption because the booking of fabrics is dependent on consumption. Mentioned that the accuracy of fabric and thread consumption can reduce the excess fabric which helps to reduce cost of fabric.

7.16 Consumption formulas

No	Consumption type	Formula
01	Fabric consumption for **Basic T-Shirt**	**Formula in Centimeter:** Fabric consumption = $\frac{(\text{Body length} + \text{Sleeve length}) \times (\text{Chest} \times 2) \times \text{G.S.M}}{1000 \times 1000}$ Kg

		Formula in Inch: Fabric consumption $= \frac{(\text{Body length} + \text{Slib length}) \times (\text{Chest} \times 2) \times \text{G.S.M}}{1550 \times 1000} \text{Kg}$

No	Consumption type	Formula
02	Fabric consumption for **Basic Trouser**	**Formula in Inch:** Fabric length $= \frac{(\text{Front rise} + \text{Back rise})}{2} + \text{Inseam length}$ Fabric width = Thai×4 $\therefore$ **Total Fabric consumption** = $\frac{\text{Fabric Length} \times \text{Fabric width} \times \text{G.S.M}}{1550 \times 1000}$

7.17 Fabric consumption for Basic T-shirt

Calculation – 01: Formula in Centimeter:

Suppose one of T-shirt's Body length (72+4) cm, Slib length (23+2) cm, Chest length (Dia) (53+2) cm and G.S.M 180. Determine the fabric consumption for the basic T-Shirt.

Solution:

Here, Body Length = 76 cm
Sleeve Length = 25 cm
Chest Length = 55×2=110 cm (For both side)

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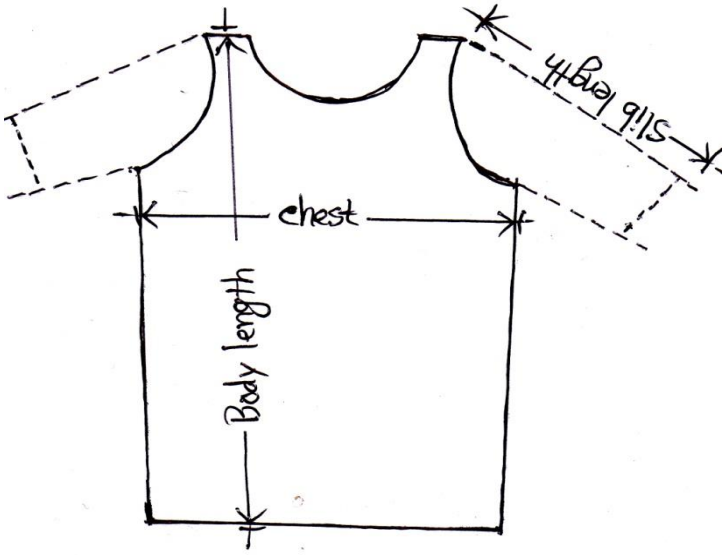

Figure: A basic Trouser ad his measurement

We get,

$$\text{Fabric consumption} = \frac{(\text{Body length} + \text{Sleeve length}) \times (\text{Chest} \times 2) \times \text{G.S.M}}{1000 \times 1000} \text{Kg}$$

$$= \frac{(76 + 25) \times (55 \times 2) \times 180}{1000 \times 1000} \text{Kg}$$

$$= \frac{101 \times 19800}{1000000} \text{Kg}$$

$$= \frac{1999800}{1000000} \text{Kg}$$

$$= 0.\underline{19}998 \text{ kg}$$

The amount of fabric is just for 1 piece. Generally 12 pieces are counted with one.

$\therefore$ Fabric consumption for 1 Dozen = 12×0.19998 kgs

= 2.399 kgs

$\therefore$ **Fabric consumption for 1 Dozen 2 kgs and 399 gms.**

7.18 Calculation – 02: Formula in Inch:

Here, Body Length = (28+ 1) inch

Sleeve Length = (9+1) inch

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Chest Length = (21+1) inch =22 inch×2

= 44 inch

G.S.M = 180

According to formula,

$$\text{Fabric consumption} = \frac{(\text{Body length} + \text{Sleeve length}) \times (\text{Chest} \cdot 2) \times \text{G.S.M}}{1550 \times 1000} \text{Kg}$$

$$= \frac{(29 + 10) \times (22 \times 2) \times 180}{1550 \times 1000} \text{Kg}$$

$$= \frac{308880}{1550000} \text{Kg}$$

= 0.199920 kgs

The amount of fabric is just for 1 piece. Generally 12 pieces are counted with one.

∴ Fabric consumption for 1 Dozen = 12×0.199920kgs

= 2.391 kgs

∴ **Fabric consumption for 1 Dozen 2 kgs and 391 gms.**

7.19 Fabric consumption for Basic Trouser

Calculation: **Formula in Inch:**

Suppose one of Trouser's Front rise (12.5+1) inch, Back rise (15.5+1) inch, Thai (Dia) (12+0.5) inch, In-seam (27+1) inch and G.S.M 180. Determine the fabric consumption for the basic Trouser.

Solution:

Here,	Front rise	= (12.5+1) inch,
	Back rise	= (15.5+1) inch
	Thai (Dia)	= (12+0.5) inch
	In-seam	= (26.5+1) inch
	G.S.M	= 180

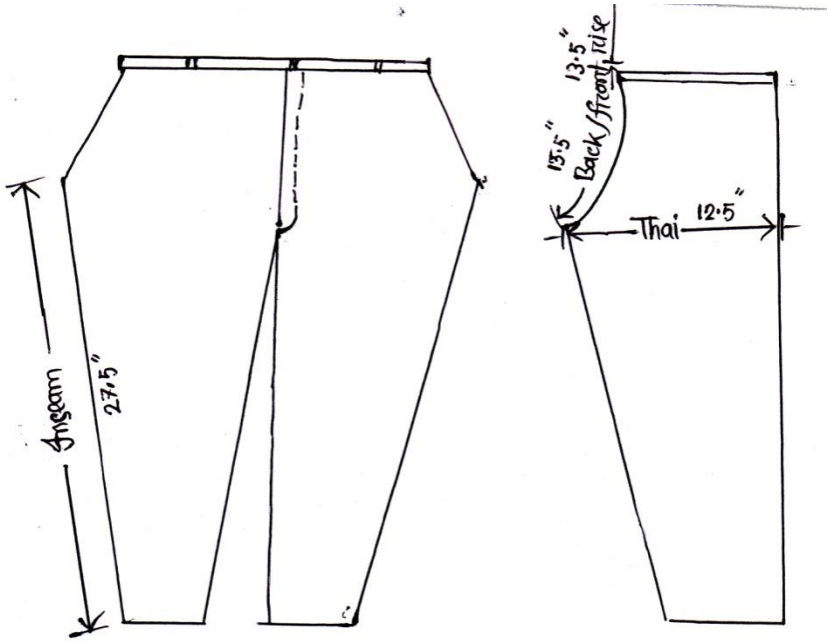

Figure: A basic Trouser ad his measurement

According to formula--

$$\text{Fabric length} = \frac{(\text{Front rise} + \text{Back rise})}{2} + \text{Inseam length}$$

$$= \frac{13.50 + 16.50}{2} + 27.50$$

$$= \frac{30}{2} + 27.50$$

$$= 15 + 27.50$$

$$= 42.50 \text{ inch}$$

Fabric width = Thai×4

= 12.50×4

= 50 inch

$\therefore$ **Total Fabric consumption** $= \frac{42.50 \times 50 \times 180}{1550 \times 1000}$ kg

$$= \frac{382500}{1550 \times 1000}$$

$$= 0.246774 \text{ kg}$$

The amount of fabric is just for 1 piece. Generally 12 pieces are counted with one.

$\therefore$ Fabric consumption for 1 Dozen $= 12 \times 0.246774$kgs

$= 2.961$ kgs

$\therefore$ **Fabric consumption for 1 Dozen 2 kgs and 961 gms.**

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7.20 Thread Consumption for garments sewing:

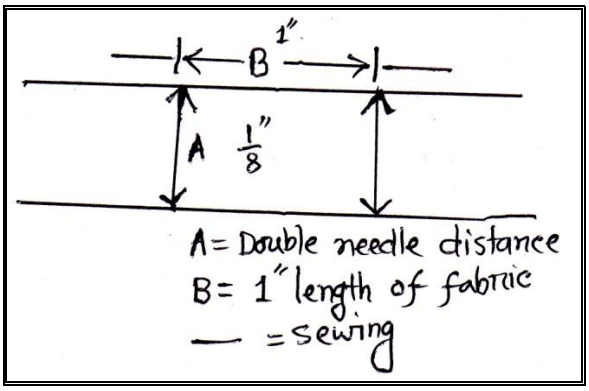

Figure: A Double Needle and 1/8 Distance sewing.

Sewing Tread Consumption Chart (For Per Inch Basis)

No	Sewing machine type	Consumption amount (Inch)
01	S/N Lock Stitch	3
02	D/N Lock Stitch	6
03	4 thread Over Lock	22
04	3 thread Over Lock	14
05	F/ L S/N chain stitch	8
06	F/L D/N 1/8 Distance	14
07	F/L D/N 1/4 Distance	18
08	F/L B/N Zigzag 1/4 Distance	30
09	F/L D/N Zigzag 1/8 Distance	20
10	3 thread O/L Blancet stitch	20
11	3 thread O/L Litus	20
12	Kansai S/N chain stitch	12
13	Pecoding Double Thread	24
14	Bartack 1 cm	12
15	Bartack 1.5(Distance) cm	18
16	BTN Hole ¾ knife	30
17	B/A 4 eye BTN (BTN=Button)	10
N#B: Stitch Per Inch = 11-12(According to buyer requirement. 1 m = 100cm 1 inch= 2.54 cm 1 m = 39.37 inch 1cm= 10mm		

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1 yard (Gauge) = 36 inch

7.21 CARTON:

7.21.1 Type of Carton:

1. DEPEND ON PAPER : 1. Khaki Carton Or Brown Carton
   2. Duplex Carton
   3. Box Carton
2. DEPEND ON STITCHING : Gum Pasting Carton .
3. DEPEND ON PLY : 1. 3 Ply Carton
   2. 5 Ply Carton
   3. 7 Ply Carton
4. DEPEND ON LINER : 1. Both Side Liner Carton
   2. Out Side Liner Carton
5. DEPEND ON SIZE : 1. Master Carton
   2. Inner Carton m

7.21.2 Carton Measurement:

$$\text{FORMULA (1)} = \frac{(L+W)\,(W+H)X2 \text{ in cm}}{100X100} \quad \text{(Without Wastage)}$$

$$\text{FURMULA (2)} = \frac{(L+W+6)\,X\,(W+H+4)\,X\,2}{100X100} \quad \text{(Include Wastage)}$$

$$\text{PRICE} = \frac{(L+W)\,(W+H)\,X\,2}{100x100} \text{ x Rate per Square Meter}$$

= Rate/P

Example:

L = 30, W =40,H =20

$$\text{From(2)} = \frac{(30+40+6)X(40+20+4)X2}{100X100}$$

$$= .97 \text{ square meter}$$

Here is given below process flow chart of basic T-shirt & Polo shirt with a line balancing:

7.22 SEWING SEQUENCE OF T-SHIRT

Number matching front 2 back part (back on part on upper side)

↓

Solder stitching (By over lock m/c)

↓

Neck rib truck (By plain m/c)

↓

Neck rib sewing by plain m/c

↓

Neck rib joins with body pant

↓

Neck top sin

↓

Solder to solder back tip

↓

Size label sewing

↓

Solder to solder back top sin

↓

Sleeve marking ad number matching with body parts.

↓

Sleeve tuck with body part (Sleeve mark point & solder mark point)

↓

Sleeve joint with the body part

↓

Side sewing and care label joint

↓

Bottom hem tuck (at the end side)

↓

Bottom hem sewing

↓

Arm bottom hem joint

↓

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Inspection

7.23 Line Balancing of Basic T-Shirt

	no. of m/c
Shoulder joining-(O/L)=	1
Side cutting –(scissor)=	1
Neck making-(P/M)=	1+1
Neck Joining –(O/L)=	1+1
Lebel attaching (P/M)=	1+1
Piping (feed of the arm)=	1+1
Sleeve hem (F/L)=	2+1
2m/c Sleeve joining(O/L)=	3
2m/c Side seam (O/L)=	2
2m/c sleeve tuck (P/M)=	1
2m/c Bottom hem (F/L)=	2

7.24 Finishing : To be checked

- Iron or press
- Folding
- Tagging
- Packing
- Measurement checking
- Pre-final inspection

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7.25 Final Inspection:

For complete garment that is not in bundle form, it is recommended that statistical inspection done based on AQL

7.26 The defects identified in garments finished fabric:

1. Broken ends
2. Broken picks
3. Reed marks
4. Broken pattern
5. Thick and thin place
6. Rough surface cloth
7. Iron stain
8. Holes in the cloth
9. Shading
10 Shuttle marks

CHAPTER- 8

GARMENT MERCHANDISING

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8.1 Garment Merchandising:

The “Merchandising” is known to the persons specially involved in garments trade. The term merchandising has been derived from the merchandise. Merchandise means goods that are bought and sold.

The term “Merchandising” may be defined as: Person who merchandises the goods, specifically for export purpose. Garments merchandising means buying raw materials and accessories, producing garments, maintaining required quality level and exporting the garments within schedule time. From the above definitions, we can say that a person involved in garments merchandising needs a wide range of knowledge and skill to perform his job successfully. The job itself is Technical and general as well.

8.2 Quality of a merchandiser:

The quality must be needed of a merchandiser. They are as following:

- To know good speaking and writing in English thoroughly.
- To know the computer operating of program like-
    - MS Word
    - MS Excel
    - Internet & E-mail etc
- Proper knowledge on mathematics.
- Sound working capacity
- Always high mentally preparation for any kind of working pressure.
- Training is need for knowing primary knowledge about merchandising.

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- Proper knowledge about garments production.
- Proper knowledge about Commercial & Banking.
- Proper knowledge about Shipping line & Airline.

8.3 Duties & Responsibilities of Merchandiser

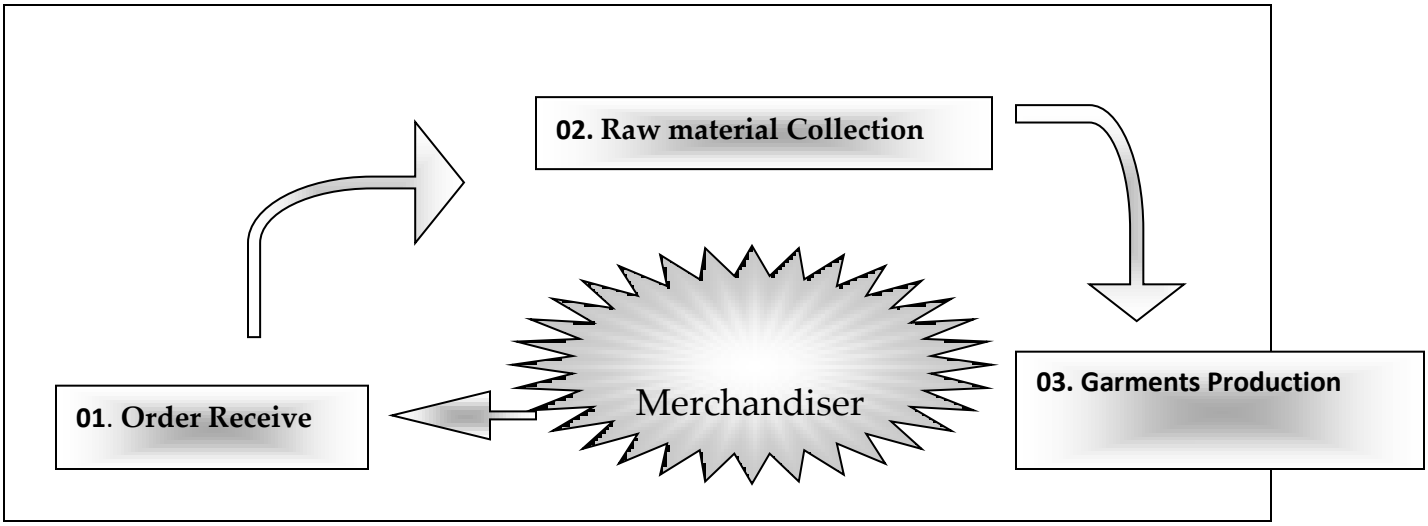
Dealing with the buyer & convincing the buyer is the main duty of marketing officer. A marketing officer also has some other duties. The main duties & responsibilities of a marketing officer are given bellow-

- To prepare cost sheet by dealing with the buyer.
- To take different steps by discussing with the high officials & merchandisers.
- To maintain a regular & good relationship between commercial officers & merchandisers.
- To maintain communication with the buyers and buying houses.
- Communicate with better knowledge of the products.

8.4 The major functions/steps of a merchandiser:

- Procuring the garments order.
- Procuring the raw materials.
- Production of garments.
- Shipments of garments.
- Receiving of payment for garments.

8.5 The steps are shown as diagramacally:



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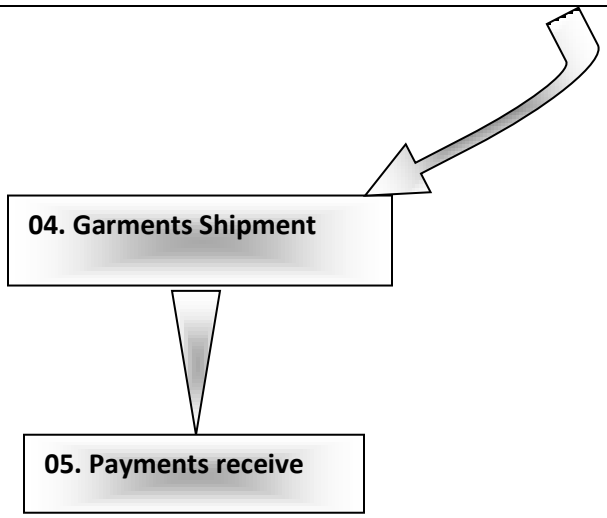

Figure: The steps are completed by a merchandiser.

8.6 Scope of Merchandiser

- Merchandisers are the key player for generating business for any manufacturing plants/company.
- Merchandisers are responsible for making good profit for the company. Whatever the nature of business, they are always keen to increase the profit margin for the company.
- To maintain a good relationship between all the departments and to get the best output from each department is also important and merchandisers play a vital role in getting good out put from each department.
- Communication skill is important to maintain a effective communication between all concerned parties. Corresponding with buyer/agent for all related work i.e. sample approval, testing, packaging, shipping.
- To act as a link between different departments of company for order processing, supplying, payment collection and other export related documents.

8.7 Production planning and pre production meeting:

- Initial planning is prepared by the merchandising department when the order confirmed.

- Based on the sample approval and shipment date, the production department makes the planning of the production only.
- The planning is done following the styling of the product and the machine lay out to calculate the number of pieces production per hour.
- Before production commence, pre production meeting is necessary with all concerned departments to get the correct productions.

8.8 Quality Control and Inspection (AQL)

- Quality control is mainly taking care by the quality control department, but the merchandisers need to well aware about this so that it will not impact on the delivery dates.
- In-line quality inspection
- Buyer Inspection
- Final inspections done following customers AQL [Acceptable quality Limit] level, some customers required AQL level 4.0, some are AQL level 2.5.
- Based on AQL level, the number of garments will get vary for inspection.

8.8 Production: sample development, planning, quality control and inspection (AQL)

Quality Control and Inspection [AQL]:

Customer wise the quality requirement will get vary and merchandisers are responsible to communicate with customers to get the correct quality requirements and need to co-ordinate with factory quality control department so that they will well understand the requirement and can take care of the bulk productions.

Inspections are done during production which is called in line inspection. Later the final inspection done by the factory QC as well as buying office QC to make sure that the final products is shipping with right quality.

8.10 Costing/Pricing

- Costing is the principal task of any merchandisers.
- Methods of Pricing:
    - Calculate the fixed and variable costs associated with the product.

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- Also below cost elements need to consider during costing.
  ~ Pricing for Fibers & Yarns
  ~ Pricing for fabric manufacturing
  ~ Pricing for garment manufacturing
  ~ Cost of accessories
  ~ Commercial cost
  ~ Break even point
  ~ Consumption of fabric and accessories with wastage percentage.
  ~ Total cost analysis [how much does it cost to provide merchandise to end customer)

CHAPTER – 9

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QUALITY ASSURANCE SYSTEM

9.1 Quality Assurance:

Quality assurance is defined as all those possible planned and systematic actions necessary to provide adequate confidence than a product or service will satisfy given requirements for quality

The quality assurance department assigned to maintain consistently uniform quality of material in process and various stages of p\its manufacturing.

9.2 Some points that are needed to maintain for high quality fabric:

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Zaara composite textile Ltd. Assures the quality of the products of dyeing section in the following three steps:

1. In Laboratory
2. In dyeing section &
3. In finishing section.

9.3 Quality assurance Procedure:

The decision plans and action that is necessary to provide adequate confidence that a product or service will satisfy given requirements for particular quality .

1.Body & Rib Inspection:

All rolls are kept in front of the inspection M/c. The fabric are spread over white inspection board which ensures high transparency and even light reflection. Then the inspection machine fabrics and are inspected at a standard speed against light. For any major or minor faults are recorded in inspection report to classify the fabric based on four points system.

2.Collar &cuff inspection:

Collar &cuff are inspected visually under the light box. For any major or minor faults in collar /cuff like having wrong ply, hole, needle line, slubs, first round problem etc are counted and recorded.

Quality inspector will check 100% of receive fabric for quality . He will identify any defect ,hole or stain in the fabric and make calculation given bellow:

Point calculation system:

Defect area	point
1" to 3"	**1**
3" to 6"	**2**
6"to 9"	3

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9” above	4
For hole in fabric	4

Calculation of points is done by-

$$\frac{\text{Actual point} \times 100}{\text{Inspected Total Yard}} = \text{Actual point}$$

•If point grade is 40 or bellow then the fabric is ok .lf the result is more than 40 points , then inform it to Gm or respective merchandiser.

•The fabric is also checked for shading defect in side by side and length. Any non conformities/ shading will be notified to asst. manager using inspected reports. Roll wise color uniformity card is maintained for identification of shade variations.

•During the fabric inspection if the yardage of any roll is reported more or less by the fabric inspection m/c then the one specified in the roll, the roll will be measured manually using measuring tapes. Only calibrated measuring tape shall be used.

•the result of fabric inspection shall e recorded in fabric inspection report.

9.4 Quality Standard:

The Quality Standard: ISO – 2001 ,9001

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CHAPTER - 10

QUALITY CONTROL

10.1 QUALITY CONTROL:

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Quality control is concerned with the evaluation of test data and its application to control of the textile process. raw materials, intermediate products and final products. It is concerned not only with quality level and cost of maintaining this quality level but also concerned with the presentation of tangible values to measure quality and changes in quality. In order to control quality one must about the consumers expectations.

10.2 object of quality control:

- Research/analysis
- Selection of raw materials.
- Process control and development
- Product testing
- Specification testing .
- Quality assurance .

10.3 List of equipment for quality control:

- Yarn grade tester
- Kern Electronics balance
- Spray rating tester
- Incubator
- Iron
- Button tester
- Lab dip dyeing m/c
- Orbiter pilling tester
- PH meter

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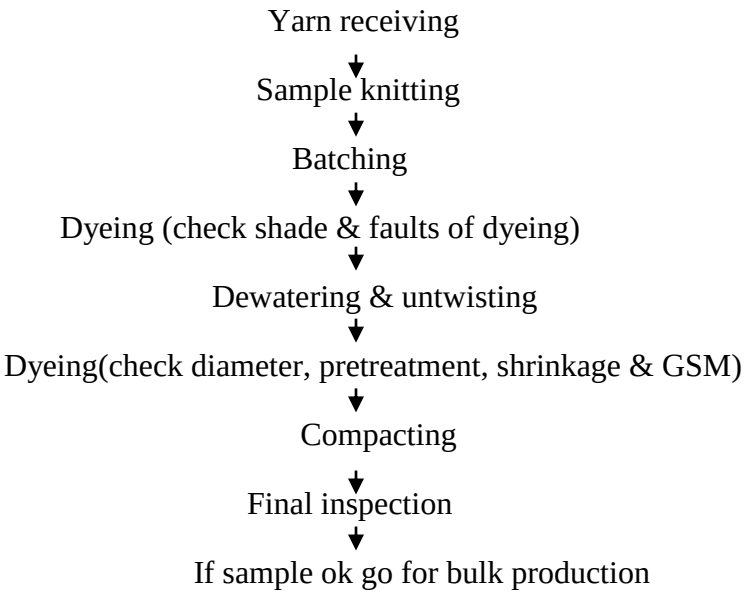
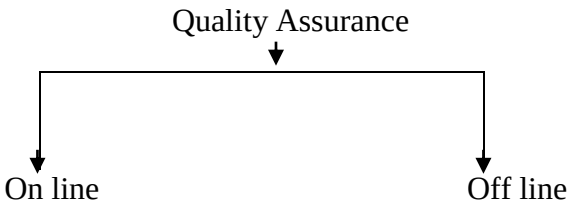
10.4 Quality control Flow chart:



10.5 Quality management System:



10.5.1 On-line quality control:

Online quality control comprises with the raw material control, process control & finish fabric inspection.

10.5.2 Raw material control:

As the quality of product depends upon the raw material quality , quality assurance department must ensure thart the best quality of raw material are used in production .

- The chemical should be with a known concentration and high degree of purity.
- The dyes and chemical should be compatible with each other.
- The fabric must be out of faults with proper absorbency, whiteness as per requirement of subsequence process.

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10.5.3 Process control:

- The method chosen for process must be provided with necessary parameters.
- Temperature, pH, water level should be checked at each stage of process.
- During dyeing sample are taken and shade match with lab dip and when match, allow for bathe drop.
- If not properly match additional or topping is done until required shade come.
- After neutralization sample is collected and match with lab dip.
- Sample is collected after fixation.
- Last of all after softening sample is collected and match with lab dip.
- Each batch should be match with other batch.
- During finishing temperature, speed, overfeed should be controlled as per requirement.
- GSM, width , shrinkage should be maintain as per buyer requirement.

10.5.4 Finish fabric inspection:

Purpose:

To ensure that only an acceptable quality fabric is used for producing garments and proper quality of shipment is received from the supplier.

Procedure:

Store in charge will check the received fabric with reported length, color and type of fabric with the stated shipment document quality and actual order quantity.

- The finding will be recorded in inventory report and discrepancy regarding fabric type, color and length will be notified to the factory manager.
- For in-house products quality control officer will guide all over inspection.

10.6 off line quality control:

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Zara composite Textile Ltd. have all the facility for off-line quality control of the materials used and process materials. There are two types material are tested in laboratory for quality control. This are

a. Fabric

b. Raw materials.

a. Fabric testing:

All the off-line tests for finished fabrics can be grouped as follows:

1. Physical test
2. Chemical test

1.Physical test:

- Fabric inspection by 4-point system.
- GSM test
- Width of the fabric measure.
- Rubbing test
- Pilling test
- Shrinkage test

2. Chemical test

- Color fastness to water
- Color fastness to wash
- Color fastness to rubbing
- Color fastness to perspiration
- Oxidative test

b. Raw material testing

a. water : pH, hardness test

b. Glauber salt : purity test

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c. Acetic Acid : Strength

d. Soda ash : Strength

e. Caustic soda : Strength

f. Hydrogen per oxide: Strength

10.7 Final inspection:

If final inspection is ok then we can say quality is good and apparel are under control.

Defect found in final inspection:

- Uneven shade
- Oil spot
- Neps
- Crease mark
- Line mark
- Double yarn
- Fly yarn contamination

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CHAPTER -11

UTILITY SECTION

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11.1 Utility Services Available:

- Electricity
- Gas
- Water
- Steam
- Compressed air

11.2 Capacity & Other Technical Details:

11.2.1 Electricity -

Generally the factory doesn't depend on electricity. They hardly use the government electricity. The electricity is supplied form REB. The electricity supplied in the factory about 4500 KWH monthly. But five standby power generators are also kept to meet the need of electricity if necessary.

Generator Specification→

PARAMETERS	**Brand name :** CHIDONG	
	GENERATOR 1	**GENERATOR 2**
Brand name	CHIDONG	CHIDONG
Origin	CHINA	CHINA
Mfg.	2007	2007

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Fuel	Gas Driven	Gas Driven
Power	550 KW	550 KW
R.P.M	1000	1000
VOLTS.	400	400

11.2.2 Gas -

Gas is mainly used for producing electricity, steam production and also used in generator and boiler. The gas is supplied by TITAS GAS DISTRIBUTION CO. Gas consumption is 3, 20,000 – 3, 30,000 m^3 monthly.

11.2.3 Water-

Continuous supply of water for different section of Zaara Composite Textile Ind. Ltd. must be ensured by pump.

11.2.3 Steam-

Pure steam with required temperature must be produced to meet the continuous demand of steam in different sections. There is a gas boilers used for steam generation, to meet the requirement of different sections.

Specification of Boiler Machine

- Company- DAELIM
- Origin- KOREA
- Year- 2006
- Capacity- 6 tons/hr
- Design pressure- 10 Bar

11.2.4 Compressed Air

The requirement of compressed air is fulfilled by air compressor m/c. In this m/c, natural gas is drawn by pipe through the filter above the compressor & the air is compressed. In such a case the air becomes slightly hot. Hence cold water is drawn to reduce the temperature of compressed air. While doing so, the cold water becomes slightly hot & it is transferred through outlet pipe to the overhead reservoir. There the vapors are condensed and outlets drop by drop. Then the water is let to fall slowly through the reservoir to the compressed air to obtain moist compressed air. The moist compressed air is transferred to the dryer & a slight warm compressed air is delivered to required sections of The Delta Composite knitting Ind. Ltd.

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Specification of Air Compressor Machines

Parameters	specifications
Brand name	ATLAS COPCO
Origin	India
Mgt. date	2007
Max pressure	10 bar
R.P.M	2800

11.2.5 Source of Utility:

Electricity	:	RBE & Gas Generator
Steam	:	Boiler
Water	:	Pump
Compressed air	:	Compressor
Gas	:	TITAS GAS DISTRIBUTION CO.

CHAPTER - 12

MAINTAINCE SECTION

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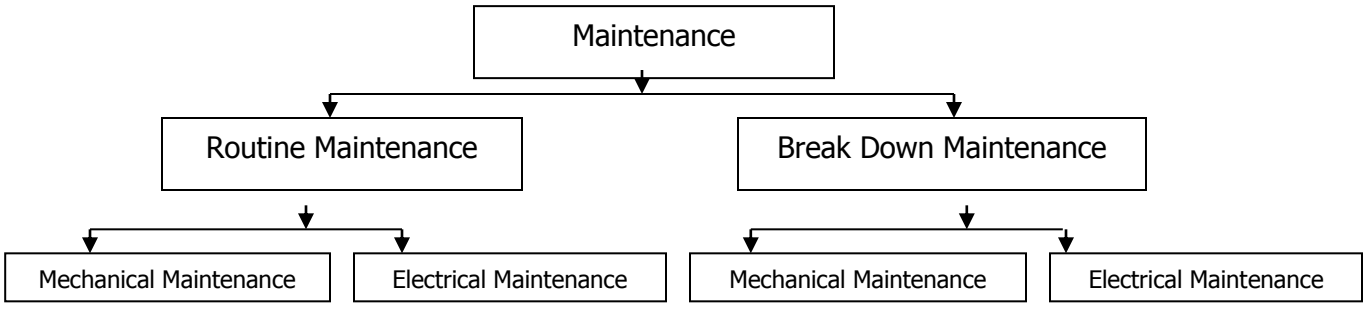
12.1 Introduction of Maintenance:

Maintenance of machinery is very essential mechanical effort for achieving smooth running of different machines. Maintenance is a process by which equipment is looked after in such a way that trouble free services and increased machine life can be ensured and specific product quality required by the customers is sustained. On time maintenance increase m/c lifetime & ensures trouble free services.

12.2 In The Zaara Composite Textile Ltd., 2 types of maintenance are done:

1. Break down maintenance
2. Routine maintenance



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1. Break down maintenance:

Break down maintenance is done instantly when problem arises in machine. In this case, repairs are made after the equipment is out of order and it cannot perform its normal functions.

2. Routine maintenance:

After a particular period of operation, the machines are cleaned & reordered, that is routine or schedule maintenance. The maintenance department does it once in a month. Schedule maintenance varies, time in time & also depends on situation according to types of machines, because maintenance is directly related to production.
Most of the time, all the screws, nuts, bolts & levers are checked, lubrication is also done. Workers inform about the problem areas of the machines. Depending on their information maintenance is done. Maintenance engineer analyze the records and take steps according to requirement.

13.3 Routine:

Maintenance is a necessary task in any industry. But the degree and interval of maintenance is dependent upon the age of the machineries. The Zaara Composite Textile Ind. Ltd. has relatively new machineries, which are very modern. Due to this reason a relatively less amount of maintenance is needed to be carried out in Zaara Composite textile Ind. Ltd. Never-the-less, routine maintenance of the machineries is carried out –

1. Daily Work
2. Weekly Work
3. Monthly Work

12.4 Maintenance Procedure: (Mechanical)

12.4.1 Machine: Dyeing Machines

No	Item needed to be checked & Serviced
01	Comp: air system Checking
02	Steam and cond. System checking
03	All motor/pump sound and temperature checking
04	Water system checking
05	Oil level(Pump/gear box) checking
06	All belt tight/Adjusting
07	Gear oil checking/Renlling

08	All bearing cleaning
09	Checking all control panels
10	Lubrication of all motors bearing

12.4.2 Machine: Gas Boiler

No	Item needed to be checked & Serviced
1	Checking of water level glass
2	Checking of F.W system and handiness
3	Checking of auto operation of pumps
4	Checking and cleaning of photo-cells
5	Checking of control
6	Checking all control panels
7	All cable terminal tighting
8	Lubrication of all motors bearing

12.3 Machine: Gas Generator Machines

No	Item needed to be checked & Serviced
1	Lub oil leveling checking
2	Cooling water system checking
3	Better water level checking
4	All belt tight/Adjusting

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5	Panel board cleaning
6	All bearing greasing
7	All cable terminal tighting
8	Cleaning and maintenance of PHE and CT

12.4.4 Machine: Compactor, dryer machines

No	Item needed to be checked & Serviced
1	Comp: air system Checking
2	All motor/pump sound and temperature checking
3	Steam and cond. System checking
4	Filter cleaning and thermo oil checking
5	All belt tight/Adjusting
6	All bearing cleaning
7	Checking all control panels
8	Lubrication of all motors bearing

12.4.5 Maintenance Tools and Equipments:

Sl. No.	Maintenance tools/equipments	Functions
1.	Adjustable wrench	Used for setting nut & bolts
2.	Pipe Spanner	For pipe fitting
3.	Spanner	Fixed Spanner for nut & bolts

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		fitting
4.	Socket spanner	Handle system for nut & bolt fitting
5.	Hammer	To apply load where required
6.	Screw driver	To release any screw
7.	Punch	Used to fit any worn out shaft
8.	Lock opener	To open the clip of bearing
9.	Hack saw	To cut any metallic thing
10.	Outside calipers	To measure outside dia
11.	Inside calipers	To measure inside dia
12.	Slide calipers	To measure very small dia
13.	Vernier scale	To measure very small dia
14.	Chain ton	To lift heavy load
15.	Welding machine	To join metallic parts
16.	Grinding machine	To make the smooth fabrics
17.	Tester	To test electric circuit
18.	Pliers	To grip anything & cut anything
19.	Avometer/Voltmeter	To measure voltage
20.	Steel tape	To measure length, width & height

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CHAPTER - 13

EFFLUENT TREATMENT

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13.1 Introduction of E.T.P

Effluent is the stream of excess chemical liquor which is extracted from an industry after using in original operation. For example-

The excess dye liquor which is extracted from textile industry after dyeing from different processes are treated with various chemicals to remove or neutralize the toxic materials before discharging to environment (e,g- ground water) . This is called effluent treatment.

13.2 The main objective of ETP

The main objective of ETP are mentioned in the below-

- To remove coloring matter.
- To control pH
- To maintain proper value of BOD,COD
- To reduce TDS amount.

Where,

BOD= Biological Oxygen Demand.

COD= Chemical Oxygen Demand.

TDS= Total Dessolved Solid.

13.3 Type of Effluent Treatment plant follows zaara:

Now – a – days various types of ETP are available. But the physico- chemical treatment followed

By biological process is applied at Delta EPT.

13.4 Capacity of the E.T.P

Daily treatment capacity = 125 m3/hour

Daily treatment capacity = 3000 m3/day

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13.7 Flow diagram of The Zaara E.T.P

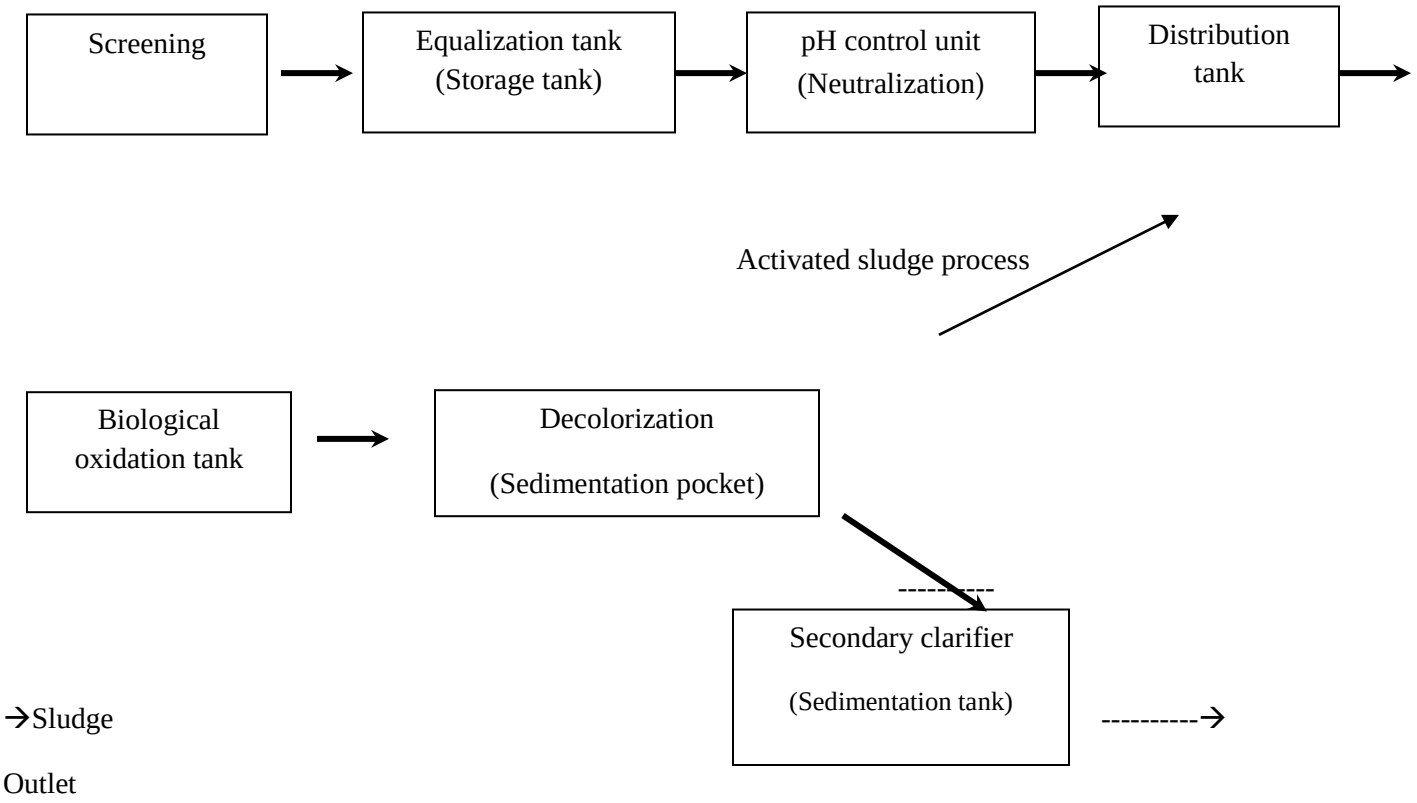

Figure: Flow diagram of Zaara E.T.P

13.8 The used chemicals in Zaara E.T.P

No	Chemicals name	Function of the chemicals
01	H_2SO_4	It is used to neutralize the waste-water. The p^H is to controlled by the acid. In the first, the p^H of waste-water is generally 10-11 which the changed into p^H=7.30-7.50 by the acid.
02	Anti-foaming agent	It is used at distribution tank as if there not to create any foam formation.
03	Decolorant	It is used at decolorization unit to break the waste water's coloring matter. So it helps to make the colorless water that is suitable for fresh environment.
04	Bacteria	It is used at biological oxidation unit to eat the organic compounds of waste-water. It works in presence of oxygen.
05	Poly-electrolyte	It helps to increase the size of flock of the waste-water. It is used at sludge drying bed as if the sludge can be precipitated.

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06	Na-hypochlorite	It damages the residual suspended solids after secondary treatment. The harmful bacteria is also be damaged by the chemicals.

13.9 Waste-water analysis of textile industry

A typical textile unit is expected to generate various types of waste-water differing in magnitude and quality at the stages shown in the below:

No	We processing stages	Waste-water type
01	Desizing	High TSS, High BOD, p^H
02	Scouring	High TSS, High BOD, High TDS, High alkalinity, High temperature
03	Bleaching and mercerization	High TSS, High BOD, Alkaline waste-water.
04	Dyeing, printing, Finishing	Waste dye, High TSS, High BOD

13.10 A typical discharged limit for textile waste-water parameters

No	Parameters	Discharge limit
01	p^H	6.5—9.0
02	BOD(Biological Oxygen Demand)	150 mg/L
03	COD(Chemical Oxygen Demand)	200 mg/L
04	TDS (Total Dissolved Solid)	2100 mg/L
05	Color	None

13.11 The physical treatment stages with their function

There are two stages under physical treatment are followed in Zaara E.T.P. The functions are given in the below:

1. Screening
2. Equalization tank

No	Stages and functions
01	**Screening**
	In screening, the course particles are separated by a filtration process. The solids such as- water thread, fabric pieces, lints etc are removed by screening. N.B # The depth of the equalization is 25 feet.

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	Equalization tank
02	In equalization tank, the wastewater is kept basically for- ❖ Cooling the wastewater by reducing temperature. ❖ Make the wastewater homogeneous in nature. ❖ Mixing the wastewater N.B # It is 25 feet's depth.

13.12 The chemical treatment stages with their function

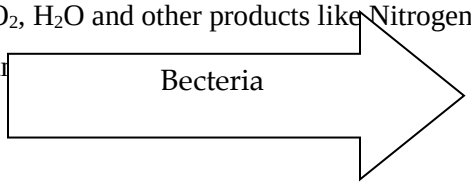
The stages are followed for the chemical treatment—

1. p^H control unit (Neutralization)
2. Distribution tank
3. Decolorization (Sedimentation pocket)

No	Stages and functions
	p^H control unit (Neutralization)
01	Generally, the waste-water's is p^H = 10.0—11.0. But this range is harmful for land and human. To remove the high p^H of the waste-water, the neutralization process is applied. For p^H control, here H_2SO_4 acid is used. As a result the pH comes to acceptable range (e.g- p^H=7.0—7.30) after treatment. The reaction is mentioned in the below : $NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$ Alkali Acid (Soluble) water The employees of the E.T.P always check their p^H value every day at inlet and outlet.
	Distribution tank
02	Here the activated sludge's (by recycling process) water and p^H controlled water are come combinely.In this unit an antifoaming agents are used to remove the foam formation.
	Decolorization (Sedimentation pocket)
03	Here it is named as sedimentation pocket. The decolorant chemicals are used to break the coloring matter. So it helps to make the colorless water. The pH is slightly removed at decolorization unit but it is negligible.

13.13 Biological Oxidation tank (Airatic)

The wastewater is oxygenated to encourage the growth of micro-organism. The organic compounds are converted into CO_2, H_2O and other products like Nitrogen, Sulphare, and phosphorous etc. The reaction of biological treatm



$COHNS + O_2 \rightarrow CO_2 + H_2O + NH_3 + CH\text{-}NO_2$

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The main purpose of the biological treatment to reduce BOD load of wastewater.

○Temperature : 35º to 37º C

○ PH (Maximum) : 6.5

○ Dissolved oxygen : 4 PPM

13.14 The basic ingredient are used in the biological treatment

They are as following:

High density of micro-organism
Good contact between organism and waste water
Provide high volume of oxygen by many pipes.
Favorable temperature, pH maintained.
Polyelectrolyte and Na-hypochlorite are used to increase the size of flock and remove the residual wastewater from sedimentation tank.

Secondary clarifier:

From secondary clarifier, one pipe is attached to sludge drying bed and another for activated sludge which goes to distribution tank by recycling.

Activated Sludge Process It is a process in which a mixture of wastewater and micro-organism are agitated and aerated from secondary clarifier to distribution tank. Then it is come to biological unit from distribution tank.

13.15 The controlling points of the E.T.P

The controlling points are mentioned in the below

No	Parameters	At	Discharged Range
	pH	Storage tank, pH control unit	7.30-7.50
	BOD	Inlet, Outlet	Less than 150mg/L
	COD	Inlet, Outlet	50- 200mg/L
	TDS	Inlet, Outlet	Less than 2100 mg/L

13.16 Product Quality Checked:

- Biological Oxygen Demand (BOD)
- Chemical Oxygen Demand (COD)
- Total suspended solids
- Total dissolved solids
- Color
- p^H etc.

13.17 Maintenance Procedure of the E.T.P

The workers of the E.T.P check the various valves, pipe line daily. The bearings are lubricated on daily basis and weakly basis. If any kinds of parts are damaged, the E.T.P department notices to the maintenance department for new one. In a short time the maintenance department manages all problems because of running smoothly of the E.T.P.

13.18 Sludge management system of the E.T.P

The sludge is separated from secondary clarifier. Then air is given by a pipe. After that a compactor
Is used to remove the excess water from sludge. The output sludge then dried in sunlight. After that the last output sludge is used for land cultivation as a bio-fertilizer.

13.19Amount of Chemicals are used for 125 m3/hour

No	Chemicals name	Amounts of chemicals(Average)
01	H_2SO_4	200-250 kgs/day
02	Decolorant	200-210 kgs/day
03	Polyelectrolyte	25-30 kgs per six months
04	Bacteria Dosing	200 drum for life time(20kg/drum)
05	Na-hypochlorite	200-300 kgs/month

Here the nutrients are used in the time when the dyeing wastewaters are not come for not to dye. Because there have a possibility to die the micro-organism if not run the plant for stopping the dyeing. So for living the bacteria, the nutrients are given in the plant. The nutrients are mentioned in the below:

1. Urea
2. H_3PO_4
3. Di-ammonium phosphate

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CONCLUSION:

I have completed my industrial attachment successfully by the grace almighty **ALLAH.**
Industrial attachment sends me to the expected destiny of practical life. The completion of the two months Industrial attachment at **Zaarz composite Textile LIMITED.**

During my training period, I knew that the mill is fulfilling the country's best export oriented garments due to its modern machinery & good management system.
Mill is settled with utility to give all convenient supports to the productions for twenty-four hours. It had self-power generator system to satisfy total power consumptions of the mill.
I am enough fortunate that I have got an opportunity of having a training in this mill. During the training period I have received co-operation and association from the authority full & found all man, machines & materials on appreciable working condition. All stuffs & officers were very sincere & devoted their duties to achieve their goal.

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