



# **Daffodil** *International* **University**

## **Industrial Training Report**

(Course Code: TE 410)

At

 **PURBANI**

### **PURBANI FABRICS LIMITED**

Nurbag, Mouchak, Kaliakoir, Gazipur, Dhaka

Academic Supervisor:

**Sumon Mazumder**  
Assistant Professor  
Department of Textile Engineering  
Daffodil International University

Industrial Supervisor:

**Mr. Robiul Hasan Masud**  
Manager  
Dyeing Section  
Purbani Fabrics Limited

Prepared By:

**M. Ferdous Islam**  
ID: 092-23-1482

**Date of Submission: 09/04/2013**



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## Letter of Transmittal

Date: 7<sup>th</sup> April, 2013.

To

**Prof. Dr. Md. Mahbubul Haque**

Head, Department of Textile Engineering, FSIT

Daffodil International University.

Subject: Letter Regarding Submission of Internship Report on Comparative Study on “Textile Engineering” Study at Purbani Fabrics Limited.

Dear Sir,

With due to respect, it is my pleasure to submit this report entitled “Comparative study on textile study at Purbani Fabrics Limited.” This was assigned to me a requirement for the B.Sc. in Textile Engineering program.

I have prepared this report based on my (02) two month’s works in “Purbani Fabrics Limited.” I have tried to my best to make a enrich report and now I am glad to submit you this for better judgment. I shall be cheerful if this report serve the purpose of my dissertation. However, I am ready to explain anything to you if feel necessary.

I would be very grateful if you kindly accept the report and evaluate property.

Yours truly,

M. Ferdous Islam

ID: 092-23-1482

## Acknowledgement

At the very beginning I acknowledge the infinite blessing & profound kindness of "**Almighty Allah**"- The supreme authority of the universe. I also acknowledge the loving support of my parents & family members.

**Sumon Mazumder** Assistant Professor, Department of Textile Engineering, Daffodil International University, my supervisor, to whom I am extremely grateful for his tremendous support & guidance throughout my internee.

Being working with him I have not only earned valuable knowledge but was also inspired by his innovativeness which helped to enrich my experience to a greater extent. His ideas & way of working was truly remarkable. I believe this internee report could not be finished if he did not help me continuously.

I would like to thank **Prof. Dr. Mahbub-ul-Haque Majumder**, Dean of FSIT, Daffodil International University, who has inspired me to take & continue this report.

I would like to thank Professor **Dr. Md. Mahbubul Haque**, Head of the Department of Textile Engineering, Daffodil International University, who has inspired me to take & continue this report.

I would like to thank Professor **Prof. Dr. Md. Zulhhash Uddin**, Dean Faculty of Textile Chemical Process Engineering and Applied Science (FTCPE & AS), Bangladesh University of Textiles, who has inspired me to take & continue this report.

I would also like to express my sincere gratitude to **Mr. Shafiqul Islam Sarker** Director, Purbani Group. For following me to complete my 2 months long Industrial attachment course in their factory.

I also want to thank **Mr. Atiqul Islam, Deputy General Manager, Admin, HR & Compliance** (KTL, PFL & PYDL). For his encouragement, inspiration, support, supervision, special care and cooperation during training period.

I would like to thank specially **Md. Azizul Hoque, General Manager, Purbani Fabrics Limited**. For their cordial cooperation during the training period.

I would like to thank specially **Md. Shamsuddin Ahmed, Deputy General Manager, Dyeing Section, Purbani Fabrics Limited**. For their cordial cooperation during the training period.

I would like to thank specially **Mr. Robiul Hasan Masud, Manager, Dyeing Section, Purbani Fabrics Limited**. For their cordial cooperation during the training period.

Last but not the least, thanks go to all the people who have assisted, helped & inspired me to complete this task at various stages. I realize that without their continuous support I would not be a person I am right now.

## Introduction

Textile and garments sector is the biggest and fastest growing sector in Bangladesh. It is also the highest foreign currency earning sector in Bangladesh. Among this sector, knit dyeing is growing very rapidly due to smaller investment requirement, greater backward linkage facility & higher profit than woven garments. That's why export of knit dyeing garments has increasing steadily for last few years.

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 month (8 Weeks) long industrial training in "**Purbani Fabrics Ltd.**" which is a 100% export, oriented composite Knit Dyeing Industry. It has well planned & equipped fabric and Knit dyeing-finishing units in addition to facilitate Knit and knitting wear manufacturing.

The industrial internship 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.

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# CHAPTER: 1



## Company Profile

About Purbani



## **PURBANI FABRICS LIMITED**

**Factory Address: Noorbag, Mouchak, Kaliakoir, Gazipur**

### 1.1 Profile of the Company

## **PURBANI FABRICS LIMITED**

**At a glance .....**





**Name of Company** : PURBANI FABRICS LIMITED.

**Company Logo** :



**Slogan** : **1. From Raw Cotton to Readymade Garments.**  
**2. We Spin Knit Dye Stitch for Excellence.**  
**3. Explore new Horizons with Complete Textile.**

### Address

**Factory** : Noorbagh, Kaliakoir  
Gazipur ,Dhaka, Bangladesh  
Telephone: +88-02-9298373  
Fax:+88-02-8817567  
E-MAIL: [admin@purbanigroup.com](mailto:admin@purbanigroup.com)

**Website** : [www.purbanigroup.com/web](http://www.purbanigroup.com/web)  
[www.purbanigroup.com/index.php](http://www.purbanigroup.com/index.php)

**Office** : Richmond Concord, 5<sup>th</sup> Floor  
68, Gulshan Avenue, Gulshan-1  
Dhaka-1212,Bangladesh  
Telephone: 88-02-8825205,  
Fax: 88-02-881756  
E-mail: [info@purbanigroup.com](mailto:info@purbanigroup.com)

<b>Established Year</b>	:	1984
<b>Contact persons</b>	:	Shafiqul I. SarkerSohel, Director M. Yousuf Khan Director
<b>Nature of business</b>	:	100% Export-oriented composite knit dyeing Factory
<b>Nature of company</b>	:	Private Limited Company
<b>Total employees</b>	:	1000 persons
<b>Turnover</b>	:	US\$ 10 million/year.
<b>Total Area</b>	:	30Bigha
<b>Building:</b>		8storied dye house and finishing area.
<b>Certificate</b>	:	<b>Cotton USA licenses,</b> <b>WRAP&amp;</b> <b>Oeko-Tex.</b>
<b>Item of product</b>		
<b>Knit fabric</b>	:	Structures, Single Jersey, Pique, Lacoste, Interlock, Rib, Herring Bone, Knitted Twill, French Terry and other great designs. <b>(100% cotton, polyester, polyamide and blends with elasthane inserts).</b> In addition, this unit produces interlock fabrics in plain and lycra varieties of the highest quantity.
<b>Garments</b>	:	T-shirt, Polo shirt, Sweat-shirt,Golf shirt, Cardigan, jogging suit,Short/Trouser, Legging Tank Tops, Children wear, Jogging suits, Fashion dress and Children wear etc.



**Buyers:**

H&M  
Carrefour  
Tex Line  
Alexander  
NKD  
Coles Group Target  
C. Vogele



**1.2 ACHIEVEMENT**



**Cotton USA Licensee**



**Certified By, WRAP**



**Certified By, Oeko-Tex**

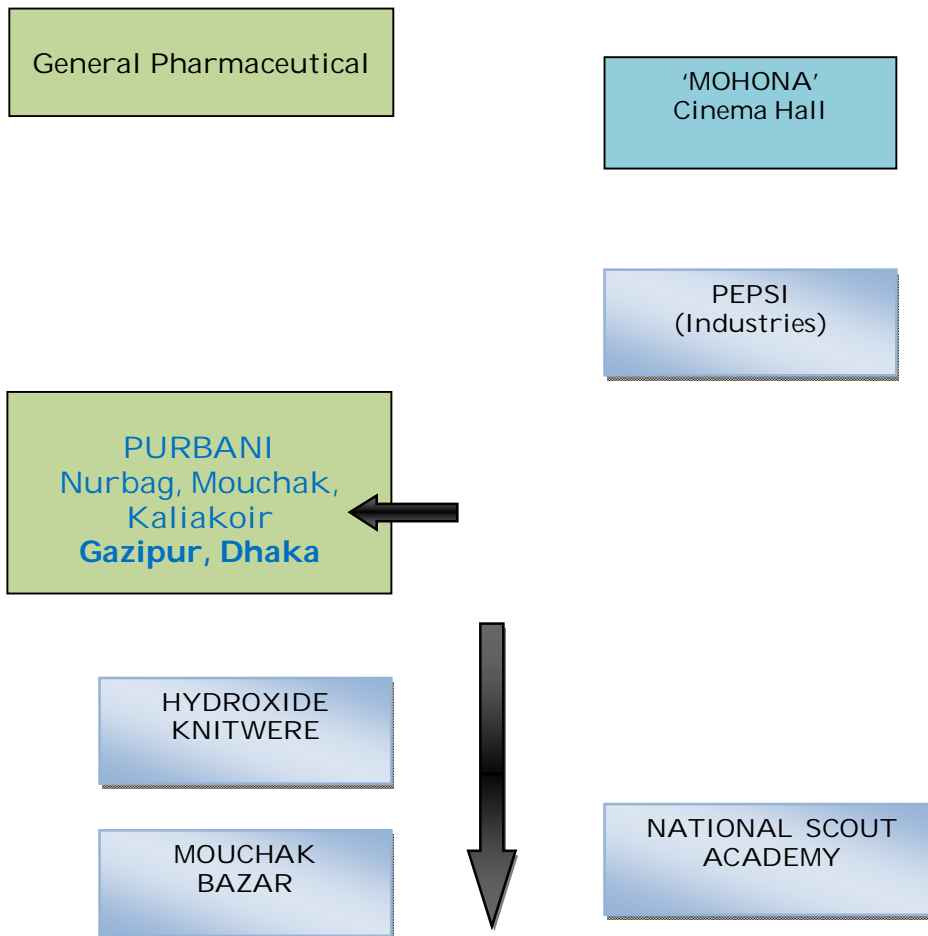


**Certified By, Oeko-Tex**

**1.3 Plant Layout of purbani**

## 1.4 Location Of Purbani Group



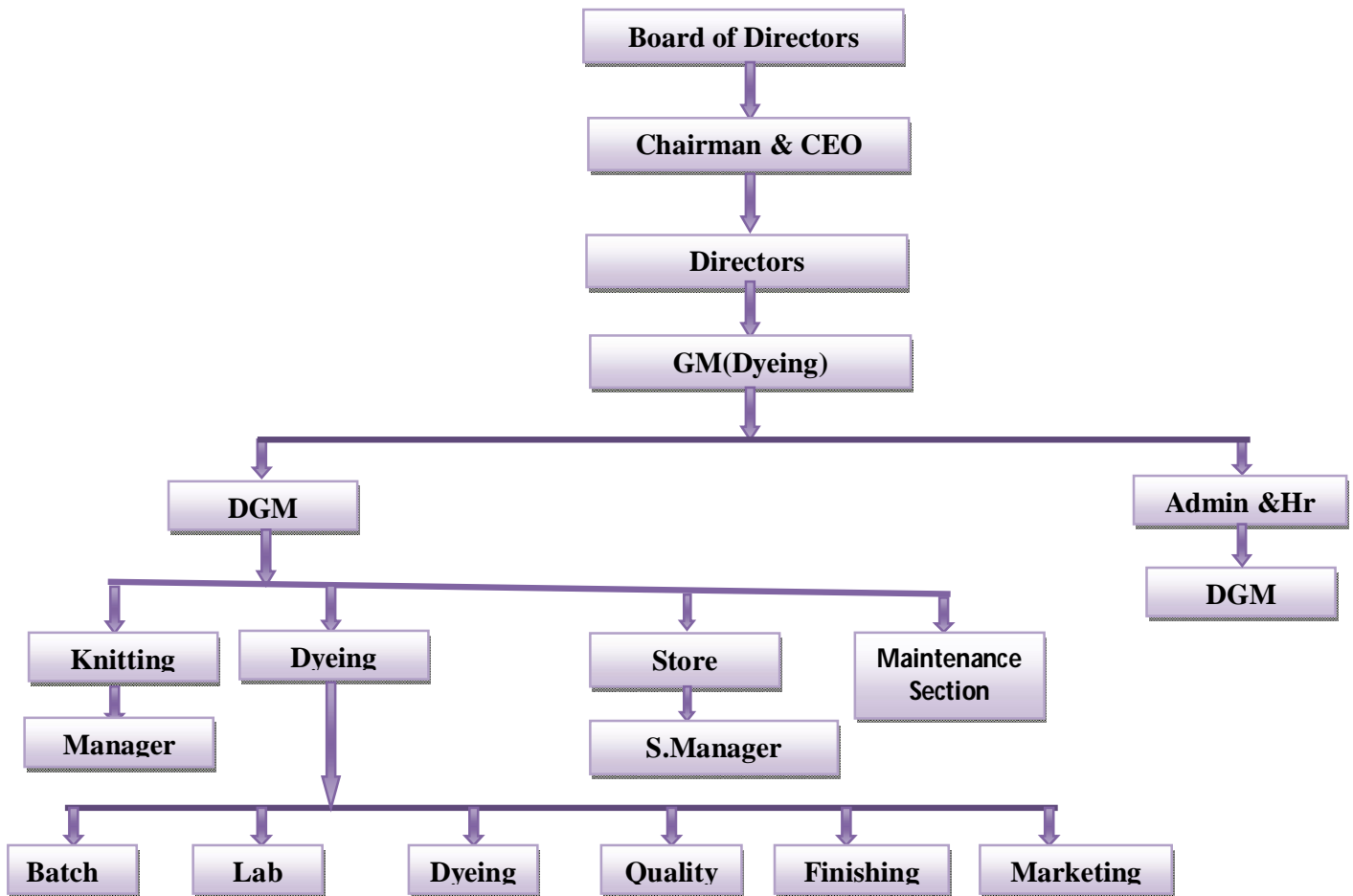


**1.5 Sister Concern of Purbani  
Fabrics Ltd**

- 1. Purbani Fabrics Ltd.**
- 2. Karim Spinning Mills Ltd.**
- 3. Shohagpur Textile Mills Ltd.**
- 4. Purbani Synthetic Spinning Ltd.**

5. Purbani Rotor Spinning Ltd.
6. Purbani Yarn Dyeing Ltd.
7. Karim Textiles Ltd.
8. Purbani Traders.
9. Purbani Food & Beverage Ltd.
10. Purbani Fisheries.

**1.6 Organizational Structure of Purbani Fabrics Ltd.**

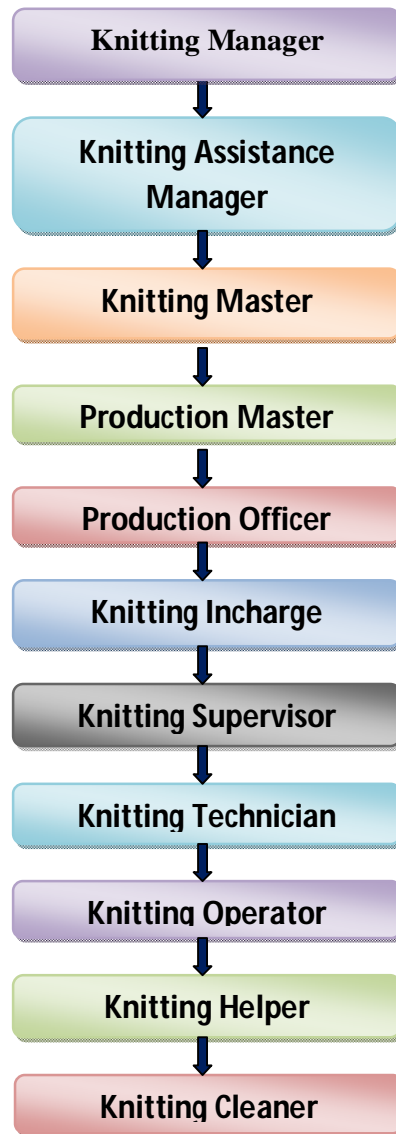


## CHAPTER: 2



### **Knitting Section**

#### 2.1 Organogram of Knitting section in Purbani Fabrics Ltd



## 2.2 Yarns:

Yarns are the most important part of a Textile industry. Yarn is a generic term for a continuous strand of textile fibers, filaments or material in a form suitable for knitting, weaving or otherwise intertwining to form a textile fabric. Yarn occurs in the following forms:

- Number of fibers twisted together.
- Number of filaments lay together without twist.
- Number of filaments lay together with a degree of twist.
- Single filament with or without twist.
- A narrow strip of material.

### 2.2.1 Counts of Yarns Used:

Count is an important parameter for the manufacture and processing of fabrics as it indicates the fineness of the yarn. Finer or more count yarns produce finer fabrics and coarser or less count yarns produce coarser fabrics.

Normally the counts of yarns used in the DIVINE Knitting section are given below:

Cotton: 20/1, 24/1, 26/1, 28/1, 30/1, 34/1, 40/1 Ne

PC: 20/1, 26/1, 28/1, 30/1 Ne

CVC: 26/1, 30/1, 34/1 Ne

Mélange: 20/1, 22/1, 26/1, 30/1 Ne

Spandex: 40D, 70D

Polyester: 75D, 150D

Sewing thread: 40/2, 150D etc.

### 2.2.2 Yarn LOT( Specification Card):

<p><b>YARN COUNT- 30/CARD</b> <b>SUPPLY-PSML LOT- 04/10</b> <b>QUANTITY- 4650.0 KG</b> <b>YARN COUNT- 34/C.</b> <b>SLUB SUPPLY-PSML LOT-61/10</b></p> <p><b>Quantity-1200.0 Kg</b></p>
--

### 2.2.3 Types of yarns used in PURBANI:

There are various types of yarns used in PURBANI FABRICS LIMITED knitting section which is discussed below:

- Carded Cotton Yarn.
- Combed Cotton Yarn.
- Slub Cotton Yarn.



- 50% Cotton & 50% Modal Yarn.
- Grey Mélange.
- Lycra/Elastane/Spandex Yarn.
- CVC (60% Cotton & 40% Polyester) Yarn.
- Polyester Yarn.
- Cotton Mélange.
- Various Cotton Dyed Yarn.
- PC (60% Polyester & 40% Cotton) Yarn.
- Viscose Yarn.
- Carded Slub Yarn.

### 2.3 Characteristics of various types of Yarn:

There are various types of yarns which are formed of various types of fibers and demonstrate various properties. The varieties of yarns used in PURBANI are discussed below:

#### **Carded Yarn:**

A fibrous cotton yarn or cotton blend yarn made of short staple cotton fiber from which most of the impurities have been removed by various processes of carding and drawing.

#### **Combed Yarn:**

A fibrous cotton yarn which is combed and the fibers are long with small diameter is called Combed Yarn.

#### **Slub Cotton Yarn:**

The cotton yarn which contains irregularity of thick and thin places in the yarn in continuous bases is termed as Slub Cotton Yarn.

**50% Cotton & 50% Modal Yarn:** The yarn which is a mixture of 50% cotton fiber and 50% Modal fiber is termed as 50% Cotton & 50% Modal Yarn. Modal is mainly an artificial fiber which has a similar appearance to silk

**Grey Mélange:** The yarn which is a mixture of maximum 15% viscose fiber and 85% cotton fiber is known as Grey Mélange yarn.

#### **Lycra/ Elastane/ Spandex yarn:**

A yarn which shows elastic properties and which is formed of polyurethane/ polyamide fibers is known as Elastane/Lycra/Spandex yarn.

#### **CVC yarn:**

CVC yarn is a yarn which means Chief Value Cotton and consists of 55% /60% /65% of cotton fiber and 45%/ 40%/ 35% of polyester fiber.

#### **Polyester Yarn:**

Such type of yarn which is made from polymers produced from melt spinning of ethylene glycol and terephthalic acid.

**Cotton Mélange:**

A yarn which consists of 15% black dyed yarn and 85% of grey cotton yarn and spanned to form a yarn is called Cotton mélange.

**Viscose Yarn:**

Such type of yarn which is formed of spinning of viscose rayon fiber is called Viscose Yarn.

**PC (60% Polyester & 40% Cotton) Yarn:**

Such yarns which are formed by blending 60% polyester fiber and 40% cotton fiber through various processes. It is also known as Anthra Mélange

**2.4 Types of raw material**

- ✓ Yarn: Carded Yarn
- ✓ Combed Yarn
- ✓ Cotton Modal
- ✓ Cotton + Viscose
- ✓ Cotton Yarn Cone
- ✓ Spun Yarn: 100% Polyester
- ✓ Lycra

**2.5 Source of yarn for knitting:**

Serial No	Name of the spinning Mills
1	Karim Spinning Mills ltd.
2	Square Yarns ltd.
3	Badsha Textiles ltd.
4	Shamsuddin Spinning Mills ltd.
5	CRC Textile Mills ltd.
6	Syed Spinning and Cotton Mills ltd.
7	Amber Cotton Mills ltd.
8	Keya Spinning Mills ltd.

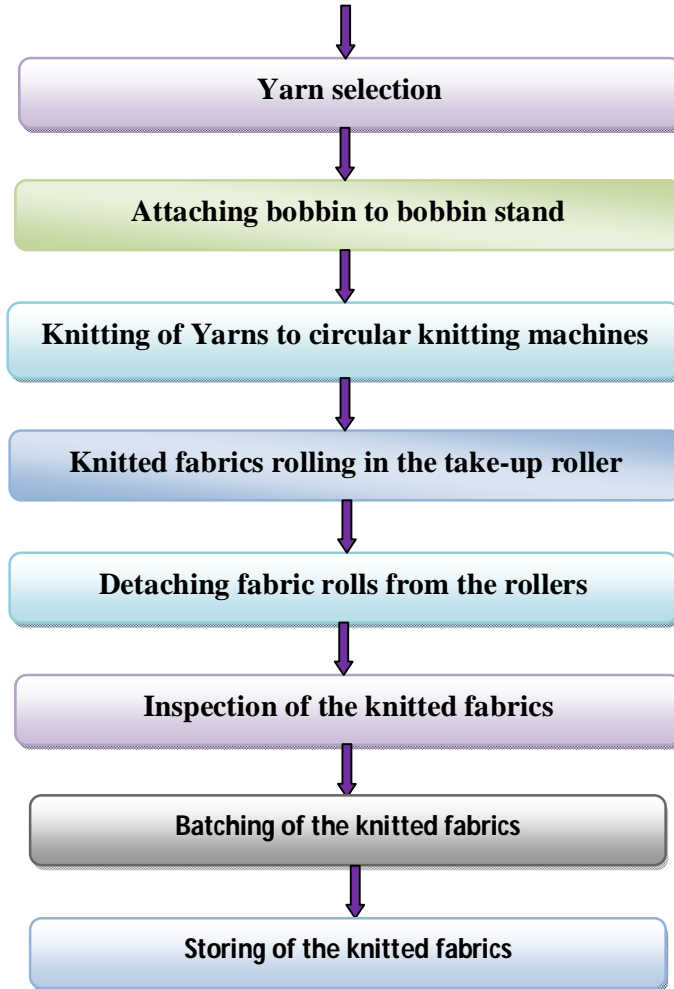
9	M.S.M.L
10	Rising Spinning Mills ltd.
11	Karim Spinning Mills ltd.

## 2.6 Fabrics Produced in Purbani Fabrics Ltd:

- Single Jersey.
- Single Lacost.
- Double Lacost.
- Double Pk.
- Heavy Jersey.
- Rib Fabrics.(1/1, 2/1)
- Lycra rib (1/1, 2/1)
- Plain Interlock.
- Single Jersey full feeder lycra.
- Single Jersey half feeder lycra.
- Single lacust half feeder lycra.
- Teri fabrics.
- Flat knit collar.
- Fleece fabric.
- Cos Fleece.
- Birds eye.
- Mini eye let.
- Eye let.
- Interlock Pk.
- Wofelet.

## 2.7 Flow process of knitting section:

Yarn bobbin from storage stage



**2.8 Flat Knitting Section:** Generally collar and cuff of knitted garments is produced in this section there are flat knitting machines of the same type. There specifications of the machines are given below:

<b>Place of Origin</b>	Taiwan
<b>Brand Name</b>	JY LEH
<b>Model Number</b>	JL-303
<b>Knitting Style</b>	Flat
<b>Computerized</b>	Yes
<b>Available</b>	41 pieces

**Features**

- Programs are stored in I/C card and can be input to other machines.
- The machine can compile the program input by keyboard without other auxiliary equipment.

- It is adjustable for knitting width without any location limit.
- Feature of single carriage can knit wide or narrow textile of best quality.

<b>Model</b>	<b>JL-303</b>
<b>Gauge</b>	7, 8, 10, 12, 14 and 16G
<b>Bed Width</b>	40"(101cm), 52"(132cm), 68"(172cm)
<b>Carriage Speed</b>	100-120 cm/sec
<b>Knitting Width</b>	Can be set freely
<b>Yarn feeder</b>	Single feeder
<b>Cam Driving</b>	Solenoid driving
<b>Stitch Density</b>	0-99 stepping motor
<b>Yarn Colors</b>	6 colors, both side changeable
<b>Racking</b>	1/2 P x 1 section, 1P x 5 section
<b>Rahben</b>	H-needle tuck, L-needle tuck, all needle tuck
<b>Needles used</b>	High and low butt
<b>Take Down Roller</b>	Automatic auxiliary roller moves with fabric take-down
<b>Data input</b>	Direct input from keyboard, memory by I/C card
<b>Driving</b>	1/2HP, 3 phase, AC motor by frequency converter control
<b>Language</b>	English and Chinese are available.
<b>Power</b>	220V, 50/60Hz, single phase
<b>Dimension</b>	80 x 234 x 185 (cm) / L.W.H for 52"
<b>Specifications</b>	Specifications and appearance may change without notices

**Collar:**L: 45-50 cm \* W:09-10cm \* T:3/4/5 ply, 35-45 pcs /Kg(Depends on count, ply of Yarn and tension of knitting.

**Cuff:** L: 37-39 \* W:3.8-4.0cm \* T:2/3/4 ply, 60-70 pcs /Kg(Depends on count, ply of yarn and tension of knitting).

**Factor should be considered in production:**

There should follow several factor when set the program according to buyer requirements.

- a) Ply of Yarn
- b) Width of Collar or Cuff
- c) Stitch Length
- d) Type of Collar & Cuff (e.g. - Fancy, Tripping, Solid etc.)
- e)

**2.9 DIFFERENT TYPES OF KNITTING MACHINE:**

- ❖ **Singlejersey Circular Knitting Machine:**
- ❖ **Double Jersey Circular knitting Machine**

**Singlejersey Circular Knitting Machine:**

Mac hine NO	Manufacturer	Cylinder Diameter	Feeders	Gauge	Machine Model	Needles	Safety RPM	Manufacturing Year
1	RUNSHAN (Made in China)	16"	48	24G	RS	1392	24	2008
2	RUNSHAN (Made in China)	17"	51	28G	RS	1488	24	2008
3	RUNSHAN (Made in China)	19"	55	28G	RS	1680	24	2008
4	RUNSHAN (Made in China)	18"	54	28G	RS	1584	24	2008
5	RUNSHAN (Made in China)	30"	30	28G	RS	2640	24	2008

6	RUNSHAN (Made in China)	34"	102	28G	RS	2990	24	2009
7	FALMAC (Made in Singapore)	24"	72	24G	FSB 3 × SK	1810	24	1998
8	FALMAC (Made in Singapore)	21"	63	24G	FSB 3 × SK	1583	24	1999
9	FALMAC (Made in Singapore)	23"	69	24G	FSB 3 × SK	1734	24	1998
10	FALMAC (Made in Singapore)	25"	75	24G	FSB 3 × SK	1885	24	1999
11	FALMAC (Made in Singapore)	22"	66	24G	FSB 3 × SK	1659	24	1998
12	FALMAC (Made in Singapore)	20"	60	24G	FSB 3 × SK	1508	24	1999
13	FALMAC (Made in Singapore)	19"	57	24G	PN 3 × SK	1433	24	2000
14	FALMAC (Made in Singapore)	17"	51	24G	PN3SK-15	1282	24	2000
15	FALMAC	26"	78	24G	PN 3 × SK	1960	24	2000

	( Made in Singapore)							
16	FALMAC	20"	84	24G	PN3SK-15	1507	24	2006
	( Made in Singapore)							
17	FALMAC	23"	69	28G	PN3SK-15	2023	24	2006
	( Made in Singapore)							
18	FALMAC	18"	54	24G	PN3SK-15	1357	24	2006
	( Made in Singapore)							
19	Mayer & Cie (Made in Germany)	16"	51	28G	MV4-3.2	1408	24	2002
20	Mayer & Cie (Made in Germany)	16"	51	28G	MV4-3.2	904	24	2002
21	Mayer & Cie (Made in Germany)	30"	96	28G	RELANIT411	2639	24	2002
22	Mayer & Cie (Made in Germany)	30"	96	28G	RELANIT411	2639	24	2002
23	Mayer & Cie (Made in Germany)	30"	96	28G	RELANIT411	2639	24	2002
24	Mayer & Cie (Made in Germany)	30"	96	28G	RELANIT411	2639	24	2002
25	Mayer & Cie (Made in Germany)	30"	96	28G	RELANIT411	2639	24	2002
26	Mayer & Cie (Made in	30"	96	28G	RELANIT411	2639	24	2002



	Germany)							
27	JIUNN LONG Machine Co. Ltd(Taiwan)	34"	102	24G	JLS-C	2544	13	2012
28	JIUNN LONG Machine Co. Ltd(Taiwan)	34"	102	24G	JLS-C	2544	13	2012
29	JIUNN LONG Machine Co. Ltd(Taiwan)	34"	102	24G	JLS-C	2544	13	2012
30	JIUNN LONG Machine Co. Ltd(Taiwan)	36"	108	24G	JLS-2	2712	13	2012
31	JIUNN LONG Machine Co. Ltd(Taiwan)	36"	108	24G	JLS-2	2712	13	2012
32	JIUNN LONG Machine Co. Ltd(Taiwan)	36"	108	24G	JLS-2	2712	13	2012
33	Mayer & Cie (Made in Germany)	30"	96	28G	RELANIT411	2639	24	2002
34	Mayer & Cie (Made in Germany)	30"	96	28G	RELANIT411	2639	24	2002
35	Mayer & Cie (Made in Germany)	30"	96	28G	RELANIT411	2639	24	2002
36	Mayer & Cie (Made in Germany)	30"	96	28G	RELANIT411	2639	24	2002
37	Mayer & Cie (Made in Germany)	30"	192	28G	RELANIT1.6R	2639	24	2002
38	Mayer & Cie (Made in	30"	192	28G	RELANIT1.6R	2639	24	2002

39	Germany)							
	Mayer & Cie (Made in Germany)	30"	96	28G	RELANIT411	2639	24	2002

### Double Jersey Circular knitting Machine:

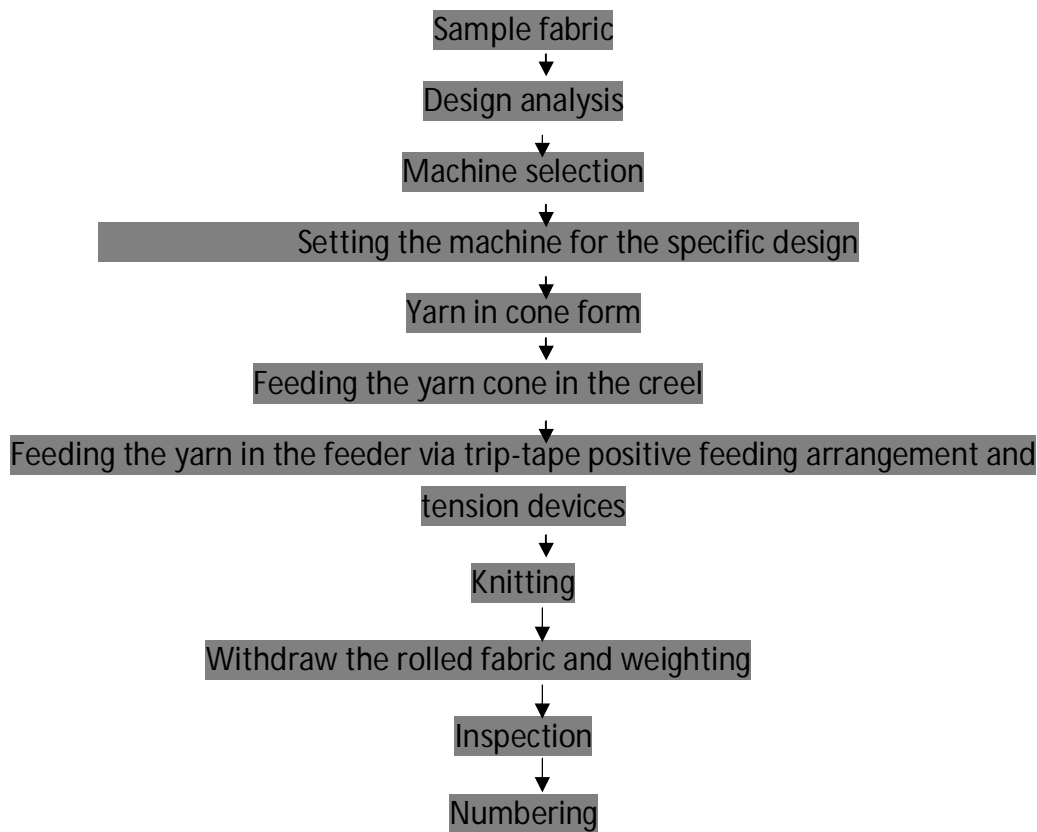
Machine NO	Manufacturer	Cylinder Diameter	Feeders	Gauge	Machine Model	Needles	Safety RPM	Manufacturing Year
01	Mayer & Cie (Made in Germany)	12"	23	18G	FV 2.0	2×684	24	2002
02	Mayer & Cie (Made in Germany)	14"	29	18G	FV 2.0	2×792	24	2002
03	Mayer & Cie (Made in Germany)	16"	33	18G	FV 2.0	2×900	24	2002
04	Mayer & Cie (Made in Germany)	16"	33	18G	FV 2.0	2×900	24	2002
05	Mayer & Cie (Made in Germany)	18"	37	18G	FV 2.0	2×1008	24	2002
06	Mayer & Cie (Made in Germany)	18"	37	18G	FV 2.0	2×1008	24	2002
07	Mayer & Cie (Made in Germany)	30"	96	24G	OV 3.2 QC	2×2268	24	2002
08	Mayer & Cie (Made in Germany)	30"	96	24G	OV 3.2 QC	2×2268	24	2002

09	Mayer & Cie (Made in Germany)	30''	96	24G	OV 3.2	2×2268	24	2000
10	Mayer & Cie (Made in Germany)	30''	96	24G	OV 3.2	2×2268	24	2000
11	Mayer & Cie (Made in Germany)	30''	96	24G	OV 3.2	2×2268	24	2000
12	Mayer & Cie (Made in Germany)	30''	60	18G	FHG11	2×1680	24	2002
13	Mayer & Cie (Made in Germany)	24''	54	18G	FV 2.0	2×1476	24	2002
14	Mayer & Cie (Made in Germany)	24''	50	18G	FV 2.0	2×1344	18	2002
15	Mayer & Cie (Made in Germany)	22''	45	18G	FV 2.0	2×1248	18	2002
16	Mayer & Cie (Made in Germany)	20''	41	18G	FV 2.0	2×1128	24	2002
17	Mayer & Cie (Made in Germany)	30''	96	24G	OV 3.2	2×2268	24	2002

### Remarks:

Production runs with the help of mechanical fitters. For any kind of mechanical fault of any machine the fix and work under technical in charge. Production officers take account of daily production by running after the supervisor and workers so on.

## 2.10 Process flow chart of knitting:



## 2.11 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:

- I. Firstly, knitting manager gets a production shit from the merchandiser as accordance as consumer requirements then he informs or orders production officer about it.
- II. Production officer informs technical in charge and knows about machine in which the production will be running.
- III. 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
- IV. Production officer with experienced mechanical fitter adjusts required stitch length and grey GSM for required final GSM.
- V. Supervisor checks daily production regularity and make operator conscious about finishing tin due time.

- VI. 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.
- VII. After required production and final inspection in 4-point system, they sent in dyeing section.

### 2.11.1 Production Parameters:

- Machine Diameter;
- Machine rpm (revolution per minute);
- No. of feeds or feeders in use;
- Machine Gauge;
- Count of yarn;
- Required time (M/C running time
- Machine running efficiency.

### 2.11.2 Relationship between knitting parameters:

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

### 2.11.3 Considerable points to produce knit fabric:

Before production of knitted fabric, these factors are needed to consider. These includes

- ↯ Type of Fabric or design of Fabric.
- ↯ Finished G.S.M.
- ↯ Yarn count
- ↯ Types of yarn (combed or carded)
- ↯ Diameter of the fabric.
- ↯ Stitch length
- ↯ Color depth.

## 2.12 G.S.M

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

### Points considered while setting grey GSM:

- ↗ Enzyme level
- ↗ Color
- ↗ Suided or non- suided

### 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.

### Factors that should be changed in case of fabric design:

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

### Effect of stitch length of 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.

### 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.

### **2.13 Faults and their causes in knitting:**

#### **Hole mark:**

##### **Causes:**

- ↗ Buckling of the needle latch
- ↗ Buckling the sinker
- ↗ Higher G.S.M

#### **Star mark:**

##### **Causes:**

- ↗ Buckling of the needle latch.
- ↗ Yarn tension variation during production.
- ↗ Low G.S.M.

#### **Oil spot/Grease spot:**

##### **Causes:**

- ↗ Excess oil/Grease use.
- ↗ Jamming of needle & sinker.

#### **Patta:**

##### **Causes:**

- ↗ Yarn comes from different lot.
- ↗ Faulty cam use in the m/c.

#### **Needle mark:**

##### **Causes:**

- ↗ Faulty needle use in the m/c.

#### **Sinker mark:**

**Causes:**

- ↗ Faulty sinker use in the m/c

**Fabric Shrinkage:**

**Causes:**

- ↗ Yarn twist
- ↗ Knitting tension
- ↗ Fabric G.S.M.

Twist ↑	Shrinkage ↑
G.S.M. ↑	Shrinkag ↑

**2.14 Different Fabric GSM and Their Yarn Count:**

**A. S/J without lycra -**

Fabric G.S.M	Yarn Count
110 – 120	40 <sup>S</sup> – 36 <sup>S</sup>
120 – 130	36 <sup>S</sup> - 32 <sup>S</sup>
130 – 140	32 <sup>S</sup> – 28 <sup>S</sup>
140 – 150	28 <sup>S</sup>
150 – 160	26 <sup>S</sup>
170 – 210	24 <sup>S</sup>

**B. Rib without lycra -**

Fabric G.S.M	Yarn Count
180 – 190	36 <sup>S</sup> - 32 <sup>S</sup>
190 – 200	30 <sup>S</sup>
200 – 215	28 <sup>S</sup>
215 – 230	26 <sup>S</sup>



230 – 250	24 <sup>S</sup>
250 – 300	24 <sup>S</sup>

### C. Interlock without lycra -

Fabric G.S.M	Yarn Count
200 – 220	34 <sup>S</sup>
220 – 230	32 <sup>S</sup>
230 – 250	30 <sup>S</sup>
250 – 300	26 <sup>S</sup>

### D. Lacoste without lycra -

Fabric G.S.M	Yarn Count
180 – 190	30 <sup>S</sup>
190 – 210	28 <sup>S</sup>
210 – 230	26 <sup>S</sup>
230 – 250	26 <sup>S</sup>

### E. 40D Lycra Rib -

Fabric G.S.M	Yarn Count
230 – 240	32 <sup>S</sup>
240 – 250	30 <sup>S</sup>
250 – 280	26 <sup>S</sup>
280 – 300	24 <sup>S</sup>

## F. 40D Lycra S/J –

	Fabric G.S.M	Yarn Count	
	180 – 190	34 <sup>S</sup>	
	190 – 210	32 <sup>S</sup>	
	210 – 220	30 <sup>S</sup>	
	220 – 240	28 <sup>S</sup>	
<b>2.15</b>	240 – 250	26 <sup>S</sup>	<b>Different Knitting</b>
<b>Parts of Machine:</b>			

**Creel:** Creel is used to place the cone.

**Feeder:** Feeder is used to feed the yarn.

**Tensioning device:** Tensioning device is used to give proper tension to the yarn.

**VDQ pulley:** VDQ pulley is used to control the GSM by controlling the stitch length.

**Guide:** Guide is used to guide the yarn.

**Sensor:** Sensor is used to see & the machine stops when any problem occurs.

**Spreader:** Spreader is used to spread the knitted fabric before take up roller.

**Take up roller:** Take up roller is used to take up the fabric

**Fixation feeder:** These types of feeder are used in Electrical Auto Striper Knitting Machine to feed the yarn at specific finger.

### 2.15.1 Production Calculation:

#### A. Production/shift in kg at 100% efficiency

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

#### B. Production/shift in meter

$$\begin{aligned}
 &= \frac{\text{Course} / \text{min.}}{\text{Course} / \text{cm}} \\
 &= \frac{\text{RPM} \times \text{No. of Feeder} \times 60 \times 12 \times \text{Efficiency}}{\text{Course} / \text{cm} \times 100}
 \end{aligned}$$

### C. Fabric width in meter:

$$\begin{aligned}
 &= \frac{\text{Total no. of wales}}{\text{Wales} / \text{cm} \times 100} \\
 &= \frac{\text{Total no. of Needles used in knitting}}{\text{Wales} / \text{cm} \times 100}
 \end{aligned}$$

### D. Calculation for total number of needle of a machine = $G \times D \times \pi$

Here,

**G** = Machine gauge

**D** = Machine diameter

### E. From finish G.S.M calculating grey GSM, SL, count:

Suppose a fabric involve 180 finishes G.S.M

$$\text{So, gray G.S.M} = \frac{\text{Finish G.S.M}}{1.3} = \frac{180}{1.3} = 138$$

$$\text{So, count} = \frac{4320}{F.G.S.M} = \frac{4320}{180} = 24/s$$

$$\text{So, S.L} = \frac{95351.5}{\text{count} \times G.GSM} = \frac{95351.5}{24 \times 138} = 28.78 \text{ cm} = 2.9 \text{ mm}$$

### F. Calculation of S.L where yarns count = 24:

$$\rightarrow \text{S.L} = 16.66d$$

$$= 16.66 \frac{1}{28\sqrt{\text{count}}}$$

$$= 16.66 \frac{1}{28\sqrt{24}} = .308 \text{ cm} = 3.08 \text{ mm}$$

## 2.16 Photo gallery





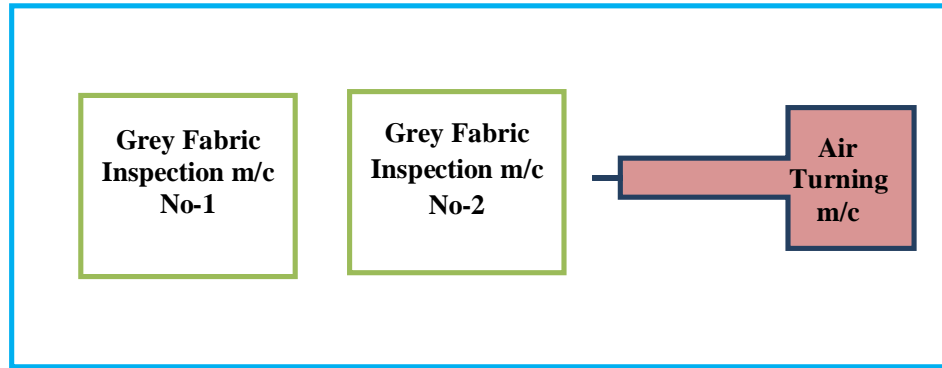
# CHAPTER: 3



## **3. Batching Section**

### **3.1 Batching Section**

**Layout of Batching Section:**



### Grey Fabric Inspection:

The inspection and grading of fabric quality is one of the important functions of Quality Control in the grey or finished state, the grading of fabric is a difficult task, taking two primary considerations: as the frequency of effects and the seriousness of defects.

The grading has two primary functions: First, to classify the fabrics according to standard qualities based on the end-use and customer demands and second, to supply information as to the qualities actually being produced.



Grey Fabric Inspection

#### 3.1.1 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.
- 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.

### 3.1.2 Grading procedure:

- ↗ All open defects or major defects counted with 4 points per defect.
  - ↗ Surface defects over 9 inch length counted with 4 points per defect.
  - ↗ Surface defects 6 to 9 inches length counted with 3 points per defect.
  - ↗ Surface defects 3 to 6 inches length counted with 2 points per defect.
  - ↗ Surface defects up to 3 inches length counted with one point per defect.
  - ↗ 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.

### 3.2 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
- ↗ Type of fabrics(100% cotton, PET, PC, CVC)



- ↗ Emergency
- ↗ To send the grey fabric to the dyeing floor with batch card.
- ↗ To keep records for every previous dyeing.

### 3.2.1 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.

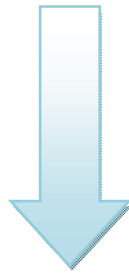
### 3.2.2 Batch management:

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.

### 3.3 M/Cs in batch section

No. of M/c	: 01
Machine name	: Air turning machine
Origin	: KOREA
No. of M/c	: 02
Machine name	: Fabric Inspection machine
Origin	: KOREA

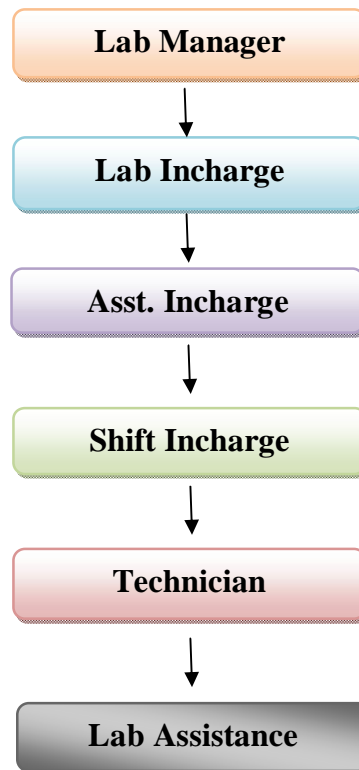
## CHAPTER: 4



### **Fabric Dyeing**

## 4.1 Dyeing Centre Lab Section

### 4.1.1 Organ gram of color lab:



### **Definition:**

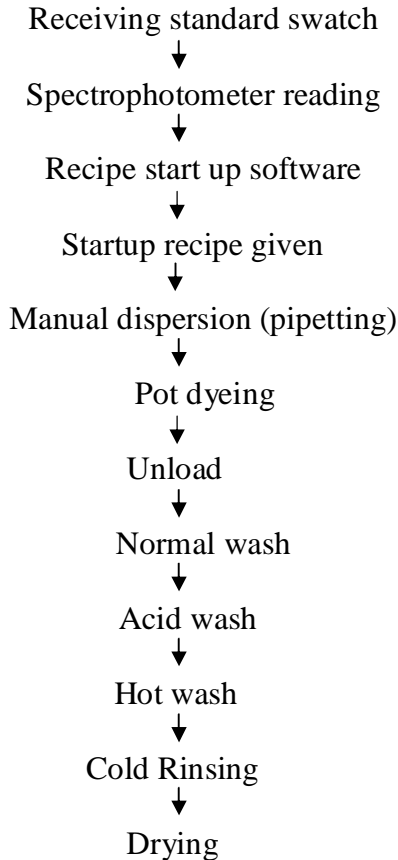
LAB dip development means the sample which is dyed according to buyer's requirements (similar shade and so on). Depending on lab dip development sample dyeing and bulk production the dyeing planning done.

### **4.1.2 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 or Spectroflash.
- To calculate revise recipe for sample dyeing.
- Finally approved Lab Dip (Grade: A B C).

### 4.1.3 Development of Dip:



### 4.1.4 Preparation and storage of stock dyes:

#### Preparation of Concentration of stock dye sol<sup>n</sup> -

Normally 0.1%, 0.5%, 1%, 1.5%, 2% and 4% stock solution of dyes are prepared in beakers for daily used.

#### Preparation of Concentration of stock chemical sol<sup>n</sup>-

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

### 4.1.5 Types of Pipette:

- 0.1ml
- 0.2ml
- 0.5ml
- 1.0ml
- 2.0ml
- 5.0ml
- 10ml
- 20ml

#### 4.1.6 Dyes and chemicals measuring formula for lab:

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

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

**Example –**

In recipe,      Fabric wt. = 5gm  
                       Shade % = 2%

[ If used 0.5 % stock sol<sup>n</sup> of dyes ] then ,

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

**The amount of chemical sol<sup>n</sup> (ml) is measured as follow -**

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

**Example –**

In recipe,      Fabric wt. = 5 gm  
                       Salt            = 20 g/l  
                       M: L            = 10

[ If taken 25 % stock sol<sup>n</sup> of salt ] then ,

$$\text{Amount of chemical sol}^n \text{ (ml)} = \frac{5 * 10 * 20}{1000 * 0.25} = 4 \text{ml}$$

#### 4.2 Machineries for lab dip:

Machine No-1	Types	Water Heater
	Brand	Fongs
	M/C No	SDM2-12-140
	SER NO	93-10-017
	Volt	415
	Amp.	13

Origin	Hongkong
--------	----------

<b>Machine No-2</b>	<b>Types</b>	<b>Dry Iron</b>
	Brand	Sebec
	Model	SDI-8
	SER NO	93-10-017
	Volt	220-240 volts(50-60Hz)
	Origin	China

<b>Machine No-3</b>	<b>Types</b>	<b>Sample Dyeing Machine</b>
	Brand	Datacolor AHIBA IR™
	Model	SDI-8
	SER NO	93-10-017
	Volt	220-240 volts(50-60Hz)
	Origin	USA

<b>Machine No-4</b>	<b>Types</b>	<b>Sample Dyeing Machine</b>
	Brand	ECO Datacolor AHIBA NUANCE
	Model	SDI-8
	SER NO	93-10-017
	Volt	220-240 volts(50-60Hz)

Origin	USA
--------	-----

<b>Machine No-5</b>	<b>Types</b>	<b>Spectrophotometer</b>
	Brand	Datacolor
	Model	SDI-8
	SER NO	93-10-017
	Volt	220-240 volts(50-60Hz)
	Origin	USA

<b>Machine No-5</b>	<b>Types</b>	<b>CMC(Light Box)</b>
	Brand	Verivide
	Light-1	TL84
	Light-2	-D65
	Light-3	-Florescent
Light-4	-Ultraviolet (UV)	

#### 4.3 Salt and Soda for 30% stock solution:

Salt and Soda (g/l)	Salt & Soda Solution (C.C)
4	0.53
5	0.67
6	0.80

7	0.93
8	1.07
10	1.33
12	1.60
14	1.87
15	2.00
17	2.27
18	2.40
20	2.65
25	3.30
30	4.00
40	5.33
50	6.70
60	8.00
70	9.30
80	10.66
100	13.30

**For production:**

S/L	SHADE %	SALT	SODA
01	0.001-0.1	12	5
02	0.1-0.5	15	6
03	0.5-1.0	20	7
04	1.0-1.5	30	8



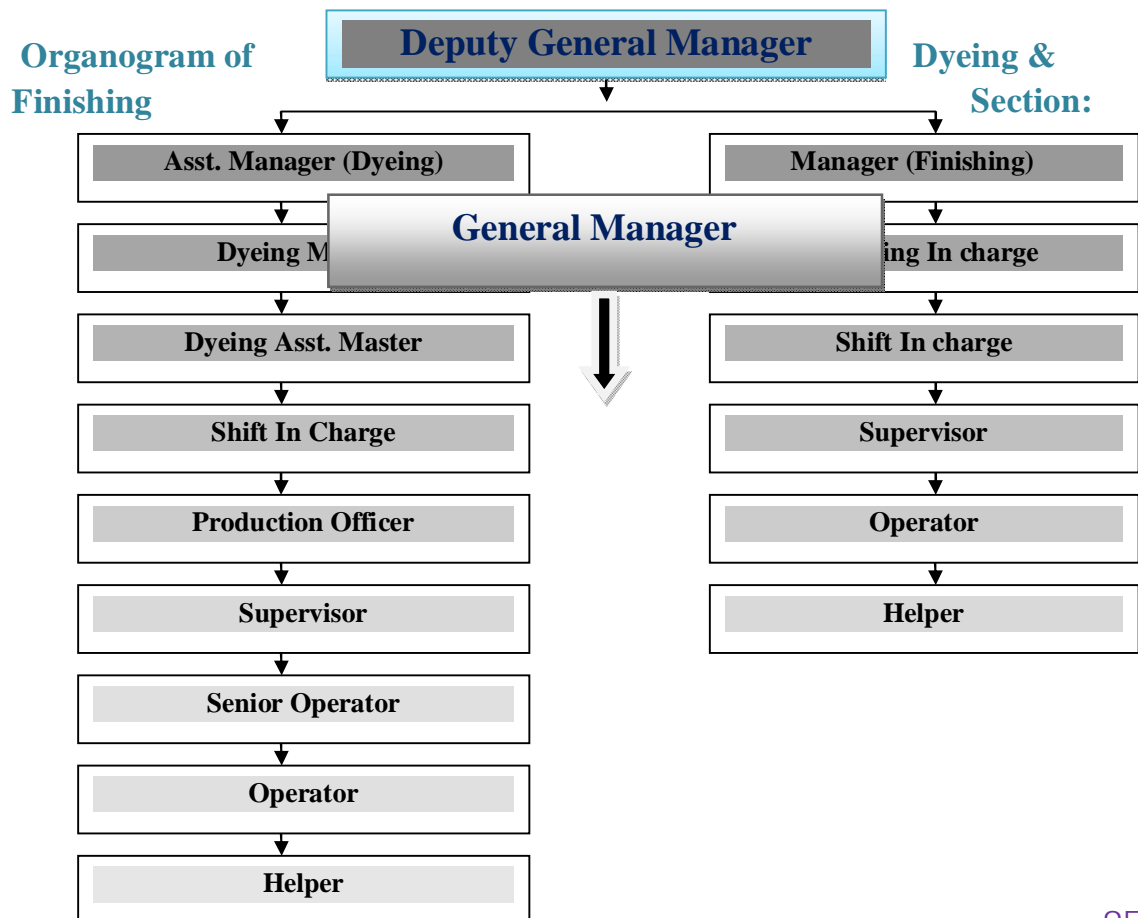
05	1.5-3.0	40	9
06	3.0-4.0	50	10
07	4.0-7.0	60	13

4.4 Photo Gallery Of  
Dyeing lab

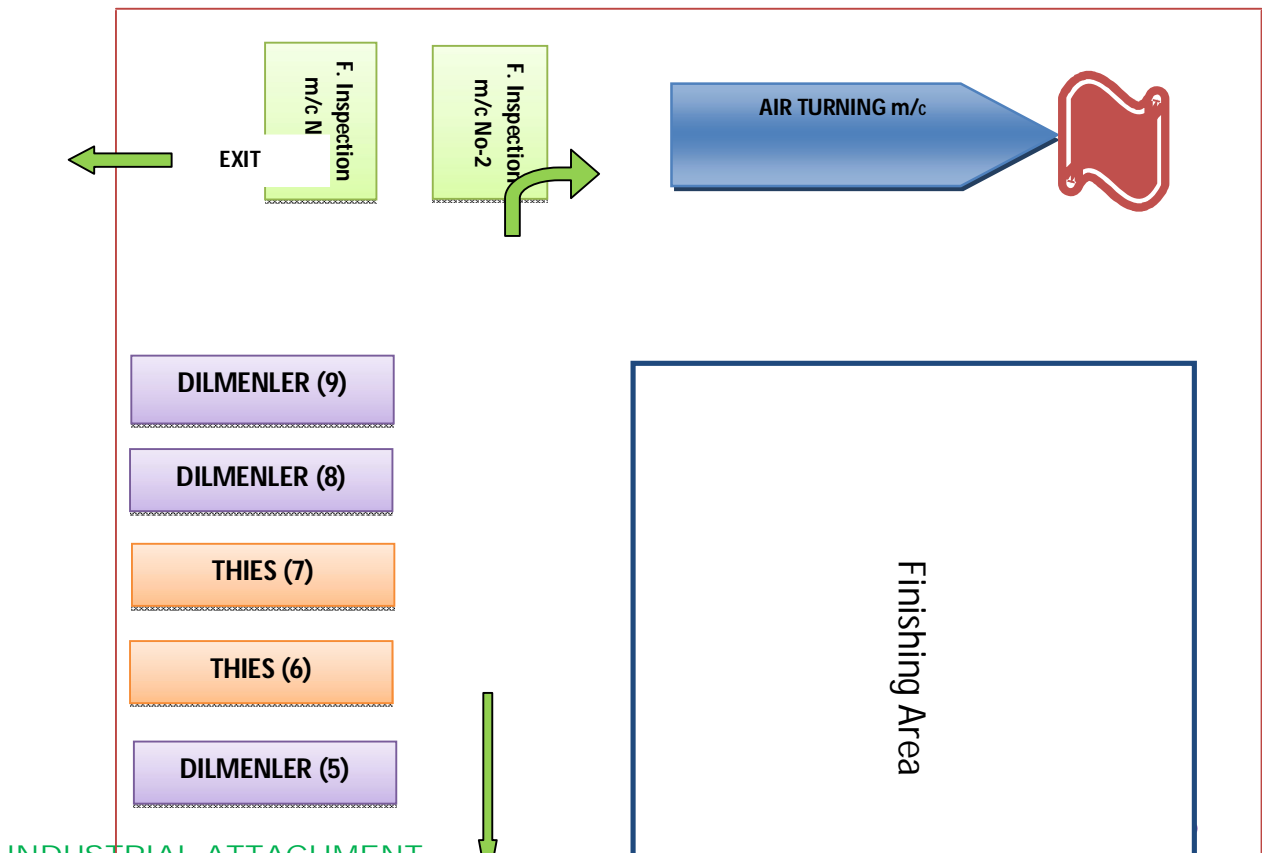


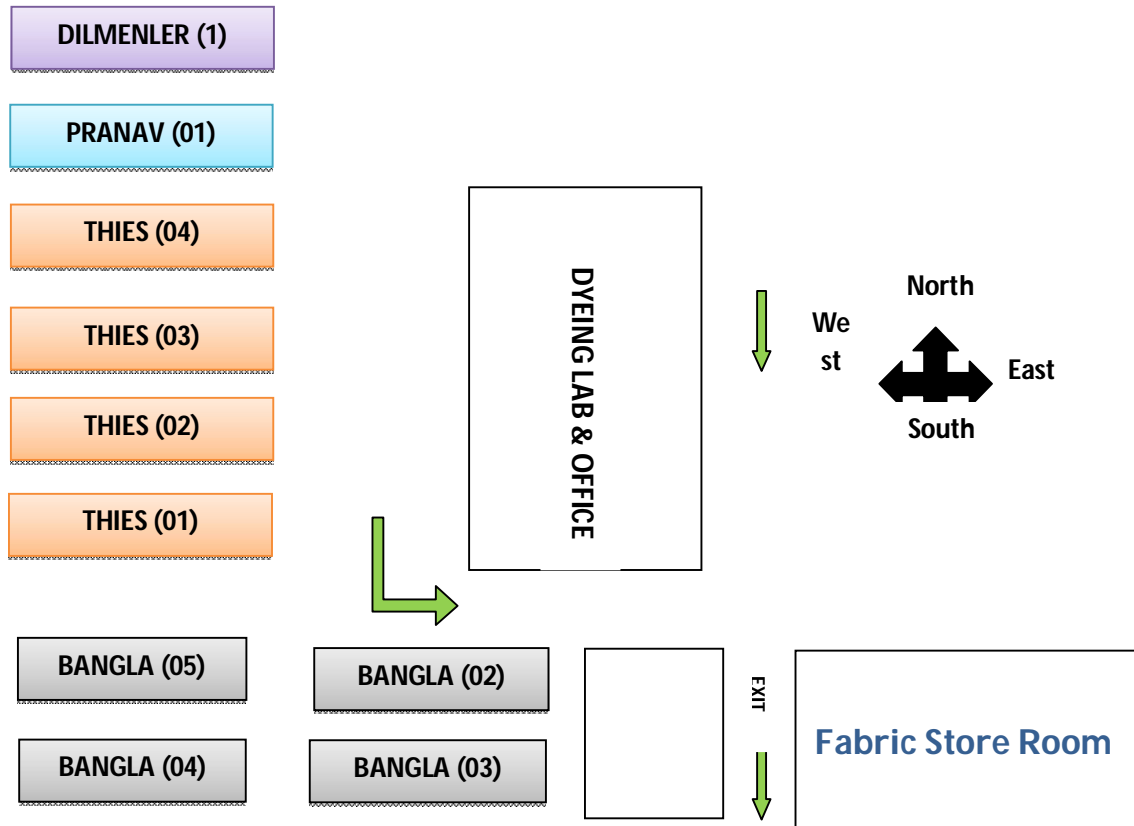


### 4.5 Dyeing Section



4.6 Layout of dyeing Section





#### 4.7 Dye & chemicals Used in Purbani Fabrics Ltd:

Aids	Chemicals Name	Price (kg/tk)
<b>General Chemicals</b>	Soda Ash	20
	Caustic	37
	H <sub>2</sub> O <sub>2</sub>	41
	Hydrose	52
	Antifoam-39	400
	Gluber Salt (anhydrous)	17
<b>Acid</b>	H <sub>2</sub> SO <sub>4</sub>	
	Acetic Acid	70-97
	Formic Acid	
	Oxalic Acid	
<b>Cationic Softener</b>		210-230
<b>Anti-crease</b>		140-165
		180-200
<b>Fixing</b>		360-400
<b>Buffer</b>		30-160
		117-145
<b>Sequestering</b>		110-163
<b>Enzyme</b>		480-550

<b>Stabilizer</b>		145-210
Brightener		289-550

#### 4.7.1 Reactive Dyes:

Serial No	Name of Reactive Dyes
1	Sunzol Red S3B
2	Sunfix Red SPD
3	Star fix Red SPD
4	Starfix Yellow 3RFN
5	Boditive Orange
6	Everzol Blue Lx
7	Everzol Blue Lx
8	Starfix Red SS
9	Novacron Yellow S3R
10	NovacronRubby S3B
11	Everzol Yellow Lx
12	Starfix Yellow SSR
13	Sunflix Blue RS
14	Sarfix Black EDHG
15	Remazol Red RGB
16	Remazol Navy RGB
17	Remzol Yellow RGB
18	Elbezol Deep Blue SB
19	Elbezol Deep Blue SB2B
20	Elbezol Yellow SB
21	Remazol Red RR
22	Remazol Yellow RR
23	Remazol Blue RR
24	Starfix Yellow S4GL
25	Everzol Turkish Blue G

#### 4.7.2 Disperse Dyes:

Serial No	Name of Disperse Dyes
01	CoralineRedBF
02	Coraline Navy MD
03	Coraline Blue 2RX
04	Coraline Yellow 4GNL
05	Coraline Navy MD
06	Coraline Yellow GDR
07	Coraline Red GDB

#### 4.8 Responsibility of production officer:

- ❖ Overall supervision of dyeing & finishing.
- ❖ Dyes & chemicals requisition issue & check.
- ❖ Program making, sample checking color measurement.
- ❖ Control the supervisor's operators & helpers of machines.
- ❖ To give dye-line or the program slip according to daily production plan, batch preparation & P<sup>H</sup> check.
- ❖ To rectify the finished fabric which rejected from quality control department?
- ❖ To check daily production report.
- ❖ To study dye & chemicals nature delivery by the manufacture & applied them correctly to the production to get best product.

##### 4.8.1 Job Description:

Title: Production officer.

Dept: Dyeing

Report to: Senior production officer.

Job summary: To plan execute & follow up the production activities & control the quality production with related activities.

#### 4.9 Machine Description:

Machine Type	Quantity
Winch dyeing m/c HT&HP	03
Winch dyeing m/c(Sample)	01
Winch dyeing m/c(Atmospheric)	06
Bangla dyeing m/c(Sample)	04

##### Machine no:01

<b>Machine name</b>	Winch dyeing m/c(Atmospheric)
<b>Brand</b>	Thies
<b>Origin</b>	Germany
<b>Capacity</b>	200 kg
<b>Nozzle pressure</b>	0.5 bar
<b>Temperature range</b>	Up to 98 <sup>0</sup> C



**Machine no:02**

<b>Machine name</b>	Winch dyeing m/c
<b>Brand</b>	Thies
<b>Origin</b>	Turkey
<b>Capacity</b>	400 kg
<b>Nozzle pressure</b>	0.5 bar
<b>Temperature range</b>	Up to 98 <sup>0</sup> C

**Machine no:03**

<b>Machine name</b>	Winch dyeing m/c
<b>Brand</b>	Thies
<b>Origin</b>	Germany
<b>Capacity</b>	400 kg
<b>Nozzle pressure</b>	0.5
<b>Temperature range</b>	Up to 98 <sup>0</sup> C

**Machine no:04**

<b>Machine name</b>	Winch dyeing m/c
<b>Brand</b>	Thies
<b>Origin</b>	Germany
<b>Capacity</b>	600 kg
<b>Nozzle pressure</b>	0.5 bar
<b>Temperature range</b>	Up to 98 <sup>0</sup> C

**Machine no:05**

<b>Machine name</b>	HT Winch dyeing m/c
<b>Brand</b>	Dilmenler
<b>Origin</b>	Turkey
<b>Capacity</b>	900 kg
<b>Pressure</b>	2.5 bar
<b>Temperature range</b>	Up to 135 <sup>0</sup> C

**Machine no:06**

<b>Machine name</b>	Winch dyeing m/c
<b>Brand</b>	Thies
<b>Origin</b>	Germaany
<b>Capacity</b>	250 kg
<b>Temperature range</b>	Up to 98 <sup>0</sup> C

**Machine no:07**

<b>Machine name</b>	Winch dyeing m/c(Atmospheric)
<b>Brand</b>	Thies
<b>Origin</b>	Germany
<b>Capacity</b>	750 kg
<b>Nozzle pressure</b>	0.5 bar
<b>Temperature range</b>	Up to 98 <sup>0</sup> C

**Machine no:08**

<b>Machine name</b>	HT Winch dyeing m/c
<b>Brand</b>	Dilmenler
<b>Origin</b>	Turkey
<b>Capacity</b>	600 kg
<b>Nozzle pressure</b>	0.5 bar
<b>Temperature range</b>	Up to 98 <sup>0</sup> C

**Machine no:09**

<b>Machine name</b>	HT winch Dyeing m/c
<b>Brand</b>	Dilmenler
<b>Origin</b>	Turkey
<b>Capacity</b>	600 kg
<b>Temperature range</b>	Up to 135 <sup>0</sup> C

**Machine no:10**

<b>Machine name</b>	Pranav Aqua Soft HT & HP soft flow fabric dyeing machine
<b>Brand</b>	Pranav
<b>Origin</b>	India
<b>Capacity</b>	25 kg
<b>Temperature range</b>	Up to 135 <sup>0</sup> C

**Machine no:11**

<b>Machine name</b>	Sample Dyeing Machine
<b>Brand</b>	Bangla
<b>Origin</b>	Bangladesh
<b>Capacity</b>	50 kg
<b>Temperature range</b>	Up to 98 <sup>0</sup> C

**Machine no:12**

<b>Machine name</b>	Sample dyeing m/c
<b>Brand</b>	Bangla
<b>Origin</b>	Bangladesh
<b>Capacity</b>	50 kg
<b>Temperature range</b>	Up to 98 <sup>0</sup> C

**Machine no:13**

<b>Machine name</b>	Sample dyeing m/c
<b>Brand</b>	Bangla
<b>Origin</b>	Bangladesh
<b>Capacity</b>	50kg
<b>Temperature range</b>	Up to 98 <sup>0</sup> C

**Machine no: 14**

<b>Machine name</b>	Sample dyeing m/c
<b>Brand</b>	Bangla
<b>Origin</b>	Bangladesh
<b>Capacity</b>	50 kg
<b>Temperature range</b>	Up to 98 <sup>0</sup> C

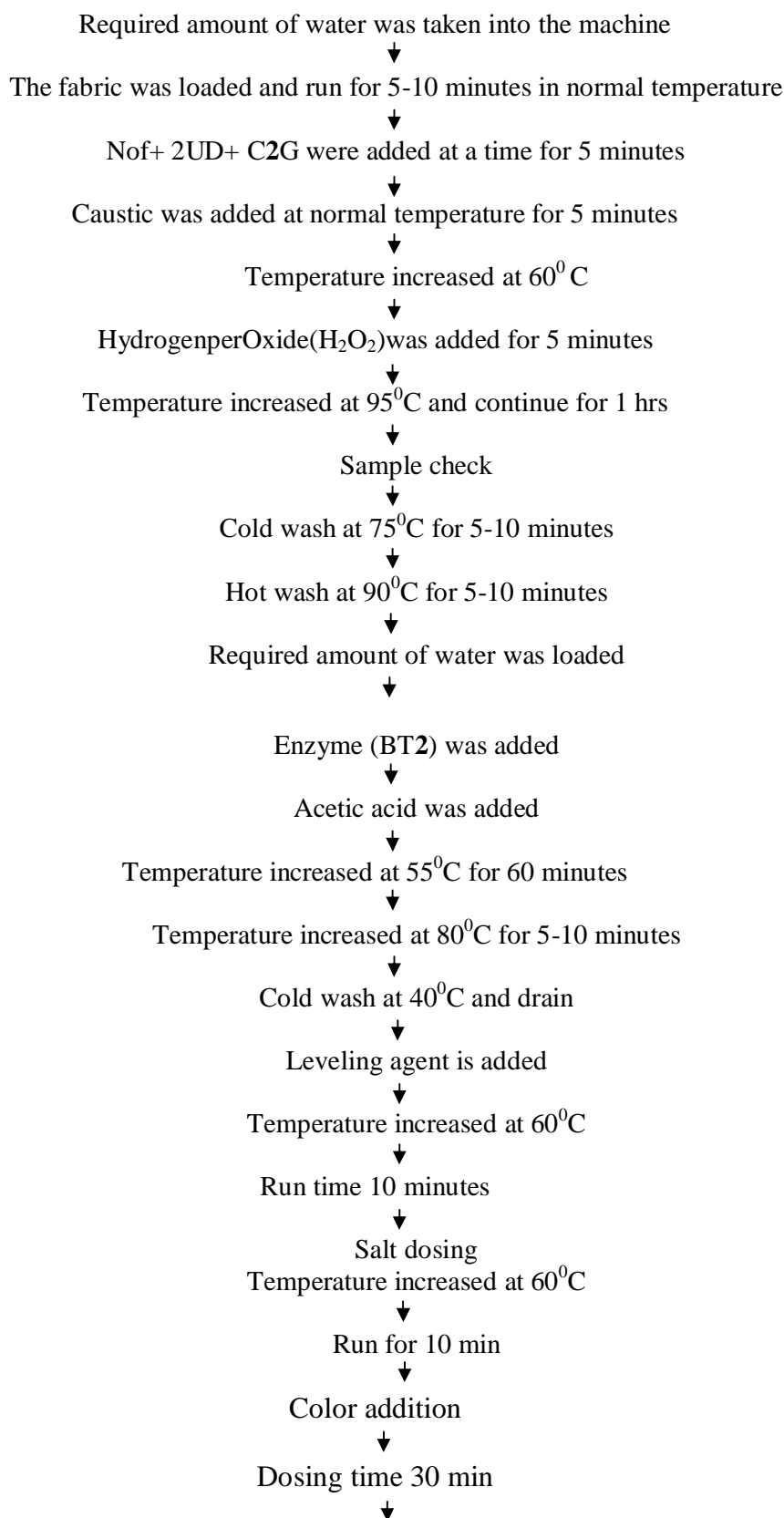
#### 4.10 Different parameters in dyeing:

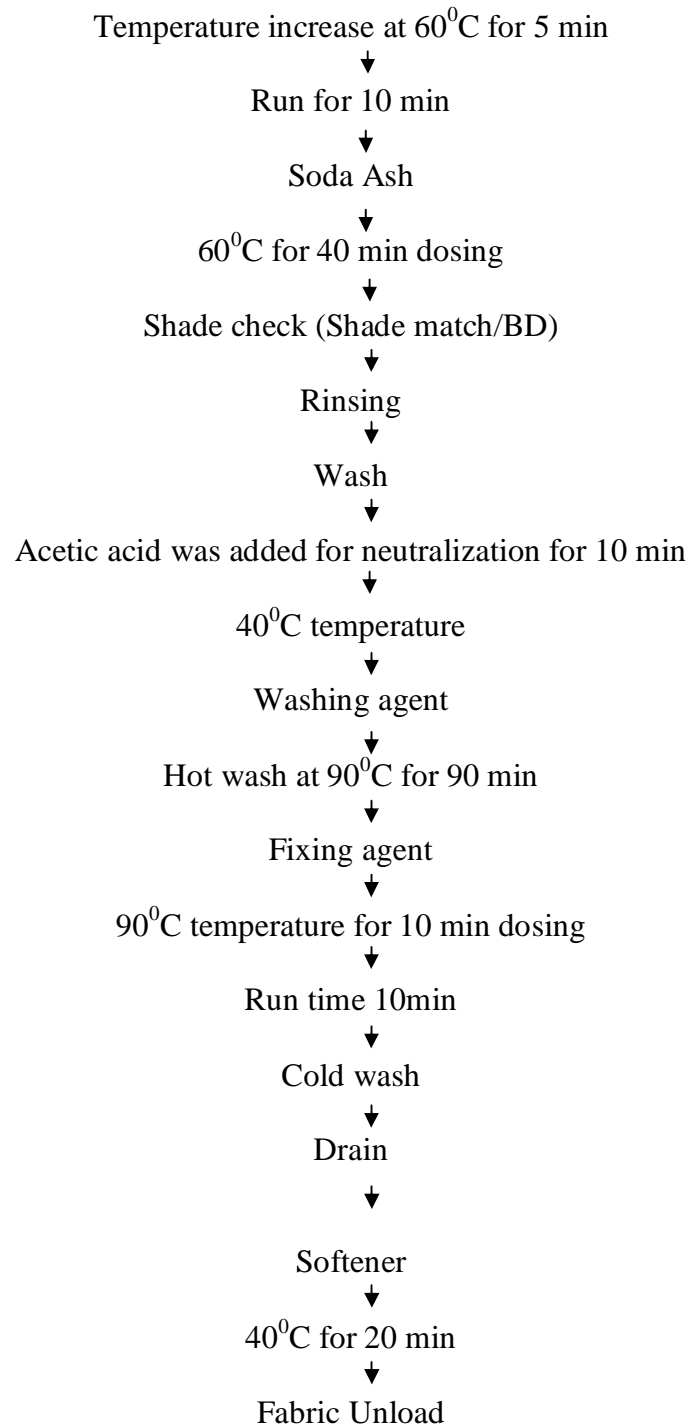
<b>A. pH</b>	
During peroxide bleaching & scouring	9-11
During enzyme treatment	4.5-5
Before addition of leveling agent	6-6.5
Before addition of color softener	6-6.5
Before addition of white softener	4.5-5
Softener at stenter & de-watering	5.5-6
Silicon softener	5.5-6
Reactive dyeing	10.5-12
Disperse dyeing	4.5-5.5

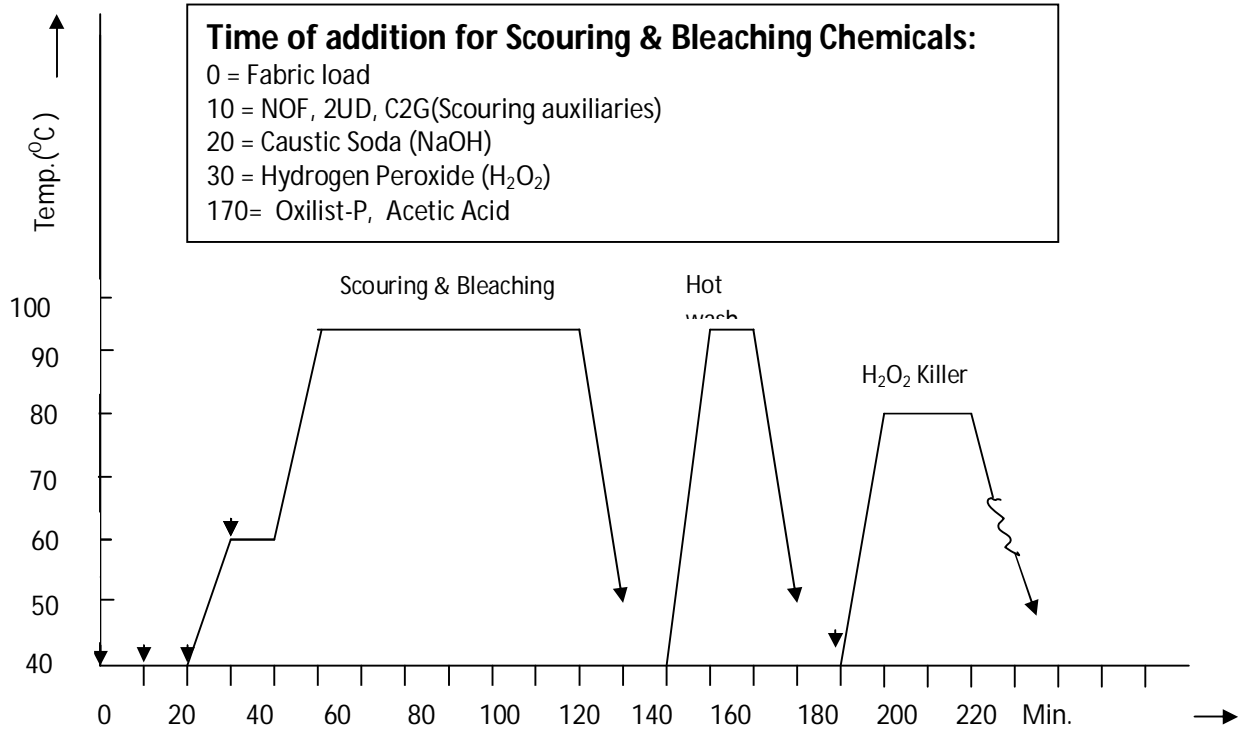
<b>B. Temperature</b>	
For cotton scouring	95-100°C
For cotton bleaching	50-60°C
For cotton hot wash	70-80°C
For cotton acid wash	60-70°C
For cotton dyeing	80°C ( For hot brand)/60°C(For cold brand)

<b>C. Time</b>	
For scouring and bleaching	60-90 mins
For reactive dyeing	60-90 mins
For disperse dyeing	60-90 mins

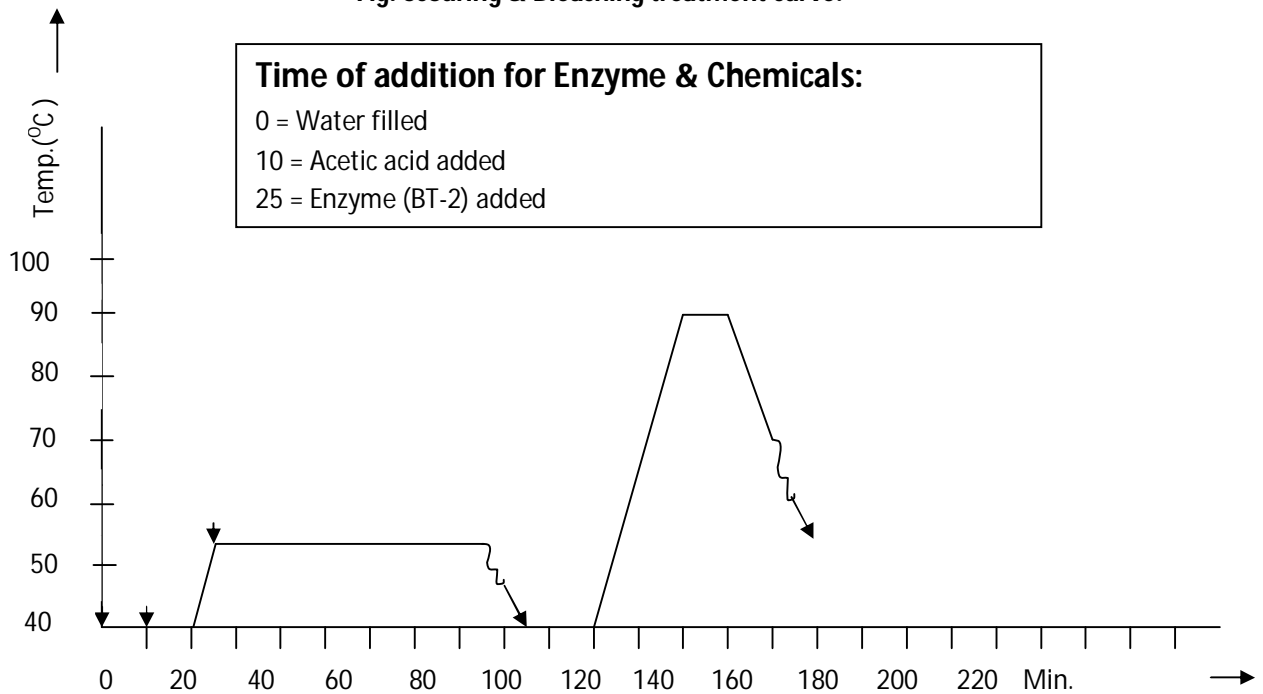
#### 4.11 Cotton Dyeing steps with Curve:





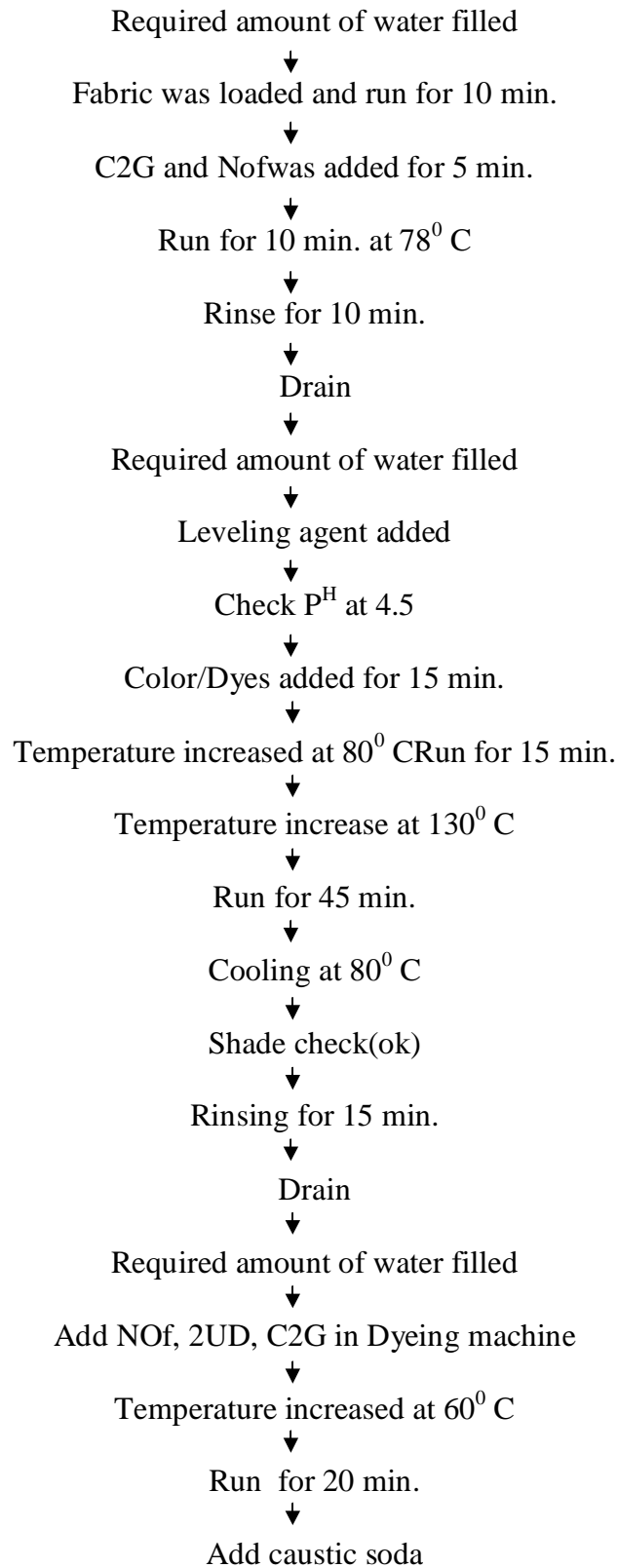


**Fig: Scouring & Bleaching treatment curve.**

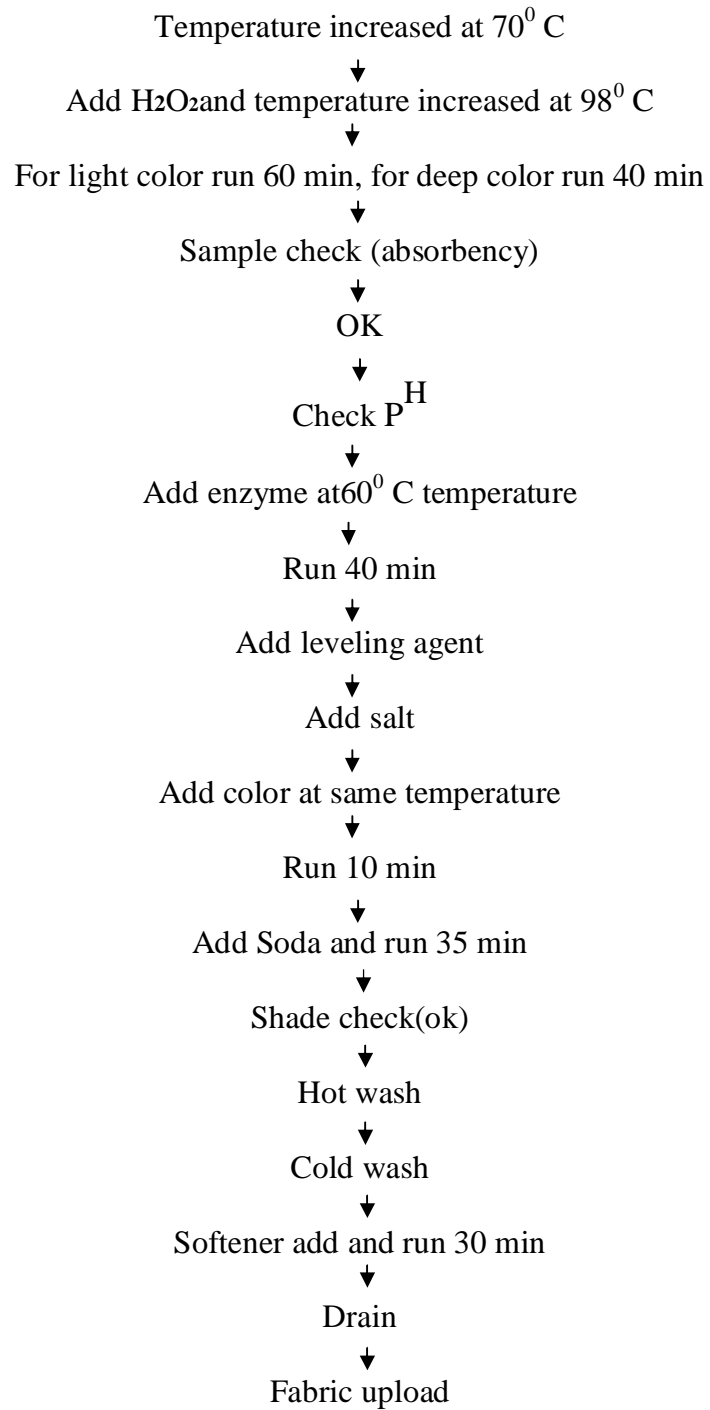


**Figure: Enzyme Treatment Curve.**

#### 4.12 Dyeing Procedure of polyester/cotton blend fabrics with Curve:







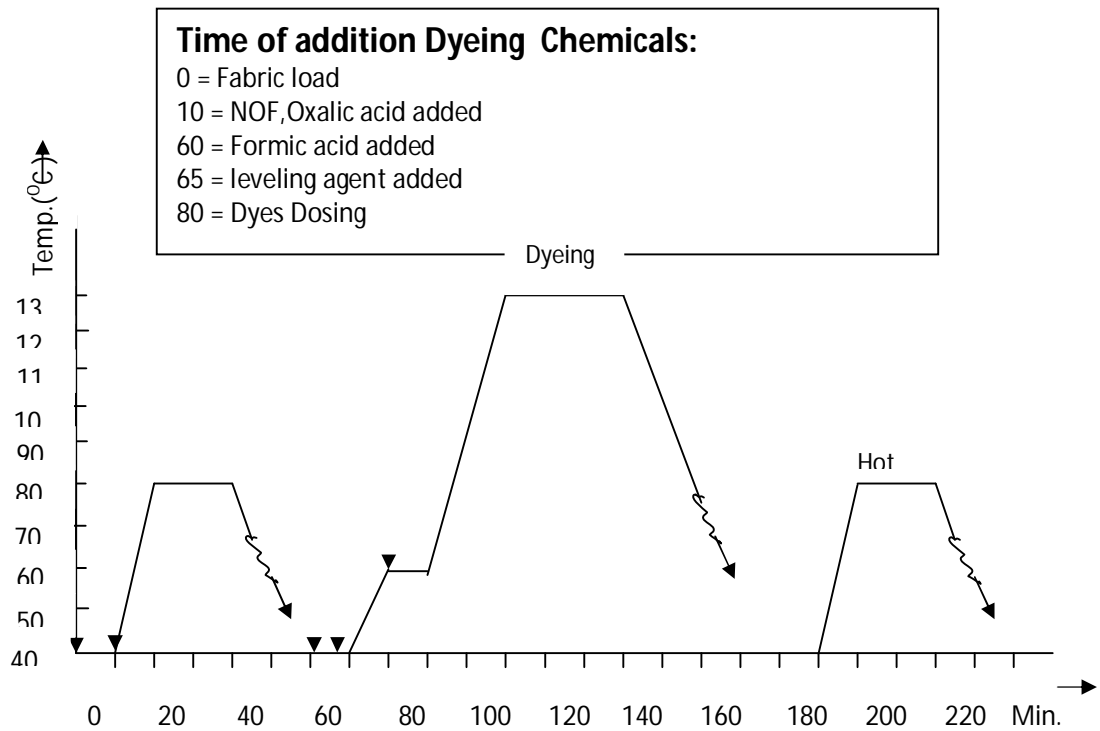
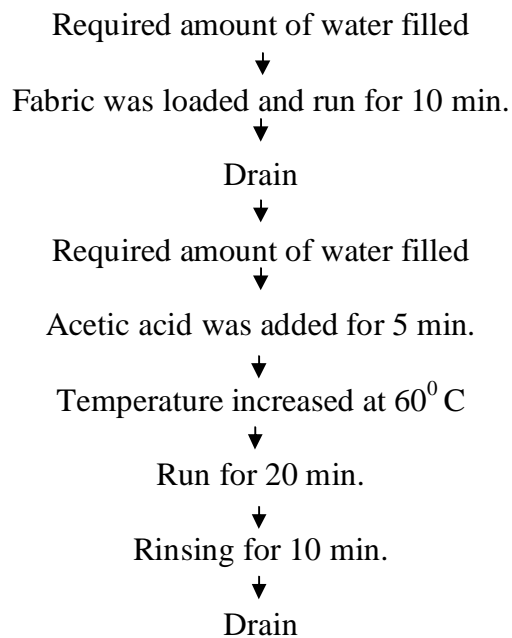
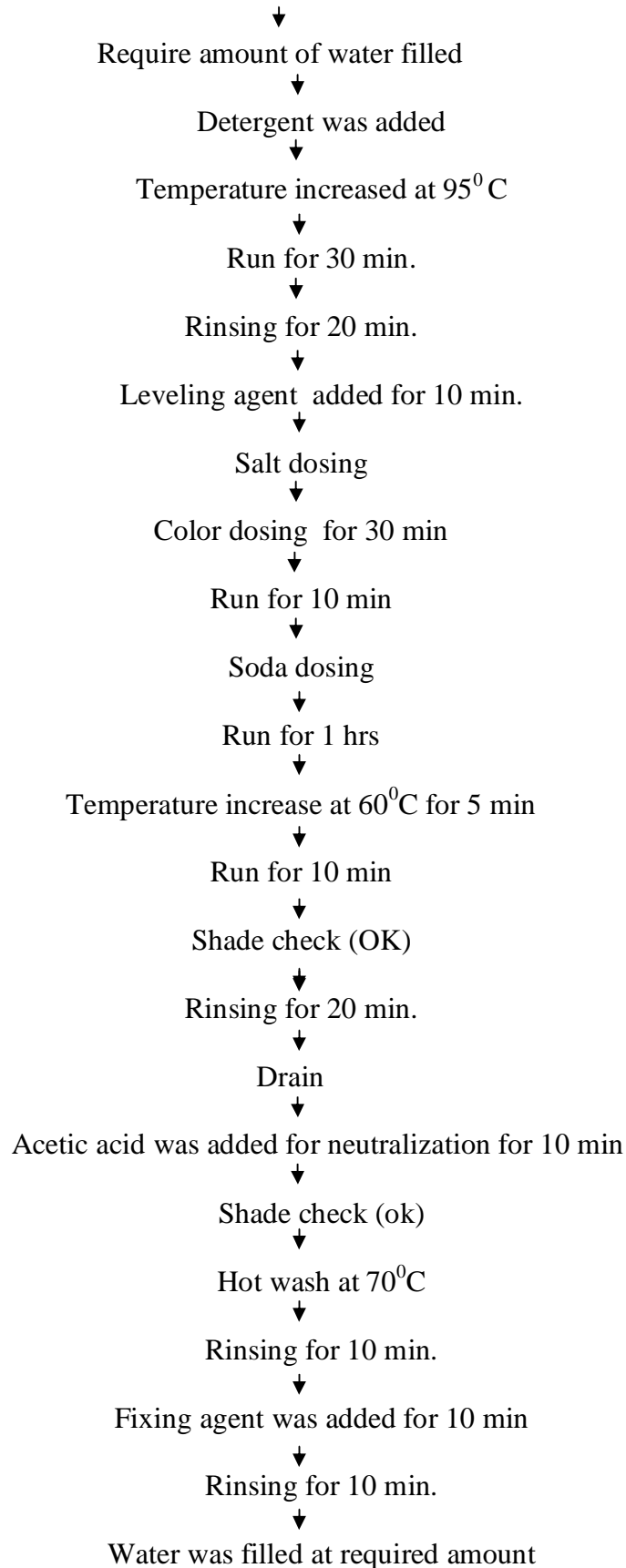
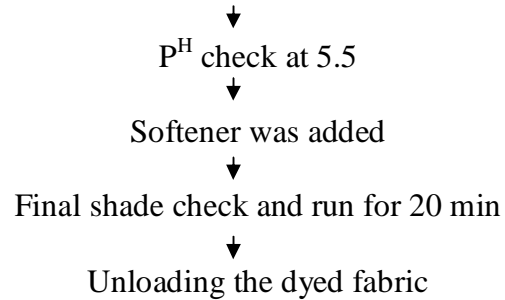


Figure: Dyeing Curve of Polyester/cotton blend.

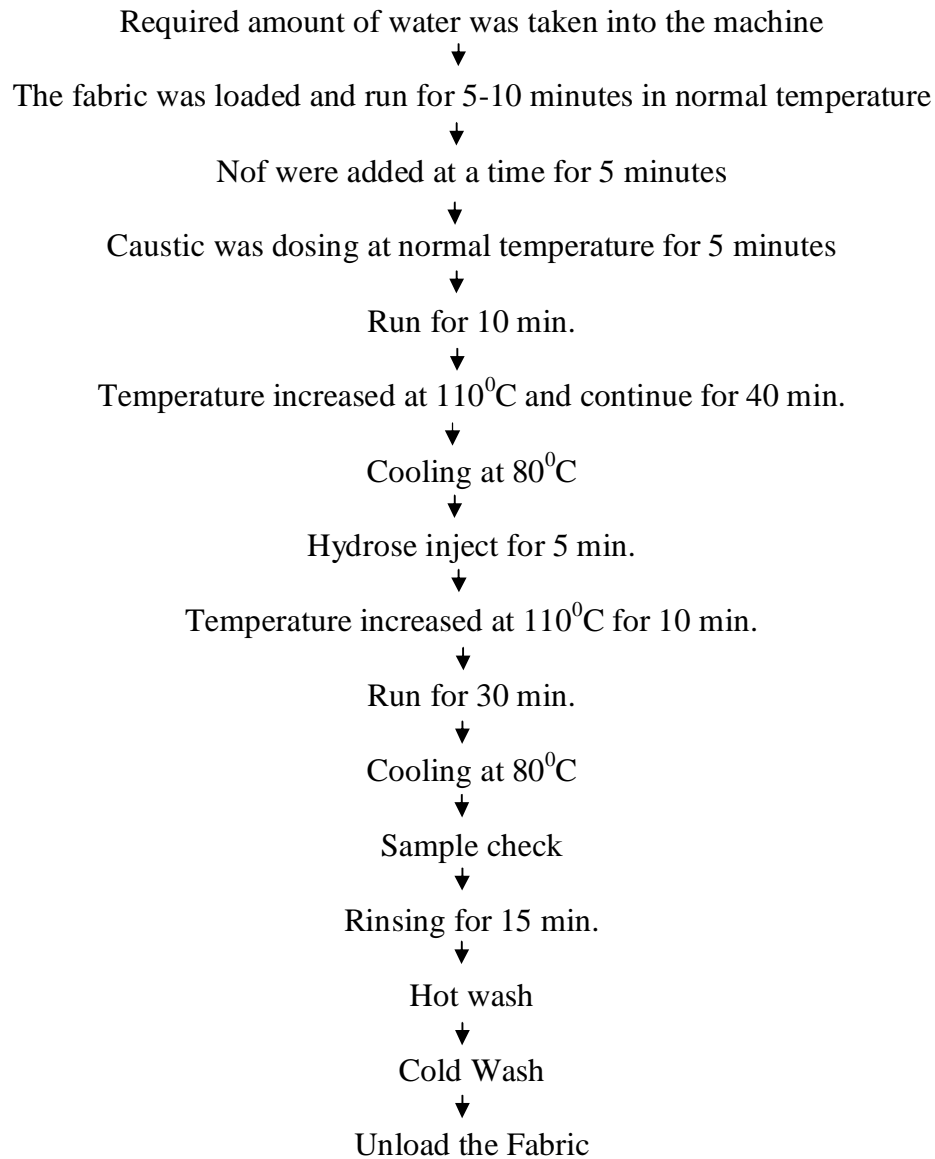
#### 4.13 Process sequence of topping:



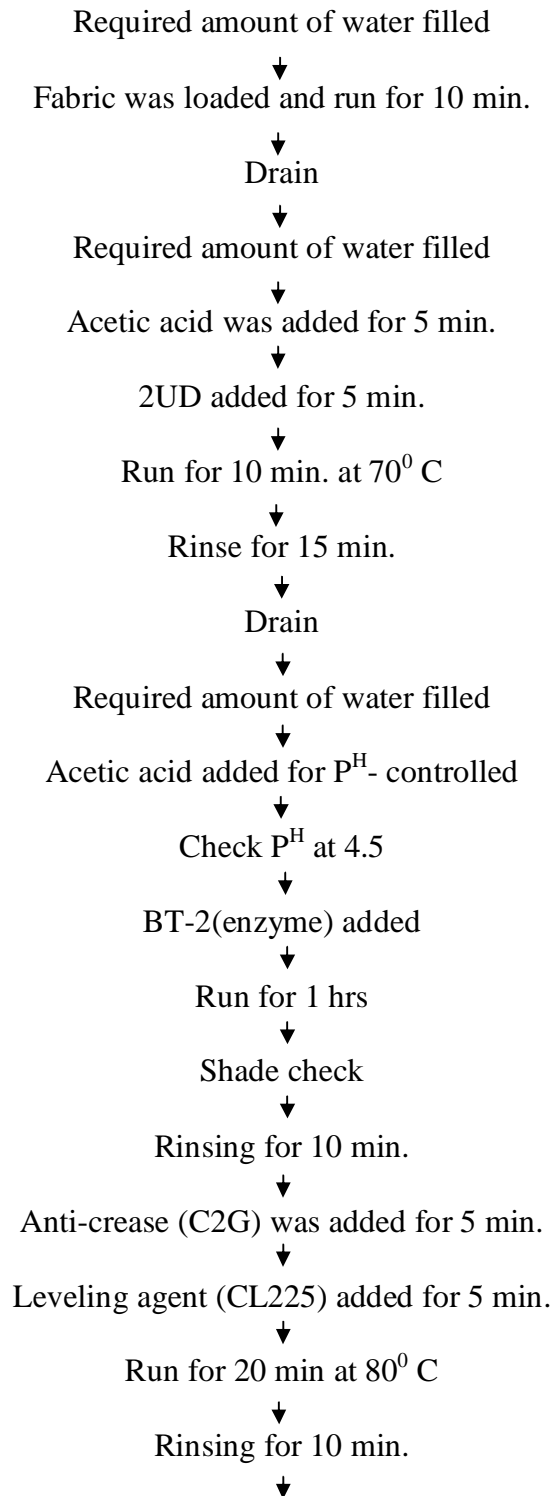


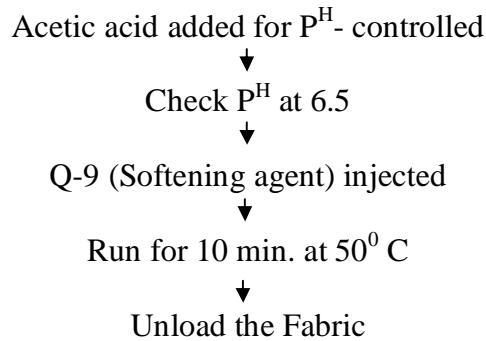


#### 4.14 Process sequence of stripping:



#### 4.15 Process sequence of Removal Softener spot:





## 4.16 Common faults and their remedies in knit dyeing:

### 1. Crack, rope & crease marks:

#### Causes:

- ❖ Poor opening of the fabric rope
- ❖ Shock cooling of synthetic material
- ❖ Incorrect process procedure
- ❖ Higher fabric speed

#### Remedies:

- ❖ Pre-Heat setting
- ❖ Lower rate rising and cooling the temperature
- ❖ Reducing the m/c load
- ❖ Higher liquor ratio
- ❖ Running at a slightly higher nozzle pressure

### 2. Fabric distortion and increase in width:

#### Causes:

- ❖ Too high material speed
- ❖ Low liquor ratio

#### Remedies:

- ❖ By decreasing both nozzle pressure & winch speed

### 3. Pilling:

#### Causes:

- ❖ Too high mechanical stress on the surface of the fabric
- ❖ Excess speed during processing
- ❖ Excess foam formation in the dye bath

#### Remedies:

- ❖ By using of a suitable chemical lubricant
- ❖ By using antifoaming agent
- ❖ By turn reversing the Fabric before dyein

### 4. Running problem:

### **A. Ballooning:**

#### **Causes:**

- ❖ Seam joining with too densely sewn

#### **Remedies:**

- ❖ By cutting a vertical slit of 10-15 cm in length for escaping the air.

### **B. Intensive foaming:**

#### **Causes:**

- ❖ Pumping a mixture of air and water

#### **Remedies:**

- ❖ By using antifoaming agent

### **5. Uneven dyeing:**

#### **Causes:**

- ❖ Uneven pretreatment (uneven scouring, bleaching & mercerizing)
- ❖ Uneven heat-setting in case of synthetic fibres
- ❖ Quick addition of dyes and chemicals
- ❖ Lack of control of dyeing m/c

#### **Remedies:**

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

### **6. Shade variation (Batch to batch):**

Batch to batch shade variation is common in exhaust dyeing which is not completely avoidable. Even though, to ensure a consistent batch to batch production of shade the following matters should be controlled carefully-

- ❖ 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.

### **7. Dye spot:**

#### **Causes:**

- ❖ Improper mixing of dyestuff in the solution, in right amount of water, at the temperature.

#### **Remedies:**

- ❖ We should pass the dissolved dyestuff through a fine stainless steel mesh strainer when adding it to the chemical tank, so that the large un-dissolved particles are removed.

### 8. Patchy dyeing:

#### Causes:

- ❖ Uneven heat in the machine.
- ❖ Improper impregnation of dye liquor due to the low wetting property of the fabric.
- ❖ Dye migration during intermediate dyeing.

#### Remedies:

- ❖ By proper pretreatment.
- ❖ By adding extra wetting agent.
- ❖ Heat should be same throughout the dye liquor.

### 9. Specky dyeing:

#### Causes:

- ❖ Excessive foam in the dye bath.
- ❖ Fall of water droplets on fabric surface before or after dyeing.
- ❖ In sufficient after treatment.

#### Remedies:

- ❖ By using antifoaming agent.
- ❖ Sufficient after treatment.
- ❖ By using a good wetting agent in the dye bath.

### 10. 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

### 11. Crease mark:

#### Causes:

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

### 12. 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

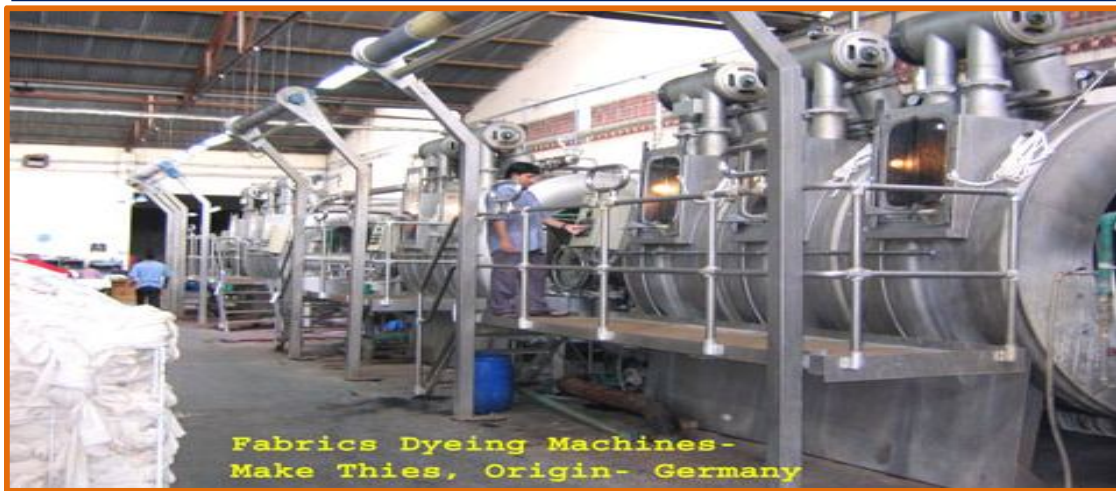
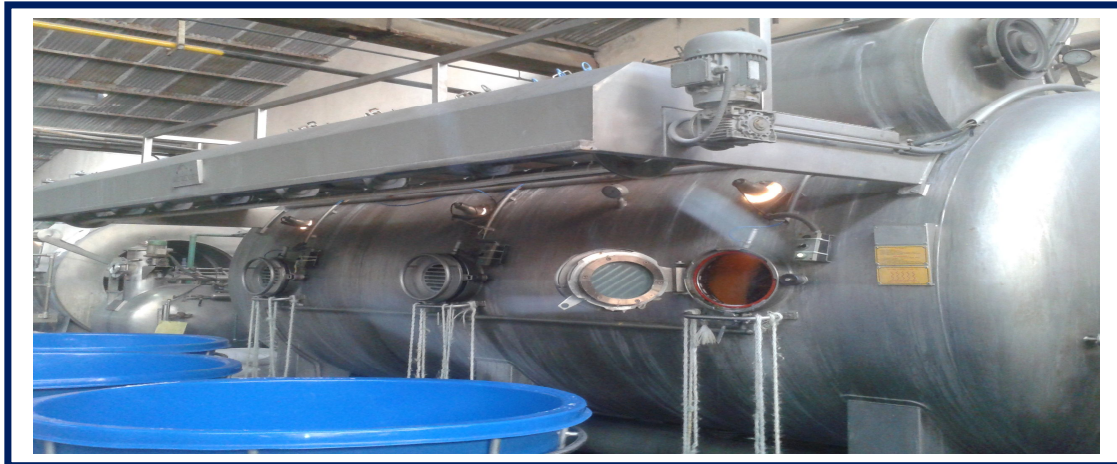
### 13. Softener Mark:



**Causes:**

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

**4.17 Photo Gallery**

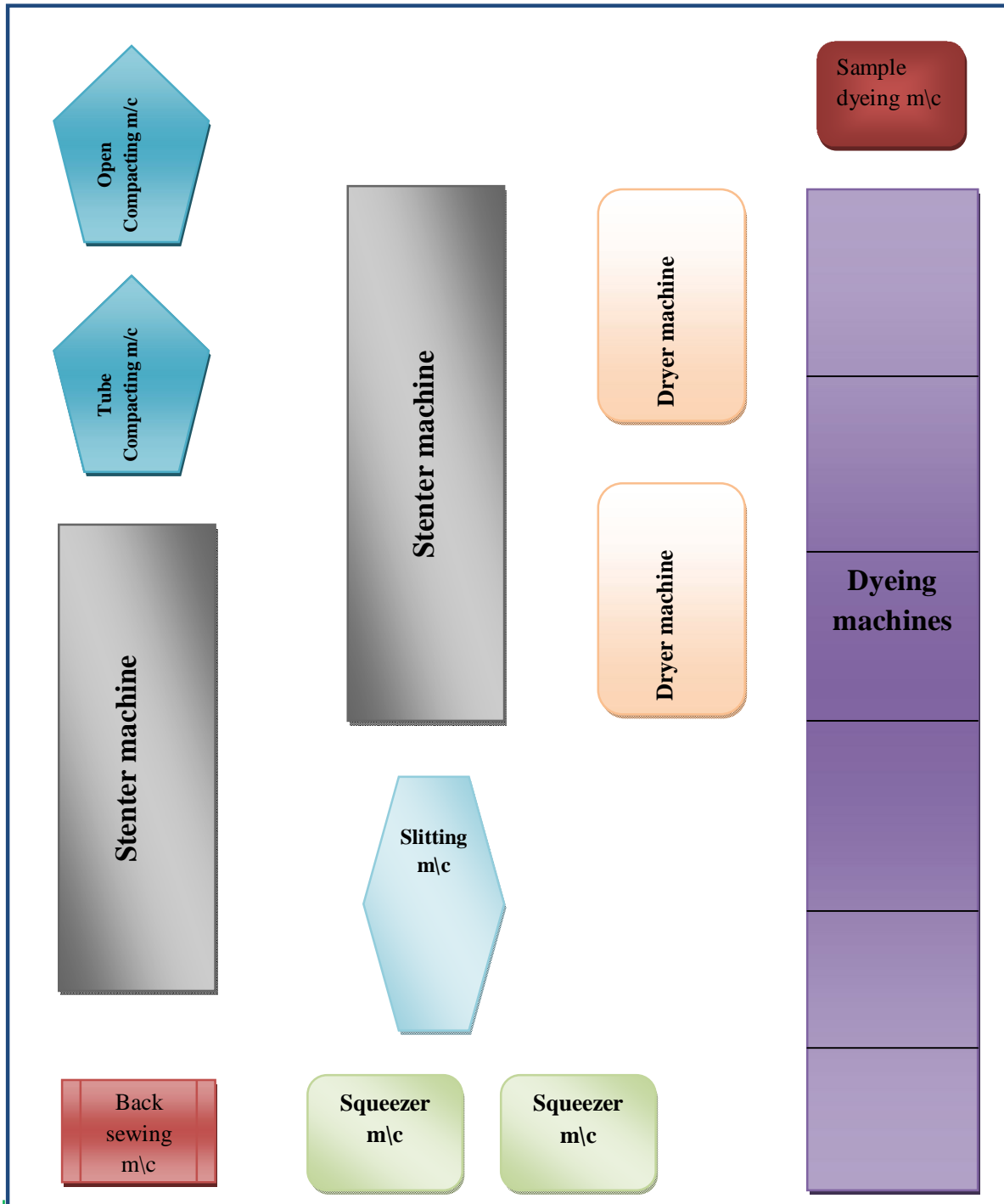


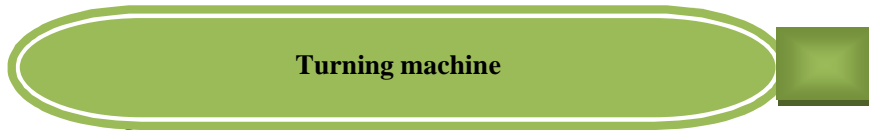
# CHAPTER: 5



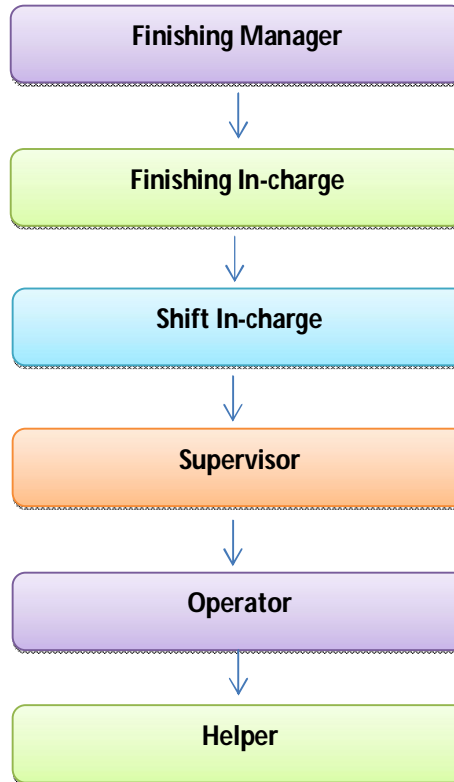
**Finishing**

### 5.1 Layout of Finishing Section:





**Organogram of Finishing Section:**



**5.2 Machine description of finishing section:**

S/L	Machinery	No. of machine	Brand	Origin
1	Fabric Reversing M/C	01	MERSAN	Turkey
2	Scutcher M/C	02	SANTEX	Switzerland
3	Dryer M/C	01	SANTEX	Switzerland
4	Dryer M/C	01	HELINT	Switzerland
5	Calendering M/C	01	FERRARO	Italy
6	Slitting M/C	01	SANTEX	Switzerland
8	Stenter M/C	01	BRUCKNER	Italy
9	Back sewing M/C	01	HSING CHENG	Taiwan
10	Dryer M/C	01	SANTEX	Switzerland

11	Hydroextractor	01		
12	Tumble dryer	01		
13	Tumble Dryer	01		

### 5.3 Different types of machine with their function:

**Machine No:01**

**Name: Wet Fabric Reversing Machine**

**Function:**

- ❖ Turn tube fabric face side to back side or back side to face side to remove loosen fibers.

Details

Brand	Mersan
Serial No	13200909
Electric Power	2KW
Weight	650 Kg
Origin	Turkey

**Machine No: 02**

**Name: Scutcher Machine**

**Function:**

- ❖ Clean the fabric.
- ❖ Increases the softness of fabric.
- ❖ Remove water through squeezing.
- ❖ Dewatering, softener application and overstretching.

Details

Brand	Santex
-------	--------

Type	SANTASTRETCH PLUS 120
ELECTR. DIAGR.NR:	94-3540
Working Speed	0-80m/min
Working Widths	100-240cm
Electric Power Supply	4-8KW
Year of construction	1994
Origin	Switzerland

**Machine No: 03**

**Name: Scutcher machine.**

**Function:**

- ❖ Clean the fabric
- ❖ Increases the softness of fabric.
- ❖ Remove water through squeezing.
- ❖ Dewatering, softener application and overstretching.



**Details**

Brand	Santex
Type	Santastretch Plus
ELECTR. DIAGR.NR:	01-5552
Electric Voltage	3*380 volt+PEN 220 V/50Hz
Connected Load	20 Kw
Year of construction	2002
Origin	Switzerland

**Machine No: 04**

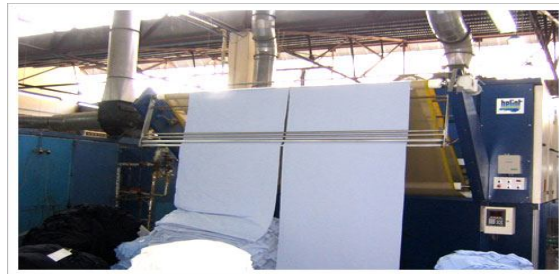
**Name: Dryer Machine**

**Function:**

- ❖ To dry the fabric.
- ❖ To control the overfeed system.
- ❖ To control the vibration which increase the G.S.M.
- ❖ Tensionless drying, shrinking and relaxing for knitted and woven fabrics.

#### Details

Brand	Santex
Model	CH-9555 Tobel
Working Width	60-420cm
Evaporation Capacity	320 Kg/h
Machine Speed	5-80m/min
Electr. Diagr.Nr	93-3541
Electric Voltage	3*388 volt+N+E220V,50 Hz
Connected Load	60 Kw
Year of Manufacturing	1994



**Machine: 05**

**Name: Dryer**

**Function:**

- ❖ To dry the fabric.
- ❖ To control the overfeed system.
- ❖ To control the vibration which increase the G.S.M.

#### Details

Brand	Helint
Model	CH-9555 Tobel
Type	ONDLLOMAX 3.3.2GAZ
Connected Load	60 Kw
Year of Manufacturing	1994

#### **Machine No: 06**

#### **Name: Dryer machine(Tube)**

#### **Function:**

- ❖ To dry the fabric.
- ❖ To control the overfeed system.
- ❖ To control the vibration which increase the G.S.M.
- ❖ Steaming and Compacting of tubular fabrics.
- ❖

#### Details

Brand	Santex
Model	CH-9555 Tobel
Type	Santaspread 120
Working Width	100-180cm
Working Speed	5-50m/min
Electr. Diagr.Nr	93-3542
Electric Voltage	3*388 volt+N+E230V,50 Hz
Connected Load	8 Kw
Year of Manufacturing	1994



**Machine No: 07**

**Name: Calendaring Machine**

**Function:**

- ❖ Removing shrinkage of fabric.
- ❖ Control dia of fabric.

Details

Brand	Ferraro
Connected Load	10 Kw
Year of Manufacturing	2006
Origin	Italy

**Machine No: 08**

**Name: Hydro Extractor**

**Function:**

- ❖ To extract excess water.



Details

Brand	Dilmenler
Capacity	125 Kg
Extraction %	80
Origin	Turkey
Time	5-10 mins

**Machine No: 08**

**Name: Slitting machine.**



**Function:**

- ❖ To open tube fabric according to specific needle mark.
- ❖ Slitting of tubular fabrics

**Details**

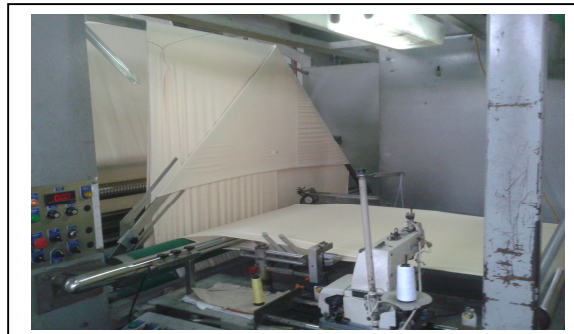
Brand	Santex
Model	CH-9555 Tobel
Electr.diagr.Nr	01-5553
Working Width	2400mm
Electric Voltage	3* 380 V+PE 220 V/50 Hz
Connected Load	21 Kw
Year of Manufacturing	2002

**Machine No: 09**

**Name: Back Sewing Machine**

**Function:**

- ❖ To removing side dull.



**Details**

<b>Brand</b>	Hsing Cheng
<b>Model</b>	HC-AEN-2600mm-A12797

<b>Year of Manufacturing</b>	2005
<b>Origin</b>	Taiwan

**Machine No: 10**

**Name: Stenter Machine**

**Function:**

- ❖ GSM of the fabric is controlled by stenter.
- ❖ Spirality controlled by the stenter.
- ❖ Moisture of the fabric is controlled by the stenter.
- ❖ Loop of the knit fabric is controlled by the stenter.
- ❖ Finishing chemicals apply on the fabric by the stenter.
- ❖ Width of the fabric is controlled by the stenter.
- ❖ Heat setting is done by the stenter for lycra fabric, synthetic and blended fabric.
- ❖ Fabric is dried by the stenter.
- ❖ Shrinkage property of the fabric is controlled by the stenter.



**Details**

Brand	Bruckner
Serial No	72276-0463
Temperature Range	50-250° c
Max Speed	120 (m/min)
Production Capacity	8 ton/day
No of Chamber	3
Max. Fabric Width	102"
Minimum Fabric Width	30"

Steam Pressure	2 bar
Air pressure	10 bar
No of rotamatic burner	6
Extra Attachment	Mahlo weft straightener
Year of Manufacturing	2002
Origin	Germany

**Machine No: 11**

**Name: Calendaring Machine**

**Function:**

- ❖ Removing shrinkage.
- ❖ Increase smoothness.
- ❖



**Details**

Brand	Santex
Model	CKN/280
Year of Manufacturing	2002
Origin	Italy

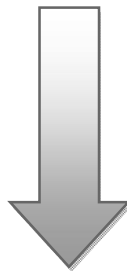
**5.4 Finished Fabric Inspection:**

The following defects are found in the final inspection.

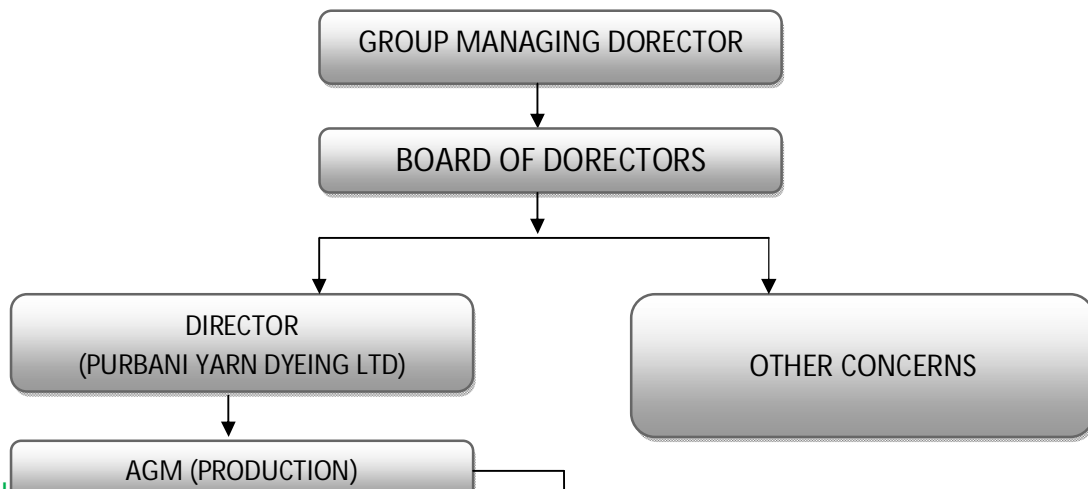
1. Uneven shade
2. Oil spot
3. Naps
4. Crease mark
5. Machine Stoppage mark

6. Listing
7. Line mark
8. Pick missing
9. Double yarn
10. Dead cotton
11. Bowing
12. Fly yarn contamination

## CHAPTER: 6



### 6.1 ORGANOGRAM OF PURBANI

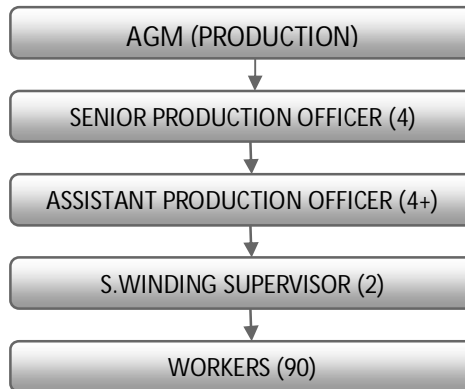


**6.2 SECTION WISE MANPOWER DISTRIBUTION:**

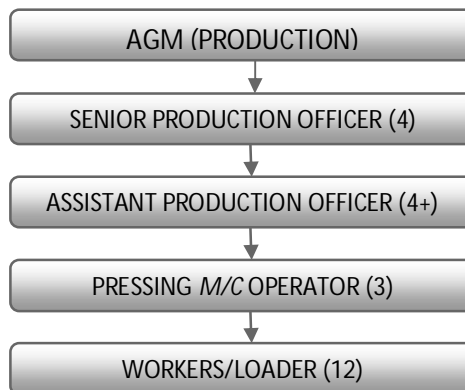
**SECTIONS UNDER DIRECT SUPERVISION OF AGM, SPO & APO:**

- A. Soft winding
- B. Batch section
- C. Dyeing floor
- D. Hydro extractor & dryer
- E. Hard winding
- F. Packaging

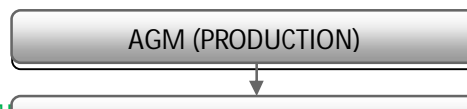
**ORGANOGRAM OF SOFT WINDING SECTION:**



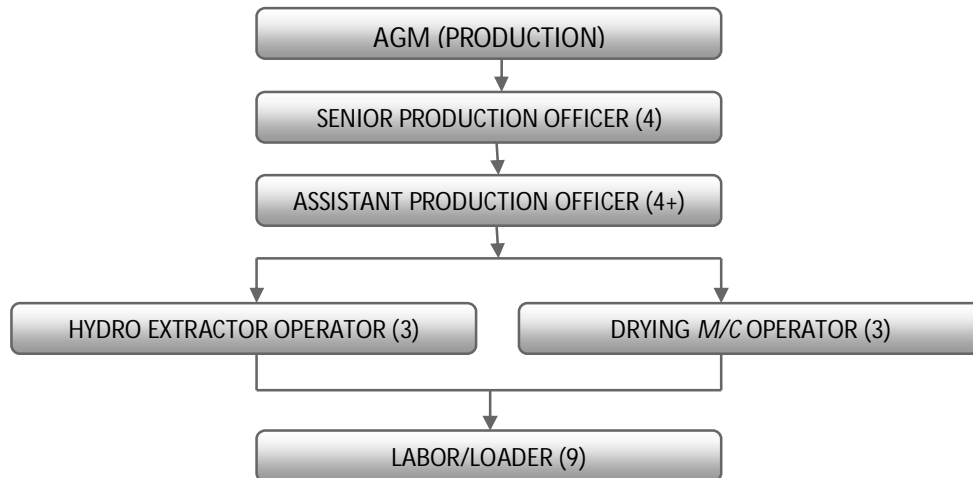
**ORGANOGRAM OF BATCH SECTION:**



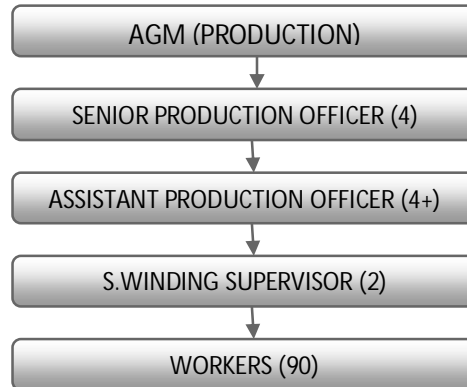
**ORGANOGRAM OF DYEING FLOOR:**



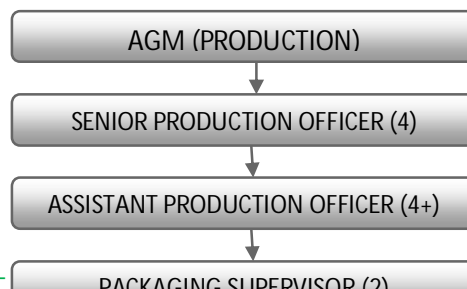
**ORGANOGRAM OF HYDRO EXTRACTOR & DRYER SECTION:**



**ORGANOGRAM OF HARD WINDING SECTION:**

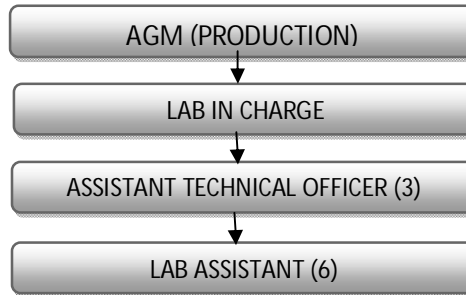


**ORGANOGRAM OF PACKAGING SECTION:**

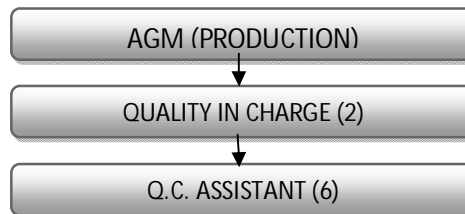




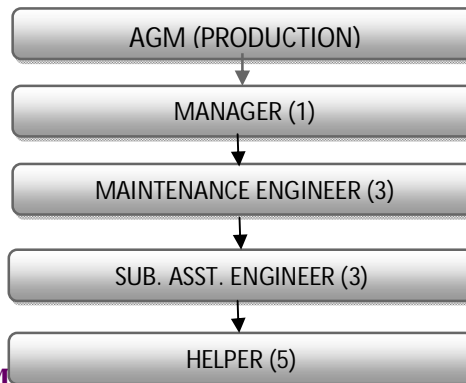
**ORGANOGRAM OF LABORATORY:**



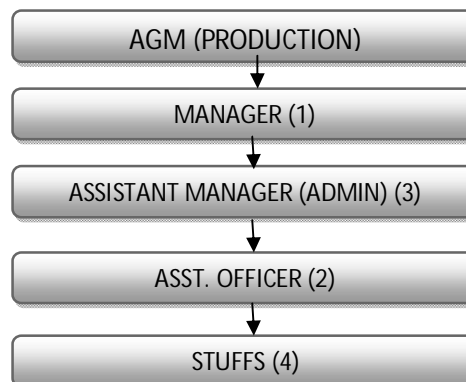
**ORGANOGRAM OF QUALITY CONTROL SECTION:**



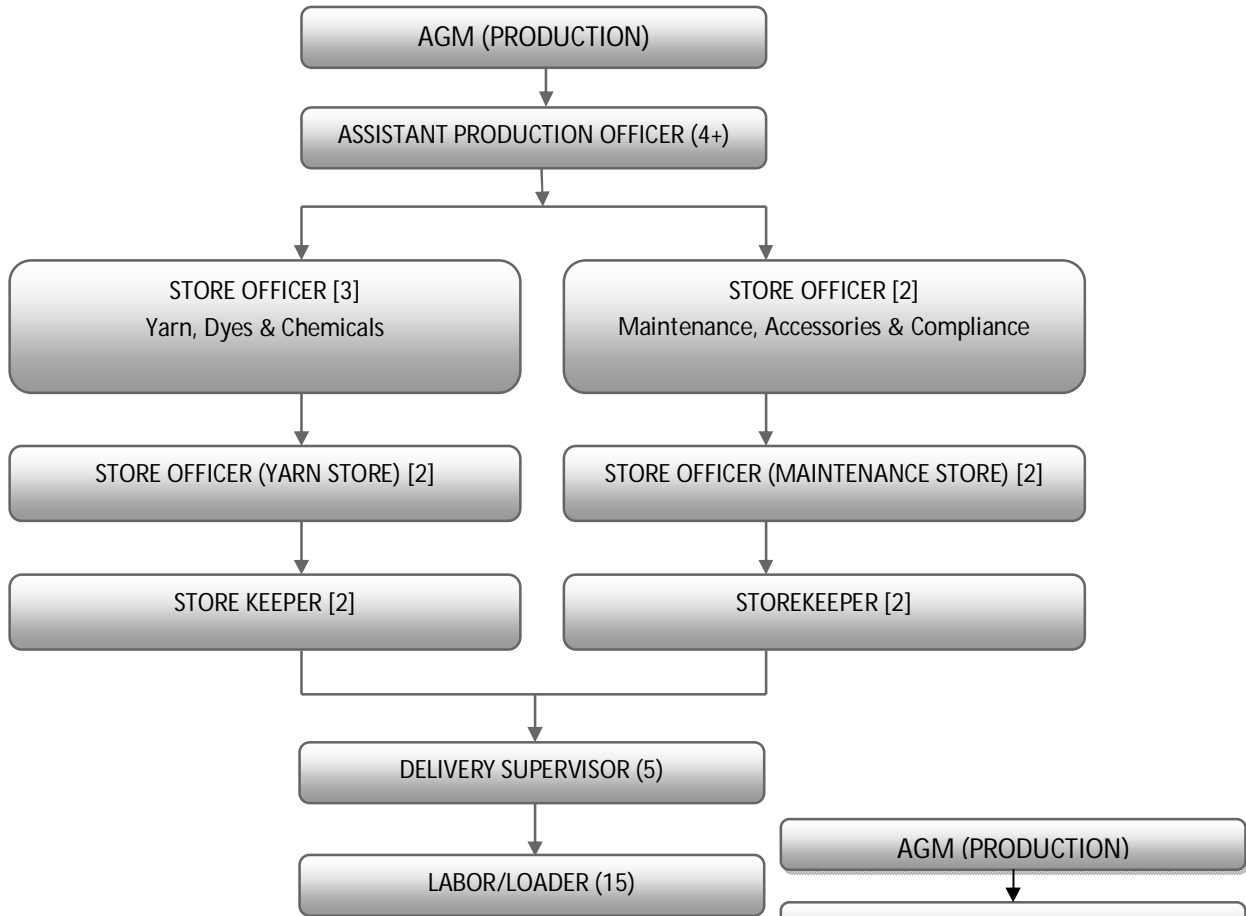
**ORGANOGRAM OF MAINTENANCE SECTION:**



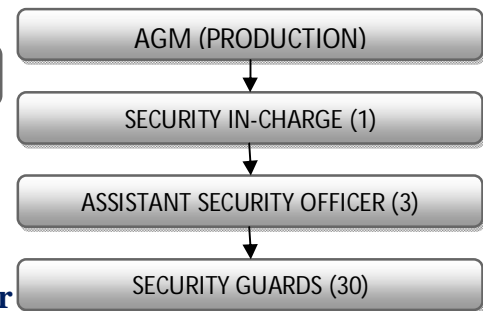
**ORGANOGRAM OF ADMINISTRATION & COMMUNITY**



**ORGANOGRAM OF INVENTORY:**



**ORGANOGRAM OF SECURITY:**



**Responsibility of production officer**

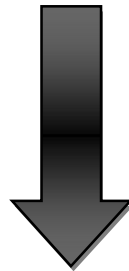
- ❏ Overall supervision of dyeing & finishing.
- ❏ Dyes & chemicals requisition issue & check.
- ❏ Program making, sample checking color measurement.
- ❏ Control the supervisors, operators & helpers of machines.
- ❏ Giving dye-line or the program slip according to daily production plan, batch preparation & pH check.
- ❏ Rectifying the finished fabric which rejected from quality control department
- ❏ Checking daily production report.
- ❏ Collecting the necessary information and instruction from the previous shift for the smooth running of the section.
- ❏ Making the junior officer understand how to operate the whole production process.

- ❏ Matching production sample with target shade.
- ❏ Collecting the production sample lot sample matching next production.
- ❏ Identifying disputed fabrics and report to PM/GM for necessary action.
- ❏ Signing the store requisition and delivery “challan” in the absence of PM
- ❏ Executing the overall floor work.

### Job Description

- ❏ **Title:** Production officer.
- ❏ **Dept:** Dyeing
- ❏ **Report to:** Senior production officer.
- ❏ **Job summary:** To plan execute & follow up the production activities & control the quality production with related activities.

## CHAPTER: 7



**Raw materials  
of  
vorn dyeing**

## 7.1 CHEMICALS:

### CATEGORIZED LIST OF CHEMICALS FREQUENTLY USED:

#### Wetting Agent:

0.3	BASF	Germany
0.5	CIBA	Switzerland
0.5	CHT	Germany
0.5	MATEX BD.	Singapore

#### Detergent:

0.5	BASF	Germany
1.0	CLARIANT	Switzerland
1.0	CIBA	Switzerland

**Stabilizer:**

<b>0.7</b>	<b>BASF</b>	<b>Germany</b>
<b>0.5</b>	<b>MATEX BD.</b>	<b>Singapore</b>
<b>1.0</b>	<b>Local</b>	<b>Bangladesh</b>

**Dye Bath Sequestering & Leveling agent:**

<b>1.5</b>	<b>BASF</b>	<b>Germany</b>
<b>1.5</b>	<b>CHT</b>	<b>Germany</b>
<b>1.5</b>	<b>CIBA</b>	<b>Switzerland</b>

**Peroxide Killer:**

0.3- 0.5	CIBA	Switzerland
0.5	CHT	Germany

**Washing Chemicals & soap:**

0.5- 1.5	FRIENDS	Indonesia
0.5- 1.5	Local	Bangladesh
0.5- 1.5	CLARIANT	Switzerland
1.0- 1.5	MATEX BD.	Singapore
0.5- 1.5	CIBA	Switzerland

**Pretreatment Sequestering agent:**

1.5	FRIENDS	Indonesia
1.5	ORIENT	Taiwan
1.5	CLARIANT	Switzerland
1.5	MATEX BD.	Singapore

**Fixing agents/ Fastness Improver:**

1.5	CIBA	Switzerland
1.5	MATEX BD.	Singapore
1.5	CIBA	Switzerland
1.5	CHT	Germany

**Softener & yarn Lubricant:**

3.0	CHT	Germany
3.0	CIBA	Switzerland
3.0	CIBA	Switzerland
3.0	HANKLE	Germany

**Alkali:**

Any	Any
-----	-----

**Salt:**

Any	Any
-----	-----

**Oxidizing:**

Any	Any
-----	-----

**Polyester Leveling & dispersing Agent:**

1.0	CIBA	Switzerland
0.1	BASF	Germany

0.5 MATEX BD. Singapore

**Buffering agent:**

05. Any Any

**P<sup>H</sup> controller (5 to 5.5):**

0.2 Any Any

**Polyester Yarn Lubricant:**

3.0 CHT Germany

3.0 CHT Germany

**7.2 Overall, Purbani Yarn Dyeing Ltd. Uses the Following Chemicals and Dyes:**

1.	Acetic Acid
	Albafix ECO
3.	Albafix FFC
	Albafix FRD
5.	Beizyum UL
	Caustic Soda
7.	Clara Cup WS
	Clarite – CBB
9.	Dyapol AB
	Edonine SNL
11.	Eriopon –OS
	Eriopon-R
13.	Felosan RG-N
	Formic Acid



15.	Glaubar Salt
	Hydrogen peroxide
17.	Hyrose (BASF)
	Imerol DLJ
19.	Invading DA
	Kappacom E-12
21.	Kappacom ETS
	Ladiquist 1097
23.	Lavonil N-100
	Levela T HTN
25.	Lustrafin SA-86
	Max Brite-4BK
27.	Neutracid NVM 200
	OG-Fix-NPT
29.	OG-Leveling
	Oxalic Acid
31.	Rocogal SUR
	Sandoclean PCLF
33.	Sirrix S-B
	Soda Ash
35.	Sodium Hyposulphate
	Ultaphor BN
37.	Univandin DP
38.	Best Acid Blue RL
	Best Acid S, Red SFR
40.	Best Acid S. Yellow SF
	Bezaktive Blue 3GLD
42.	Cibacron Blue HGN
	Cibacron Orange FNR
44.	Des Yellow – 2GD
	Dis Lumo Pink RBSF
46.	Disper Black EXNSF
	Dragon FYellow8GFF
48.	Dychufix Black GR 150%
	Imcozen Blue V-CR
50.	Imcozen Red – 3BF
	ImcozenYellow – E3R
52.	Imcozon (Reactive)
	Larperse Blue F-BL
54.	Novacron Blue FNR
	Novacron Dk. Blue WR
56.	Novacron Navy WB
	Novacron Red FNR
58.	Novacron Red WB
	Novacron Yellow FN2R
60.	Novacron Yellow S-3R
	Nobcron yellow F4g
62.	NovaBri. Red Fn 3GL
	Novacron Deep Red S-B

64.	Novacron Lemon S-3G Novacron Navy S-G
66.	Novacron Occan SR Novacron Red FN-2BL
68.	Novacron Red S-2B Novacron Ruby S-3B
70.	Novacron Super Black G Novacron Super Black R
72.	Polymide (Acid)→Disperse Ramazol (Reactive0
74.	Reactive Black B Reactive Black HFGR
76.	Reactive Carbon RGB Reactive Orange 2RL
78.	Reactive Red 6BL Reactive Yellow 3R
80.	Reactron Red F3B Reactron S-Yellow F3R
82.	Remazol B. Blue R/SPL Remazol Navy RGB
84.	Remazol Red 3BS Remazol Red RGB
86.	Remazol Tur Blue G133% Remazol Yellow 3RS
88.	Solazol Navy KHWT Sunfix (Reactive)
90.	Sunfix Blue SNR Sunfix Navy Blue SBF
92.	Sunfix Red MF-3BD Sunfix Red SPD conc
94.	Sunfix S. Yellow S4GL Sunfix YellowSPD Conc
96.	Sunzol B Blue RSPL Sunzol Black B
98.	Sunzol Black EP/HC Cone Sunzol Blue SBR
100.	Sunzol T/q Blueg 266% Tera (Disperse)
102.	Terasil Black SRL-01 Terasil Blue BGE
104.	Terasil Blue WBLS Terasil Blue WRBS
106.	Terasil Golden Yellow 3R Terasil Navy GRLC
108.	Terasil Red FBN Conc Terasil Red W4BS
110.	Terasil Red WBF Terasil Vailet BL
112.	Terasil Yellow W 46GS Terasil Yellow W4G

**REMARKS:**

As quality is the prime concern of the factory, qualitative raw materials are always bought by the management of the factory. Besides, there is enough space to keep those raw materials in the factory.

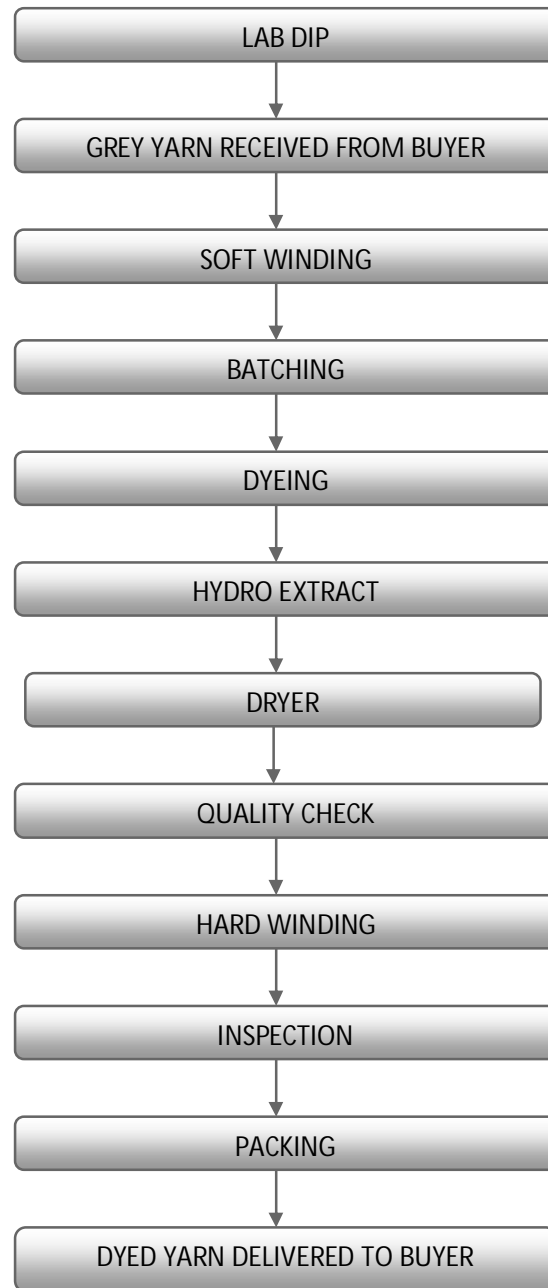
## CHAPTER: 8



### **Production Planning and Sequence of Operation**

## 8.1 PRODUCTION SEQUENCE

The Overall flow chart of **Purbani Yarn Dyeing Ltd** is as follows:



## 8.2 PRODUCTION PARAMETERS

### PRODUCTION PARAMETER OF SOFT WINDING SECTION:

- No. of Spindles per m/c
- Yarn tension.
- Length of yarn to be winded
- Package density
- Package weight
- Package dimension
- Type of bobbin
- Count of yarn
- M/c speed (meter/min)
- Type of yarn.

### PRODUCTION PARAMETER OF BATCH SECTION:

- No. of cones per spindle.
- Pressing ratio.

### THE PRODUCTION PARAMETERS FOR YARN DYEING:

- $p^H$
- Time
- Pressure
- Liquor ratio
- Temperature
- Machine Capacity
- Dye & Chemical Quality
- Chemical concentration
- Dye category or Dye type
- Machine running efficiency
- Dye percentage/ Shade percentage
- Yarn composition (i.e. fiber used to make the yarn)

**THE PRODUCTION PARAMETERS FOR HYDRO EXTRACTOR:**

- M/c Capacity.
- M/c Rpm.
- Amount of water extracted.

**THE PRODUCTION PARAMETERS FOR DRYER:**

- Speed of conveyor belt
- Radio Frequency efficiency.
- Moisture content.
- Moisture Percentage to be removed
- Running Time

**PRODUCTION PARAMETER OF SOFT WINDING SECTION:**

- Yarn tension.
- Type of yarn.
- Count of yarn
- M/c speed (meter/min)
- No. of Spindles per m/c
- Package weight to be given
- Length of yarn to be winded

**PRODUCTION PARAMETER FOR PACKAGING:**

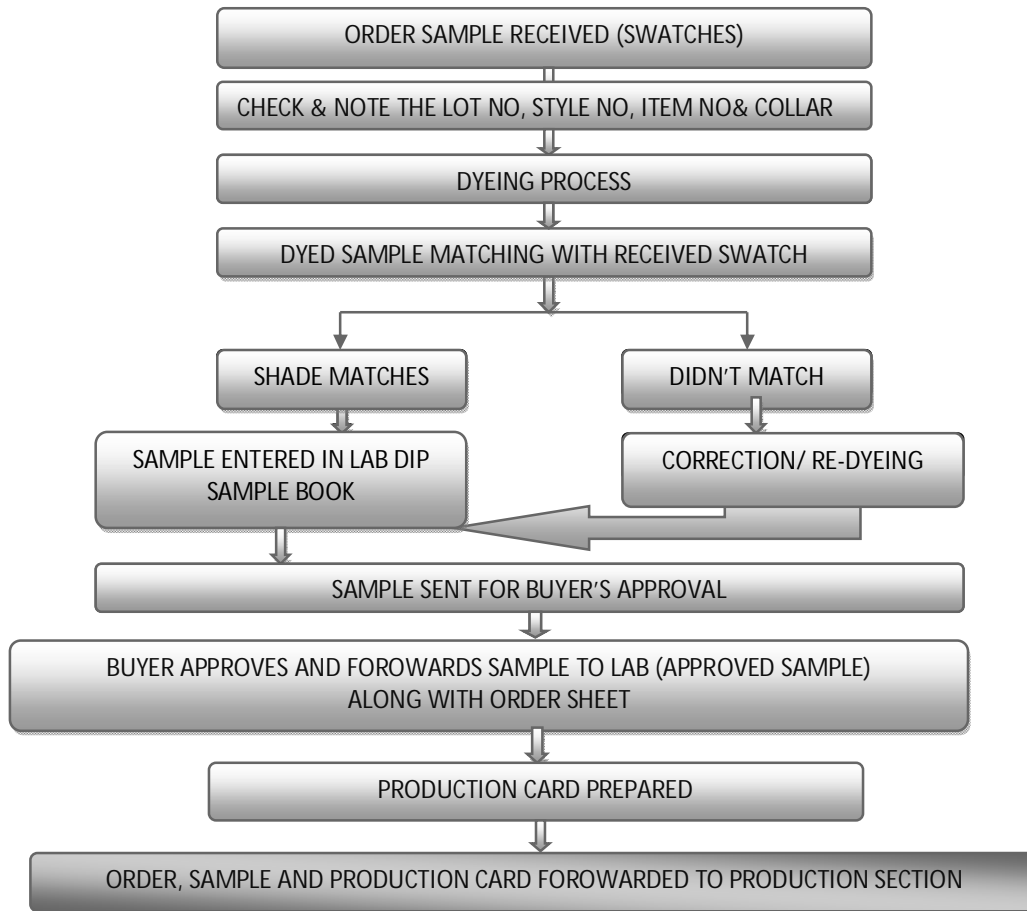
- No. of cones per unit package.
- Weight of total package.
- Labeling.
- Other buyer requirements of packaging.

Production Planning and  
Sequence of operation

**SECTION 1: LABORATORY**



### 8.3 YARN DYEING LABORATORY WORK SEQUENCE



#### THE RESPONSIBILITIES OF THE LABORATORY ARE:

- Sample preparation according to buyer requirement
- Different properties test (Chemical)
- Strength test of Dyestuff
- Chlorine test, Peroxide test
- Product Development etc.

## 8.4 MACHINE SPECIFICATIONS

Machines available in the laboratory of **Purbani Yarn Dyeing LAB** are as follows:

<b>LAB SAMPLE DYEING MACHINE- 01</b>	
<b>Name</b>	AHIBA SpectroDye
<b>Manufacturer</b>	Datacolor International, USA
<b>Max<sup>m</sup> temperature</b>	150°C
<b>Capacity</b>	24 Beakers (Including Sensor)
<b>Power</b>	230 Volts AC, 50-60 Hz.
<b>Functionality</b>	Shaking, Sensor controls Temperature, Cooling by Water



<b>LAB SAMPLE DYEING MACHINE- 02</b>	
<b>Name</b>	AHIBA Nuance
<b>Manufacturer</b>	Datacolor International, USA
<b>Model</b>	ECO
<b>Max<sup>m</sup> temperature</b>	150°C
<b>Power</b>	230 Volts AC, 50-60 Hz.
<b>Capacity</b>	20 Beakers (Including Sensor)
<b>Functionality</b>	Rotation, Sensor controls Temperature, Cooling by Air



DRYER	
<b>Name</b>	CARBOLITE
<b>Manufacturer</b>	Carbolite LTD, ENGLAND
<b>Max<sup>m</sup> temperature</b>	300°C
<b>Capacity</b>	150-250 gm Yarn Drying Per hour
<b>Power</b>	220-240 V AC, 4.7-5 A, 1000 Watts
<b>Functionality</b>	Micro Wave, Thermostat controls Temperature, Suction Enabled.



ELECTRIC BALANCE	
<b>Name</b>	ADVENTURER™
<b>Manufacturer</b>	OHAUS Corporation, USA
<b>Readability</b>	0.001 grams
<b>Capacity</b>	310 grams Maximum
<b>Power</b>	8-14.5 V, 50-60 Hz, or, 9.5-20V≈ 6 watts
<b>Functionality</b>	Micro Wave, Thermostat controls Temperature, Suction Enabled.

LIGHT BOX	
<b>Name</b>	VERIVIDE™
<b>Manufacturer</b>	VERIVIDE Ltd., England.
<b>Light Modes</b>	D-65, TL-84, TL-83, F
<b>No. of lights</b>	5 Tube lights (Including 1 UV), 4 white Round Bulbs
<b>Power</b>	8-14.5 V, 50-60 Hz, or, 9.5-20V≈ 6 watts
<b>Functionality</b>	Micro Wave, Thermostat controls Temperature, Suction Enabled.



Water Heater	
Name	Sol-RAY®
Manufacturer	Sol-RAY Lab Inc, Germany.
Maximum Temperature	140°C
Power	220-240 V, 50-60 Hz, 2.5 A, 450 Watts



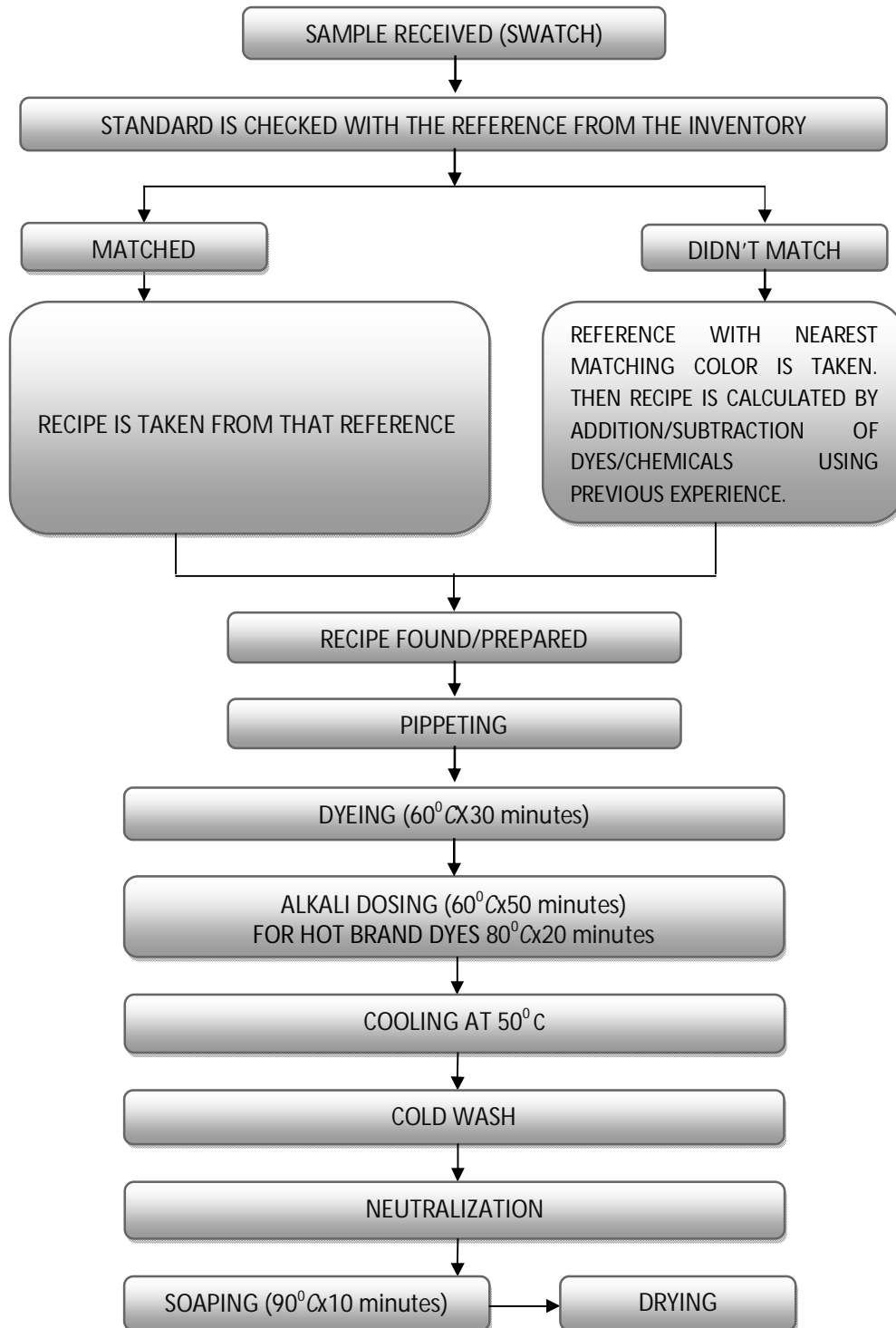
## 8.5 LAB DYEING PROCESS FOLLOW UP

(COTTON YARN)

### RECIPE:

Dyes	According to shade %
Leveling agent	1.5 g/l
Sequestering agent	1.0 g/l
Acetic acid	0.15 g/l
Antifoaming agent	0.15 g/l
Salt	10-20 g/l (light shade)
	20-40 g/l (medium shade)
	50-80 g/l (dark shade)
Liquor Ratio:	1:6

**FLOW CHART:**



## PROCESS TERMS & DEFINITIONS:

**Sample Received (swatch):** Buyer sends a sample which is considered as standard in whole process. Buyer also gives some requirements about the properties of the standard fabric. For example, Buyer wants good wash fastness, light fastness, rubbing fastness etc. The lab receives this standard to make this fabric according to buyer requirements.

**Standard is checked with the Reference from the inventory:** The factory dyed a lot of fabric in its running years. It also stores a lot of sample in its inventory. The standard is first checked with the samples kept in the inventory.

**If matched then sample prepared from that recipe:** If the standard is matched with the sample of inventory then the next process becomes easier. Because after matching the sample with standard previously maintained recipe is followed.

**If Doesn't Match:** If the standard does not match with the samples of inventory, Reference with Nearest Matching Color Is Taken. Then Recipe Is Calculated By slight Addition/Subtraction of Dyes/Chemicals Using Previous Experience to match the shade.

**Recipe found/ prepared:** According to anyone of the Previous Process, the recipe is prepared to make the desired sample of that standard.

**Pipetting:** Following recipe dyes, chemicals & water are taken in beakers. For matching the color of each swatch, two or three different recipes (varying slightly) are prepared.

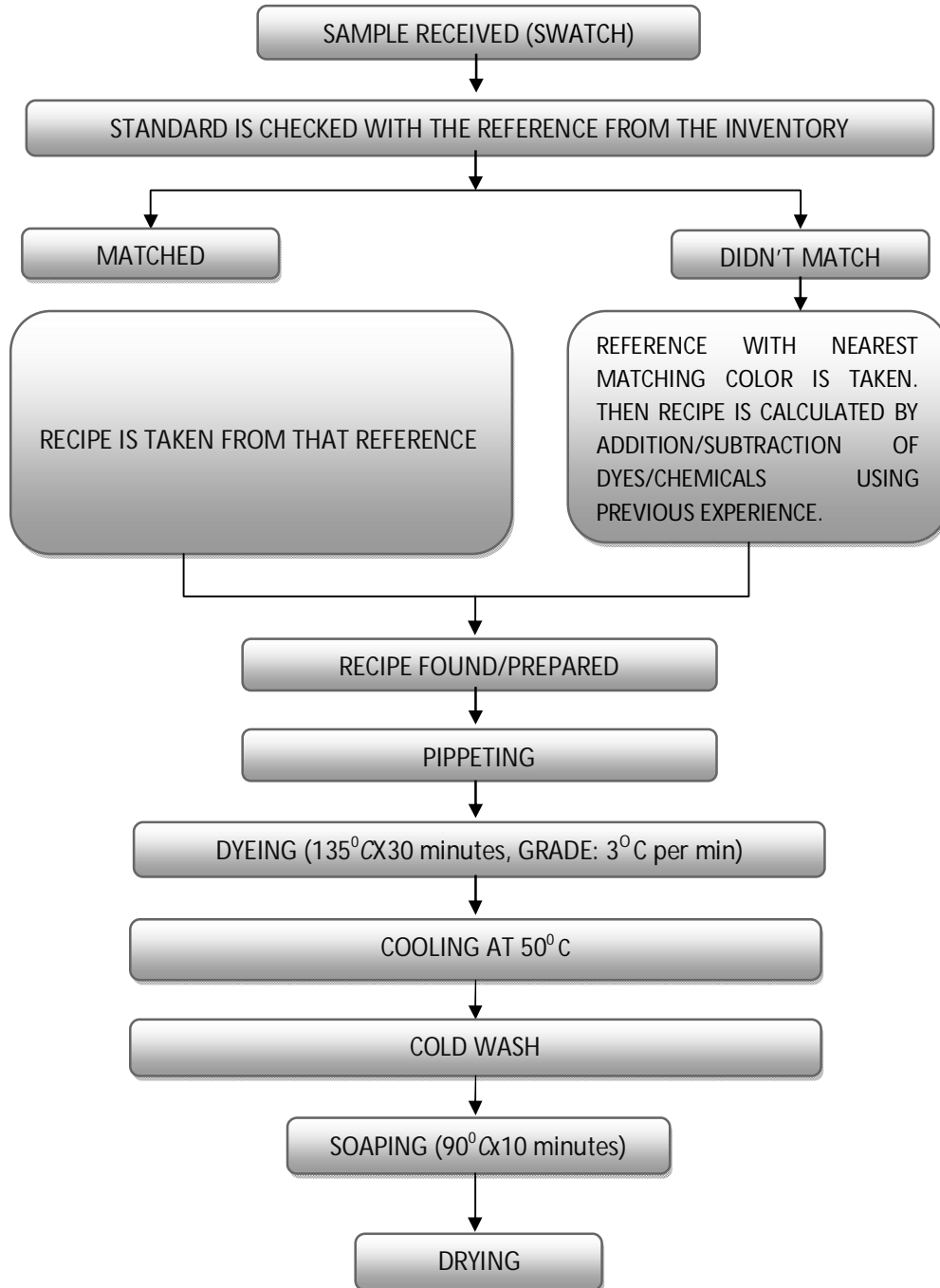
**Dyeing:** The sample is dipped in the beakers. In this lab, 3 gm-weight sample is taken for experiment. Then the beaker is put inside the dyeing m/c and kept for 30 minutes at 60<sup>0</sup>C.

**Alkali dosing:** After 30 minutes, the beakers are taken out from the machine; Checked if the color is nearly the desired color, then caustic soda and soda ash is poured in the beaker, the sample is re-inserted in beaker, and the beaker is also put into the dyeing machine again and kept for 50 minutes at 60<sup>0</sup>C. For hot brand dyes, this process is carried out for 20 minutes at 80<sup>0</sup>C.

**After Treatment:** Cooling is carried out with water of temperature 50<sup>0</sup>C, then washed with cold water, Neutralized with Acetic acid, then soap washed at 90<sup>0</sup>C for 10 minutes. Then the sample is hand squeezed and dried.

**Later:** Then the sample is matched with buyer given sample for buyer's approval and the other steps of Yarn dyeing Laboratory work sequence is followed

## 8.6 LAB DYEING PROCESS FOLLOW UP (POLYESTER YARN)



### PROCESS TERMS (OTHER THAN COTTON DYEING):

**Dyeing:** The sample is dipped in the beakers. In this lab, 3 gm-weight sample is taken for experiment. Then the beaker is put inside the dyeing m/c and kept for 30 minutes at 135°C.

**After Treatment:** Cooling is carried out with water of temperature 50°C, then washed with cold water. Then the sample is hand squeezed and dried.

**Later:** Then the sample is matched with buyer given sample for buyer's approval and the other steps of *Yarn dyeing Laboratory work sequence* is followed.

### RECIPE:

<b>Dyes</b>	According to shade %
<b>Leveling agent</b> (Gemsol HTN 10%)	1.0 g/l
<b>Formic acid</b>	0.2 g/l
<b>Aluminum Sulphate</b>	1.0 g/l
<b>Salt</b>	10-20 g/l (light shade) 20-40 g/l (medium shade) 50-80 g/l (dark shade)
<b>Liquor Ratio:</b>	1:6

## 8.7 COLOR FASTNESS TO WASH TEST

In **Purbani Yarn dyeing** lab color fastness is tested in ISO-3 and ISO-4

### **Procedure:**

1. A bundle of dyed yarn (to be tested) weighing 2 grams is taken.
2. Then the sample is wrapped over Multi fiber Fabric (keeping the multi fiber fabric in two plies of the bundled yarn) and is bound with same yarn softly.
3. Then Pipetting is carried out (recipe is made).
4. Sample is dipped in beaker.
5. Then the beaker is sealed, shaken and put into the dyeing machine for 30 minutes at 60°C
6. Then the beaker is taken out, sample is cold washed and dried.
7. Then the sample is evaluated with Fastness scales (Grayscale for color bleeding & staining)



### RECIPES:

---

#### ISO 3 TEST

<b>Soda ash</b>	2 gm/l
<b>Detergent (ECE:- Non Phosphate Reference detergent )</b>	5gm/l
<b>Time</b>	30 min
<b>Temperature</b>	60°C
<b>Sample weight</b>	2 gm
<b>Liquor Ratio</b>	1:50

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#### ISO 4 TEST

<b>Sodium Perborate Tetra Hydrate (NaBO<sub>3</sub>.4H<sub>2</sub>O)</b>	2 gm/l
<b>Detergent (ECE:- Non Phosphate Reference detergent )</b>	4-5gm/l
<b>Time</b>	30 min
<b>Temperature</b>	60°C
<b>Steel Ball</b>	10-12 pieces
<b>Liquor Ratio</b>	1:50
<b>Sample weight</b>	2 gm

### 8.8 DYESTUFF STRENGTH TEST

Dyestuff strength test is very important for any textile dyeing industry.

A dye comes to industry then a sample fabric is dyed first to make it a reference. When that dye is used and finished from inventory, new dye is ordered. But it is not sure the dye that reached newly, will make a fabric as much dyed as before. That is why after arriving of dye to the factory it is used to make a sample. Then this newly made sample is checked in respect of previously dyed sample. If the two samples match with each other, it is resulted that the strength is okay. But if not match then the amount to be given (less or more) is determined. Thus the strength of dyestuff is measured in this way.

## 8.9 CHEMICALS TESTING PROCESS

ACETIC ACID (CH <sub>3</sub> COOH) TESTING PROCESS	
<b>RECIPE</b>	Caustic soda (NaOH) 4.0% solution
	Phenolphthalein (C <sub>20</sub> H <sub>14</sub> O <sub>4</sub> ) 0.1% solution
	Acetic Acid (CH <sub>3</sub> COOH) 6.0 gm + 94 ml Water
<b>Testing Procedure</b>	1. Acetic acid (10ml) and Phenolphthalein- As Indicator (3 drops) are taken in a glass flask.
	2. Caustic Soda is kept pouring from burette into the flask drop by drop until the solution color turns into pink.
	3. Burette reading is taken
<b>Calculation</b>	Burette reading x 10= Purity %
CAUSTIC SODA (NaOH)	
<b>RECIPE</b>	Hydrochloric acid (HCl) 3.75 gm+ 100ml water = 0.45N HCl
	Phenolphthalein (C <sub>20</sub> H <sub>14</sub> O <sub>4</sub> ) 0.1% solution
	Caustic soda (NaOH) 2.0% solution
	Water 49.0 ml
<b>Testing Procedure</b>	1. Caustic soda (1.0 ml) and Phenolphthalein- As Indicator (1 drop) are taken in a glass flask.
	2. Water (49.0 ml) added to the solution.
	3. Hydrochloric Acid is kept pouring from burette into the flask drop by drop until the solution color turns into pink.
	4. Burette reading is taken
<b>Calculation</b>	$\frac{\text{Burette Reading} \times 0.45N \times 0.04 \times 100}{\text{NaOH Weight}} = \% \text{Purity}$

ACETIC FORMIC ACID (CH <sub>3</sub> COOH) TESTING PROCESS	
<b>RECIPE</b>	Caustic soda (NaOH) 4.0% solution
	Phenolphthalein (C <sub>20</sub> H <sub>14</sub> O <sub>4</sub> ) 0.1% solution
	Hydrochloric acid (HCl) 3.75 gm+ 100ml water = 0.45N HCl
<b>Testing Procedure</b>	1. Formic acid (10ml) and Phenolphthalein- As Indicator (3 drops) are taken in a glass flask.
	2. Caustic Soda is kept pouring from burette into the flask drop by drop until the solution color turns into pink.
	3. Burette reading is taken
<b>Calculation</b>	Burette reading x 10= Purity %

ACETIC HYDROCHLORIC ACID(HCl) TESTING PROCESS	
<b>RECIPE</b>	Caustic soda (NaOH) 0.4% solution
	Phenolphthalein (C <sub>20</sub> H <sub>14</sub> O <sub>4</sub> ) 0.1% solution
	Hydrochloric acid (HCl) 1.0 gm + 100ml Water
<b>Testing Procedure</b>	1. Hydrochloric acid (25ml) and Phenolphthalein- As Indicator (3 drops) are taken in a glass flask.
	2. Caustic Soda is kept pouring from burette into the flask drop by drop until the solution color turns into pink.
	3. Burette reading is taken
<b>Calculation</b>	$\frac{\text{BURETTE READING} \times 0.1N \times 0.365 \times 400}{\text{HYDROCHLORIC ACID WEIGHT}} = \% \text{Purity}$

ACETIC HYDROGEN PEROXIDE (H <sub>2</sub> O <sub>2</sub> ) TESTING PROCESS	
<b>RECIPE</b>	Hydrogen Peroxide (H <sub>2</sub> O <sub>2</sub> ) 0.12% solution
	Sulphuric Acid (H <sub>2</sub> SO <sub>4</sub> ) 20% solution
	Potassium Permanganate (KMnO <sub>4</sub> ) 1.0 gm + 100ml Water
<b>Testing Procedure</b>	1. Hydrogen Peroxide (50ml or 0.06gm) and Sulphuric acid (10ml or 2gm) are taken in a glass flask.
	2. Potassium Permanganate is kept pouring from burette into the flask drop by drop until the solution color turns into pink.
	3. Burette reading is taken
<b>Calculation</b>	$\frac{\text{Burette Reading} \times 0.17 \text{ (Constant)}}{\text{Hydrogen Peroxide weight}} = \% \text{Purity}$

ACETIC SODA ASH (Na <sub>2</sub> CO <sub>3</sub> ) TESTING PROCESS	
<b>RECIPE</b>	Sulphuric Acid (H <sub>2</sub> SO <sub>4</sub> ) 0.49 gm + 99.51 ml water
	Soda Ash (Na <sub>2</sub> CO <sub>3</sub> ) 0.53% solution
	Methyl Orange 0.1% solution
<b>Testing Procedure</b>	1. Soda Ash (10ml) and Methyl Orange - As Indicator (3 drops) are taken in a glass flask.
	2. Sulphuric Acid is kept pouring from burette into the flask drop by drop until the solution color turns into pink.
	3. Burette reading is taken
<b>Calculation</b>	Burette reading x 10= Purity %

### 8.10 WATER HARDNESS TESTING

EDTA 0.01 (M) Solution = 1000 ml 1M EDTA = 372.24 gm

$$1\text{ml } 1\text{M EDTA} = \frac{372.24}{1000}$$

$$500\text{ ml } 0.1\text{M EDTA} = \frac{372.24 \times 0.01 \times 500}{1000}$$

$$= 1.8612\text{ gm}$$

**Testing Procedure:**

1. 100 ml sample water is taken in a flask.
2. 5ml NH<sub>4</sub>– Buffer solution (p<sup>H</sup>>10) is added.
3. 2drops of EBT water is added as indicator.
4. 20-25 ml dye house water is added.
5. 0.01M EDTA is kept pouring from burette into the flask drop by drop until the solution color becomes light blue.

**Calculation:**

Burette Reading X 20 = Result PPM

EDTA= Ethylene Di-Amine Tetra Acetic Acid

### 8.11 PHYSICAL TESTS

TESTS DONE	INSTRUMENTS USED	MANUFACTURER
Rubbing Fastness of Yarn	Crocking Meter	James H Heal & co. Ltd
Color Assessment	Spectrophotometer (SpectroFlash)	Datacolor LTD.

### 8.11.1 Rubbing fastness test of yarn:

**Requirements:** Crocking cloth, crocking meter, Sample yarn (5gm X 20 cm), Water.

**Dry testing:**

1. The crocking cloth is put on to the finger & is attached by finger clip.
2. The Handle of crocking meter is revolved 10 times in 10 seconds manually.
3. Assessment is carried out by comparing the crocking cloth with gray scale.

**Wet testing:**

1. The crocking cloth is dipped in water and is hand squeezed.
2. Then the wet Crocking cloth is placed on to the finger and attached with finger clip.
3. The Handle of crocking meter is revolved 10 times in 10 seconds manually.
4. The Cloth is dried then.
5. Assessment is carried out by comparing the crocking cloth with gray scale.

Wet and dry rubbing are checked according to buyer's requirement.

### 8.11.2 COLOR ASSESMENT OF YARN:

**Procedure:**

1. First, the Spectrophotometer is calibrated with White and Black piece given with the machine.
2. Then standard yarn (Swatch given by the buyer or reference yarn, with relation to which, dyed sample is to be tested) is placed on the eye piece (Disk with hole, the hole is 6mm in diameter).
3. Then the new standard is entered in m/c software (Colortools™) database and the standard is withdrawn, data about the color of the standard is displayed on computer monitor.
4. The data found are as follows:>>

Obs (Lightning condition)	DL	Da	Db	Dc	Dh	DE (ΔE)	CMC DE
D65- 10 Deg	1.95	0.28	-0.45	0.26	-0.46	2.02	1.83

Ms TL 84-10 Deg	1.96	0.08	-0.46	0.06	-0.46	2.02	1.81
A- 10 Deg	1.95	0.01	-0.39	-0.10	-0.37	1.98	1.69

\*Entered values are only examples for considering the type of data displayed on monitor

5. In same procedure, the dyed sample color is also measured, but in this case, the software (Colortools™) directly shows the difference of color properties with relation to the previously measured specimen.

6. Color difference assessment can be directly carried out from the displayed table or related graphical information. An example Difference relation table is given below:

Obs (Lightning condition)/III	DL	Da	Db	Dc	Dh	DE (ΔE)	CMC DE
D65- 10 Deg	1.90	0.26	-0.45	0.21	-0.46	1.97	1.78
Ms TL 84-10 Deg	1.96	0.08	-0.36	0.06	-0.45	2.00	1.99
A- 10 Deg	1.95	0.03	-0.39	-0.10	-0.37	1.98	1.69

\*Entered values are only examples for considering the type of data displayed on monitor

7. Shade% can be directly calculated from the values got from the table and combining them with the Color co-ordinates.

#### 8. Calculation:

a. The DL, Da & Db Values are used for Measuring DE (ΔE).

$$\text{The formula is, DE } (\Delta E) = \sqrt{(DL)^2 + (Da)^2 + (Db)^2}$$

#### Remarks:

The laboratory of the factory is well enough to make quality products. But more attention to laboratory is required to make it more efficient. The information's that lacks about laboratory in this report is just the result of the unavailability of time of the department.

Production Planning and  
Sequence of operation

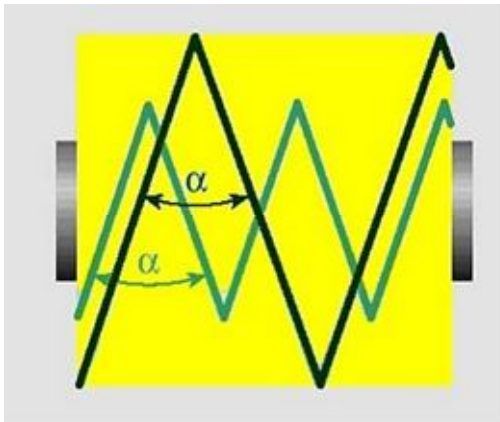
**SECTION 2: SOFT WINDING**

## 8.12 SOFT WINDING

The precision winders are used to transfer the yarn from paper cones to specially designed shells (bobbins). The process of transferring yarn from paper cones to shells is called soft winding. The soft winding by the precision winders can heavily affect the final result of dyed yarn; therefore, imported precision winders are preferable instead of locally manufactured machinery. Package quality always influences the processes that come prior to or after the dyeing process. The proper density and homogeneity of the package allows the color to penetrate between the various layers of yarn, producing a uniform flow inside the batch.

There are two methods of soft winding adopted in **Purbani Yarn Dyeing LTD**:

**Groove Drum Winding system:** The main characteristics of this system is:



**Winding angle ( $\alpha$ ):** Grooved drum is used for winding, so the winding angle remains the same.

**Winding ratio:** The number of coils per turn of the package decreases as the diameter of the package increases, so the package is softer at the outer layers.

**Ribbon formation:** It may occur at certain points within the package when diameter of package reaches to a certain ratio to drum diameter.

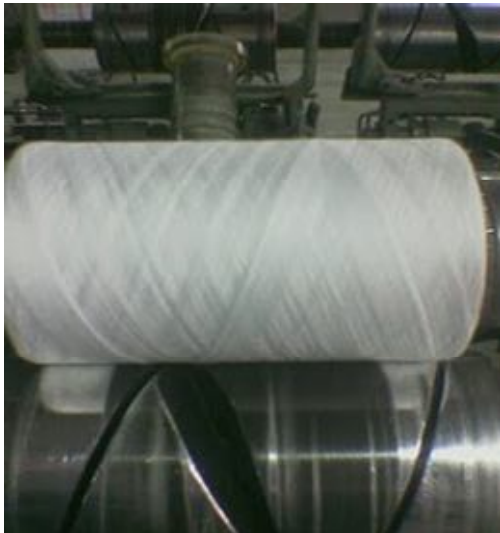
**Package stability:** good.

**Layer to layer density:** It is not very uniform throughout the package.

**Hard edges formation:** This may occur at the yarn turning at the ends.

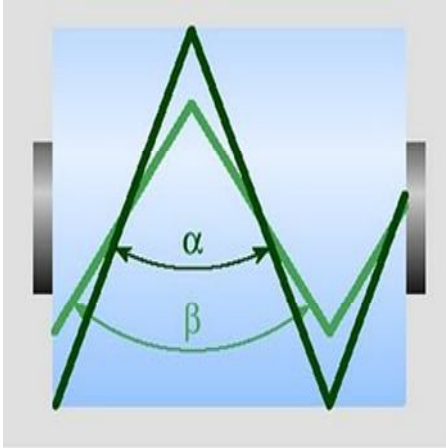
**The machine speed:** Cannot be very high, because it is very difficult to maintain good density profile at high speeds on Groove Drum winding machines.

**Cost:** Low.

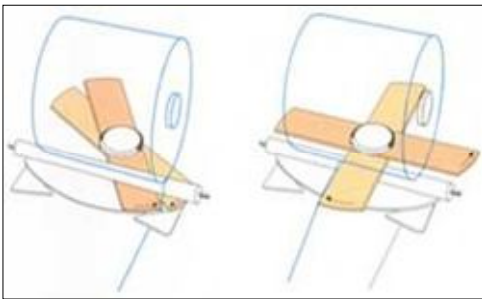




**Precision Winding system:** The main characteristics of this machine are:



1. Propeller blades or guide is used for yarn displacement; the winding angle does not remain the same and decreases with the increase in package diameter.
2. The number of coils per turn of the package remains same as the diameter of the package increases because the number of displacement remains constant per rotation of the package.
3. There is no ribbon formation.
4. The package stability is moderate.
5. Layer to layer density is very uniform throughout of the package.
6. Hard edges formation does not occur at the ends.
7. The machine speed is high.
8. Cost of the machine is medium to high.



**Purbani Yarn Dyeing LTD** uses Soft winding machines manufactured by two famous companies:

1. SCHÄRER SCHWIÈTER METTLER ÁG. (SSM)
2. SHANGHAI CORAL TEXTILE MACHINERY CO. LTD. (CORAL)

There are eight soft winding machines of four categories at **Purbani Yarn Dyeing Ltd.**

- A) SSM plastic tube Soft winding machine.
- B) SSM steel spring bobbin Soft winding machine.
- C) CORAL plastic tube Soft winding machine.
- D) CORAL steel spring bobbin Soft winding machine.

**8.13 Information about the machines used in Purbani Yarn Dyeing Ltd.**

M/C NO.	Mfg. Co.	ORIGIN	SPINDLES	SPEED (m/min)	BOBBIN TYPE	MECHANISM
01	SSM	Switzerland	120	950-1200	Steel Spring	Precision
02	SSM	Switzerland	120	950-1200	Steel Spring	Precision
03	SSM	Switzerland	100	950-1200	Steel Spring	Precision
04	SSM	Switzerland	100	950-1200	Steel Spring	Precision
05	CORAL	China	108	650-750	Steel Spring	Groove Drum
06	SSM	Switzerland	120	950-1200	Plastic Tube	Precision
07	SSM	Switzerland	120	950-1200	Plastic Tube	Precision
08	CORAL	China	108	650-750	Plastic Tube	Groove Drum



**Fig: Coral Steel Spring Soft Winding M/C**



**Fig: SSM Steel Spring SWM**



**Fig: SSM Plastic Tube SWM**



**Fig: Coral Plastic Tube SWM**

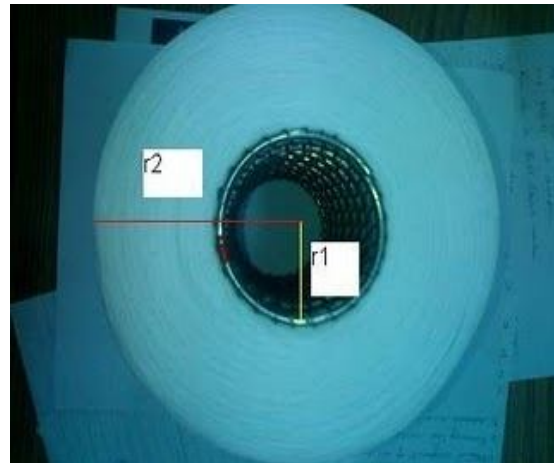
## 8.14 FACTORS CONSIDERED DURING SOFT WINDING IN THIS FACTORY:

- a) **Density of the package:** It should be uniform throughout of the package diameter, i.e. the layer to layer density is to be controlled carefully (here it is kept  $320\text{-}350\text{ kg/m}^3$ ). The density variation from one package to another must be controlled statistically and CV% should not exceed 5%.
- b) **Hard Edges:** The packages should not have the hard edges, or these must be broken or cupped by a suitable device or manually.
- c) **Package Weight:** The package weight must be controlled and all the packages must fall within the standard norms, varying from 0.75 Kg to 1.15 Kg as per batching requirement.
- d) **Winding ratio:** More the number of revolutions per round of package make the package less permeable.
- e) **Winding angle:** The smaller winding angle makes the packages less permeable.
- f) **Yarn tension in winding:** The higher the yarn tension in winding makes the package harder and denser and hence less permeable.
- g) **The machine speed:** It should not be very high, because it is very difficult to maintain good density profile at high speeds.

## 8.15 MEASURING THE DENSITY OF PACKAGE

For measuring the density, we need the following information about the Package:

1. Total Package weight.
2. Bobbin Weight.
3. Bobbin Length.
4. Bobbin Diameter/Radius.
5. Bobbin circumference.



### CALCULATION:

The package density is expressed in  $Kg/m^3$

Let the gross weight of the package	= $W_1 kg$
The weight of the cheese/spring	= $W_2 kg$
Net weight of the yarn	= $W = (W_1 - W_2) kg$
Height of the package in cm	= $h cm$
Outer radius of the Bobbin	= $r_1 cm$
Outer radius of the package	= $r_2 cm$
Outer circumference of the Bobbin	= $c_1 cm = 2\pi r_1 cm$
Outer Circumference of the Package	= $c_2 cm = 2\pi r_2 cm$

$$\text{Density of the yarn on the package} \quad \rho = \frac{\text{Mass}}{\text{Volume}} = \frac{4\pi m}{h(c_2^2 - c_1^2)} \text{ Kg/m}^3$$

### EXAMPLE DENSITY MEASUREMENT:

**Package Type** : Coral Steel Spring

**M/c no.** : 05

**Package weight** : First, the bobbin weight was taken; the electric balance was set to zero while the bobbin was on it. Then the Bobbin is replaced by the package and we found the actual weight of the yarn.

**Yarn Weight** = 0.9961 kg

**Package circumference ( $c_2$ )** = 54.7 cm = 0.547 m (*Measured directly by Measuring tape*)

**Bobbin circumference ( $c_1$ )** = 21.2 cm = 0.212 m (*Measured directly by Measuring tape*)

**Package height** = 14.1 cm = 0.141 m

$$\begin{aligned} \text{Density,} \quad \rho &= \frac{\text{Mass}}{\text{Volume}} \\ &= \frac{4\pi m}{h(c_2^2 - c_1^2)} \\ &= \frac{4 \times 3.14 \times 0.9961}{0.141 \{ (0.547)^2 - (0.212)^2 \}} = 348.973 \text{ kg/m}^3 \end{aligned}$$

### Remark s:

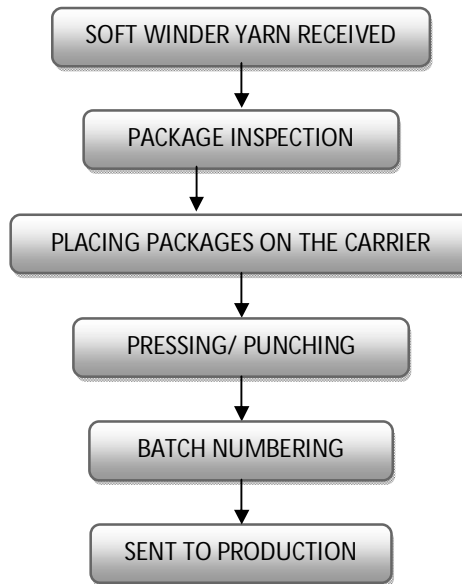
As Soft winding faults directly affect the production, all steps are taken carefully and only skilled operators are allowed to operate the machines. Suitable supervision is carried out to serve this purpose.

Production Planning and  
Sequence of operation

**SECTION 3: BATCHING**

### **8.16 BATCH PROCESS FLOW CHART**

Flow process chart of Batching Section of **Purbani Yarn Dyeing Ltd.**



**PROCESS DESCRIPTION**

**YARN INSPECTION:**

Any type of yarn can be batched for different purpose (*e.g.*: Grey yarn for Dyeing or Faulty Dyed yarn for Re-treating). The Package density, Weight per package & Yarn Count is checked (if they matches buyer requirement or not) in this stage. Other package properties like Yarn color, Yarn type and Buyer name are noted for matching or keeping detailed record about the batch.

**BATCHING PROCEDURE:**

The procedure of batching Packages at **Purbani Yarn Dyeing LTD** is as follows:

- Soft winded cones are arranged on the spindles consisting in a carrier.
- When the all spindles are full/ arranged into required no. of cones, they are covered with an overhead plate (for each spindle). As they call the types of batching,
  - 6 packages per spindle= Half Batching
  - 9 packages per spindle= 3-Quarter Batching
  - 12 Packages per spindle= Full Batching

- Each spindles filled with cones are individually taken under pressure foot of punch m/c with the help of revolving Circular base of the Punching m/c and adjusting the position of the pressure foot.
- Then cups (wt-above 1 kg) are placed over spindles and pressure foot comes down on it. Its insider clip mechanism sets it in fixed position with the screw thread of spindle.

#### **RELATED CALCULATON:**

Pressure applied on the batch: *8bar* to *10bar*

$$\text{Package length Punching Percentage} = \frac{\text{Previous length} - \text{Current length}}{\text{Previous length}} \times 100$$

(Calculated as whole batch)

#### **Remarks**

The batch section of the factory is well equipped but it lacks in a well educated quality controller. The punching machines were very old that, no machine specification can be seen on its body and none of the batch section could tell the correct specification.

Production Planning and  
Sequence of operation

**SECTION 4: DYEING**



**8.17 DYEING MACHINES USED AT PURBANI YARN DYEING LTD.  
WITH SPECIFICATIONS**

THERE ARE 19 DYEING MACHINES ON PURBANI YARN DYEING FLOOR.

**M/C NO: SAMPLE 01**

<b>Capacity (kg)</b>	01
<b>No. of spindles</b>	01
<b>No. of Packages per spindle</b>	01
<b>Total Packages</b>	01
<b>Company</b>	Fong's.
<b>Origin</b>	China
<b>Maximum Temperature</b>	160°C
<b>Maximum Pressure</b>	520 Kpa
<b>Volume Capacity</b>	10 Litre



**Fig: sample m/c 01**

**M/C NO: SAMPLE 2**

**SPECIFICATIONS**

Capacity (kg)	3.5
No. of spindles	1
No. of Packages per spindle	3
Total Packages	3
Company	Scholl
Origin	Switzerland

Maximum Temperature	165
Maximum Pressure	4.5-6 bar
Volume Capacity	20 L



**Fig: Sample m/c 02**

**SAMPLE M/C 3**

**SPECIFICATIONS**

Capacity (kg)	14
---------------	----

No. of spindles	1
No. of Packages per spindle	12
Total Packages	12
Company	Scholl
Origin	Switzerland
Maximum Temperature	165
Maximum Pressure	4.5-6 bar
Volume Capacity	41.5 L



**Fig: Sample m/c 03**

**M/C NO: SAMPLE M/C 4**

**SPECIFICATIONS**

	14
No. of spindles	1

No. of Packages per spindle	12
Total Packages	12
Company	Scholl
Capacity (kg)	Switzerland
Maximum Temperature	165
Maximum Pressure	4.5-6 bar
Volume Capacity	75 L



**Fig: Sample m/c 04**

**M/C NO: SAMPLE M/C 5**

**SPECIFICATIONS**

Capacity (kg)	20
No. of spindles	5
No. of Packages per spindle	4
Total Packages	20
Company	Fong's
Origin	China
Maximum Temperature	165
Maximum Pressure	520 KPa
Volume Capacity	180 L



**Fig: Sample m/c 05**

**M/C NO: SAMPLE M/C 6**

SPECIFICATIONS	
Capacity (kg)	20
No. of spindles	5
No. of Packages per spindle	4
Total Packages	20
Company	Fong's
Origin	China
Maximum Temperature	165
Maximum Pressure	520 KPa
Volume Capacity	180 L



**Fig: Sample m/c 06**

M/C NO: SAMPLE M/C 7

SPECIFICATIONS	
Capacity (kg)	15
No. of spindles	3
No. of Packages per spindle	5
Total Packages	15
Company	Dong-Bao
Origin	China
Maximum Temperature	165
Maximum Pressure	0.44 MPa
Volume Capacity	100 L



**Fig: Sample m/c 06**



M/C NO: SAMPLE M/C 8

<b>SPECIFICATIONS</b>	
Capacity (kg)	15
No. of spindles	3
No. of Packages per spindle	5
Total Packages	15
Company	Dong-Bao
Origin	China
Maximum Temperature	165
Maximum Pressure	0.44 MPa
Volume Capacity	100



**Fig: Sample m/c 7**

M/C# 1

SPECIFICATIONS	
Capacity (kg)	55
No. of spindles	4
No. of Packages per spindle	12
Total Packages	48
Company	Scholl
Origin	Switzerland
Maximum Temperature	165
Maximum Pressure	4.5-6 bar
Volume Capacity	350 L



M/C# 2

SPECIFICATIONS	
Capacity (kg)	55
No. of spindles	4
No. of Packages per spindle	12
Total Packages	48
Company	Scholl
Origin	Switzerland
Maximum Temperature	165
Maximum Pressure	4.5-6 bar
Volume Capacity	350 L



**M/C# 3**

<b>SPECIFICATIONS</b>	
Capacity (kg)	100
No. of spindles	7
No. of Packages per spindle	12
Total Packages	84
Company	Scholl
Origin	Switzerland
Maximum Temperature	165
Maximum Pressure	4.5-6 bar
Volume Capacity	718 L



M/C# 4

SPECIFICATIONS	
Capacity (kg)	200
No. of spindles	15
No. of Packages per spindle	12
Total Packages	180
Company	Scholl
Origin	Switzerland
Maximum Temperature	165
Maximum Pressure	4.5-6 bar
Volume Capacity	1020 L



M/C# 5

SPECIFICATIONS	
Capacity (kg)	500
No. of spindles	38
No. of Packages per spindle	12
Total Packages	456
specifications Company	Scholl
Origin	Switzerland
Maximum Temperature	165
Maximum Pressure	4.5-6 bar
Volume Capacity	3300 L



M/C# 6

SPECIFICATIONS	
Capacity (kg)	900
No. of spindles	65
No. of Packages per spindle	12
Total Packages	780
Company	Scholl
Origin	Switzerland
Maximum Temperature	165
Maximum Pressure	4.5-6 bar
Volume Capacity	6000 L



M/C# 7

SPECIFICATIONS	
Capacity (kg)	900
No. of spindles	65
No. of Packages per spindle	12
Total Packages	780
Company	Scholl
Origin	Switzerland
Maximum Temperature	165
Maximum Pressure	4.5-6 bar
Volume Capacity	6000 L





M/C# 8

SPECIFICATIONS	
Capacity (kg)	918
No. of spindles	102
No. of Packages per spindle	9
Total Packages	918
Company	Fong's
Origin	China
Maximum Temperature	165
Maximum Pressure	4.5-6 bar
Volume Capacity	6019 L



**M/C# 4A**

<b>SPECIFICATIONS</b>	
Capacity (kg)	220
No. of spindles	24
No. of Packages per spindle	9
Total Packages	216
Company	Fong's
Origin	China
Maximum Temperature	165
Maximum Pressure	520 KPa
Volume Capacity	1415 L



M/C# 4B

SPECIFICATIONS	
Capacity (kg)	300
No. of spindles	33
No. of Packages per spindle	9
Total Packages	297
Company	Fong's
Origin	China
Maximum Temperature	165
Maximum Pressure	520 KPa
Volume Capacity	2025 L

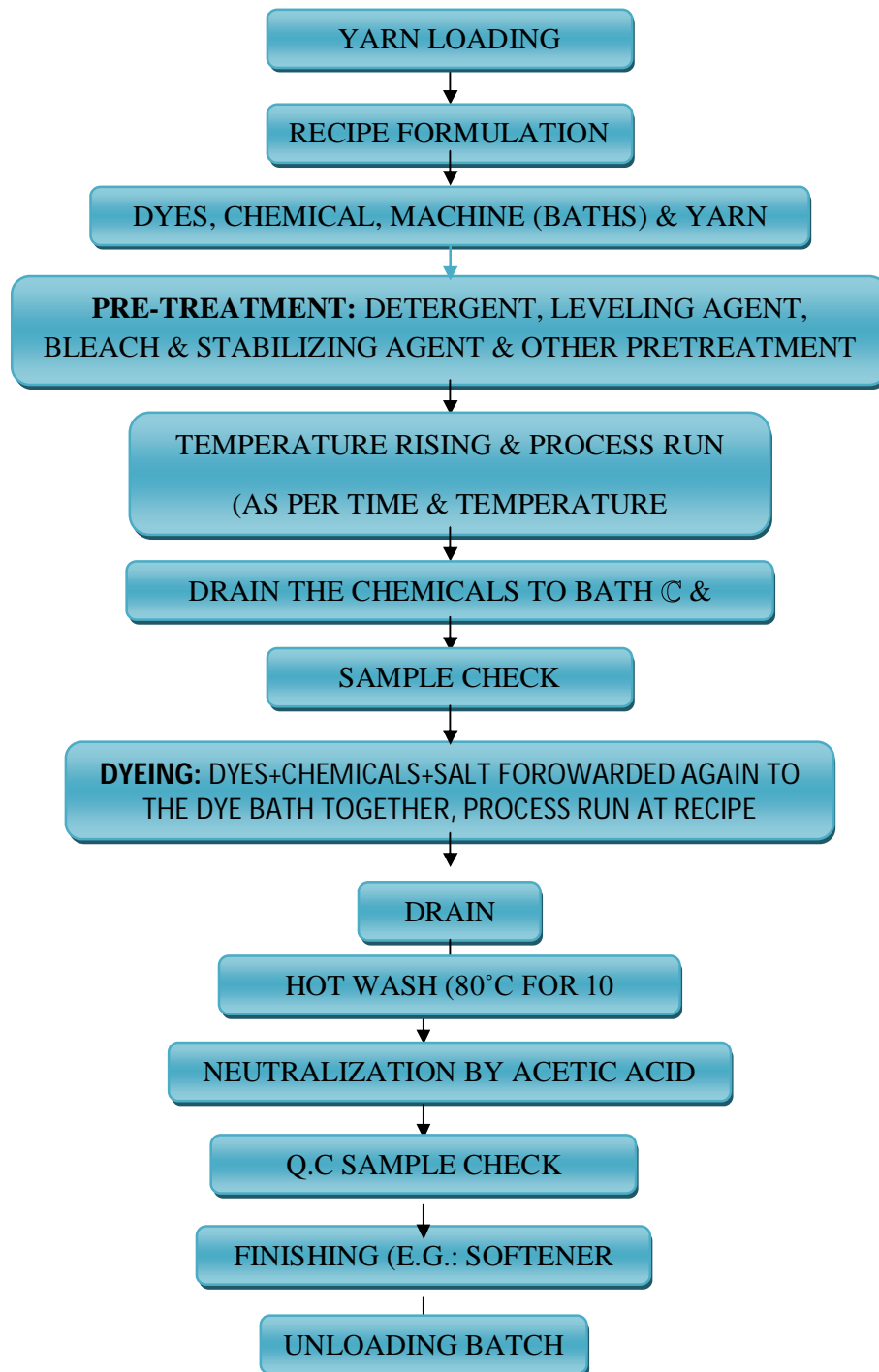


M/C# 4C

SPECIFICATIONS	
Capacity (kg)	300
No. of spindles	33
No. of Packages per spindle	9
Total Packages	297
Company	Fong's
Origin	China
Maximum Temperature	165
Maximum Pressure	520 KPa
Volume Capacity	2025 L



### 8.18 COMMON DYEING WORK FLOW CHART



## 8.19 DYEING PROCESS FOLLOW UP

### »COTTON YARN«

#### **BATCH INFORMATION:**

Yarn count	>28 s/1
No. of packages	>297
Weight of packages	>360 (Grey)
Shade	>Lt. Lilac
Batch	>080511 B
Lot	>03
Buyer	> Asrotex
M/c No	>04/B
M: L	>1:6
Total Liquor Used	>360x6= 2160≈2200 Liters. (Fixed Volume)

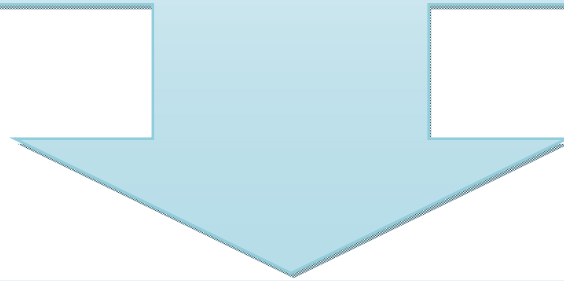
#### **RECIPE CALCULATION:**

Type of Ingredient	Name	g/l	%	Weight	Calculation of Weight
Detergent	Europon R	1.0		2.2 Kg	<b><i>g/l to gm or Kg</i></b>
Detergent	Europon R	0.5		1.1 Kg	This is calculated with relation to Volume of total Liquor (2200L here)  <b>Grams-wt =</b> Total Liquor(L) x g/l  <b>Kg wt =</b> Grams-wt÷1000  <b>% to gm or Kg</b>
Detergent	Invadine DA	1.5		3.3 Kg	
Leveling agent	Kappacom EIS	1.0		2.2 Kg	
Leveling agent	Kappacom-12	1.5		3.3 Kg	
Leveling agent	Ladiqust 1097	0.5		1.1 Kg	
Alkali	Caustic Soda	2.5		5.5 kg	
Alkali	Caustic Soda	10		22 kg	
Bleach	H <sub>2</sub> O <sub>2</sub>	2.5		5.5 kg	
Stabilizer	Tinoclart CBB	1.0		2.2 Kg	
Dyestuff (Reactive)	Nova. Blue-FNR		0.2704	973.44 gm	
Dyestuff	Nova Ruby-S3B		0.2652	954.72 gm	This is calculated on the weight of yarn.  <b>Grams-wt=</b> Yarn Weight x Recipe %  <b>Kg wt =</b> Grams-wt÷1000
Neutralizer	Acetic Acid	0.15		330 gm	
Neutralizer	Acetic Acid	1.0		2.2 Kg	
Per Oxide Killer	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	1.0		2.2 Kg	
Fixing agent	Albafix FRD		2.0	7.2 Kg	
Fixing agent	Albafix FFC	0.15		33 gm	
Salt	Glauber's salt	20		44 Kg	
softener	Oiling CT 2005		2.0	7.2 Kg	

## WHOLE PROCESS STEP BY STEP

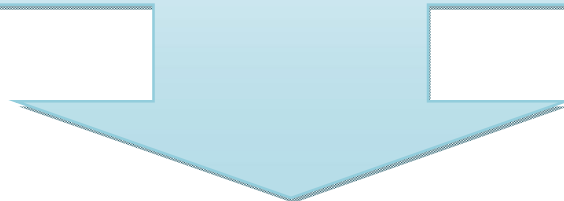
### PRETREATMENT:

- After yarn loading :
    - Invadine D/A (1.5 g/l),
    - Kappacom FC (1.0 g/l),
    - Caustic soda (2.5 g/l),
    - H<sub>2</sub>O<sub>2</sub> (2.5 g/l) &
    - Tinoclart CBB (1.0 g/l)
- are mixed together in chemical tank, and then drained toward Main tank/Dye Bath.
- The liquor in-out process is run for 20min at 115°C.
  - Cooling down to 80°C for 5 min carried out.
  - All Chemicals are drained out.
  - Sodium Thiosulphate Anhydrous (Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>: 1 g/l) added for peroxide killing.
  - The liquor in-out process is run for 10 min at 90°C.
  - Neutralization is done with Acetic Acid (0.5 g/l) @ 50°C for 10min.



### DYEING:

- Before Applying Dyes, the yarn is treated with followings for 10min at 60°C:
  - Acetic Acid (0.15 g/l)
  - Albafix FFC (0.15 g/l)
  - Kappacom-12 (1.50 g/l) &
  - Ladiquist (0.50 g/l)
- Dosing carried out for 15min at 60°C with following Reactive Dyes: Nova Blue-FNR (0.2704%) & Nova Ruby- S3B (0.2652%), Previously inserted chemicals are also remaining in dye bath.
- The process is run for 20min at same temperature.



- Levelness Checked (Matching shade- taking yarn from Inner side, outer side & middle side)
- If Dyeing occurs improperly, additives are applied.

»Continued in next page»

- Glauber's salt (20 g/l) inserted in tank C, Runtime: 10min, Temperature: 60°C.
- Caustic Soda (10g/l) added to it.
- Dosing takes places for 30min at 60°C.

**Sample Checking:**

- Small length of samples is torn from package.
- Hand washed & dried.
- Assessment carried out by Manager/Shift In-Charge (Only Visual appearance checked)

**If Sample checking yields OK,**

- Liquor is drained
- Rinsing (Water Comes Through one Valve, Passes through Yarn, Leaves the Bath through Another Valve).

**AFTER TREATMENT:**

- Yarn Neutralized By Acetic acid(1g/l) Runtime: 10min at 50°C)
- Washed With:  
Europon-R (1 g/l): 10' x 90°C  
Europon-R (0.5 g/l): 10' x 90°C

**Sample Checking:**

- Washed sample taken by Q.C officer for checking the yarn Shade match/mismatch with the reference/ Swatch/ Pantone book.
- Record Keeping.

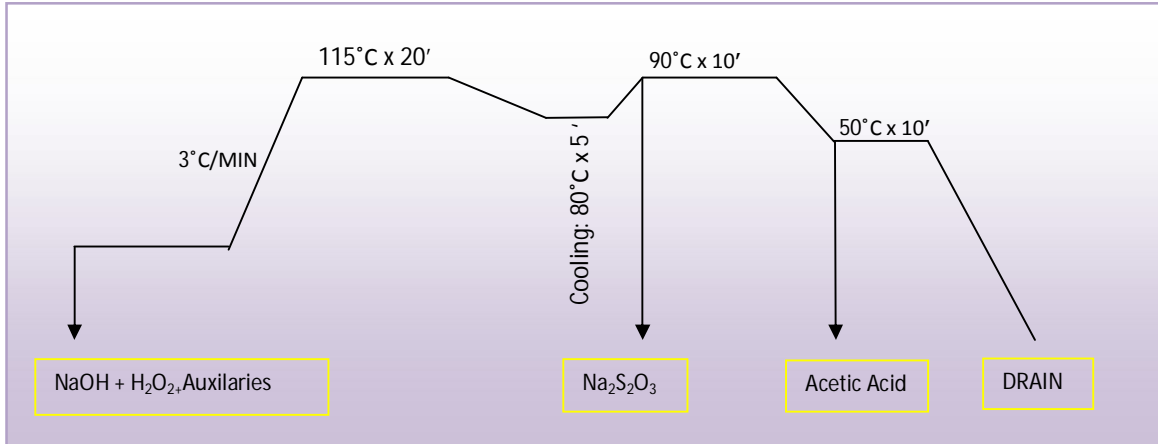
**FINISHING:**

- Washed yarn is treated with:
  - Albafix FRD (2%) + Acetic Acid (1g/l) @ 60°C x 10' & Drained.
  - Oiling C.T 2005 (2%) + Acetic Acid (1g/l) @ 40°C x 10' & Drained.

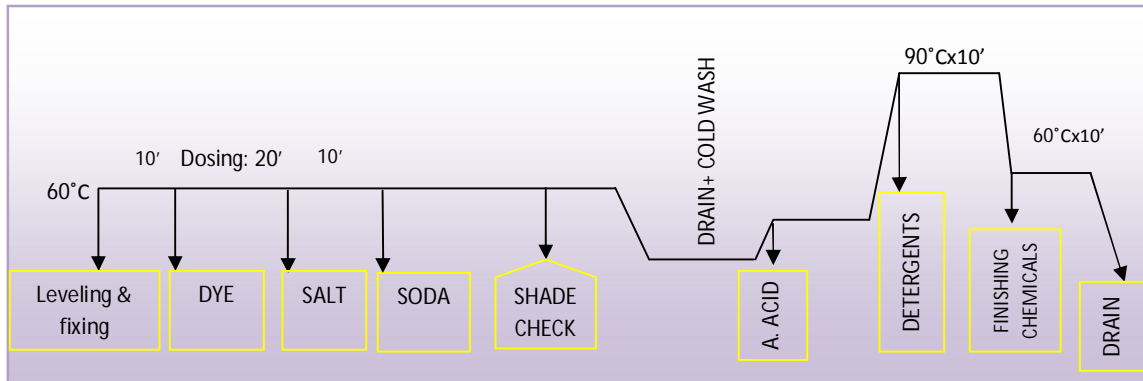
- The Batch Is now OK, Packages are drawn out of the Dye bath
  - Proceed toward Hydro extractor



**DYEING CURVES FOR COTTON YARN:**



**Scouring and bleaching**



**Dyeing**

## 8.20 DYEING PROCESS FOLLOW UP

### »POLYESTER YARN«

#### **BATCH INFORMATION:**

Yarn count (CVC)	›28/ s
No. of packages	›11
Weight of packages	›10 kg
Shade	›Light Blue Mélange
Batch	›140511 C
Lot	›01
Buyer	› Rising
M/c No	›Sample 7
M: L	›1:7
Total Liquor Used	›10x7= 70 Liters. (Fixed Volume)

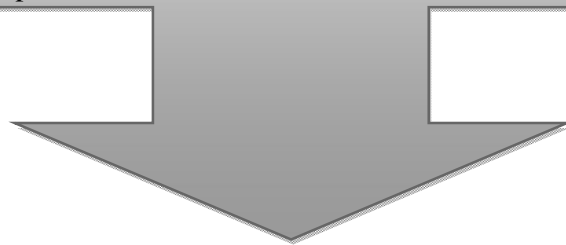
#### **RECIPE CALCULATION:**

Type of Ingredient	Name	g/l	%	Weight
Detergent	Invadine DA	1.5		105 gm
Leveling agent	Kappacom FC	1.0		70 gm
Leveling + Dispersing	Gemsol HTN	1.5		150 gm
Alkali	Caustic Soda	2.5		175 gm
Alkali	Caustic Soda	1.5		150 gm
Bleach	H <sub>2</sub> O <sub>2</sub>	2.5		175 gm
Stabilizer	Tinoclart CBB	1.0		70 gm
Dyestuff (Disperse)	Terra Navy GRLC		0.0795	7.95 gm
Dyestuff	Terra Red W4BS		0.0220	2.20 gm
Neutralizer	Acetic Acid x 2	0.5		35 gm
Buffer solution	Dyapol AB		1.0	100 gm
Per Oxide Killer	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	1.0		70 gm
Softener	Oiling CT 2005		2.0	200 gm
	Hydrosulfite	1.5		150 gm

## WHOLE PROCESS STEP BY STEP

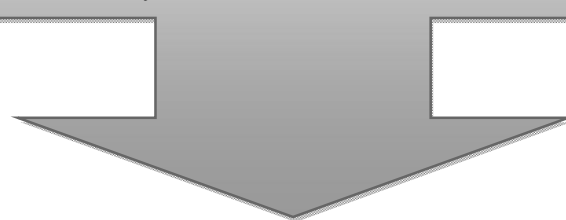
### PRETREATMENT (COTTON PART):

- After yarn loading :
  - Invadine D/A (1.5 g/l),
  - Kappacom FC (1.0 g/l),
  - Caustic soda (2.5 g/l),
  - H<sub>2</sub>O<sub>2</sub> (2.5 g/l) &
  - Tinoclart CBB (1.0 g/l)
- are mixed together in chemical tank, and then drained toward Main tank/Dye Bath.
- The liquor in-out process is run for 20min at 115°C.
- Cooling down to 80°C for 5 min carried out.
- All Chemicals are drained out.
- Sodium Thiosulphate Anhydrous (Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>: 1 g/l) added for peroxide killing.
- The liquor in-out process is run for 10 min at 90°C.



### DYEING (POLYESTER PART):

- In this case, yarn is treated with following Dyes & chemicals together for 30min at 135°C:
  - » Chemicals:
    - Acetic Acid (0.15 g/l)
    - Albafix FFC (0.15 g/l)
    - Kappacom-12 (1.5 g/l) &
    - Ladiquist (0.5 g/l)
  - » Dyes:
    - Terra Navy GRLC0.0795%
    - Terra Red W4BS 0.0220%
- Total Liquor is drained away.

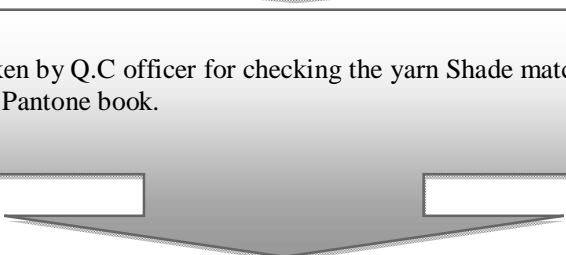


- Hot Wash at 80°C for 10 minutes
  - » Drain



### Sample Checking:

- Washed sample taken by Q.C officer for checking the yarn Shade match/mismatch with the reference/ Swatch/ Pantone book.
- Record Keeping.



- AFTER TREATMENT:**
- Reduction Cleaning By following chemicals at 80°C x 20min
    - Hydrosulfite (1.5 g/l)
    - Caustic Soda (1.5 g/l)
  - Drain all Chemicals
  - Cooling & Neutralization carried out With:
    - Acetic Acid (1.5 g/l) at 50°C x 10 min



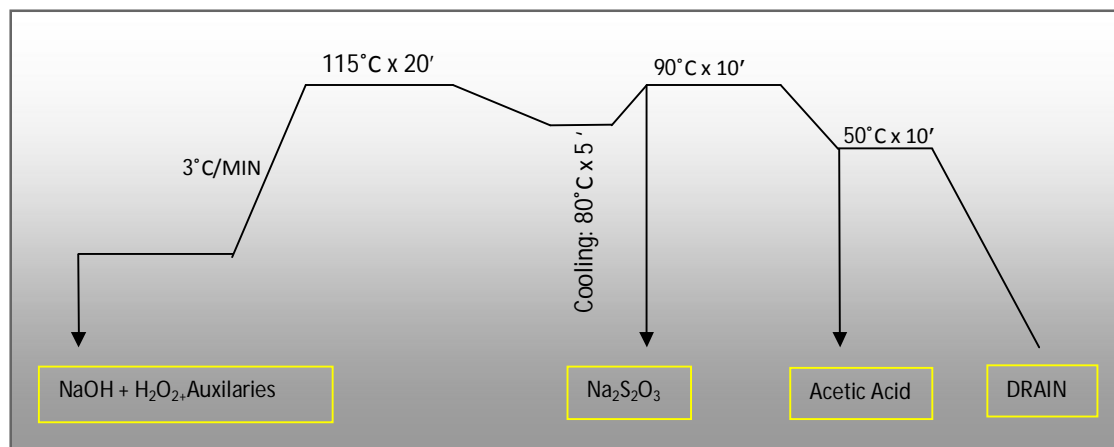
- FINISHING:**
- At this stage, yarn is treated with:
    - Oiling CT 2005 (2%)
  - Dosing at 40°C x 15min
  - Runtime 40°C X 20min



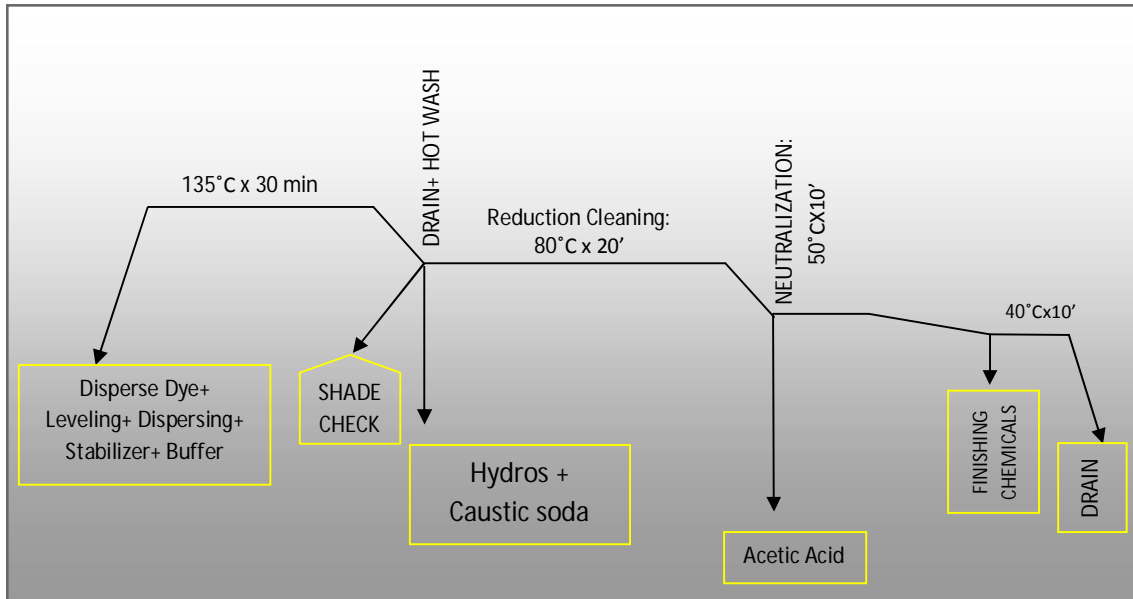
- The Batch Is now OK, Packages are drawn out of the Dye bath
  - Proceed toward Hydro extractor

**DYEING CURVES FOR POLYESTER YARN:**

**Scouring and bleaching of cotton part:**



**Dyeing of polyester part:**



**PROCESS TERMS OVERALL**

**Pretreatment:**

Pretreatment is the preparation period of fabric fro dyeing. For getting proper fastness of fabric and proper dyeing pretreatment is a mandatory process.

**Demineralization:**

It is a process of removing mineral materials from the water. It is done in water treatment plant. Water from natural sources contains many mineral materials which may hamper the dyeing process. If the mineral materials are present in water then it may lead to uneven shade in dyeing. Besides it may also damage the fabric and the machine.

**Scouring & Bleaching:**

Scouring is process of removing the natural materials from the textile fabric. This process is also a pretreatment for textile. Mostly caustic soda is used a scouring agent.

**Neutralization:**

Peroxide is used for neutralization if bleaching is present in fabric. So it should be removed, otherwise it will create a harmful effect on dyeing. On the other hand enzyme should enter in acidic medium.

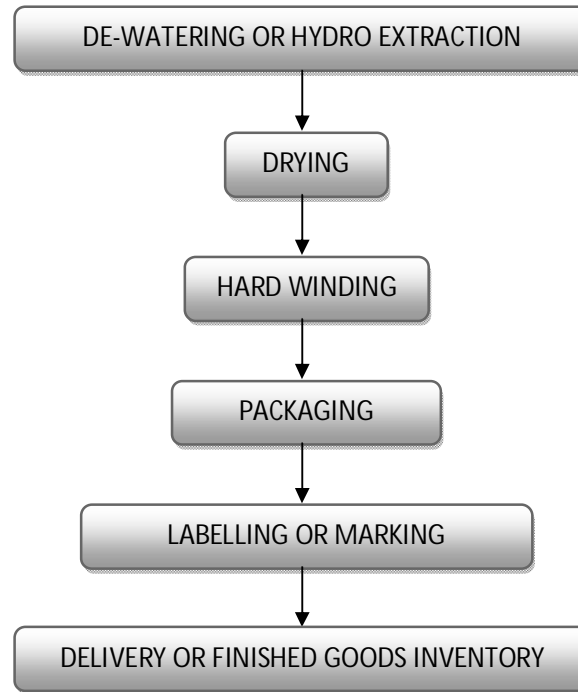
**REMARKS**

The dyeing process of **Purbani Yarn Dyeing Ltd** is very much satisfactory. **Purbani Yarn Dyeing Ltd** only cares for quality. It is heard from the management of the company, after establishing the factory till now, a single order is not cancelled. That’s why it is sure that the company is well enough to produce quality fabric.

Production Planning and  
Sequence of operation

**SECTION 5: FINISHING**

**PROCESS SEQUENCE OF FINISHING SECTION:**



# PROCESS DESCRIPTION

## HYDRO EXTRACTION

Purbani Yarn Dyeing Ltd Uses Two Hydro extractors of same specification:

Specifications	
Name	Dettin
Model	Berta 24
Manufacturer	Dettin Textile Developments Inc.
Origin	USA
Batch Size	24 Packages
Cycle Time	6-10 minutes
Maximum Possible Loading	60 kg.
Speed	Up to 1500 Rpm
Operation	Automatic Loading & Unloading



Fig: Hydro Extractor 1



Fig: Hydro Extractor 2 (Right side View)



### DRYING

**Purbani yarn dyeing Ltd.** uses the following two Radio-Frequency dryer for package drying:

<b>Name</b>	Stray Field
<b>Model</b>	SO 85/T
<b>Manufacturer</b>	Stray Field Ltd.
<b>Manufactured in</b>	England
<b>Output</b>	85 kW
<b>Power Consumption</b>	380-420 Volts AC, 50Hz, 3 Phase, 190 kVA
<b>Power Factor</b>	0.9
<b>Maximum Belt Speed</b>	7 Meter per Minute
<b>Weight</b>	4.35 tons (Approximately)
<b>Operating Frequency</b>	25 MHz



Fig: RF Dryer 01

**RF DRYER 2:**



**Fig:** RF Dryer 2

<b>Name</b>	Stray Field
<b>Model</b>	SO 100 TS
<b>Manufacturer</b>	Stray Field PVT. LTD.
<b>Manufactured in</b>	Pune, India
<b>Output</b>	100 kW
<b>Power Consumption</b>	415 Volts AC, 50Hz, 3 Phase, 203 kVA
<b>Power Factor</b>	0.9
<b>Maximum Belt Speed</b>	7 Meter per Minute
<b>Weight</b>	4.5 Tons (Approximately)
<b>Operating Frequency</b>	27 MHz

## HARD WINDING

### MACHINE SPECIFICATIONS:

**Purbani Yarn Dyeing LTD** uses Hard machines manufactured by two famous companies:

3. SCHÄRER SCHWIÈTER METTLER ÁG. (SSM)
4. SHANGHAI CORAL TEXTILE MACHINERY CO. LTD. (CORAL)

There are seven soft winding machines running at **Purbani Yarn Dyeing Ltd.**

- E) SSM Precision Hard winding machine.
- F) SSM Grooved Drum Hard winding machine.
- G) CORAL Grooved Drum Hard winding machine.

Information about the hard winding machines used in **Purbani Yarn Dyeing Ltd.**

M/C NO.	Mfg. Co.	ORIGIN	SPINDLES	SPEED(m/min)	MECHANISM
01	SSM	Switzerland	96	650-800	Precision
02	SSM	Switzerland	96	650-800	Precision
03	SSM	Switzerland	96	650-800	Groove Drum
04	Not Functioning				
05	CORAL	China	90	650-750	Groove Drum
06	CORAL	China	90	650-750	Groove Drum
08	CORAL	China	90	650-750	Groove Drum

### ESSENTIALS OF A HARD WINDING MACHINE:

- **Length counter:** Each lead each contains computer length counter sensor.
- **Motor:** Each head have motor of 60W Power
- **Speed controller:** Speed controller Controls the speed of the motor.
- **Starting winding speed:** Low speed start wingding.
- **Winding speed:** Maximum winding speed used here is 800 meter/min.
- **Winding drum/Precision Mechanism:** Grooved Steel winding drum Controls the winding angle.
- **Yarn breaking sensor:** Touch-less yarn-breaking sensor senses the yarn absence through its Infra-red eye.

## IMAGES FROM HARD WINDING



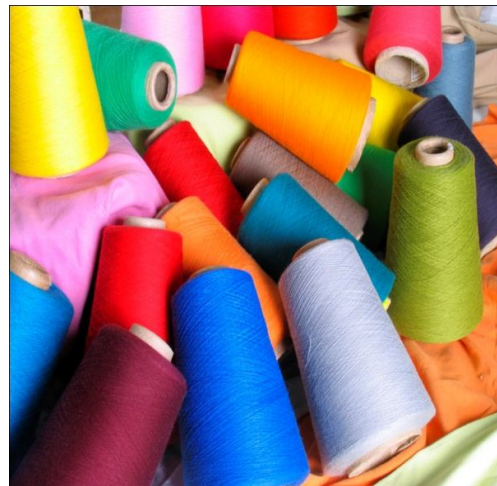
**Fig: SSM Hard Winding Machine (Precision)**



**Fig: Coral Hard Winding Machine (Grooved Drum)**



**Fig: SSM Hard Winding Machine (Grooved Drum)**



**Fig: Hard Winded Cones From pydl**

## SEWING THREAD HARD WINDING

### SPECIFICATIONS

Company	Zhenjiang New Tide Precision Mc. Co
Model	WFF-YTLB-03
No. of spindles	8
Winding Length	1800-2600 Meter
Speed	320-450 Meter per Minute



## PACKAGING

**Purbani yarn Dyeing Ltd** Packages their Finished Products in following systems:

- Cartons of 50 kg package.
- Plastic woven sacks containing 48-50 cones (50 Kg).
- Plastic Woven sacks Containing 24-25 cones (25 kg).
- Other mediums & weight specified by the buyer.
- Sewing threads are packed usually in units of dozens.



In **Purbani Yarn Dyeing LTD**, labeling on the packages is carried out by:

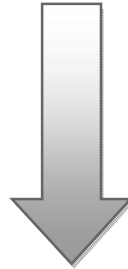
- Stencil printing.
- Hand written information on the previously printed table on bags/cartons.
- Especially printed label on packed goods for specific buyer.
- Pre-Printed information for specific common products.

## REMARKS

Finishing is the most important of all the processes of textile. Because, whether the order delivered will be accepted or rejected by buyer- depends on the finishing process. The finishing section of **Purbani Yarn Dyeing Ltd** has a well equipped finishing section to ensure quality.

At Hard Winding Section, All other Methods, Devices & operations are same as those of soft winding machine, so these are not elaborated repeatedly for hard winding section. Here the pressure applied on feed yarn during winding is slightly more than Soft winding and the output is brought on Paper cone or other packages specified by the buyer, which suits their usage. In addition, I had limited access to this section due to some organizational difficulties/limitations.

# CHAPTER: 9



**Quality Control Section**



## 9.1 Quality Assurance System:

The Quality Assurance Department is assigned to maintain consistently uniform quality of the material in process and various stages of its manufacturing.

### 9.1.1 Objects of quality Control:

1. Research.
2. Selection of raw materials.
3. Process control.
4. Process development.
5. Product testing.
6. Specification test.

### 9.1.2 Quality Assurance at different stage:

**Purbani Fabrics Limited** 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

### Procedures are described below:

#### In laboratory:

1. Swatch card from buyer according to their requirement
2. recipe prediction for sample dyeing
3. sample dyeing until matching with swatch card
4. Fastness & other tests of the fabric or yarn are done here.

#### In dyeing section:

1. According to the buyer's sample, sample dyeing is done in sample dyeing machine in dyeing shed & again matched with the approved sample.
2. If result is OK, then bulk production.
3. During dyeing, samples are taken until accurate shade matching. The interval may be 30-40 minutes.
4. After dyeing sample is collected after softening matching is done.
5. Last of all, sample is collected after fixation & matched.
6. Then allowed the fabrics to be finished.

### **In finishing section:**

By using a series of finishing machines correct width, softness & appearance are maintained according to requirements.

Then sampling is done for several times to test GSM, Shrinkage & fastness properties.

Finally fabric is inspected & prepared for delivery.

### **Quality Standard:**

**Purbani Fabrics Ltd.** Follows the quality standard: ISO-9001:2000.

### **List of Equipment:**

In the quality assurance Department the followings equipment's are used-

- ❖ Electronics Balance
- ❖ Iron
- ❖ Ahiba Nuance lab. Dip Dyeing Machine
- ❖ Rota Wash
- ❖ Crock Meter
- ❖ Spectro Photometer with software (Data Color)
- ❖ P<sup>H</sup> meter

### **9.2 Different Quality Test Method:**

Different types of fastness tests of the dyed fabric are done in quality control department of the **Purbani Fabrics Ltd.** Different types of method (Standard or buyer's recommended) are followed for different types of tests.

There are two types of tests are done in Quality Assurance department. They are-

1. physical Tests
2. Chemical Test.

#### **Physical Tests:**

- ❖ GSM Test
- ❖ Shrinkage test
- ❖ Spirality test
- ❖ Pilling resistance

#### **Chemical Tests:**

- ❖ Fastness to washing.
- ❖ Fastness to rubbing

### **Fabric Inspection:**

The inspection of fabric is a procedure by which the defects of fabric are identified and fabric is classified according to degree or intensity of defects. The fabric inspection is done for both grey and finished fabric.

### **Grey Fabric Inspection:**

Grey fabric inspection is performed according to 4-point system.

### **Finished Fabric Inspection:**

4 point numbering system is followed for finished fabric inspection. Defects found in the final inspection.

- i. Uneven shade
- ii. Oil spot
- iii. Neps
- iv. Crease mark

### **Machine Stoppage mark**

- v. Listing
- vi. Line mark
- vii. Pick missing
- viii. Double yarn
- ix. Dead cotton
- x. Bowing
- xi. Fly yarn contamination

## **9.3 Color Fastness to wash Test procedure:**

### **Colorfastness:**

The “color fastness” of a colored textile is defined as its resistance to these changes when subjected to particulars of conditions. It follows that color fastness must be specified in terms of these changes and expressed in terms to the magnitude.

### **Required materials:**

1. Sample size 40 x 100 mm
2. multifiber at 40 x 100 mm
3. ECE detergent (WOB)-4g/L
4. Sodium Perborate ( $\text{Na}_2\text{BO}_3 \cdot \text{H}_2\text{O}_2$ )-1g/L
5. Distilled water
6. Normal cold water
7. Steel balls

### Required instrument:

1. Rota wash
2. Scissor
3. Stitch machine

### Procedure:

1. Cut sample & multifibre at 40 x 100 mm
2. 50 ml ECE detergent (WOB) & 50 ml Sodium per borate is taken with the sample. For marks & Spencer, the solution is taken by the following formula: (Sample fabric + Multifibre weight) x 50 ml
3. the sample is kept in 60<sup>0</sup>C for 30 minutes in Rota Wash Machine
4. Rinse the sample twice with cold water.
5. Dry at 60<sup>0</sup>C by hanging or by Flat iron pression but temperature should bot be more than 150<sup>0</sup>C.

### Report:

Dry the specimen and the change of shade & degree of staining is measured by Grey Scale & Staining Scale.

## 9.4 Color fastness to rubbing (Dry & Wet) Test:

### Sample :

- ❖ Dyed fabric -15 cm x 5 cm
- ❖ White Test Cloth -5 cm x 5 cm

### Procedure:

- ❖ White test cloth is put on to the grating and stag by steel wire.
- ❖ The sample is run twenty times manually for ten seconds. And the rubbing fastness of the sample cloth and degree of staining is accessed.
- ❖ For rubbing fastness (Wet), the rubbing cloth is placed in the water and socked and squeeze. The wet rubbing cloth is placed on to the grating and stag with stainless steel wire and run ten times manually then assesses the attaining on to the rubbing cloth and the rubbing fastness of the sample cloth is accessed.

### Report :

- ❖ Change of shade of the sample is measured with grey scale and degree of staining of the white test cloth is measured by Staining Scale.
- ❖ There are also some tests are done in the lab. And the process is described below-

## 9.5 Measuring dimensional stability (Shrinkage & spirality):

### Sample:

- ❖ Two piece of 50 cm x 50 cm fabric is taken for test.

### Procedure :

- ❖ conditioning: Put the sample in the table for 4 hours for conditioning before starting test.
- ❖ Cut the sample 50 x 50 cm & benchmark should be 35 x 35 cm. Stitch the sample (3 sides) by over lock sewing machine.
- ❖ Put sample in washing machine and run according to buyer's choice.
- ❖ Drying: All Buyers' requirement is tumble Dry except ECHO SCOURING is flat dry.

### Shrinkage test calculation:

$$\text{Shrinkage \% (Percentage)} = \frac{\text{Before wash} - \text{After Wash}}{\text{Before wash}}$$

### Spirality test calculation

$$S = (S_1 + S_2) / 2$$

$$\text{Spirality} = (S \times L) / 100.$$

Suppose,

$S_1$  = The right side distance of the specimen from the stitch line wash.

$S_2$  = The left side distance of the specimen from the stitch line after wash.

L = Length before wash.

**9.6 Pilling Test:** Generally, pilling test is applicable for fabric with synthetic fabric. This test is carried out in pilling box. A Sample of 10 cm x 10 cm is sewn round a rubber tube. Then the tube in the Pilling box and the door of it is closed. Then the meter is set for 10600 cycles. After the cycle is completed, the fabric is assessed by a special grey scale. The grey scale is provided Pilling box.

## 9.7 Light fastness test:

**Purpose:** Light fastness is the test design to evaluate the laundering fastness test of dyeing, Pigment which re to be made in comparison of result obtained on many test pieces treated under light.

**Method: ISO**

**Apparatus:**

1. Light fastness tester & blue scale
2. scale
3. scissor
4. hard paper
5. 11cm X 4.5 cm

**Procedure:** At first, we took the blue woolen cloth & test sample. The blue woolen clothes were dyed with acid blue, 104,109 etc. Then we cut the woolen cloth & sample according to template. The blue woolen cloth is cut to make standard & sample is cut to test light fastness. Then we put the holder of woolen cloth and sample in the set of machine and set the time, which was 24 hrs. After completing the process we get the slandered test result. Then we compared with the standard rating.

Standard	Rating
8	Fast
7	Fast
6	Average
5	Average
4	Average
3	Average
2	Not fast
1	Not fast

**Result:** The test result of light fastness test is equivalent to the class of standard 6. So we can say that the color fastness of dyed fabric is average.

## 9.8 Color Fastness to Perspiration:

**Purpose:** To assess the degree of change of shade or cross staining due to Perspiration.

**Method:** ISO

**Reagent:** Alkaline Solution:

- ▶ L Histadine monohydrochloride monohydrate 0.5 g/l
- ▶ NaCl
- ▶ Di – Sodium Orthophosphate dehydrate 0.5 g/l
- ▶ ( Dilute the Solutions in one liter distill water)
- ▶ pH  $8 \pm 0.05$  with 0.1 mol/ltr. (0/1N) NaOH.

● **Test Specimen:** Fabric (4x 10) cm

● **Procedure:** (Alkaline Perspiration)

- ▶ Keep the specimen in contact with S.D.C multifibre stripe of (4x10) cm
- ▶ Liquor Ratio of 50: 1
- ▶ Allow the Specimen to soak for 30 min
- ▶ Place the specimen glass slide and lightly scrap of with a glass rod.
- ▶ Place the specimen indicator for hrs at 37° C. Then remove from incubator open out keep sometime in open air.
- ▶ Repeat the same process with another specimen using the acid solution.

**Assessment:** Assess the change in color of each specimen and the staining of the multifibre strip using the grey scale.

**Report:** Record the change in color of each specimen and & the staining of the individual components of the multifibre adjacent fabric separately for both the acid alkaline test.

### 9.9 pH Check :

**Purpose:** To fulfill the buyer requirements to keep the pH of the fabric as Per standard.

**Method: ISO**

**Procedure:**

☑ Take 3 Pieces of 2 gm sample

▶ Take 100ml of distilled water (pH – 5.5 to 7.5) in three Conical Flack.

▶ Shake them for 1 hrs in normal temperature.

▶ Finally measures the pH by average them.

Standard pH range for colored fabric 6 to 8

Standard pH range for colored fabric 5 to 8

**9.10 G S M Test:** G S M is the most important factor. There is a G S M Cutter. The Sample cut by this weighted in the electronic balance. The reading (in gm) from the balance multiplied by 100 to get Value of G S M.

**Remarks:**

**Purbani Fabrics Ltd.** Always about the quality of the product. The quality of the product is always approved by the buyer. They follow the quality standard: ISO – 9001:2000. Purbani Fabrics Ltd is well equipped for checking the quality of the product. They sent the quality report to batch. We think as Purbani Fabrics Ltd strictly meet up the quality level that's why they are the only one direct manufacture of Marks & Spencer garments.



# CHAPTER: 10



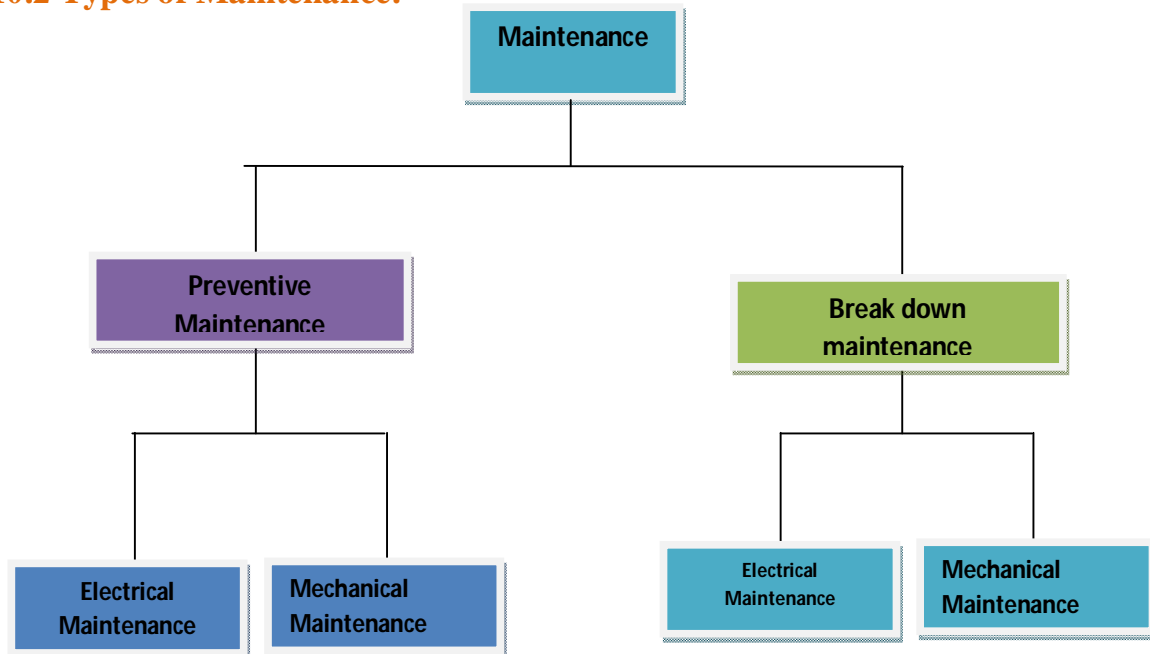
## **10.1 Definition:**

Machine, Buildings and other facilities are subjected to deterioration due to their use and exposure to environmental condition process of deterioration, if unchecked, culminates in rendering these service facilities unserviceable and brings them to a standstill. In Industry, therefore has no choice to attend them from time to time to repair and recondition them so as to elongate their life to the extent it is economically and physically possible to do so.

### 10.1.1 Objective of Maintenance:

1. To keep the factory plants, equipments, machine tools in an optimum working condition.
2. To ensure specified accuracy to product and time schedule of delivery to customer.
3. To keep me downtime of machines to me minimum must to have control over me production program.
4. To keep the production cycle within the stipulated range.
5. To modify the machine tools to meet the need for production.

### 10.2 Types of Maintenance:



#### Preventive maintenance:

Preventive maintenance is a predetermined routine actively to ensure on time inspection/ checking of facilities to uncover conditions that may lead to production break downs or harmful description.

### Break down maintenance:

In this case, repairs are made after the equipment is out of order and it can not perform its normal functions.

### Routine Maintenance:

Maintenance of different machines are prepared by expert engineer of maintenance department. Normally in case of dyeing machine maintenance after 30 days complete checking of different important parts are done.

Manpower setup for maintenance:

• A Shift	7 AM	2 PM
• B Shift	7 PM	10 AM
• General Shift	10 AM	7 PM

### 10.3 Maintenances Procedure:

Normally preventive maintenance should be done. During maintenance procedure following points should be checked.

#### Check List of Different Parts:

**Maintenance:** Mechanical

**Machine:** Dyeing machine

Sl No	Items need to be checked & Serviced
01	Crease the M/C bearing.
02	Complete cleaning of machine.
03	Cleaning of drain valves, replace seals if required.
04	Check air supply filters, regulators auto drain seals
05	Clean filters element and blow out.
06	Greasing of unloading roller bearing.
07	Checking of oil level and bolts of unloading roller gearbox.

08	Checking of unloading roller coupling and packing.
09	Checking & cleaning (if required) of main vessel level indicator.
10	Check the oil level of pump bearing and refill if required.
11	Check the function of heat and cool modulation valves
12	Check all door seals

**Maintenance:** Electrical

**Machine:** Dyeing machine

SI No	Items need to be checked & Serviced
01	Check & clean fluff and dirt at dirt at all motor fan covers.
02	Check all motor's terminals
03	Check main panels (by using compressed air)
04	Check panel cooling fan & clean its filter
05	Clean main pump inverter and its cooling fan.
06	Check all circuit breaker, magnetic conductors and relays.
07	Check current setting of all circuit breaker & motor over load.
08	Visual checking of all power & control cables.
09	Check all pressure switches.
10	Check calibration of main vessel & all addition tank.
11	Check all pneumatic solenoids
12	Check calibration of heating / cooling modulation value
13	Check setting of tangle sensor.
14	Check setting & operation of lid safely switches
15	Check all emergency switches
16	Check all indication lamps
17	Check all on/off switches
18	Check all signal isolators

## 10.4 Maintenance Tools & Equipment's:

### 1. Combination tools / spanner

Function : Tightening & loosening of nuts & bolts.

### 2. Socket ratchet set

Function : Tightening of nuts & bolts

### 3. Slide Range

Function : Tightening & loosening of nuts & bolts

#### **4. Monkey pliers**

Function : Tightening & loosening of nuts & bolts

#### **5. Pipe thread cutting tools**

Function : To cut the thread in pipe.

#### **6. Bearing puller**

Function : To assist the opening of bearing from shaft.

#### **7. Pipe range**

Function: Tightening & loosening of pipe joint

#### **8. Pipe cutting tools**

Function : for pipe cutting.

#### **9. Hole punch**

Function : Punching the hole.

#### **10. Divider**

Function : For circle making on metal & wood.

#### **11. Easy opener**

Function : To open the broken head bolt.

#### **12. External thread die**

Function : For external thread cutting.

#### **13. Heavy scissor**

Function : Cutting of gasket & steel sheet

#### **14. Pipe thread cutting tools**

Function: To cut the thread in pipe.

#### **15. Drill machine and drill bit.**

Function : for drilling.

### **16. Grease gun**

Function : For greasing of moving parts of M/C.

### **17. Grinding M/C**

Function : For grinding & cutting of mild steel.

### **18. Welding M/C**

Function : For welding & cutting.

### **19. Spirit leveler**

Function : For perfect leveling.

### **20. File**

Function : For smoothing the surface.

### **21. Hammer**

Function : For scaling & Right angling.

### **22. Circlip tools**

Function : Circlip opening & closing.

### **23. Hacksaw blade**

Function: For metal cutting.

### **24. Handsaw (wood)**

Function: For wood cutting.

### **25. Grinding stone**

Function: For smooth finishing.

### **26. Grinding paste**

Function: For easy cutting of metal.

### **Remarks:**

Maintenance of M/C's are very essential to prolong the M/C life and good maintenance is important consideration. It is necessary to check that all routine maintenance is being done regularly and properly otherwise efficiency of each department will be reduced.

# CHAPTER: 11



**Utility Department**

### 11.1 Utility Service:

Here the following utility services are available-

1. Water
2. Electricity
3. Steam
4. Gas
5. Compress air

### Water Pumps:

Centrifugal Pump for water supply to Dyeing & Others Section			
1	20 H. P Pedrollo Pump each pump, 1000L/min	4 Units	4,000.00L/min
2	10 H.P Pedrollo Pump flow rate, 600 L/Min	1 Unit	600.00L/min
3	5.5 H.P Pedrollo – Pump flow rate, 50 L/Min	1 Unit	350.00L/min
4	Spare Pump Motor Pedrollo 20 H.P1 Unit and 5.5 H.P	1 Unit	1, 00L/min
5	Jhonson Pump (30 H.P)	2 Unit	100 m <sup>3</sup> /hr
6	KSB Pump (30 H.P)	1 Unit	100 m <sup>3</sup> /hr
7	Submerssible Pump KSB	46 Kw	150 m <sup>3</sup> /hr

### Natural Water Quality:

Water for a textile plant may come from various sources. These include surface water from rivers and lakes, and subterranean water from wells. In PPC they collect water from Under ground. Natural and pretreated water may contain a variety of chemical species that can influence textile wet processing in general, and dyeing in particular.

The various salts present in water depend on the geological formations through which the water has flowed. These salts are mainly the carbonates ( $\text{CO}_3^{2-}$ ), hydrogen carbonates or bi-carbonates ( $\text{HCO}_3^-$ ), Sulphates ( $\text{SO}_4^{2-}$ ) and chlorides ( $\text{Cl}^-$ ) of calcium ( $\text{Ca}^{2+}$ ), magnesium ( $\text{Mg}^{2+}$ ). Although calcium and magnesium carbonates in limestone are relatively insoluble in water. So in this reasons, water hardness can be divided into two ways-

**1) Temporary hardness :** Temporary hardness of water which contain such this materials as  $\text{Ca}(\text{HCO}_3)_2$  ,  $\text{Mg}(\text{HCO}_3)_2$  ,  $\text{Fe}(\text{HCO}_3)_2$  .



2) **Permanent hardness** :Parmanent hardness of water which contain such this materials as  $\text{CaCl}_2$  ,  $\text{CaSO}_4$  ,  $\text{Ca}(\text{NO}_3)_2$  ,  $\text{MgCl}_2$  ,  $\text{MgSO}_4$  ,  $\text{Mg}(\text{NO}_3)_2$  .

This water hardness causes some serious consequences in a textile dyeing and finishing industries and these are -

- ❖ Precipitation of soaps.
- ❖ Redeposit ion of dirt and insoluble soaps on the fabric being washed , this can cause yellowing and lead to uneven dyeing and poor handle.
- ❖ Precipitation of some dyes as calcium and magnesium salts.
- ❖ Scale formation on equipment and in boilers and pipelines.
- ❖ Reduction of the activity of the enzymes used in washing.
- ❖ Incompatibility with chemicals in finishing recipes and so on.

Hardness expressed by parts per million (ppm) of  $\text{CaCO}_3$  which is standard hardness scale and it is also called American hardness. The hardness of raw water is 100 ppm or more. To use it in dyeing and in boiler this water must need to soft & foreign materials needs to remove.

### 11.2 Standard Water Quality for Dye House:

Parameter	Permissible concentration
Color	Color less
Smell	No bad smell
Water Hardness	<5 ppm
PH value	7-8 (Neutral)
Dissolve solid	< 1 ppm
Inorganic salt	< 500 ppm
Iron (Fe)	< 0.1 ppm
Manganese (Mn)	< 0.01 ppm
Copper (Cu)	<0.005 ppm
Nitrate ( $\text{NO}_3$ )	< 50 ppm
Nitrate ( $\text{NO}_2$ )	< 5 ppm

**Source of Utility:** The main Utility, which is used by Purbani knit Dyeing Industries Ltd., is Natural gas. From Natural gas generator produce electricity. From natural gas and electricity in associate with mechanical and electrical apparatus, Purbani Knit dyeing Industries Produce other Utilities like water, steam, Compressed air etc.

### 11.3 Capacity and Other Technical Details:

**Power (Electricity):** Generator house is the main Power Producing Plant of Purbani Knit Dyeing Ltd. there are two Generators in Generators house. Specifications of two Generators are given below:



**Waukesha gas Generator**

<b>Brand</b>	<b>Waukesha</b>
<b>Gas Intake</b>	<b>0.20 mm</b>
<b>Gas Exhaust</b>	<b>0.66 mm</b>
<b>RPM</b>	<b>1500</b>
<b>Fuel</b>	<b>Natural Gas</b>
<b>Capacity</b>	<b>164 KW</b>
<b>Orogin</b>	<b>USA</b>
<b>Available</b>	<b>3 pieces</b>

**11.4 Boiler:** Steam generator or boiler is usually a closed vessel made of steel. There is one boiler in Surma Knit dyeing Ltd.

**Function:** Boiler function is to the heat produced by the combustion of fuel (Gas) to water and ultimately to generator steam. The steam produced may be supplied in wet processing department for –

- ▶ Heating cylinder dryer
- ▶ Steaming during dyeing

**Objects:** For supplying steam.

### 11.5 Types of steam:

1. Wet steam
2. Dry saturated steam, and
3. Superheated steam.

In Purbani Knit dyeing Ltd. wet steam is used for the relevant processes.

Boiler Specification:

Brand Name	: Revotherm
Origin	: India
Type	: Fire tube boiler
Capacity	: 5.5 ton per hour
Pressure	: 5 bar
Temperature	: 180° C
Fuel	: Natural Gas
Year of Manufacturer:	2000



**Revotherm Boiler**

### Water supply for the boiler:

Water required for steam production is supplied by deep tube well.

### Pretreatment of the boiler water:

Boiler feed water needs special standard. Any deviation from the required standard may result in scale formation, which eventually reduces the efficiency of the boiler. This ultimately affects the cost of steam generation and makes the production cost high. To maintain the required standard of the water, there should be some means to pretreat that the boiler feed water. To protect scale formation of boiler, NELCO is used as chemical in water feed tank. 200 gm NELCO is injected per 12 hrs. In Surma Knit dyeing Industries Ltd. there are water softeners that act before the water enters the boiler.

**11.6 Manufacture of the softener:** The manufacturer of the softener is cleaver brocks U.S.A.

**No of the Softener:** There are two water softener to pretreated the boiler feed water

### Softener Specification:

Brand Name: Cleaver brocks  
Model No: ACC- SMR – 150 – 1- 1/2T  
Serial No: CH – 0000 236  
Capacity: 150000000GRS / TANK  
Unit NO: HS 008892  
Pipe Size: 1.5 inch  
Salt Capacity brine marker: 576 Ibs

**11.7 Compressed Air:** The compressed air is supplied from air condition from air compressor. There are two air compressors in Surma Knit dyeing industries Ltd.

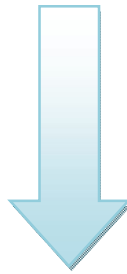
### Compressor No: 01

Brand Name: BOGO  
Origin: Japan  
Model No: S361694  
Serial No: 546206  
Maximum working pressure: 10 bar  
Average working pressure: 6-7.5 bar  
Year of Construction: 2001

Volt: 400 Frequency: 50 Hz



# CHAPTER: 12



**Marketing Department**

## 12.1 Marketing department of purbani yarn dyeing ltd

### Buyer of Purbani Yarn Dyeing Ltd.

The followings are the list of buyer that buys or orders to produces quality fabrics from **Purbani Yarn Dyeing Ltd.**

• <b>Epyllion group</b>	• <b>Lakhsma Sweater Limited</b>
• J.K Fabrics Ltd.	• Lakhsma Fashion Limited
• Masco Industries Limited	• Jams Sweater Limited
• Grameen knitwear Ltd.	• Mantrust Sweater Ltd
• Northern Corporation ltd.	• Sweater Fashion
• Jamuna Group	• Aman Sweater Limited
• Utah Group	• Target Sweater
• Doel Group	• Arizona Sweater Limited
• Multifabs Limited	• Ekram Sweater Limited
• Dulal Brothers Limited	• Deep Wear Limited
• A.P.S Apparels Limited	• Swan Sweater Limited
• Asrotex Group	• Factory Style
• Harvest Rich Ltd	• Bengal Exporter Ltd
• Radial International Ltd	• Fashion Style
• Delta Composite Knitwear Limited	• Fashion Sweater
• Divine Group	• Biped Sweater
• Tasniah Fabrics Limited	• Oriental Sweater Ltd
• Newtex Group	• Gazipur Sweater
• Far East Knitting And Dyeing Ltd	• Musk Sweater
• Evince Textile Limited	• Shanon Sweater
• As Knitwear Limited	• Europ Sweater
• Robintex Group	• Ehsan Sweater
• Tilotoma Fashions Ltd	• Naomi Sweater
• Fariha Knit Tex Ltd	• Garnish Sweater
• JN Apparels Ltd	• Lakhsma Sweater Limited
• Raihana Apparels Limited	• Lakhsma Fashion Limited
• Seus Fabrics Ltd	• Jams Sweater Limited
• Ratul Knitwear Ltd	• Mantrust Sweater Ltd
• Belkuchi Knitwear Ltd	• Sweater Fashion
• Givensee Group of Industries	• Aman Sweater Limited
• Chaity Group	• Target Sweater
• Knit Asia	• Viyellatex Group

**End Product:** As a yarn dyeing industry, the products are obviously yarn. Two types of yarns are the products:

- » White yarn
- » Dyed yarn

**Pricing:** Price of the product is determined by the following method:

Price= Cost of material+ Cost of labor (Overhead cost) + Profit.

**Cost of Material:** This depends upon the shade percentage of yarn. This is categorized into 5 categories.

These are approximate overall price of them:

- |                  |        |              |
|------------------|--------|--------------|
| » White yarn     | —————> | \$ 1.00      |
| » Light shade    | —————> | \$ 1.50-1.60 |
| » Medium Shade   | —————> | \$ 1.80-1.90 |
| » Dark shade     | —————> | \$ 2.20-2.30 |
| » Special shades | —————> | \$ 2.50-2.60 |

**Overhead Cost:** This cost comprises of Govt. approved standard overhead cost and factory determined additions (Direct labor cost)

**Profit:** This is the net profit gained through successful negotiation between buyer and marketing personnel.

## Remarks

The marketing department of the **Purbani Yarn Dyeing Ltd** is very efficient with above 10 merchandisers and above 30 skilled and qualified officers. All of the merchandisers are very helpful, experienced and well educated.

## 12.2 Marketing department of Purbani Fabrics Ltd.

### Consumer of Products:

PFL is a 100% export oriented industry. All the goods produced in this industry are exported into various foreign countries. Name of the main buyers are given below:

### Name of Buyers:

1. Colombus
2. Max
3. Garcia
4. Nayomi
5. Betty
6. Barcaly
7. ZXY
8. Calvin- Calin
9. Lerros
11. Trimarx
12. Radiance
13. P.Q.S
14. D-tex
15. Aftab
16. Spicy
17. Avrora
18. H.S Fash
19. Knit Zone
20. Anando
21. T.C.G
22. Scott
23. Dress-up
24. Astro-knit
25. Blith
26. S.R.G
27. Oxford
28. Shocby
29. Kooke- Design
30. Non.wash
31. Eshan
32. Faruquee.knit

### Communication System:

- ❖ Intercom telephone
- ❖ Fax
- ❖ E-mail
- ❖ Written letters



### 12.3 Marketing Strategy:

Marketing strategy is a very important factors to sale the products to the buyer. If the marketing strategy is not so developed, it will be very hard to reach the goal. In case of garments marketing the dealings with the buyer is a very important factor.

**Purbani Fabrics Ltd.** mainly senior marketing officers, merchandiser & higher officials deal with the buyer. There are some fixed buyers of the industry. The buyers give their orders continuously all over the year. The marketing officers & the merchandisers communicate with the buying houses to collect the orders.

By both side understanding the rate & the order quantity are fixed.

### 12.4 Responsibilities of marketing officer:

Dealing with the buyer & convince the buyer is the main duty of marketing officer. A marketing officer also has some other duties. The main duties & responsibilities of a marketing office 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 officer & merchandisers.
- ❖ To maintain a communication with the buyers and buying houses.
- ❖ Communicate with better criteria of the products.

### Remarks:

**Purbani Fabrics Ltd.** hasmarketing & merchandising team. They always communicate with the buyers.**Purbani Fabrics Ltd.** has some fixed buyers. The marketing section also looks the quality & quantity of buyers.

## CHAPTER: 13



### **Inventory Section**

## 13.1 Inventory Control:

Store is the place where every type of raw materials, spares finished goods are kept in proper system. Inventory control means the accurate calculation and data of every type of raw materials spares and finished goods in time to time. Store inventory control are necessary, because –

- ❖ To know about the required amount of raw material.
- ❖ To know about the job no – which would be processed?
- ❖ To be continued the production process.
- ❖ To fine out the profit or loss of a company.
- ❖ Stock and stock value for consumption measuring.

### 13.1.1 Frequency of Inventory Update:

- ❖ Daily
- ❖ Monthly
- ❖ Annual

### 13.1.2 Scope of Inventory Control:

- ❖ Dyes store.
- ❖ Raw material.
- ❖ Other chemicals.
- ❖ Grey fabrics.
- ❖ Spare parts.
- ❖ General store.
- ❖ Capital equipment's.
- ❖ Accessories.
- ❖ Stationary.
- ❖ Maintenance parts.

### Inventory System for raw material:

In **Purbani Fabrics Ltd.** There are different inventory systems for different raw materials.

## 13.2 Grey Fabric Store:

All the grey fabrics are stored in the fabric store near the batch section. Different types of fabric are listed in the sheet according to fabric types, quantity and consumer's requirement.

### 13.3 Dyes and Chemicals:

There is different store for dyes and chemicals. Various types of dyes and chemicals are stored here according to dyes and chemicals companies. Different types of dyes and chemicals are listed in a sheet. In the sheet the stored quantity of dyes and chemicals are also included. Every day the sheet is updated and a copy of this sheet is supplied to the dyeing manager, dye house and lab section.

### 13.4 Spares:

In **Purbani Fabrics Ltd.** required amount of spares of different machines are stored in the mechanical store room. All the spares are listed in a sheet which is controlled by the mechanical & maintenance personnel. Spares are arranged in the store room according to their size, quantity & requirements. There are shelves in the store room to keep the small spare parts.

### 13.5 Finished Goods:

**Purbani Fabrics Ltd.** Supplies its finished dyed fabrics to its garments section. So, dyed finished fabrics are stored for short time in the finishing section. All the delivered fabrics are noted on the tally khata according to the lot no, quantity, fabrics diameter, buyer's name, color & considering other technical parameters.

### Remarks:

**Purbani Fabrics Ltd.** Have individual stores for raw materials, finished goods etc. There is not enough space to store the finished goods. It requires increasing the store area. In **Purbani Fabrics Ltd.** the store for inventory control is satisfactory. Sometime, they fluctuate from ideal process otherwise they are ok.

## CHAPTER: 14



### COST ANALYSIS

## 14.1 Cost Analysis

### 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
- ✓ Knitting cost
- ✓ Cost of dyeing
- ✓ Cost of finishing
- ✓ Cost of cutting, sewing, accessories etc.
- ✓ Cost of printing (If any)
- ✓ Labor cost (direct & indirect)
- ✓ Factory cost
- ✓ Sales and caring cost
- ✓ Others cost.

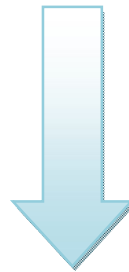
### Price of the Product:

Are not available.

### 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.

# CHAPTER: 15



HRM & Compliance

## HRM & Compliance

### 15.1 Definition:

Compliance means conformity of certain standard. PPC maintain a moderate working condition for their employees. Though it is well established project, there is some lacking of proper compliance issues. Here is list of compliance in which some points are maintained fully and some are partially.

- ✦ Compensation for holiday
- ✦ Leave with wages
- ✦ Health register
- ✦ Time care
- ✦ Accident register
- ✦ Workman register
- ✦ Equal remuneration
- ✦ National festival holiday
- ✦ Overtime register
- ✦ Labor welfare
- ✦ Weekly holiday fund
- ✦ Sexual harassment policy
- ✦ Child labor abolition policy
- ✦ Anti-discrimination policy
- ✦ Zero abasement policy
- ✦ Working hour policy
- ✦ Hiring /recruitment policy
- ✦ Environment policy
- ✦ Security policy
- ✦ Buyers code of conduct
- ✦ Health and safety committee
- ✦ Cante



### Health:

- ❖ Drinking water at least 4.5 L/day/employee
- ❖ Cup availability
- ❖ Drinking water supply
- ❖ Water cooler ,heater available in canteen
- ❖ Drinking water signs in Bangla and English locate min. 20 feet away from work place
- ❖ Drinking water vassal clean at once in a week
- ❖ Water reserve at least once a week
- ❖ Water center in charge person with cleanliness
- ❖ Suggestion box register

### Toilet:

- ❖ Separate toilet for women and men
- ❖ A seat with proper privacy and lock facility
- ❖ Urinal accommodation
- ❖ Effective water sewage system
- ❖ Soap toilet
- ❖ Water tap
- ❖ Dust bins
- ❖ Toilet white washed one in every four month
- ❖ Daily cleaning log sheet
- ❖ No-smoking signs
- ❖ Ladies /gents toilet signs both in bangle and English
- ❖ Deposal of wastes and effluent

### Fire:

- ❖ Sufficient fire extinguisher and active
- ❖ Access area without hindrance
- ❖ Fire signs in both languages
- ❖ Fire certified personal photo
- ❖ Emergency exit

### Safety Guard:

- ❖ Metal glows on good conditions
- ❖ Rubber mats & ironers
- ❖ First aid box one
- ❖ Ironers wearing sleepers
- ❖ First trained employees
- ❖ Motor/needle guard
- ❖ Eye guard
- ❖ Nurse
- ❖ Doctor
- ❖ Medicine
- ❖ Medicine issuing register

**Others:**

- ❖ Room temperature
- ❖ Lighting facilities



**Fig: Doctor**

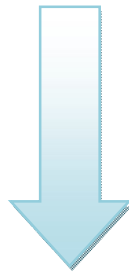


**Fig: First aid box**



**Fig: Fire training**

## CHAPTER: 16



ETP AND WTP

## 16.1 EFFLUENT TREATMENT PLANT (ETP)

In textile industries, Effluent Treatment Plant used to remove the color particles & chemicals that are present in the water discharged from various wet processing stages.

**The major steps of liquid discharge are:**

- » Scouring.
- » Bleaching.
- » Dyeing.
- » Washing

**After scouring, the water contains:**

- » Detergent particles
- » Soap solution.
- » Other auxiliaries used with them.

**After bleaching, the water contains:**

- » Dilute hypochlorite solution.
- » H<sub>2</sub>O<sub>2</sub>
- » Other auxiliaries used with bleach.

**After bleaching, the water contains:**

- » Various dye molecules.
- » Acetic acid.
- » Soda Ash.
- » Stabilizer.
- » Other auxiliaries used along with dyes.

### 16.1.1 TYPES OF ETP

Depending upon Water treatment Method, ETP can be classified into three categories.

1. Biological ETP (Biochemical)
2. Physico- Chemical ETP
3. Physico-Chemical & Biological ETP (Combined)

The ETP used in **Purbani Yarn Dyeing Ltd** is Biochemical in type.

**BIOCHEMICAL ETP:** Here, Bacteria is used to treat the contaminated water and Chemicals used to control the process as well as the growth of bacteria. As chemical and biological process is combined into one for treating water, the ETP type is named so.

### 16.2 SPECIFICATION OF THE PLANT:

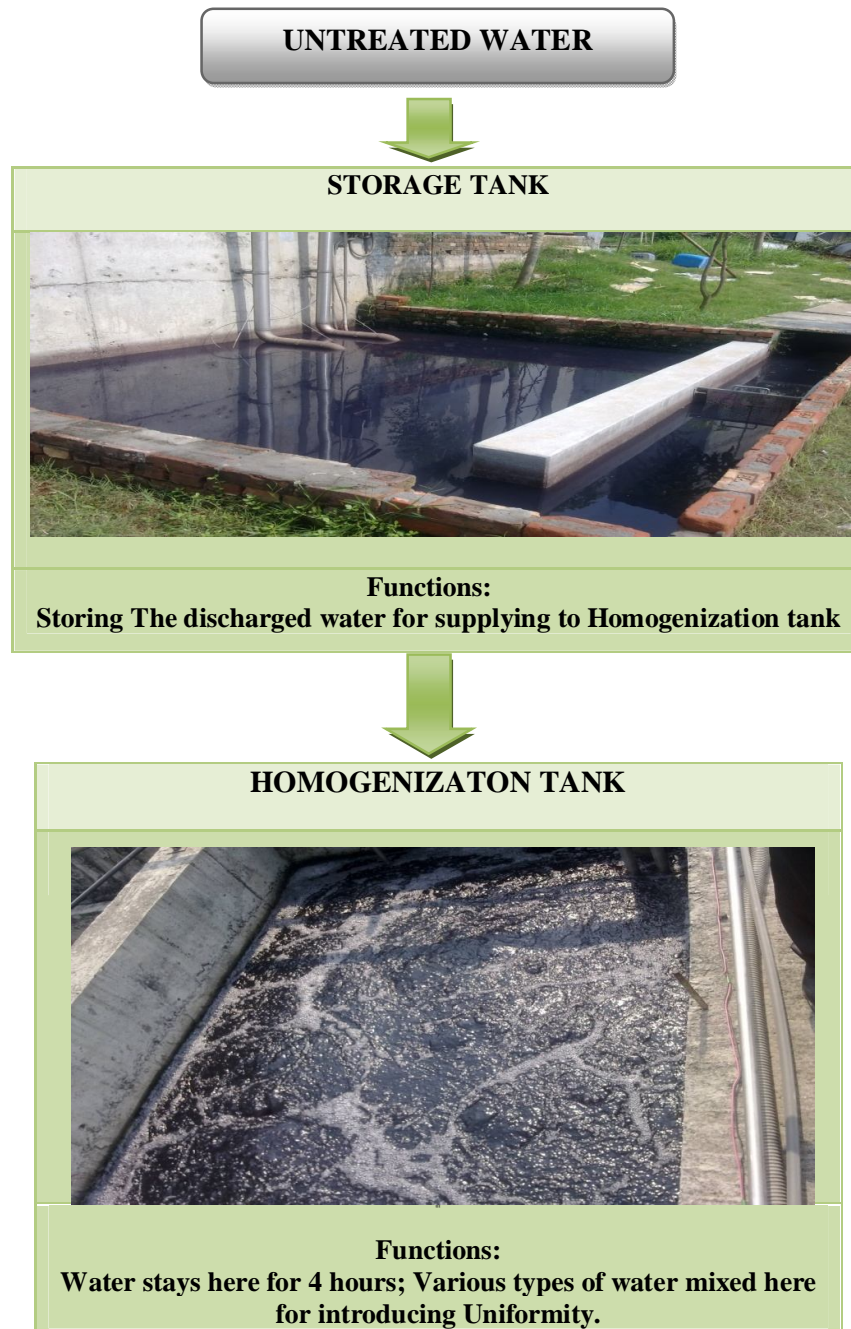
**Manufacturer:** Locally manufactured by the design given by an Engineer From Sri-lanka.

**Capacity:** 50 m<sup>3</sup>/hr.

**Chemical used and their functions:**

- Ferrous sulphate ( $\text{Fe}_2\text{SO}_4$ ), 10% conc.: To remove the coloring materials.
- Lime ( $\text{CaO}$ ): To remove coloring materials in alkali medium.
- Alum  $[\text{Al}_2 (\text{SO}_4)_3 \cdot 24 \text{H}_2\text{O}]$ : To increase the precipitation rate.
- Sulphuric acid ( $\text{H}_2\text{SO}_4$ ), 98% conc.: To reduce the pH of the wastewater.

**16.3 STEP WISE FUNCTION OF DIFFERENT UNITS OF E.T.P:**





### NEUTRALIZATION TANK



**Functions:**  
Here Water is treated with 98%  $H_2SO_4$  for 30 minutes for neutralization.



### MIXING TANK



**Functions:**  
Here bacteria are inserted in neutralized water in a continuous Process



### OXIDATION TANK



**Functions:**

Here Water stays the longest time (48 hours) and this is the largest tank of any ETP system, here we have 2400m<sup>3</sup> volume capacity. Color is de-activated here; hence, it does the main job.



### LAMELLA CLARIFIER



**Functions:**

Differentiation of bacteria from water, other particles are precipitated in this tank.





### SLUDGE RETURN TANK



**Functions:**

in this tank, precipitated Sludge is stored and forwarded to Mixing tank for re-using the alive bacteria. This Process is called as Activated Sludge Process.



### TREATED WATER



**Functions:**

This water is now suitable for use by performing de-mineralization. This water will not harm the environment much more like discharging untreated water.

### THE NEXT STEPS ARE:

**Sludge Thickener:** Here densely thickened sludge gets gathered, then they are thickened further using Polyelectrolyte.



## **Effluent Treatment Plant:**

Effluent treatment is a must in the textile industry because the water that comes out after dyeing is harmful for the environment. Effluent treatment is a process by which the water passed from the textile Industry which contains various pollutants is cured. The Effluent treatment process is briefly discussed below:

### **16.4 Pollutants Present in Textile Industry:**

Various types of pollutants are present in textile industries which are responsible for the faults caused in the processes. These pollutants are discussed below:

#### **Color:**

The presence of color in the waste water is one of the main problems in the textile industry. Most of the colors are stable and has no effect of light or oxidizing agent. These colors cannot be easily degraded by conventional methods of treatment.

#### **Dissolved Solids:**

Dissolved solids are also one of the important causes of water pollution. It is a critical parameter of the effluent present in the textile industry. Use of common salt and glauber salt etc. in textile processing increases the amount of total dissolved solids (TDS). Disposal of high amount of TDS can lead to increase of TDS in ground and surface water. It is also harmful for agricultural purpose.

#### **Toxic Metals:**

Waste water of textiles is not free from metal contents. There are mainly two sources of metals. Firstly, the metals may come as impurity with the chemicals used during processing such as caustic soda, sodium carbonate and salts. For instance, caustic soda may contain mercury if produced using mercury cell processes. Secondly, the source of metal could be dye stuffs like metalized mordent dyes. The metal complex dyes are mostly based on chromium.

#### **Residual Chlorine:**

The use of chlorine compounds in textile processing, residual chlorine is found in the waste stream. The waste water (if disposed without treatment) depletes dissolved oxygen in the receiving water body and as such aquatic life gets affected. Residual chlorine may also react with other compounds in the waste water stream to form toxic substances.

### Other Effluents:

Textile effluents are often contaminated with non-biodegradable organics termed as refractory materials. Detergents are typical example of such materials. The presence of these chemicals results in high chemical oxygen demand (COD) value of the effluent. Organic pollutants, which originate from organic compounds of dye stuffs, acids, sizing materials, enzymes, tallow etc. are also found in textile effluent, such impurities are reflected in the analysis of bio-chemical oxygen demand (BOD) and COD. These pollutants are controlled by use of biological treatment processes. In many textile units, particularly engaged in synthetic processing, low BOD/COD ratio of effluent is observed which makes even biological treatment not a ready proposition. The waste water of cotton based textile units is usually alkaline, whereas synthetic and woolen fabric processing generates acidic effluent.

### Flow Description:

The Effluent Treatment Plant of PURBANI has capacity of 1200 m<sup>3</sup>/day. Treatment processes are maintained by three steps which are given below:

**a) Physical/ Mechanical step:**

Screen Chamber.

Equalization/ Homogenous process.

Clarifying process (2 times).

Intermediate period.

Filter press.

**b) Chemical treatment step:**

Ozonation by Ozonator (2 times).

Flocculation/ Coagulant process (Z times).

Neutralization process.

**c) Biological treatment step:**

Sequencing Batch Reactor (SBR).

## Process Details:

### Screen Chamber:

There are two types of screen chambers for screening system and removing the floating dust particles from the wastewater.

1. Manual bar screen.
2. Mechanical screen.

### Equalization or Homogenous System:

All the effluents reach the equalization tank to make it equal or homogenous by providing air from air blower through coarse type diffuser. Effluents can retain here for about 20-22 hours.

### Ozonation System:

Ozone is re-circulated along with the effluents for all 24 hours to get the excellent output by removing micro color and add more dissolved oxygen as well as kill anaerobic bacteria which will come along with raw effluent. Ozone gas is continuously produced in the Ozonator machine.

### Ozone Generator:

Oxygen concentrator collects pure dry oxygen by purging nitrogen from air and sent pure oxygen to the Ozonator. In the Ozonator ozone generation is done by creating high voltage of 8000 volts.

### Flocculation System:

Coagulant-Flocculants are used for dosing into the Flocculation tank in order to remove the color bond. For example:

- Lime,
- Ferrous Sulphate,
- Polymer, etc.

During dosing the reactions which take place in the Flocculation tank is discussed in the following:

As only ferrous sulphate cannot be used as a precipitant so lime is also added at the same time to a proper precipitate. When ferrous sulphate is added to the waste water the following reaction occurs:

$\text{FeSO}_4 \cdot 7\text{H}_2\text{O} + \text{Ca}(\text{HCO}_3)_2 \rightarrow \text{Fe}(\text{HCO}_3)_2 + \text{CaSO}_4 + 7\text{H}_2\text{O}$ . After adding Lime,

$\text{Fe}(\text{HCO}_3)_2 + 2\text{Ca}(\text{OH})_2 = \text{Fe}(\text{OH})_2 + 2\text{CaCO}_3 + 2\text{H}_2\text{O}$ .

The ferrous hydroxide can be oxidized and convert to ferric hydroxide, the desired final form caused by dissolving oxygen into the wastewater. The reaction follows the following procedure:

$\text{Fe}(\text{OH})_2 + \frac{1}{4}\text{O}_2 + \frac{1}{2}\text{H}_2\text{O} = \text{Fe}(\text{OH})_3$ .

The insoluble ferric hydroxide is formed as a bulky, gelatinous floc.

### **16.5 Inclined Plate Clarifier (IPC)/ Clarifying System:**

Contains both solid and liquid parts and is achieved by breaking color and separating color bonds.

### **Neutralization System:**

Raw effluent pH is 9.5-11, so it is neutralized by dosing Hydrochloric Acid (HCl). Ideal pH for maintaining the Biological process should range within 6.5-8.5.

### **Sequencing Batch Reactor (SBR)/ Biological System:**

This is the biological treatment process where live micro-organisms are nourished. Bacteria are populated in microbial process. These micro-organisms eat those effluents and the remaining color and also remove Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). ETP plant is continuously operated for 24 hours to ensure that the bacteria are provided with sufficient food (i.e. waste water) and oxygen to keep them alive. Like other living creatures micro-organisms need a balance diet with source of carbon, nitrogen, phosphorous and sulfur. As from textile wastes have carbon and sulfur (sulphate), so lacking compound nitrogen and phosphorous are adding from outside of urea and di-ammonium phosphate.

This SBR digester is maintained through batch wise system. The Sequencing Batch Reactor consists of three chambers and at least 4 batches are maintained per chamber.

In the factory, the Mix Liquor Suspended Solids (MLSS) of micro-organism level is checked in regular basis by In-hof-man cone.

### **Intermediate Tank:**

This is the buffer zone where treated clear water is preserved before final discharge.

## Filter Press & Sludge Disposal:

The sludge generated by effluent treatment needs to be further processed of safely. It is the byproduct of the effluent treatment process, produced in the form of solid waste. In fact the production of sludge is a good indicator as to out whether the ETP is running continuously or not. Sludge can be generated at different stages of treatment, including screening, primary settling, chemical precipitation but most will come from the physiochemical stage of treatment. The sludge collected from different stages has different characteristics and compositions. Despite the differences in the nature of the sludge from each process stage, all the sludge is usually combined and handled together.

## 16.6 Characteristics of waste water of PFL assumed as follows:

pH = 9-11.5  
BOD = 300 mg/L  
COD=200 mg/L  
Suspended solid (SS) = 200 mg/L  
Color = dark

## Controlling Parameters

The characteristics of wastewater assumed at **Purbani Yarn Dyeing Ltd** are as follows:

- » pH = 11
- » BOD = 300 mg/L
- » COD=200 mg/L
- » Suspended solid (SS) = 200 mg/L
- » Color = dark reddish.

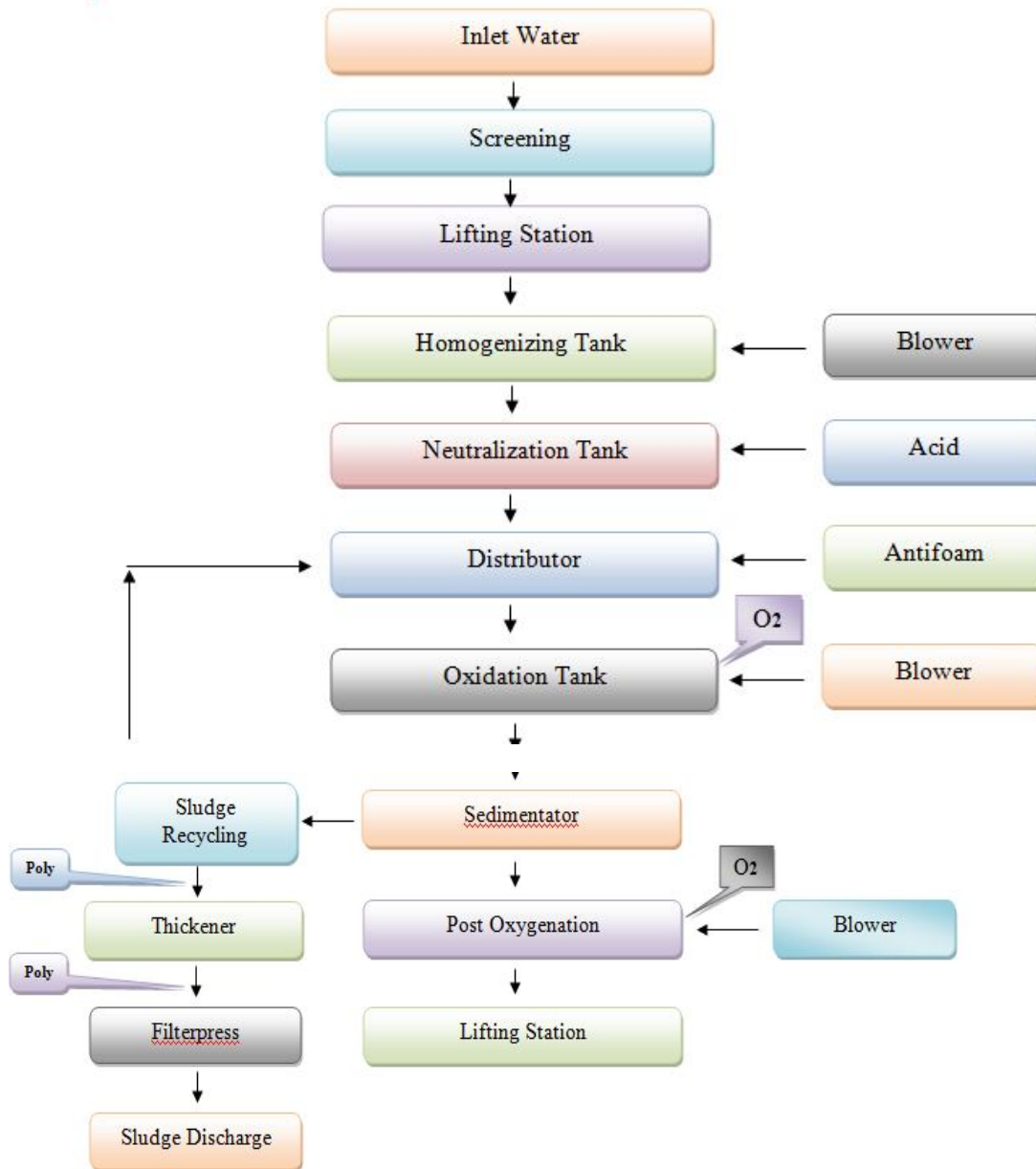
## Final treated Quality of Purbani Yarn Dyeing Ltd discharge is:

- » pH = 6-9 (disposable limit 6-9)
- » BOD = 37 mg/ L (disposable limit 50 mg/L)
- » COD = 147 mg / L (disposable limit 200 mg/L)
- » Suspended solid = 51 mg/L (disposable limit 150 mg/L)
- » Color = color less.
- »

## Remarks

The wastewater produced in the different processes of **Purbani Yarn Dyeing Ltd** is effectively removed by using the ETP. The water that is disposed after treatment is perfect for disposal according to the DOE (Department of Environment) & ISO 14001. But the capacity of the ETP can only treat up to 60% of total water discharged by the factory. It lacks more space to expand the ETP that will treat 100% of wastewater.

**Flow process of ETP:**



**16.7 Department of Environment, Government of Bangladesh required:**

PH = 6-9  
 BOD = 50 mg/L  
 COD= 200 mg/L  
 Suspended solid = 150 mg/L  
 Color = Light brownish.

**Final treated Quality of PFL discharge is:**

PH = 7-8

BOD = 30 mg/ L

COD = 160 mg / L

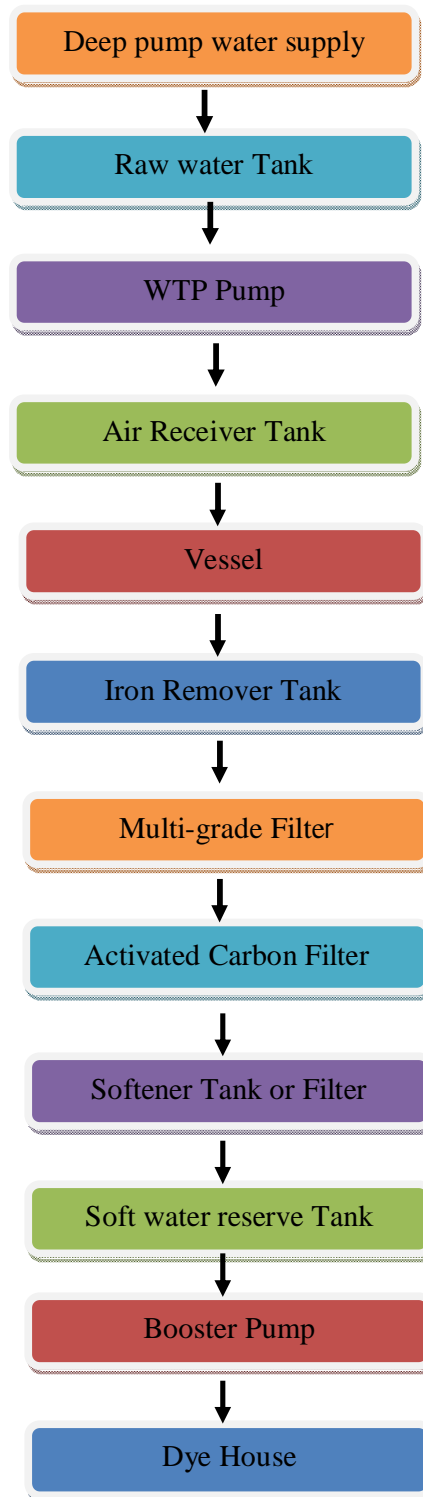
Suspended solid = 30 mg/L

Color = color less.

**16.8 Photo Of ETP**



### 16.9 Flow chart of water treatment plant:





## 16.10 Water Treatment Plant

### Water Treatment Plant:

The water treatment plant is a vital part of the dyeing section where the supply water of the dyeing floor is treated and cured for proper dyeing. The supply water contains various soluble effluents like dissolved solids, metal compounds and other impurities which can lead to any sort of fabric fault during dyeing the knitted fabrics. The process sequence of the water treatment plant in Divine Textile Limited textile mill is briefly discussed below:

### Pump:

The Deep pump is used for extracting water from raw water tank to pass in the dyeing section for the process of fabric dyeing.

### Raw Water Tank:

Raw water tank is placed 20 feet deep tank where the water needed in the dyeing and finishing process is deposited and by the water pump the water in the tank is extracted.

### Air Receiver Tank:

Air receiver tank is used for the passage of air from the boiler to the Iron exchanger tank.

### Vessel:

The vessel is where the water from the WTP pump is collected.

### Iron Exchanger Tank:

The metals contained in the water are removed or broken down by applying air from the received from the air receiver tank.

### Multi Grade Filter:

The multi grade filter is used for removing the residual iron contained in the treated water.

### Activated Carbon Filter:

The activated carbon filter is used for removing the remaining metals and other impurities by passing the water flow through rocks of different sizes arranged in different layers of the tank. At first there is a layer of small rocks and next is a layer of medium rocks and finally comes a layer of big rocks. The tank contains a carbon layer in middle.

### Softener Tank:

The softener tanks contains resin and in the softening tank water softening chemicals are applied for reducing the hardness of the water and making the water flow suitable for fabric dyeing.

### Soft Water Reserve Tank:

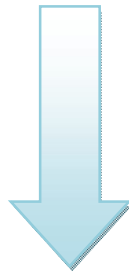
The processed soft water is reserved in the soft water reserve tank.

## 16.11 Photo Of WTP



Water Treatment Plant

## CHAPTER: 17



**CONCLUSION**

**PURBANI FABRICS LTD.** is a well-planned versatile project. The administrations, management, chain of command – all are well organized. They are devoted to satisfy the customer by their activities. However, some of the point we want to mention for the good of **PURBANI FABRICS LTD.**

#### Some Suggestions:

- ❖ During the transport of the fabric in the dyeing floor and also during the loading of the M/C, fabrics are soiled for the contact with floor. This makes the fabric / part of the fabric dirty. It may require more scouring/bleaching agent or may create stain making it faulty.
- ❖ The dyeing floor is water most of the time: it should be cleaned all the time.
- ❖ The illumination of the dyeing shade should be enhanced. It may exert the worker fatigue ness
- ❖ More skilled labor should be used in a project as **PURBANI FABRICS LTD.** Many times the dosing pipelines are clogged due to the careless dosing of chemicals.
- ❖ The M/C stoppage time should be analyzed and minimized. The maintenance should be carried out when the M/C is out of action.

#### Limitation of the Report:

- ❖ Because of secrecy act the data on costing and marketing activities has not been supplied & hence this report excludes these chapters.
- ❖ Some of the points in different chapter are not described as these were not available.
- ❖ The whole process is not possible to bind in such a small frame as this report, hence our effort spent on summarizing them.
- ❖ We had a very limited time in spite of our willing to study more details it was not possible to do so.

#### Lastly:

At last I again give thanks to almighty ALLAH for successfully completed my industrial attachment. Actually, **PURBANI** is a 100% export oriented knit composite industry. During the training period, I have completed our industrial attachment to a systematic routine which was provided by **PURBANI FABRICS LTD.**

**PURBANI FABRICS LTD.** is a well-planned versatile project. The administrations, management, chain of command- all are well organized. They are devoted to satisfy the customer by their activities. However, some of the point we want to mention for the good of **PURBANI FABRICS LTD.**

The specially of this report is that the information, data & description very much subjective & practical. So, one can easily have an idea about the whole dyeing unit of **PURBANI FABRICS LTD.** at a single look on it.

The factory runs by a number of efficient textile engineers, skilled technical and non-technical persons. All the textile engineers and technical and non-technical persons are very sincere, co-operative and helpful.

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