Report On

Industrial Attachment at

The Delta Composite Knitting Ind.Ltd

Zarun (south), Kashimpur, Gazipur.

Duration: 4th September to 4th November 2014

SUPERVISED BY

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ACKNOWLEDGEMENT

Firstly, we would like to pay all our regards to almighty Allah for whose grace we have successfully completed our Industrial attachment.

We are grateful to The Delta Composite Knitting Ind. Ltd (DCKIL) for giving us this great opportunity to intern in such supportive friendly environment. They have given us great chance to work in details.

Special thanks go to our Supervising Teacher **M.A.Baset, Senior Lecturer, Department of Textile Engineering**,**Daffodil International University**, Dhaka. Without whose help it would not have possible to complete the training successfully.

A number of people have made significant contributions on preparing this report. Their advice and suggestions helped us a lot. During the attachment with **The Delta Composite Knitting Ind. Ltd** we worked in all the departments.

We are grateful to **Md. Omar Faruque Siddique**, **Executive Director of DCKIL** for being so gracious to us.
We would like to express our sincere appreciation to **Director General Manager** and our special thanks go to **Mr. Kabir, Senior Manager, (Knitting)** and **Senior Production Officer, Ahamed Khizir Mahbub Elahi, (Dyeing)** and Finishing for their valuable advice, cooperation, guidance, encouragement and inspiration throughout the training period.

We would also like to thanks **Manager, Md. Nurul Islam, (Planning & Co-ordinator).**

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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 garment is growing very rapidly due to smaller investment requirement, greater backward linkage facility & higher profit than woven garments. That's why export of knit garments is increasing steadily for last few years and up to now.

Textile education can't be completed without industrial training. Because this industrial training minimizes the gap between theoretical and practical knowledge and make us accustomed to industrial environment. I got an opportunity to complete two-months long industrial training at The Delta Knit composite**,** which is a 100% export-oriented composite Knit Dyeing Industry. It has well planned & equipped fabric dyeing-finishing and garments units in addition to facilitate knitting and knitwear manufacturing.

Nothing Delights us more than the Customers' satisfaction

THE DELTA COMPOSITE
KNITTING INDUSTRIES LTD.

1. COMPANY PROFILE

COMPANY NAME	THE DELTA COMPOSITE KNITTING IND. LTD (DCKIL)
Corporate Headquarters	House: 389, Road: 6 (East) DOHS, Baridhara, Dhaka-1216, Bangladesh Tel.:+880-2-8813636-7, 8824092 Fax : +880-2-9297746
Operational Headquarters	Zarun (south), Kashimpur, Gazipur, Dhaka, Bangladesh. Tel.:+880-2-9297652-5, 9297741-5
Factory	Zarun (south), Kashimpur, Gazipur, Dhaka, Bangladesh.
Coverage area of total factory	2,56,332 sft
Date of incorporation	January 1998.
Commercial Production	1998, Sample dyeing m/c 2 pcs, Production dyeing m/c 5 pcs, 2003 – 2 pcs production dyeing m/c, 2004 – 10 pcs dyeing m/c
Business line	Manufacturing and Marketing of high Quality Fabrics.
Listing status	Private listed company.
Authorized capital in taka	3000 million.
Paid up capital	10 millions.
Annual sales range	US $50 Million – US $100 Million
Main Market	Western Europe
	Different types of Knitting, Dyeing, Cutting, Sewing, Finishing and Generator machines supplied by mostly Sweden, USA,

Factory Equipments	Italy, Switzerland, Germany, Spain, Japan, China, and Turkey
Product/Service:	**T-shirt, polo shirt, tank top, jacket, long pants, ladies wear,** **fashion wear**
Certification Achievement :	**WRAP, ISO 9001 -2008 & OEKO-TEX-100**
E-mail	chairman@deltagroupbd.com

1.2Production Capacity:

Section	Capacity Per Day
Knitting	14-15 Ton
Dyeing	22-24 Ton (2 Floor)
Finishing	14-15 Ton

- **Major Buyers:**

TERRANOVA	SAMS CLUB
TOM TAILOR	WAL-MART
ZARA	MONOPRIX
GYMBOREE	PIMKIE
KIABI	SPRINGFIELD

C&A	NEW WAVE
CARREFOUR	XANAK

- **1.3 Other Buyers:**

MATALAN	INTEN BD
ALDIE	FOX BANGLADESH
MONDIAL	OSTIN
O,STAIN	SORBINO
XANAKA	POLICE
CUBES	CUBAS
LING&FUNG	GSS
KIABI	YAB
PIZZI ITALIA	SERJENT MAJOR
DAZ INTERNATIONAL	IMPETUS
FASHION POWER	TEAM SOURCHING
DPAM	CAMAIU
JBL FASHION	

- **Company Allied:**

❖ Lily cosmetics Ltd.

❖ The Delta Apparels Ltd.

❖ The Delta Automobiles

❖ The Delta Accessories

❖ The Delta Spinning Mills Ltd.

❖ The Delta Carton Industries Ltd. The Delta Blended Yarn Mills Ltd.

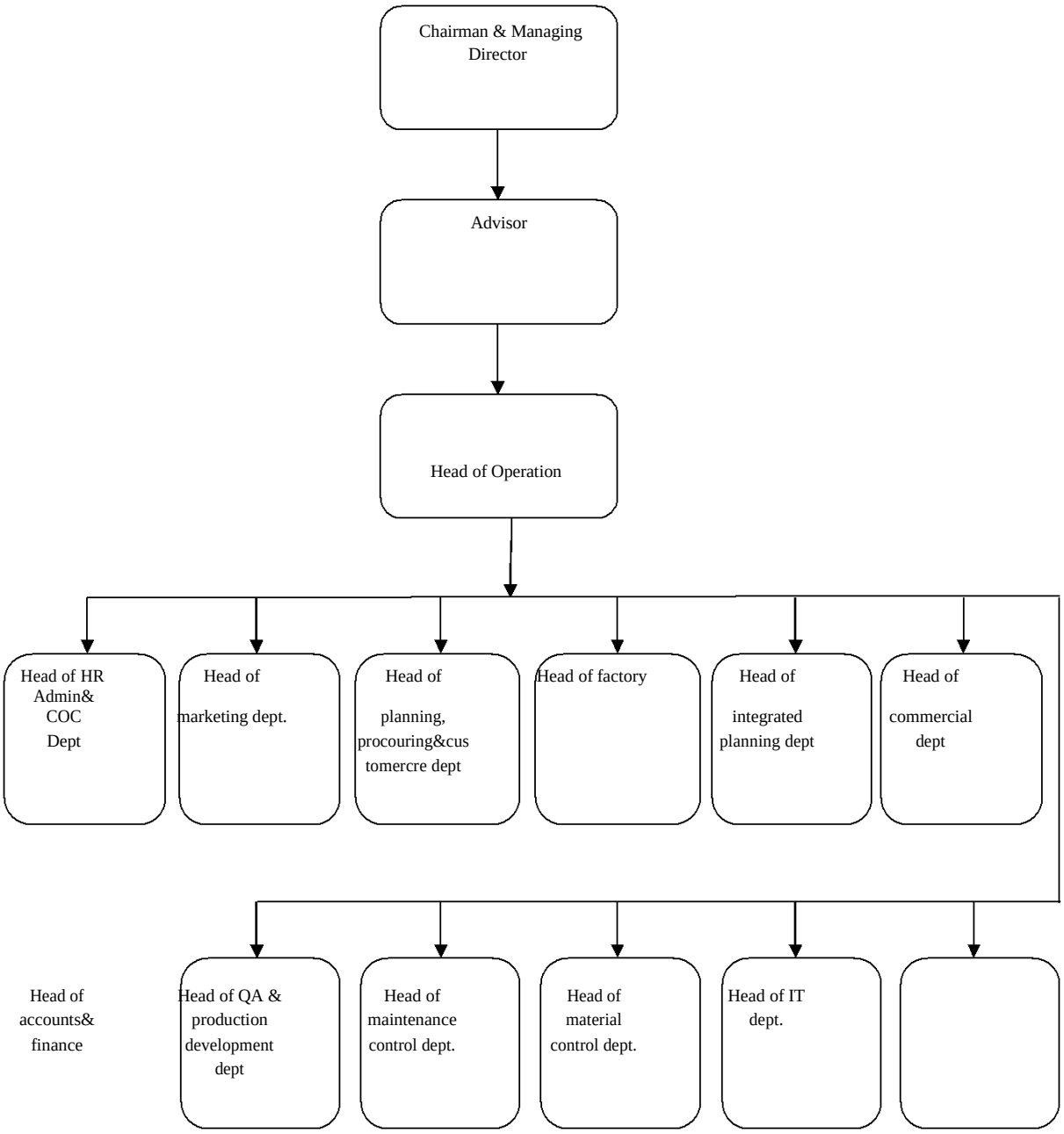
❖ The Delta Yarn Dyeing Industries Ltd. The Delta Composite Knitting Ind. Ltd.

- **Certification Achievement** :

WRAP, ISO 9001 -2008 & OEKO-TEX-100

(FABRICS & GARMENTS)

- **1.4 ORGANOGRAM:**



• 1.5 Management Organization Chart

Sl. No.	Marketing	Commercial	A/C & store	Production Dyeing	Production Knit	Quality	Utility	Administration
01				General Manager				
02	DGM	DGM	DGM	DGM				
03	AGM	AGM	AGM	AGM (Factory)				
04	Manager	Manager	Manager	Manager (Dyeing)	Manager (Knit)	Manager	Manager	Manager (Admin)
05	Assist manager	Assist manager	Cost Accountant	Assistant Manager	Assistant Manager	Assistant Manager	Electrical Engineer	Administration Officer
06	Sr. Executive	Sr. Executive	Sr. Executive	Sr. Prod. Engineer	Sr. Prod. Officer	QC officer	Mechanical Engineer	Sr. Executive Admin
07	Executive	Executive	Executive	Production Engineer	Asst. Production Engineer	Assistant QC Officer	Sub. Assistant Engineer	Executive Admin
08	Jr. Executive	Jr. Executive	Jr. Executive	Asst. Prod. Officer	Shift In-charge	QC In-charge	Forman	Asst. Officer Admin
09	Assistant	Assistant	Accounts Assistant	Lab. Chemist	Production Clark	Sr. QC Supervisor	Supervisor	Security Officer
10			Cashier	Sr. Lab. Assistant	Sr. Supervisor	QC Supervisor	Assistant Supervisor	Computer Operator
11			Purchase officer	Lab. Assistant	Supervisor	Assistant QC Supervisor	Sr. Fitter	Office Assistant/Time Keeper
12			Sr. Store officer	Report Clerk	Assistant Supervisor	QC	Fitter	Assistant Time Keeper
13			Store officer	Batch Incharge	Tr. Supervisor	Assistant QC	Assistant Fitter	Typist

14			**Asst. Store Officer**	**Finish Incharge**	**Fitter**	**Tr. QC**	**Electrician**	**Telephone Operator**
15			**St. Store Keeper**	**Froman**	**Assistant Fitter**	**Tr. Assistant QC**	**Assistant Electrician**	**Delivery Supervisor**
16			**Store Keeper**	**Sr. Supervisor**	**Operator**	**QC Man**	**Boiler Operator**	**Peon**
17			**Asst Store Keeper**	**Supervisor**	**Assistant Operator**		**Boiler Assistant**	**Driver**
18			**Store Assistant**	**Assistant Supervisor**	**Tr. Operator**		**Generator Operator**	**Gardener**
19			**Helper Store**	**Tr. Supervisor**	**Tr. Assistant Operator**		**Compressor Operator**	**Loader**
20				**Tr. Asst. Supervisor**	**Helper**		**Asst. Operator**	**Cleaner**
21				**Sr. Operator**			**W.T.P. Attendant**	**Painter**
22				**Operator**			**Tr. Operator**	**Sweeper**
23				**Asst. Operator**			**Helper**	
24				**Tr. Operator**				
25				**Assistant Tr. Operator**				

26				**Helper**				

- **1.6 Management system:**

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

- **Company Policy:**

a. Recruitment Policy:

Recruitment is done as per following systems. Serving notice/poster in important locations. Personal contacts by own employees.Head hunting for manager/executive.

b. Selection:

During the selection of the workers following factors are considered:

- Good physical appearance/fitness
- Age 18 years minimum must be supported by certificate from educational institution or local govt. authorities and confirmed by medical officer.
- Educational qualification as per job profile. Skill ness (practical for operators).
- Wages/salary negotiation

c. Joining:

- Selected workers/trainees submit the followings to personal department on joining:

  - Prescribed application form duly filled. Two passport size photographs.
  - Educational certificate.
  - Experience certificate (if any).
  - Medical fitness certificate mentioning age.

d. Service Confirmation:

On completion of 3 months satisfactory job performance, company confirms the employees' service permanently.
Trainees who fail to show satisfactory performance within this time his/her he/she cannot cope-up within this given period then his/her service is term inated**.**

e. Daily Working Hours and Over Times:

Eight hours a day from 8.30 am to 5.30 pm with one hour lunch break (maximum 48 hours per week).
Maximum two hours overtime per day (maximum 12 hours per week) with one-hour Tiffin break in the afternoon/evening.
Friday is weekly holiday.

f. Medical:

Medical facilities are as follows:

Each worker provided medical allowance @ Tk.150/= per month.
First Aid facilities with trained first aider are available for each employee. Accident register for injured person is being maintained.

g. First Aid Box:

Each floor has been provided with sufficient first aid box with following items:

- **Pain relief tablets**
- **(Paracitamol).**
- **Nix.**
- **Or-Saline.**
- **Antiseptic cleaner (Savlon).**
- **Roller bandages**
- **Surgical gauze.**
- **Cotton.**
- **Surgical scissors.**
- **Tourniquet.**
- **Adhesive tape (plasters).**
- **Antibacterial ointment sterile**

- **Surgical gloves**
- **(Savlon cream).**

Other Facilities:

a. Salary & Wages:

Salary and wages are paid to the staff and workers as per gazette notification of the government of Bangladesh.

Payment of salary and wages are made regularly on 5 th – 7 th of each month.

In the salary sheet basic salary, house rent, medical allowance and gross salary are shown separately for each employee.

Wages Grade: (Before 2010)

- Grade– 7 Tk.1125.00 - 1662.50 per month starting
- Grade – 6 Tk.1270.00 - 1851.00 per month starting
- Grade – 5 Tk.1420.00 - 2046.00 per month starting
- Grade – 4 Tk.1577.00 - 2250.10 per month starting
- Grade – 3 Tk.1730.00 - 2449.00 per month starting
- Grade – 2 Tk.2800.00 - 3840.00 per month starting
- Grade – 1 Tk.3800.00 – 5140.00 & above per month starting

b. Overtime:

Overtime is calculated on the basis of "double the basic salary calculation of over time per hour is.

Basic salary x 2 26 (days) x 8 (hours)

Payment of overtime is made of 5/7 tk of each month.

c. Bonus:

Two festival bonus equivalent to two month basic salary are paid to each

employee, Who has completed one year of service.

d. Leave:

1. Casual: All employees enjoy 10 days casual leave in a year with full salary/wages.
2. Sick Leave: All staff & workers are entitle 7 days sick leave upon submission of medical certificate.
3. Maternity Leave: Female employees are entitled to enjoy 12 weeks (6 weeks before & 6 weeks after delivery) maternity leave with 100% salary/wages**.**
4. Earn Leave: For adult worker, 1 day leave for 22 days of work (but they have to work minimum 1 year for the entitlement).
5. Festival Leave: 10 days per calendar year.

Promotion: Performance based promotions or After 3 year's auto promotions

Safety: Compliance department handle this criteria

Conflict Management: Situation demandable

Admin: Transport, Canteen, Security, Disciplinary control.

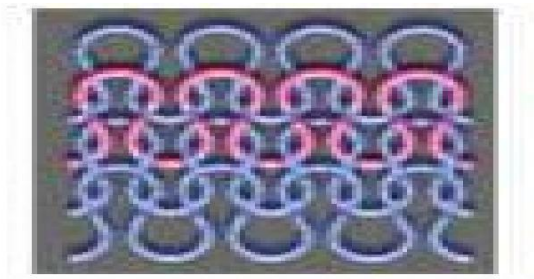
Chapter 02

- Knitting

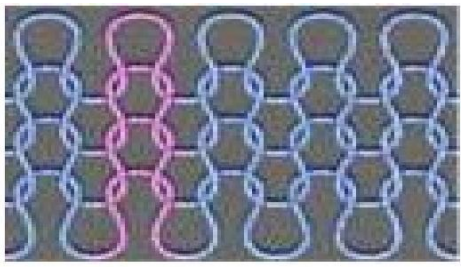
2.1Section
Layout:

2.2 PROCESS DEFINITION (KNITTING):

Knitting is considered to be the second most frequently used method of fabric construction, after weaving. It is one of the several ways to turn thread or yarn into cloth. It is similar to crochet in the sense that it consists of loops pulled through other loops. In other words, knitting is the process of construction of a fabric made of interlocking loops of yarn by means of needles. The loops may be either loosely or closely constructed, according to the purpose of the fabric. The loops or stitches are interlocked using a needle which holds the existing loop and a new loop is formed in front of the old loop. The old loop is then brought over the new loop to form the knitted fabric. Knitting is different from weaving in the sense that a single piece of yarn can be used to create fabric. The knitted fabric consists of horizontal rows known as **courses** and vertical columns of loops known as **Wales**.



Course wise



wale wise

Today, knitting is practiced manually, or with the help of machines.

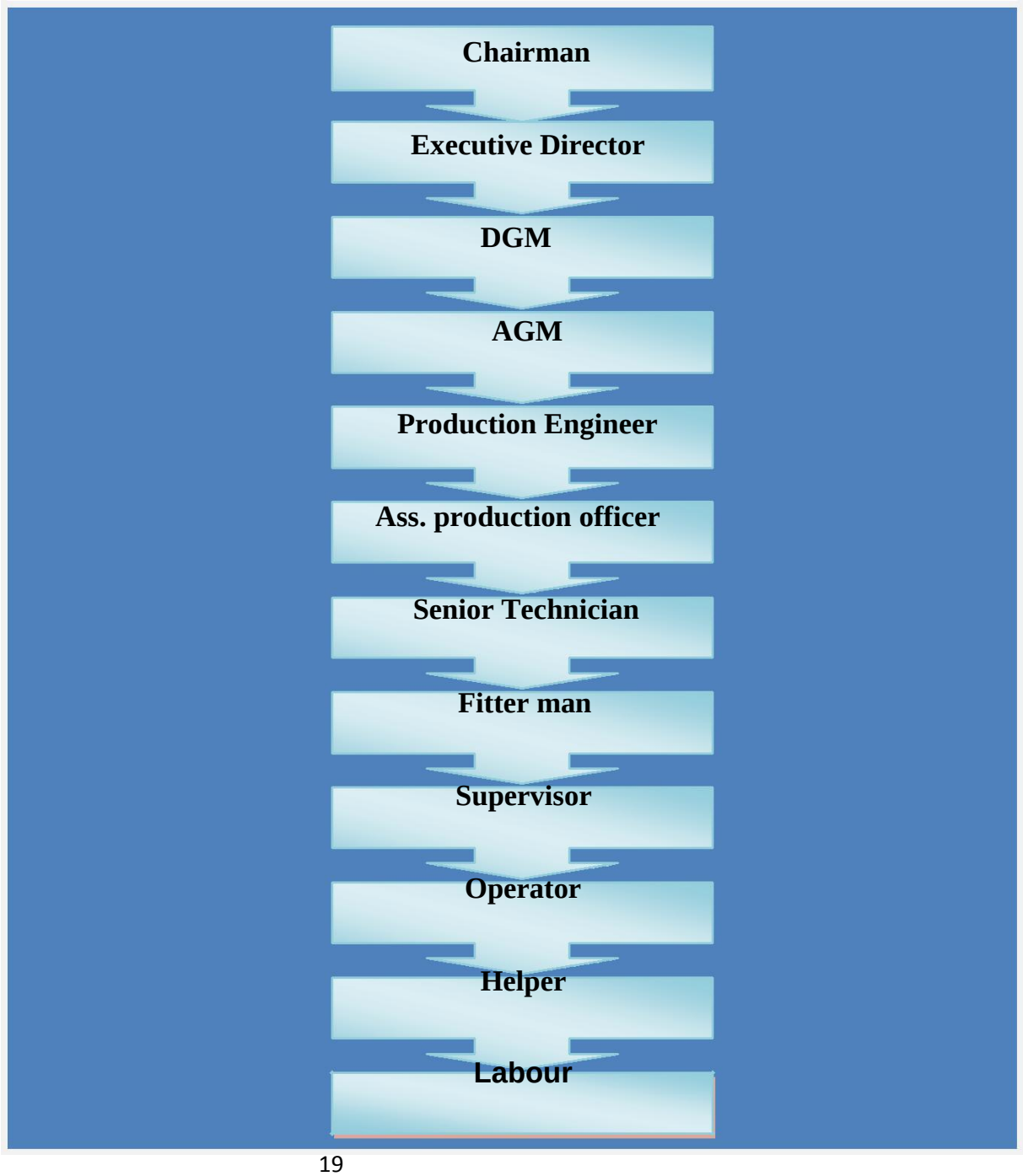
Knitted fabric has certain special characteristics that make it suitable for creating a wide range of garments and accessories like tights, gloves, underwear and other close-fitting garments. The structure of the loop of knitted fabric stretches and molds to fit body shapes.

The air trapped by the interlocking loops keeps the wearer warm.

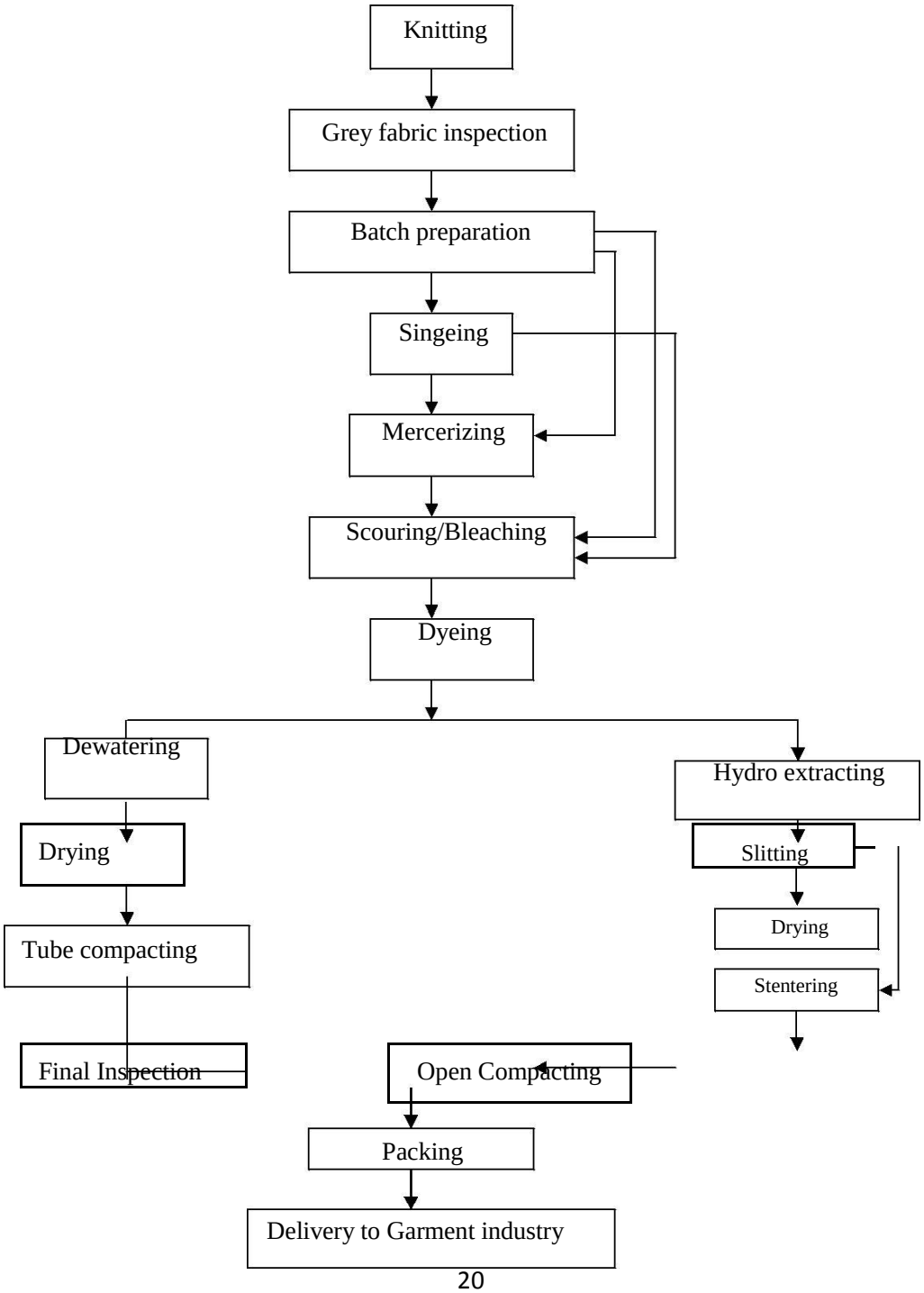
The popularity of knitting has grown a lot within the recent years owing to the adaptability of various man-made fibers, the increased versatility of knitting techniques and the growth in demand for wrinkle-resistant, stretchable, snug-fitting fabrics (particularly in the range of sportswear and other casual apparels). Today, knitted fabrics form an integral part of hosiery, underwear, slacks, sweaters, suits and coats, rugs and other home furnishing items. Knitting industry has two main divisions: One division produces knitted goods for apparel manufacturers, for sewing centers, for consumers and for others. Other division produces completed apparel like hosiery, sweaters and underwear**.**

2.3ORGANGRAM OF KNITTING SECTION:

Following organ gram are found in knitting section in DCKIL..



2.4SEQUENCE OF OPERATION:



2.5 RAW MATERIALS OF KNITTING SECTION IN DCKIL:

Yarn:

Types of Yarn	Usable Yarn Count
100% Cotton Yarn	10/1 KC
	12/1 KC
	30/2 KC
	40/2 KC
	20/1KC
	22/1 KC
	26/1 KC
	26/1 CC
	26/1 Dyed
	28/1 KC
	28/1
Core Yarn	30/1 CC
	30/1 KC
	32/1 Core
	34/1 CC
	34/1 KC
	40/1 CC
	40/1 Core
PC	26/1 PC
	28/1 PPC
	30/1 PC

	34/1 PC

Mélange	**Eqru Melange: Viscose 1-2%**
	Grey Melange: Viscose 5-15%
	Anthra Mélange: Viscose 75%
CVC	**20/1 CVC**
	26/1 CVC
	30/1 CVC
Polyester	**150 D Bright Poly**
	150 D Dull Ploy
	75 D Bright Poly
	75 D Dull Poly
Lycra	**20 D**
	40 D
	70 D

2.6 Different Brand of Lycra Yarn:

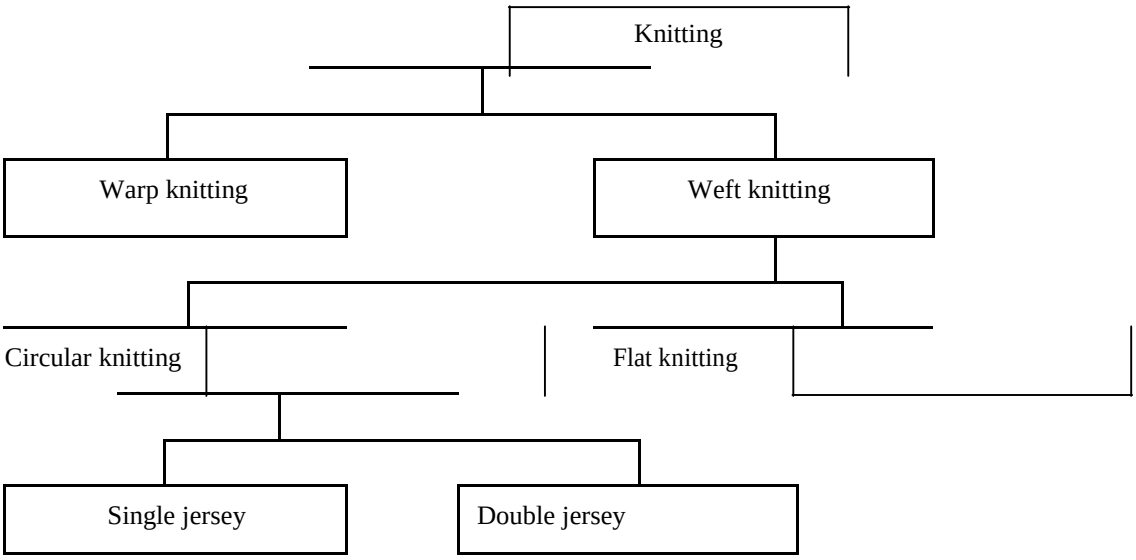
1. Lycra.
2. Aclon.
3. Dupont.
4. Elaspan.
5. Toplon.
6. Texlon.
7. Creora.
8. Korea.
9. Spandex.

Yarn Come From:

1. Padma Spinning Mill (Beximco).
2. Advance Spinning Mill.

3. Square Yarn Mill.
4. Beximco Synthetics Ltd.

2.7 CLASSIFICATION OF KNITTING SECTION:



CIRCULAR KNITTING SECTION:

Circular knitting machine is widely used throughout the knitting industry to produce fabric. This machine can be built in almost any reasonable diameter and the small diameter of up to five, which are used for wear.

Machine for outerwear and under wear may vary from 12 inch to 60 inch in diameter according to manufactures requirement. This machine can be used either as fabric or for making garments completely with fancy stitch. Latch needles are commonly employed in all modern circular machines because of their simple action and also their ability to process more types of yarns.

Plain circular machine uses only one sets of needles, circular rib machine uses two sets of needles i.e. Cylinder needle and Dial needle, the interlock circular knitting m/c also uses two sets of needles by needles are long and short respectively for both dial and cylinder, that is why multiple design and thick fabric can be produce with that machine. That machine is also called double Jersey machine.

- **2.8DESCRIPTION OF PRODUCTION PROCESS:**

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

PRODUCTION PARAMETER:

- 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

2.9 Knitting Variable

Yarn count: - Yarn count indicates the fineness of yarn. It varies according to weight with

length of the yarn.

Yarn twist: - It is the torsion of yarn which helps the fibers to ad hear with each other.

1. **Spinning system: -** This is the systematic way of giving torsion to the fibers.
2. **Yarn ply: -** It is the number of ply of the yarn which depends on the required gsm of the fabric.
3. **Stitch length:** - It is & vise versa. the length of the yarn which forms a single loop in a knitted fabric. If stitch length is increased, fabric gsm is decreased
4. **Yarn tension: -** It is the given tension on the yarn during feeding in circular knitting machine. It depends on the required gsm of the fabric. If yarn tension is increased, then stitch length is decreased and fabric gsm is increased. And if yarn tension is decreased, then stitch length is increased and fabric gsm is decreased.
5. **Take down tension: -** It is the tension created by increasing fabric take up roller speed.
6. **Yarn quality: -** Fabric quality depends on the yarn quality. As for example, for producing slub single jersey we need slub yarn.
7. **Machine gauge: -** It the number of needle in one inch area of a cylinder.
8. **G.S.M (gm/m^2):** For knitting it is the main parameter. It is controlled by loop length. If loop length increases GSM will decrease and vice versa. It is measured by GSM cutter & electric balance. It may also be calculated as below.

2.10The Delta Composite Knitting Ind. Ltd.

Zarun (South), Kashimpur, Gazipur.

TOTAL MACHINE = 61 SETS
SINGLE JERSEY MACHINE = 37 SETS

2.15 MACHINE SPECIFICATION:

SL.NO	MACHINE NAME	COUNTRY ORIGIN	MACHINE DIAMETER	MACHINE GAUGE	TYPE OF MACHINE	M/C QUANTITY	MACHINE FEEDERS	REMARKS
1	**Camber**	**England**	**19 Inch**	**24**	**Lycra Att. Single Jersey**	**1**	**57**	**Old**
2	**Mayer**	**Germany**	**22 Inch**	**24**	**Lycra Att. Single Jersey**	**1**	**69**	**Old**
3	**Mayer**	**Germany**	**24 Inch**	**24,28**	**Lycra Att. Single Jersey**	**2**	**78**	**Old**
4	**Mayer**	**Germany**	**26 Inch**	**20, 24**	**Lycra Att. Single Jersey**	**1**	**84**	**Old**
5	**Camber**	**England**	**27 Inch**	**20, 24**	**Lycra Att. Single Jersey**	**1**	**81**	**Old**
6	**Camber**	**England**	**28 Inch**	**20, 24**	**Lycra Att. Single Jersey**	**1**	**84**	**Old**
7	**PAILUNG**	**TAIWAN**	**30 Inch**	**20, 24,**	**Lycra Att. Single Jersey**	**4**	**90**	**New**
8	**PAILUNG**	**TAIWAN**	**30 Inch**	**20, 24,**	**Lycra Att. Single Jersey For Open**	**1**	**90**	**New**

9	**Mayer**	**Germany**	**30 Inch**	**20, 24, 28,**	**Lycra Att. Single Jersey**	**2**	**96**	**Old**
10	**PAILUNG**	**TAIWAN**	**32 Inch**	**20, 24,**	**Lycra Att. Single Jersey**	**2**	**96**	**New**
11	**PAILUNG**	**TAIWAN**	**34 Inch**	**20, 24,**	**Lycra Att. Single Jersey**	**3**	**102**	**New**
12	**PAILUNG**	**TAIWAN**	**34 Inch**	**20, 24,**	**Lycra Att. Single Jersey For Open**	**2**	**102**	**New**
13	**PAILUNG**	**TAIWAN**	**34 Inch**	**20, 24, 28,**	**Lycra Att. Single Jersey**	**3**	**102**	**Old**
14	**PAILUNG**	**TAIWAN**	**36 Inch**	**20, 24,**	**Lycra Att. Single Jersey**	**4**	**108**	**New**
15	**PAILUNG**	**TAIWAN**	**36 Inch**	**20, 24,**	**Lycra Att. Single Jersey For Open**	**2**	**108**	**New**
16	**PAILUNG**	**TAIWAN**	**36 Inch**	**20, 24, 28,**	**Lycra Att. Single Jersey**	**3**	**108**	**Old**
17	**PAILUNG**	**TAIWAN**	**38 Inch**	**24**	**Lycra Att. Multi Feeder For Open**	**2**	**180**	**New**
18	**LISKY**		**60'' Inch**	**20, 24, 28,**	**Lycra Att. Multi Feeder For Open**	**2**	**360**	**New**

Rib & Interlock Machine = 21 Sets

SL.NO	MACHINE NAME	COUNTRY ORIGIN	MACHINE DIAMETER	MACHINE GAUGE	TYPE OF MACHINE	M/C QUANTITY	MACHINE FEEDERS	REMARKS
19	Mayer	Germany	30 Inch	18	Lycra Att. Rib	2	62	Old
20	Mayer	Germany	34 Inch	16,18	Lycra Att. Rib	1	71	Old
21	PAILUNG	TAIWAN	34 Inch	18	Lycra Att. Rib	1	71	Old
22	PAILUNG	TAIWAN	34 Inch	18,22	Lycra Att. Rib/Interlock	1	72	Old
23	Mayer	Germany	34 Inch	18,22	Lycra Att. Rib/Interlock	1	70	Old
24	Mayer	Germany	36 Inch	18,22	Lycra Att. Rib/Interlock	5	74	Old
25	Mayer	Germany	38 Inch	18,22	Lycra Att. Rib/Interlock	3	78	Old
26	PAILUNG	TAIWAN	40 Inch	18,22	Lycra Att. Rib/Interlock	2	80	Old
27	PAILUNG	TAIWAN	42 Inch	18,22	Lycra Att. Rib/Interlock	2	84	Old
28	Mayer	Germany	30 Inch	22	Interlock	2	96	Old
29	Mayer	Germany	34 Inch	22,24	Interlock	1	108	Old

Collar Machine = 25 Sets

SL.NO	MACHINE NAME	COUNTRY ORIGIN	MACHINE DIAMETER	MACHINE GAUGE	TYPE OF MACHINE	M/C QUANTITY	MACHINE FEEDERS	REMARKS
32	Matusa	Japan	39 Inch	14	Flat Knit Collar	10	4	Old
33	Pailung	Taiwan	80 inch	114	Flat Knit Collar	15	2F	New

2.11Relation between Grey GSM & Finished GSM

Finish process/ Color shade %	(%) Percent increase/ decrease
1) White	15% to 18% increase
2) Light color (0.5% – 2%)	18% to 20% increase
3) Medium color (2% - 3.5%)	20% to 23% increase
4) Deep color (3.5 %– 6%)	23% to 25% increase
5) Extra deep (6%- 9%)	25% to 30% increase

Relation between Finish GSM & Yarn Count (S/J)

Finished G.S.M.	Count (Ne)
160-180	**34/s**
180-200	**30/s**
200-220	**28/s**
220-235	**26/s**
235-245	**24/s**

Relation between Finish GSM & Yarn Count (D/J Interlock)

Finished G.S.M.	Count (Ne)
180-200	**40/s**
200-220	**34/s**
220-240	**30/s**
240-260	**28/s**
260-280	**26/s**

Relation Between Fabric Diameter And Machine Diameter

Count	Finish GSM	Grey fabric diameter increases then machine diameter
30	**142**	**5-8%**
28	**155**	**8-12%**
26	**165**	**12-15%**

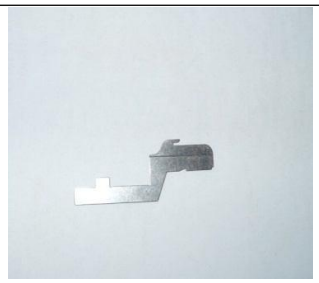
24	**180**	**15-20%**
20	**200**	**20-25%**

2.12 Description Of Knitting Parts With Figure

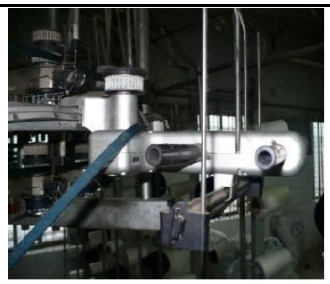
Name of the parts	Picture	Function
Creel		Creel is a part of knitting machine. Here yarn packages are stored for yarn feeding in the machine.
MPF Wheel		Its control the speed of the MPF. Pulley belt gives motion to the wheel.
MPF		It's mean Mamminger positive feed. It gives equal length yarn distribution in the knitting cycle.
VDQ Pulley		It is a very important part of the machine. It controls the quality of the product. Altering the position of the tension pulley changes the G.S.M of the fabric. If pulley moves towards the positive directive then G.S.M decreases and reverse direction G.S.M

		will increase

Pulley belt		It controls the rotation of the MPF wheel.
Yarn guide pipe		It helps the yarn to feed in the feeder & also reduce ply.
Inlet & outlet stop motion		It is an important part of the machine. It stops the machine instantly when a yarn breaks.
Feeder ring		It is a ring where all feeders are place together.
Feeder		Feeder is a device where yarn passes through the knitting section.

Brush		It cleans the pulley belt
Sinker		It is most important element of the machine. It helps to loop formation, hold down the loop, knocking over the loop.
Sinker ring		It is a ring where all sinkers are placed together.
Cam		Cam is a device which converts rotary machine drive into a suitable reciprocating action for the needles and other elements. The cams are carefully profiled to produce precisely-time movement and dwell periods and are two types, engineering and knitting cams.
Cam box		

Where cam
are placed
horizontall
y in
the box.

Needle		Needle is a primary knitting elements. It gives movement according to the cam arrangement.
Cylinder		Needle track are situated here.
Needle trick		Where all needles are placed in a decent design.
Lycra attachment		Lycra is placed here and feeding to the machine.
Lycra stop motion		When lycra is broken it stops the machine.

Screen		It is a digital screen. Which show the all machine information and we can get command to the machine.
Automatic oiler		It gives the machine oil all the time properly and automatically.

2.13 Knitting Equation:

WPI: Wales per inch is called WPI.

CPI: Course per inch is called CPI.

Needle calculation:

◊ Single jersey circular knitting machine needle

$$= \prod DG$$

◊ Rib/Inter lock /Double jersey circular knitting machine needle

$$= \prod DG \times 2 \text{ (two needle bed is here)}$$

◊Single bed flat knitting m/c's needle = width× gauge

◊ V bed flat knitting m/c's needle = 2× width× gauge

Here, D = cylinder diameter ,G = Machine gauge ,Needle pitch = 1/G.

◊ **GSM:** Grams per square meter of the fabric are called GSM.

◊ **GSM =** {WPI× CPI × (39.37)2×stitch length (mm) ×Tex /1000× 1000} g/m2

◊ **Stitch density** = (WPI × CPI) inch-2

= (WPC ×CPC) cm-2

◊ **No of sinker = No of needle**

◊ **No Wales =No of needle**

◊ **No of course = No of feeders**

=No of yarn (per revolution of cylinder)

◊ **Course per minutes = No of feeders ×cylinder rpm**

◊ **Course length = yarn required for each course.**

◊ **Fabric width = wale spacing ×Total no of Wales**

= (1/WPI ×No of Needles) inch

= (No of Needles/WPI× 39.37) meter

- For single jersey fabric = (∏DG/WPI×39.37) meter (open width)

=(∏DG/WPI×39.37) meter/2(Folded/Tubular width)

- For double jersey fabric = (2 × ∏DG/WPI×39.37) meter (open width)

= (2×∏DG/WPI×39.37) meter/2(Folded/Tubular width).

◊ **Fabric Length =**Course spacing ×Total course pr hour

= {(Feeder× cylinder rpm× 60)/CPI} inch/hour

= {(Feeder× cylinder rpm× 60)/CPI ×39.37} m/hour

Production calculation:

Production per hour = $\frac{R.P.M * N.F * N.N * S.L(mm) * M.E * 60}{10 * 2.54 * 36 * 840 * yarncount * 2.2046}\ kg$

Here,

R.P.M = Machine speed (Revolution per minute)

N.F = Number of feeder

N.N = Number of needle

S.L = Stitch length

M.E = Efficiency of machine

Some conversions

1 cm = 10 mm

1 inch = 2.54 cm

1 yd = 36 inch

1 hank = 840 yd
1 kg = 2.2046 lb

Calculation for total number of needle of a machine = G × D × π

Here,

G = Machine gauge

D = Machine diameter

2.14G.S.M calculation

GSM means grams per square meter. In knitting fabric it is the main parameter. It is controlled by loop length. If loop length increases GSM will decrease and vice versa. It is measured by GSM cutter & electric balance. It may also be calculated as below.

$$\textbf{GSM} = \frac{S^* \quad L^* \quad tex}{100}$$

$$\textbf{GSM} = \frac{S^* \quad L^* \quad 590}{Ne}$$

Where,

S = wale per cm course per cm.
= wpc cpc.
l = loop length in mm.

Industrial Calculation of DCKIL:

Collect sample (s/j) by G.S.M cutter and weighted from the weighting balance.

e.g.; form balance we get 1.838g grey fabric

so, Gray G,S.M=1.838 $100g / m^2$

=**183.8gm/m**^{2}

Calculate Finish G.S.M as like procedure1

By calculation finish G.S.M =**235g/m**^{2}

2.15 Inspection Procedure

Generally a fabric roll is cut when it reaches its ‘set cut length’ in the circular knit m/c but the roll might cut before reaching the pre-set length if required and weight is recorded other number, quantity, GSM, Knitter, Shift, Style, Yarn lot, Roll Quantity, Machine Revs, m/c no. etc. are written on the knit card.

All rolls are kept in front of the inspection m/c time to time and are inspected over the greige inspection visually in a pre-set speed (m/min) against light. For any major/ minor faults like thick-thin place, barre mark, fall out, contamination / fly, holes, oil lines, needle lines, slubs etc. are recorded in Greige inspection report to classify the fabric based on the four point system.

In case of fly and contamination, fabric is approved for color while minor needle lines or minor stripes, fabric is approved for white. The concerned inspector records all the details of inspection result on the knit card and greige inspection report.

Collar and cuff is cut when it reaches its ‘set cut no of pieces’ in the flat knit m/c. and kept in front of the inspection table. These are inspected visually under the light box. Any major or minor faulty collar / cuff like having wrongly design, first round problem etc. are properly counted and recorded.

2.16Investigation

The four point system is followed to inspect the body and rib fabric. The defects found and points given against them are recorded in the daily body and rib inspection report and daily collar and cuff inspection report.

Following tables shows the four point grading system followed by greige inspection of DCKIL:

Four Point Grading System	
Size of Defects	Penalty points
0-3''	1
Over 3''- Not over 6"	2
Over 6'' – Not over 9''	3
Above 9''	4

Rejection criteria for body & rib:

Following table shows common body & rib faults and response by grey inspection section**.**

SI. No	Faults	Response
1.	Needle marks	Major needle line is rejected but minor needle line is approved for white.
2.	Stripe	Major needle line is rejected but minor needle line is approved for white.
3.	Barre marks	Reject
4.	Fly & contamination	Acceptable for color but not for white. 1 point is assigned against 1 contamination / fly.
5.	Slubs	1 point

6.	Thick-thin place	Reject

7.	Birds Eye	1 point
8.	Pin holes	1 point
9.	Wrong design	Reject
10.	Mixed yarn	Discuss with manager
11.	Sinker Mark	”
12.	Missing Yarn	Use 4 point system
13.	Holes	”
14.	Oil line/ Stain	”
15.	Chemical / Rust Stain	”
16.	Dirt Stain	”
17.	Grease Line	”
18.	Uneven tension	”

2.17 Classification of inspection Fabric:

- **≤ 40 points = A Type**
- **41 – 60 points = B Type**
- **61 – 80 points = C Type**
- **Above 80 points = Rejects**

Acceptance: Generally any piece of fabric with 40 points or less faults per 100 sq. yard is allowed to pass however for a roll; the avg. value should not exceed 18 points per 100 sq. yard. More than 40 points fault per 100 sq. yard is recorded as reject.

Rejection: Any roll that contains wrong design, higher/ lower GSM, Barre mark, major stripe, Thick – thin, Major neps/ hairiness, uneven dye (yarn dyed), major needle line, more than 40 points / 100 sq. yard is considered as reject. As collar or cuff that contains wrong ply, hole, slubs, first round problem, needle line, wrong design, round missing. Wrong tipping is considered as reject.

Chapter 03

- Batching

3.1 BATCH PREPARATION

Primarily batching is done by batching section which is supervised by dyeing manager. The main function of batching section is to prepare the batch for dyeing according to machine capacity, order and emergency. This section receive the grey fabric from knitting section and make batch according to order for particular shade. Then this batch delivers to dyeing section for dyeing.

3.2 Type of Batch

Batching are Two types,

a. **Solid Batch**
b. **Ratio Batch**

3.3 Function or purpose of Batch Section

- To receive the grey fabric roll form knitting or other source.
- Turn the gray fabric if require.
- Prepare the batch for dyeing according to the following criteria:

  Order sheet (Received from buyer)

  Dyeing shade (light or dark, color or white)

  Machine capacity.

  Type of fabric (100% Cotton, CVC, Stripe fabric)

  Emergency order.

  Fabric construction (Single jersey, Rib, Lycra Rib, Lacoste, PK etc.)

- To send the grey fabric to the dyeing floor with batch card. To keep record.

3.4 Proper Batching Criteria

- To use maximum capacity of existing dyeing machine.
- To minimize preparation time & machine stoppage time.
- To use a particular machine for dyeing same shade.
- To keep the no of batch as less as possible for same shade.

3.5 Batch management

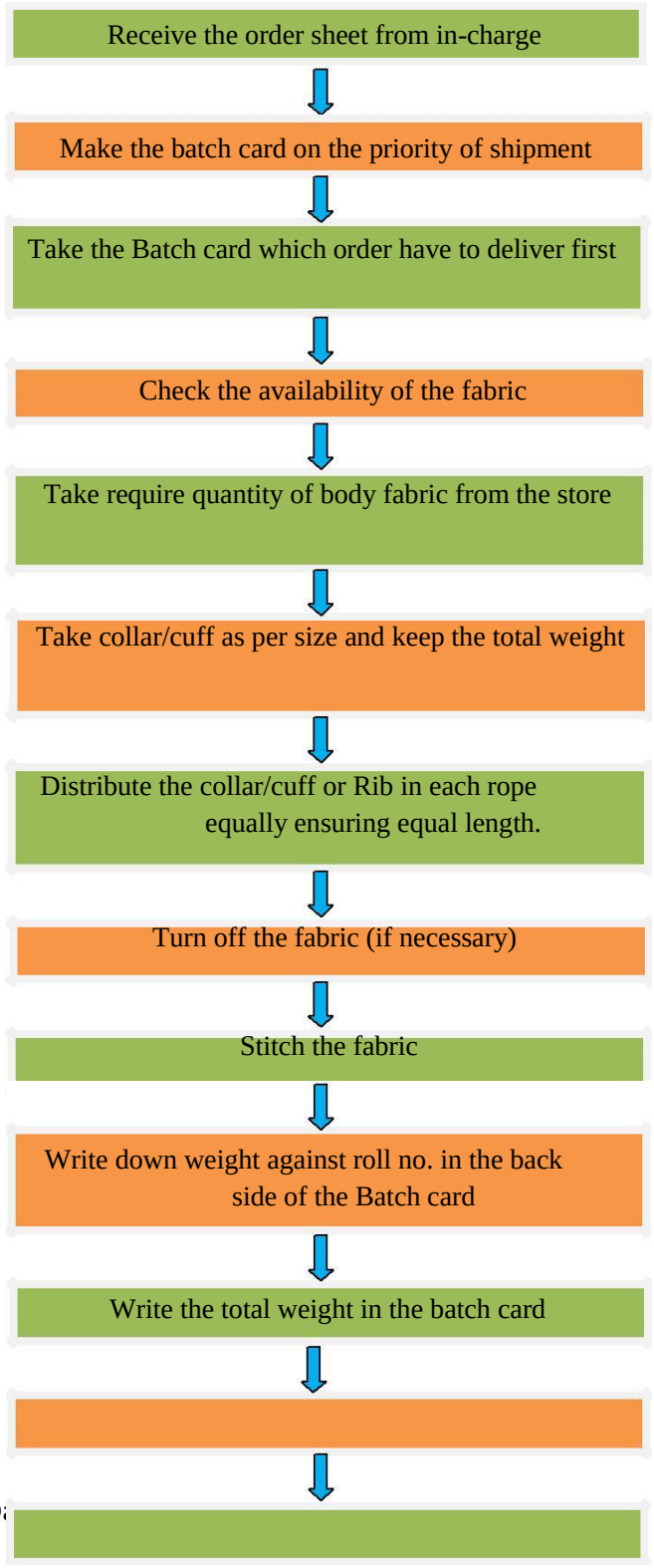
Primarily batching is done by dyeing manager taking the above criteria under consideration. Batch section in charge receives this primary batch plan from dyeing manager. Some time planning is adjusted according to m/c condition or emergency.

3.6 Batch Preparation

Normally the Batch is prepared according to following criteria:

- Order sheet
- Dyeing Shade
- Machine Capacity
- Machine available
- Type of fabric

3.7 Process flow chart of Batch preparation

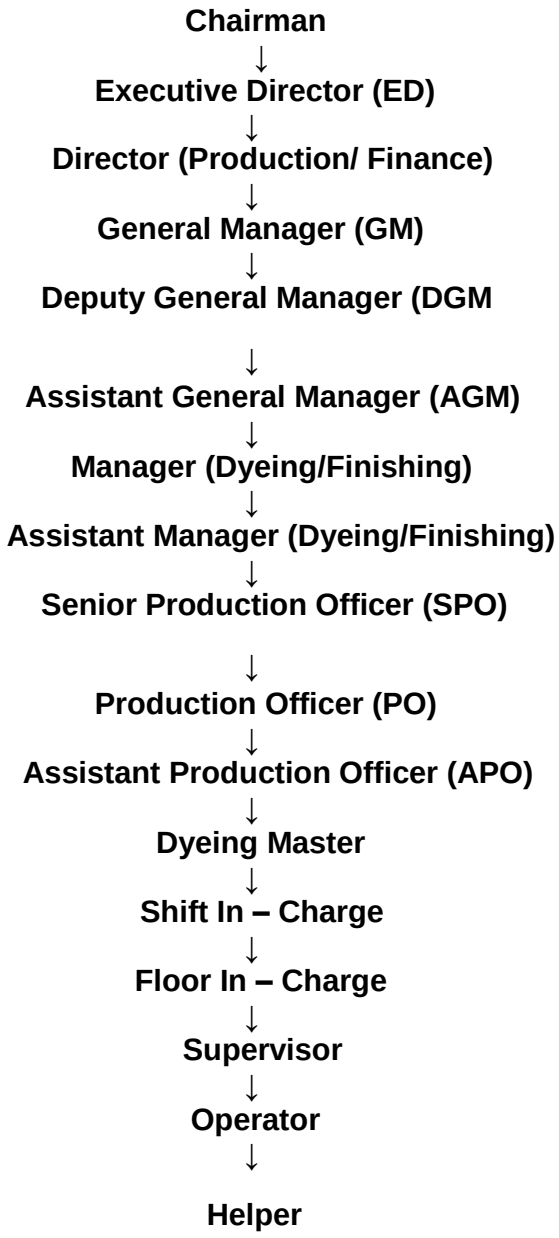


Chapter 04

- **Dyeing**

4.1 DYEING SECTION LAYOUT

4.2 ORGANOGRAM OF DYEING



Above managerial system is must for better management. But it is very rear because all of the industries are not same in volume and not interested to main all of the class of the managerial system. For this reason, some part of the managerial system could be absent. So, if anyone wants to get better production he or she should have to maintain the.

4.3 Process Flow Chart of Dyeing:

Grey Textile Materials (Fiber, Yarn or fabric)

↓

Singeing

↓

Desizing

↓

Scouring

↓

Bleaching

↓

Mercerizing

↓

Dyeing/Printing

↓

Finishing

↓

Marketing

Now I like to discuss shortly about the different terms of the flow chat. Here, grey textile materials are fiber, yarn or fabric which is also consider as the raw materials for dyeing.

Singeing is the first steps of pre-treatment. The process by which loose, hairy and projecting fibers are removed is called Singeing.
Desizing is the second steps of pre-treatment. By this process gummy materials are removed. Also size materials removed by this process.
Scouring is the third steps of pre-treatment. This process is performed for removing impurities of the textile materials.
Bleaching is another important step which is used to reduce natural color of the raw materials. Dyeing performance depends on it much more.
Mercerizing is the special types of treatment. It performs if buyer wants. It is an additional treatment. It increases the strength and luster of the materials.
Dyeing is the main process where a white material becomes decorated by different colors. We have to know about the depth of shade of the materials.
Printing is called as localized dyeing. Different types of printing are done for giving special appearance on colored or white fabric.
Finishing is the last treatment of wet processing. Different types of properties can be added to the materials by different finishing effects.
Marketing is our main goal. Say, if we done everything but there have no buyer then everything is waste. So we should have a strong marketing department.
So, all of this is about flow chart of Dyeing.

4.4 ESSENTIAL CONSIDERATIONS BEFORE DYEING:

1	**Reference Shade**	Approved Lap Dip	Merchandiser should provide a approved sample to dyeing dept.
2	**Light Source**	**D65, TL83, CWF, UV**	**Single Light Or Multiple Light ?**
3	**Colour Matching**	**Visual Or Instrumental**	
4	**Colour Type (Contrast /Solid)**	**Main fabric or contrash piping**	
5	**Approval Procedure**	**Each batch need to taken an approval**	
6	**Test Requirement**	**Rubbing, wash, Light, Perspiration**	
7	**Surface Quality Assessment (Hand feel)**	**Need Sample or Made Sample and to get approval to assess clean sample,colour,shade**	

4.5 Loading Capacity of Dyeing Machines

M/C No	Brand	Capacity	Flauroscnt	Loading Capacity on the basis of GSM Range				
				110-120	130-150	160	180	200+
			65%	75%	82%	88%	93%	96%
1	Thies	720	468	540	590	634	670	691
2	Thies	720	468	540	590	634	670	691
3	Thies	540	351	405	443	475	502	518
4	Thies	350	228	263	287	308	326	336
5	Dilmenler	700	455	525	574	616	651	672
6	Dilmenler	1050	683	788	861	924	977	1008
7	Dilmenler	700	455	525	574	616	651	672
8	ATYC	800	520	600	656	704	744	768
9	Dilmenler	150	98	113	123	132	140	144
11	Dilmenler	1050	683	788	861	924	977	1008
12	Dilmenler	1050	683	788	861	924	977	1008
13	Dilmenler	1500	975	1125	1230	1320	1395	1440
14	Dilmenler	1500	975	1125	1230	1320	1395	1440
15	Dilmenler	1050	683	788	861	924	977	1008
16	Dilmenler	1050	683	788	861	924	977	1008
17	Dilmenler	350	228	263	287	308	326	336
18	Dilmenler	350	228	263	287	308	326	336
19	Dilmenler	150	98	113	123	132	140	144
20	Dilmenler	150	98	113	123	132	140	144
		13930	9055	10448	11423	12258	12955	13373
Note: For Turqouise combination & Royal colour loading should not be more than 80% of m/c								AVG X 2 =24182

4.6 Bulk Dyeing Machine Specification:

Machine No.	Brand	Capacity (kg)	Origin	Unit	Qty.	Total Capacity	Type
1,2	Thies	720	Germany	1	2	1440	HTHP
3	Thies	540	Germany	1	1	540	HTHP
4	Thies	350	Germany	1	1	350	HTHP
5,7	Dilmenler	700	Turkey	1	2	1400	HTHP
6	Dilmenler	1050	Turkey	1	1	1050	HTHP
8	ATYC	800	Spain	1	1	800	HTHP
9	Dilmenler	150	Turkey	1	1	150	HTHP
11,12,15,16	Dilmenler	1050	Turkey	2	4	4200	HTHP
13,14	Dilmenler	1500	Turkey	2	2	3000	HTHP
17,18	Dilmenler	350	Turkey	2	2	700	HTHP
19,20	Dilmenler	150	Turkey	2	2	300	HTHP
				Total	19	13930	

4.7 Operation Process:

Preparation:

1. Turn on power on main panel
2. Open valve for cooling water of main pump
3. Check stream, water & air

+ Steam pressure : 5 – 6 kg/cm2 G

+ Water pressure : 1.2 – 2 kg/cm2 G

+ Air pressure : 5 – 7 kg/cm2 G

4. Adjustment of feeding valve as per production item & capacity

Putting fabric into the machine:

1. Select water supply level
2. Supply water automatically by pushing 'turn on' button and stop by 'turn off' button.
3. Take up edge of fabric to fabric gate through guide of the reel
4. Put edge of fabric to nozzle
5. Start main pump and put whole fabric with adjusting feeding by valve upto remaining 2 -3 meters fabric end
6. Stop main pump and pull up 2 -3 meters of fabric edge by stick
7. Joint both ends of fabric
8. Start main pump & reel to circulate whole fabric and adjust torque of speed
9. Make sure if fabric circulation is normal, then close the door of the gate, (Check

again reel speed)

Operation:

1. Close the door
2. In-put the pattern on programme controller
3. Mix dyeing stuff & chemical in dyeing-mixing tank and pour it with using pouring pump by adjusting feeding valve, after poring, feeding valve shall be closed
4. Switch 'run' on programme setting device
5. Automatic operation
    1) Select the switch of water supply to 'automatic' on main panel
    2) Push the button of automatic operation, then automatically operation will go through heating, holding, cooling, washing as per programming. Put 'stop' button when finishing buzzer will ring
    3) Open the door and take out fabric

Caution:

1. **Before operation:**
    (1) Check the power (Voltage/hz) wrong Voltage / Hz will cause to brake motor, meter etc
    (2) Check air pressure
    (3) Clean inside of tube before dyeing
    (4) Set the meter correctly as per dyeing method
    (5) Check every valves

.**Starting operation:**

(1) Check closing the door perfectly
(2) Set pressure below 1 kg / cm^3 by watching pressure meter
(3) When temperature will be over more than 80^0C, do not forget item (1) & (2)
(4) Do not start pump when tube is empty
(5) Put definitely cooling water before starting operation because pump & reel is made for cool water

2. During operation

(1) Check if meter is working correctly during operation
(2) Check if any strange vibration
(3) Check if any strange sound of pumping
(4) Check if pressure in the tube is too high
(5) Check if temperature in the tube meet programming
(6) Start pump when feeding steam & cooling water
(7) Check if reel is working correct under high temperature & high pressure

3. Nozzle installation

Set nozzle base into nozzle-casing and install nozzle by turning it clock wise.

After install nozzle, turn it one round by anti-clock wise to make 2 mm gap. The gap on nozzle shall be adjusted by kind of fabric

4. **After operation**

(1) Before opening the door, check if air pressure of inside the tube is 0 kg/cm2 and temperature of inside the tube is between 80^0-90^0C if the pressure is still remained or temperature is more than 80^0C, it is very dangerous to open the door
(2) Temperature inside the tube shall be under 80^0C for manual draining
(3) Turn off the power after operation and close the valve

Maintenance:

- Keep cleaning seal packing of the door and surface to touch the packing to be prevented from dust and hurting
- Keep electric portion, pump and control panel not to be wet by water
- Keep tight valve shaft seal ground packing of each valve by tightening sometime
- Check valve seat part of air valve & drain valve sometime o
  Keep tight each volt
- Make often oiling rotating part
- Inspect mechanical seal according to manual of pump
- Keep adding grease & oil in pump bearing part according to manual of pump o
  Inspect sometime if safety valve is working correctly

- Inspect sometime if steam trap is working correctly
    - Inspect meters of pressure and temperature

4.8 Production Parameters:

a. pH:

- During H_2O_2 bleaching pH 9 – 11
- During reactive dyeing pH 10.5 – 12
- During disperse dyeing pH 4.5 – 5.5

b. Temperature:

- For cotton scouring 90^0-95^0C
- For cotton cold wash 30^0 – 40^0C
- For cotton hot wash 70^0-80^0C
- For cotton acid wash 60^0-70^0C
- For cotton dyeing 80^0-90^0C (For hot brand)
  40-60^0C (For cold brand)
- Polyester dyeing: 100^0-130^0C

c. Time:

- For scouring 60-90 mins
- For reactive dyeing 60-90 mins - For disperse dyeing 60-90 mins

d. M:L ratio:

- For reactive dyeing M:L ration maintained between 1 : 8 to 1 : 10

4.9 Dyeing Recipe:

Fabric Composition: 100% Cotton		
Fabric Type: Single Jersey		
Colour Name : Black		
Scouring & Bleaching:		
Product Type	**Product Name**	**Dosage**
Anti-foam	**Albaflow JET**	**0.1 g/l**
Anti-crease	**Albafluid C**	**0.5 g/l**
Peroxide Stabilizer	**Gemstap HP-52**	**0.5 g/l**
Detergent	**Imerol DLJ**	**0.5 g/l**
Scouring agent	**Caustic Soda**	**2.0 g/l**
Bleaching agent	**Hydrogen Peroxide**	**2.5 g/l**
Peroxide Killing:		
H_2O_2 Killer	**Bactosol SAP**	**0.5 g/l**
Neutralisation:		
Neutraliser	**Platilon 2900(Acid Buffer)**	**1.0 g/l**
Enzyme Treatment:		
pH adjustor	**Platilon 2900**	**0.4 g/l**
Anti-pilling Enzyme	**Bactosol CA**	**1.0 g/l**

Dyeing:		
Reactive Dye	**Novacron Yellow FN2R**	**0.25%**
Reactive Dye	**Novacron Red FNR**	**0.30%**
Reactive Dye	**Novacron Black WNN**	**7.50%**
Dye bath sequestrant	**Ladiquest 1097-U**	**0.75 g/l**
Levelling Agent	**Drimagen E2R**	**0.50 g/l**
Anti-crease	**Albafluid C**	**0.50 g/l**
Electrolite	**Glauber's Salt**	**80 g/l**
Alkali	**Soda Ash**	**20 g/l**
Neutraliser	**Platilon 2900 (Acid Buffer)**	**0.5 g/l**
Wash off agent	**Sandopur SP**	**2 g/l**
Cationic softener	**Sapamine CWS**	**1%**
Fabric Composition: 100% Cotton		
Colour Name : Red		
Scouring & Bleaching:		
Product Type	**Product Name**	**Dosage**
Anti-foam	**Albaflow JET**	**0.1 g/l**
Anti-crease	**Albafluid C**	**0.5 g/l**
Peroxide Stabilizer	**Gemstap HP-52**	**0.5 g/l**
Detergent	**Imerol DLJ**	**0.5 g/l**
Scouring agent	**Caustic Soda**	**2.0 g/l**
Bleaching agent	**Hydrogen Peroxide**	**2.5 g/l**
Peroxide Killing:		
H_2O_2 Killer	**Bactosol SAP**	**0.5 g/l**
Neutralisation:		
Neutraliser	**Platilon 2900(Acid Buffer)**	**1.0 g/l**
Enzyme Treatment:		

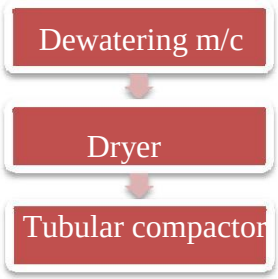
pH adjustor	**Platilon 2900**	**0.4 g/l**
Anti-pilling Enzyme	**Bactosol CA**	**1.0 g/l**
Dyeing:		
Reactive Dye	**Novacron Yellow FN2R**	**0.50%**
Reactive Dye	**Novacron Red FNR**	**2.50%**
Reactive Dye	**Novacron Black WNN**	**0.05%**
Dye bath sequestrant	**Ladiquest 1097-U**	**0.75 g/l**
Levelling Agent	**Drimagen E2R**	**0.50 g/l**
Anti-crease	**Albafluid C**	**0.50 g/l**
Electrolite	**Glauber's Salt**	**60 g/l**
Alkali	**Soda Ash**	**15 g/l**
Neutraliser	**Platilon 2900 (Acid Buffer)**	**0.5 g/l**
Wash off agent	**Sandopur SP**	**1 g/l**
Cationic softener	**Sapamine CWS**	**1%**

Chapter 5

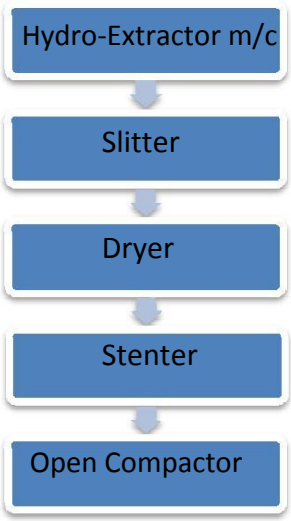
• Finishing

5.1 Process sequence of Finishing Machineries

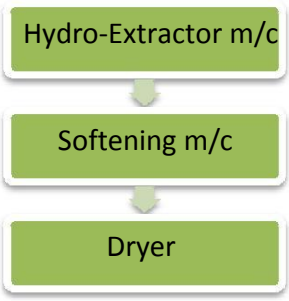
For Tubular form of Fabric:



For Open form of Fabric:



For Collar and Cuff:



Finishing is the final steps of wet processing technology. A textile products either it is dyed

or printed it needs to add some finishing features before marketing. By applying different finishing techniques a product becomes more comfortable to use. So finishing should be easier to apply

5.2 Objects of Finishing:

1. To improve the attractiveness of the fabric.
2. To increase the life time or durability of the fabric.
3. To meet up specific requirement of the fabric for achieve the final goal.

Finishing plays an important role in the modern age. Everyone likes to wear finished products with some special types of finishing. Finishing of the fabric depends on the requirement of the buyer. Different types of finishing machine are use in finishing operation.

5.3 Classification of Finishes:

Textile finishes are classified in different ways. The most common classification are-

Aesthetics finishes: This type of finishes make change or modify the appearance of the fabric or hand/ drape properties of the fabrics.

Functional finishes: This type of finishes changes the internal performance properties of the

fabric.

Permanent finishes: It involves a chemical change in fibre structure and do not change throughout the life of a fabric.

Durable finishes: Usually last throughout the life of a fabric, effectiveness becomes diminished after each cleaning and near the end of normal use of the fabrics, the finishing is nearly removed.

Semi-durable finishes: Usually last several launderings or dry cleanings and many are removal in home laundering or dry cleaning.

Temporary finishes: Removed or substantially diminished the first time an article is laundered or dry cleaning.

5.4 Finishing Machine Profile (DCKIL)

De-Watering Machine:

Brand	Type	Origin	Unit	Qty.	Capacity/Day
Calator	Tube	Sweden	1	**1**	**6000**
Fabcon	Tube	USA	1	**1**	**6000**
Bianco	Tube	Italy	2	**1**	**7000**
Bianco	Open	Italy	2	**1**	**14000**
Taida	Open	Turkey	1	**1**	**10000**
Dilmenler	Open	Turkey	3	**1**	**10000**
	Total Capacity			**6**	**53000**

Relax Dryer:

Ruckh	Gas heated	Tube	Germany	1	**1**	**7000**
Santex	Gas heated	Tube	Switzerland	1	**1**	**6000**
	Total Capacity				**2**	**13000**

Stenter:

Bruckner	**6 Chamber**	Open	Germany	2	**1**	**12000**
Taida	**6 Chamber**	Open	China	3	**1**	**10000**
TTM	**8 Chamber**	Open	Turkey	3	**1**	**15000**
	Total Capacity				**3**	**37000**

Compactor:

Fab-Con		Tube	USA	1	**1**	**7000**
Ferraro		Tube	Italy	1	**1**	**6000**
Lafer S.p.a	1,2	Open	Italy	2	**2**	**12000**
HAS fco		Open	Turkey	3	**1**	**10000**
	Total					

	Capacity				**5**	**35000**

BRUSH & PEACH:

HAS csm	Peach	Open	Turkey	3	**1**	**5000**
I Kuang	Brush	Open+Tube	China	3	**1**	**5000**
Gma Tex	Brush	Open+Tube	Germany	3	**1**	**4000**
	Total Capacity				**3**	**14000**

BACK SEWING:

MTG		Italy	2	**1**	5000
TMS		Turkey	3	**1**	5000
	Total Capacity			**2**	**10000**

5.5 DESCRIPTION OF DIFFERENT FINISHING MACHINE

Hydro Extractor m/c

Manufacturer : Nazar Corporation (Pakistan)
Extraction% : 65% Maximum
Speed : 1400 rpm
Extraction time : 5-7 min
Function : To remove the water from the fabric by centrifugal extraction.

Dewatering Machine

Manufacturer: CALATOR (SWEDEN)

Function:

1. Reduce water content
2. Apply finishing chemical
3. Open the fabric from rope form

Controlling Parameters:

Padder pressure **:** 4-7 bar
Pick up % : 80-85%
Speed at m/c : 8-60 m/min

Chemical application:

Softener: To soften the fabric
Acetic acid : 0.25 g/l
pH : 7.5

Ruckh Relax Dryer (Germany)

Gas burner Heated
4 Chamber, 1 burner/ 2 chamber.

Santex Relax Dryer (Switzerland)

Steam Heated
2 Chamber
Machine set up for **Ruckh** relax dryer is as follows:

Machine Parameters	Set-up Value
Temp. Setting	(100-120)°c for White Shade (120-130)°c for Light Shade (130-140)°c for Dark Shade (140-170)°c for Curing
Blower Fan setting	Auto
Exhaust Fan setting	Auto
Machine Speed	3-35 m/min (depends on quality of fabric)
Over feed	0-40 % (depends on the fabric construction)
Width of Expender Setting	45- 114 cm (depends on the required fabric width)
Burner Gas pressure	10-15 / bar

Machine set up for Santex relax dryer is as follows:

Machine Parameters	Set-up Value
Temp. Setting	(100-110)°c for White Shade (110-120)°c for Light Shade (120-130)°c for Dark Shade
Blower Fan setting	Push Button switch on
Exhaust Fan setting	Push Button switch on
Machine Speed	1-12 m/min (depends on quality of fabric)
Over feed	0-45 % (depends on the fabric construction)

5.6 Slitter Machine

Slitter machine is used for tubular knit fabric to make it in open form. In open form fabric finishing line; slitter machine is used after hydro-extractor, de-watering and drying machine. Slitting is a process that is applied for cutting the tubular fabric through the intended break Wales line on.

5.7 Compactor Machine

Compactor machines are two types.

1. Tubular compactor

2. Open compactor

Tubular compactor is used after hydro-extractor, de-watering and dryer. By the compactor machine, compacting is done for control the shrinkage of the fabric. Here, different types of off line quality of the fabric are measured. Open compactor is used for compacting the open form fabric. Here, slitting machine is used for open the fabric from the tubular form.

Functions of tubular compactor:

1. Shrinkage of the fabric is controlled by the compactor.
2. Fabric width is controlled by the compactor.
3. GSM of the fabric is adjusted by the compacting.
4. Fabric smoothness is achieved by the compactor.
5. Heat setting of fabric for Lycra is done by tubular compactor.

Checking Parameters:

1. Shade Check: Shade of the compacting fabric is checked in the delivery side of the machine. The operator collects the fabric and compare the shade of the fabric with the buyer's approved swatch.
2. Width Check: Operator measures the width of the fabric with the measuring tape and compares it with the buyer's requirement.
3. Weight Check: Weight of the fabric is determined by GSM check. Operator checks the GSM of
the fabric by GSM cutter and electric balance.
4. Edge Line Checking: Two edges of the fabric is check in delivery side. If any fix line is identified, which normally occurs from the expander it should be connected.
5. Design and Slanting: Operator checks design and slanting of the fabric in the delivery side of the machine.
6. Fabric Faults: Various types of fabric quality are measured in the delivery side of the fabric.

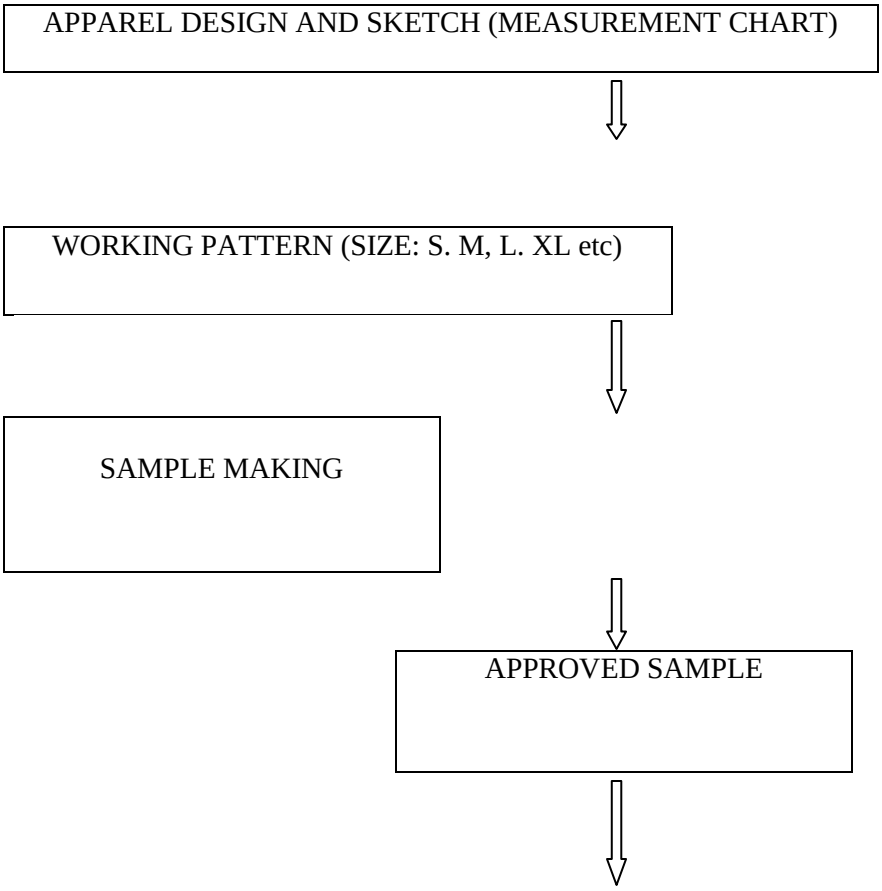
CHAPTER 06

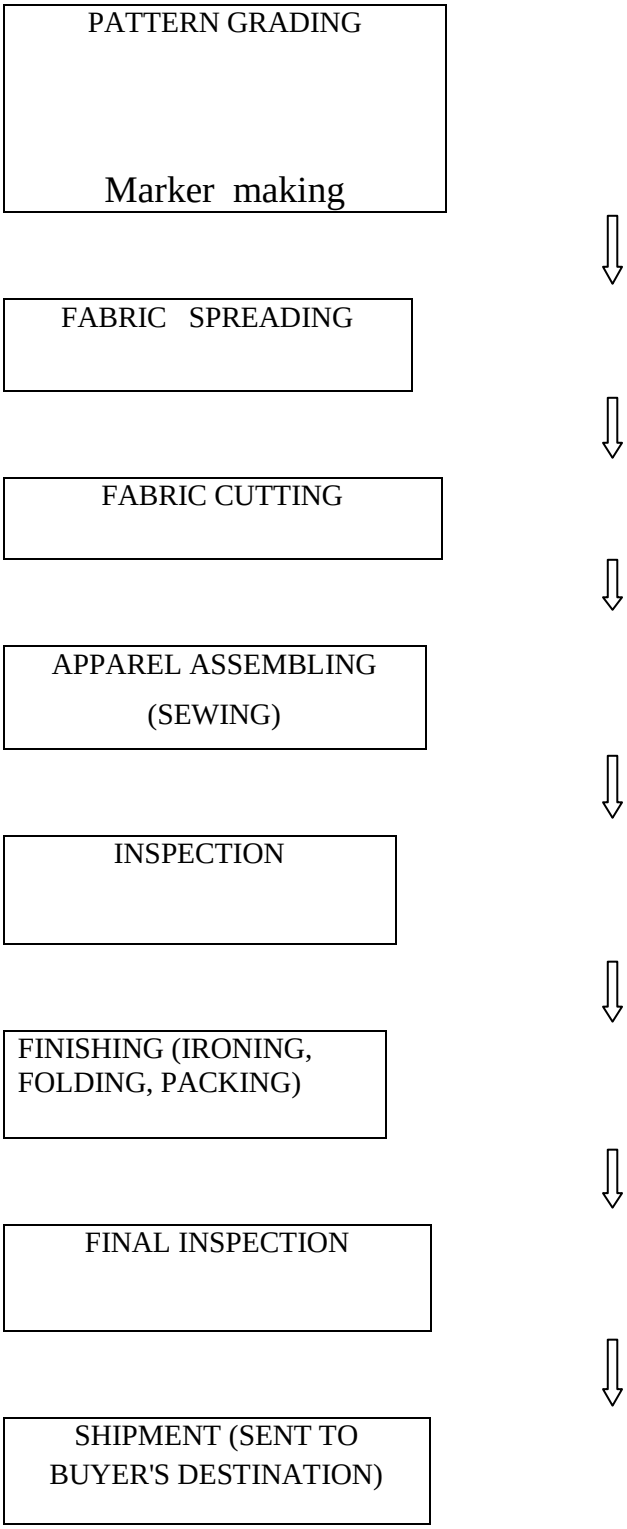
- GARMENTS

6.1 INTRODUCTION:

Apparel and Garment are two similar word but apparel used in USA standard and Garment used in UK standard. Finally it turns in to Ready made Garment (RMG).So Knit Concern Apparel is a USA standard Ready Made Garment. According to Apparel classify it is divided in to two parts - a) Bespoke Garment(Tailoring system) & h) Ready- to -wear(Industrial system).In Knit Concern Apparel used Ready-to-wear(Industrial System).ln Industrial system a group of people or group of size(S,M.LXL etc required to make an apparel.

6.2 FLOW-CHART OF APPAREL MANUFACTURING:





6.3 SAMPLE SECTION

The section which maintain various types of sample that is called Sample section. The word in Knit Concern Apparel is the "CORRECT SAMPLE AT THE FIRST TIME". This section works according the sequence.

Sketch/design

↓

Basic block

↓

Working pattern

↓

Sample making

↓

Basic manufacturing difference

↓

Approved sample

↓

Costing

OBJECTIVES:

- To make correct sample.
- To make master pattern.
- To pattern grading.

.

6.4 CUTTING SECTION

Cutting is the process which cut out the pattern pieces from specified fabric to making the garments.Using the markers from graded pattern and in accordance with the issued plan fabrics are cut to prepare the garments assembly. Flow chart of garments cutting…..

Marker making

↓

Fabric spreading

↓

Cutting

↓

Bundling

Marker Making:

Markers are layout of pattern pieces for the purpose of fabric cutting.Great effort is made to arrange patterns in the most economizing manner within the constraints of fabric type,width,nap,fabric design.

COMPUTER AIDED DESIGN (CAD):

The design which is make by computer with the help of Digitizer is called Computer Aided Design(CAD).The CAD can be 2D or 3D .In Knit Concern L td 2D is used .

Software Brand:

a.Lectra System

b.Optitex system

LECTRA SYSTEMS:

Step One : At first the pattern need to place on the digitizing table.

Step Two : For every part need to take new sheet.

Step Three : Then click twice F button and for curve position any part click C, Any.

Fault to take point D= delete

Step Four : For Grain Line click A

Step Five : After one part digitizing finished click F to finish.

Step Six : Repeating whole process another part can be digitizing.

EFFECT OF CAD:

All the jobs described so far lend themselves ideally to computerized graphics. The master patterns or blocks can be stored as images in the computer and called up as required, together with a list of each of the pattern parts for that block. With the use of a light pen, each part can be brought up in turn and enlarged on the screen. This job obviously retains its skill and even requires the added skill of computer operation. With interactive graphics the pattern maker can now adjust each part to match the designer's concept.

EFFECT OF CAD ON GARMENT DESIGN AND PRE-ASSEMBLY

- Block images stored in computer
- Grading technique replaced by expert system
- Percentage wasted computed and displayed for each layout
- Fabric pattern constraints incorporated in the program

- Learning system incorporated
- Lay-makers deskilled
- Cutters replaced by CAD/CAM
- Women take over as operators
- Wages reduced

FABRIC SPREADING:

Spreading means the smooth laying out of fabric in relation to marker length and markci width i.e. specified length and width.

CUTTING:

Then cut the fabric according to pattern or marker setting.Fabric cutting is the most important part of a garment factory.Cutting different part of garment apparel according to the pattern is called fabric cutting.

Numbering:

Sorting out the components according to size and for each size make individual bundle.Numbering includes….

- Cutting no
- Bundle no
- Style no
- Quantity
- Color
- Parts no
- Size;s m l
- Serial no

6.5 SEWING SECTION

The basic components of sewing are -

- Sewing Thread,
- Fabric and
- Elements of Machine.

Sewing machines:

The machines which are used in sewing section..

- Plain m/c
- Over lock m/c
- Fat lock m/c
- Kansai m/c
- Chain stitch m/c
- Vertical m/c
- Two needle m/c
- Feed of the arm m/c
- Zigzag m/c
- Bartack m/c

- Button holding m/c
- Button attach m/c
- Snap button attach m/c
- Eye late hole m/c

Different types of sewing machines:

Plain m/c

Properties:

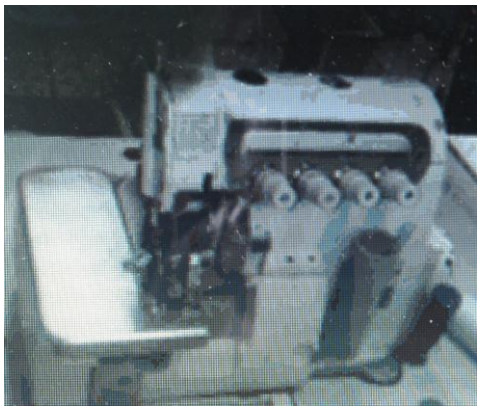
- One needle
- Two tensioners
- Three guide
- One hook

- Two thread
- One bobbin case
- One magnate guide

Application:

- Bottom hemming
- Belt top seam
- Belt joint
- Loop tack
- Pocket joint
- Zipper joint
- Flap top
- Flap joint
- Front rise
- Back rise

Over lock m/c



Properties:

5 thread

4tensioner

2 knifes

2needle for 5thread

1needle for 3thread

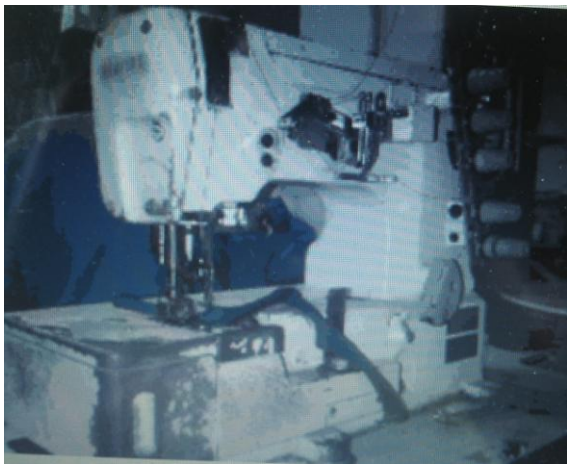
3looper for 5thread

2looper for 3thread

Application:

Used for over lock stitch

Fat Lock M/C:



Properties:

- 4 tentioner
- Contain a holder
- thread
- needle

Application:

- Zig zag stitch

- Knit hemming
- Loop making

SEWING PROCESS FOR T- SHIRT:

- ❖ Shoulder Join
- ❖ Neck R/B Make
- ❖ Neck Joint
- ❖ Label Joint
- ❖ Back Tip Joint
- ❖ Sleeve Hem
- ❖ Sleeve Joint
- ❖ Side Seam
- ❖ Sleeve Tag
- ❖ Body Hem
- ❖ Lop Join

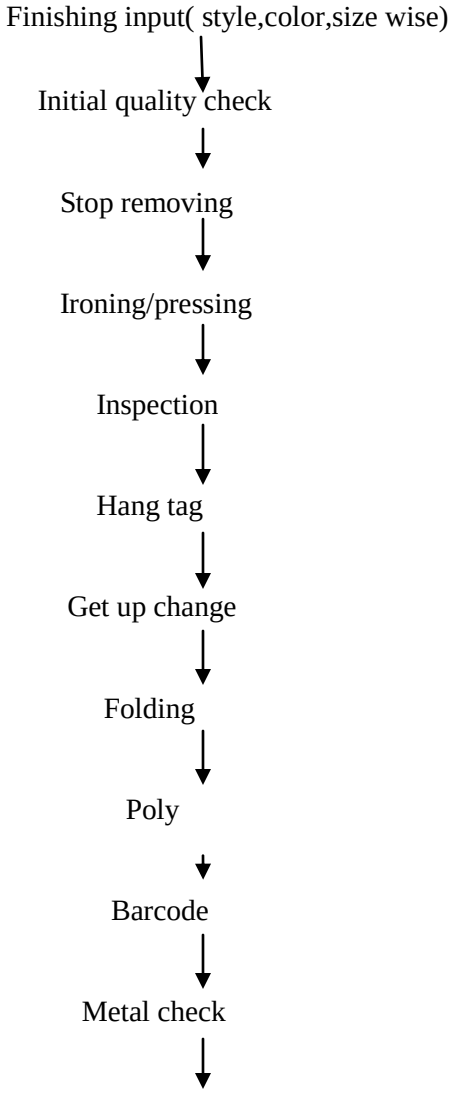
SEWING PROCESS FOR POLO- SHIRT:

- ❖ Shoulder Joint
- ❖ Placket Joint
- ❖ Placket Top Seam
- ❖ Box Tuck
- ❖ Body Hem
- ❖ Side Joint Seam
- ❖ Side Top Seam
- ❖ Nose Tuck
- ❖ Collar Joint
- ❖ Collar Tape Joint
- ❖ Top Seam
- ❖ Joint
- ❖ Top Joint

- Top
- Join
- Armhole Top Seam
- Sleeve Tuck
- Side Stitching Tuck
- Side Stitching Tape
- Side Stitching Top Seam

6.6 FINISHING SECTION

Finishing is the last processes to making apparel. The finishing process sequences are as follows



Cartooning

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Final inspection by buyer

Material used in finishing:

- Neck board
- Back boar
- Full board
- Hang tag
- Tag pin
- Tissue paper
- Al pin
- Ball pin
- Elastic clip
- Hanger
- Poly bag
- Size sticker
- Gum tape
- Inner box
- Master cartoon box
- Pp belt
- Blister

Cleaning:

In this process extra sewing thread and various unnecessary things are removed from the garments body.Air suction is done to removed this.Extra part of sewed thread is also cut from the garments by seissor.

Checking:

Prepared garments are now passes through the metal detector for checking**.**if any kinds of metal such as broken needle etc found then the machine stops and the garments are checked to remove the thing.

Ironing:

Garments are now being ironed at a high temperature which will cause no harm to the garments.special types of table are used for ironing.table is selected according to the fabric characteristics.

Tagging:

After ironing tags are attached with the garments as per buyers requirements. if the tags are needed to be printed,a sticker is made with that. Now the sticker is attached with the garments with heat(100^0c-150^0c) is applied to fix it.

Folding:

Do creases result from applying result to fold. If we wrap a paper around a cylinder,it will be easy to straighten again. If we make a fold in the paper,it will be more difficult. If we apply pressure along the fold.it will be more pronounced.

The delta composite knitting industry ltd uses following folding styles,

- Flat folding
- Roller folding
- Crunching folding

Hangers:

Hangers must be secured with a cable tie. All film specification must be same in pre made bags. The supplier must be ensure that the heat setting is adequate to seal the bags sufficiently without overheating the bags and weakening the bags strength. Garments to hang loose in the bags. Bottom edge of the garments to be above the bottom edge of the bags. Hanger opening is to face left.

Packing and packaging requirements:

To ensure the cartoon is enough strong and secure the content inside in the normal transport and distribution process according to the standards. Ensure the contents of the pack are packed according to the instruction.

The delta composite knitting industry ltd using following four types of packaging systems,

- Solid color & solid size
- Solid color & assort size
- Assort color& assort size
- Assort color & solid size

6.7 Final inspection:

Its main purpose is to assure quality. After apparel preparation,before packing this shorts of inspection is done to remove the faulty garments. Deffects are identified here and if possible garments are again send to respected section to solve the problems.

6.8 Defects in garments:

For the textile and apparel industry product quality is calculated in the terms of quality and standard of fibres,yarns,fabrics,color,design and the final finished of the garments. Quality control in terms of garments manufacturing, pre-sales and post-sales services delivery, pricing, etc are essential for any garments manufacturer ,trder,or exporter. Certain quality related problems often seen in garments manufacturing like sewing ,color,sizing,or garment defects should neve be over looked.

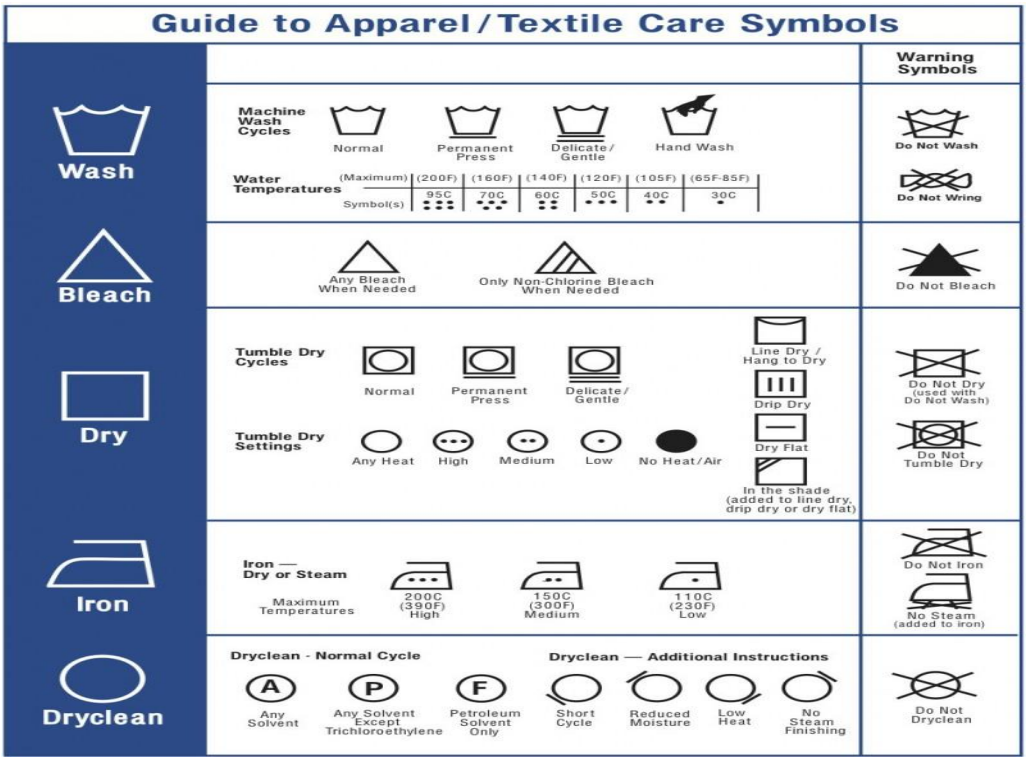
Defect classification:

Types of defects considered in AQL ,,

- **Critical Defects:** are those that render the product unsafe or hazardous for the end user or that contravene mandatory regulations.
- **Major defects:** can result in the product's failure, reducing marketability, usability.

- **Minor Defects:** do not affect products marketability or usability but represents workmanship defects that make the product fall short of defined quality standard.

6.9 Basic Symbols for all systems:



LABELS

Label is the identification of Apparel. Labels are various types named main Label and Size label.

Main Label:

- Indicate the Trade name of Apparel.

Size Label:

- Indicate the size of the Apparel.

6.10 MERCHANDISING SECTION:

Merchandizing section is the most important section for any industry. It is quite impossible to continue any industry without this section .The job done from buyers order up to shipment.

OBJECTIVES:

- To satisfy the buyer requirements.
- To work systematically to achieve good production.
- To shipment the right time.

- To communicate and motivate excellently with buyer.
- To fixed the product price.

ORDER SHEET:

A group of sheets which contents the followings.

- Apparel Design and Sketches
- Apparel Measurements
- Stitches
- Trimmings and Details
- Other Quality & size ratio
- Packing Instructions
- Other Details etc.

FABRIC CONSUMPTION:

The merchandiser used the following formula for fabric consumption.

Fabric Consumption = Fabrics Length x Chest /1550 x G.S.M. / 1000 /Body x 12 + Wastage %

= 2.26 KG per Dozen

6.11 INDUSTRIAL ENGINEERING (I.E.) SECTION & PLANNING

I.E. is an important section for any garments factory.

OBJECTIVES:

- To give layout and set up the m/c according to the layout
- To increase the production.
- To save time to making an Apparel.
- To minimize production cost.

CHAPTER 07

- UTILITY SECTION

Utility section:

Utility section contents of

- Boiler
- Generator
- Air compressor

7.1 Boiler:

Brand name: Cleaver brooks

Origin: USA

Capacity: 10000 kg/hr

Specification:

- Feed water temperature: 60^{o}c
- Feed water hardness: 2
- System pressure: 500 psi
- Types of steam: wet system
- Steam temperature: 150^{0}c
- Fuel used: natural gas

7.2Generator:

Machine no: 1

- **Brand name:** Waukesha
- **Capacity:** 1126 kva

Machine no: 2

- **Brand name:** Cater pillar
- **Capacity:** 390 kva

7.3 Air compressor:

Air compressor is a machine which compresses the air and raises its pressure. The air compressor sucks the air from the atmosphere,compresses it and deliver the

same under a high pressure to a storage vessel. From a storage vessel,it may b conveyed by the pipeline to a place where the supplied air compressor required.

7.4 EFFLUENT TREANTMENT PLANT (E.T.P.):

Effluent means wastewater discharged from a textile wet processing plant contains various types of impurities depending on the type of dyes, chemicals, auxiliaries and process used. The Effluent which is treated by a plant that is called Effluent Treatment Plant. In fact, water is the heart for dyeing Industry and chemical also an important element for different stage of dyeing. Now, it is quite impossible without chemical continue dyeing. So, which chemical we use in Dyeing that mixed with water and finally drain. If the chemical mixed water goes outside through river it is very harmful for not only our environment but also all alive animals.

7.5TYPES OF E.T.P:

There are different types of E.T.P are available .Those are

- Biological E.T.P.(Best)
- Chemical E.T.P.
- Biological & Chemical E.T.P.
- Physical ETP

BIOLOGICAL E.T.P.:

- The Effluent will be treated according to sequence or stage by stage.
- Its primary cost or set up cost is very high.
- Its effluent treatment will be best.

7.7E.T.P in Delta :

- Cost of the project is nearly 8. 00, 00,000 BDT.
- Fully Biological E.T.P.
- Manufactured by Water Treatment Technology (W.T.T.) of ITALY.
- 60 lac litre storage capacity
- 30 lac litre processing capacity

7.8Different chemical used in E.T.P:

- Sodium hypochloride
- Sulfuric acid
- Polyelctrolyte
- Nutrient salt
- Anti foam
- De-colorant

CHAPTER 08

- **COMPLIANCE**

8.1COMPLIANCE:

Compliance means conformity of certain standard which include the different facilities in the industrial environment through the employee.

8.2 LIST OF COMPLIANCE ISSUES:

- Canteen
- Health and safety committee
- Environment policy
- Labor welfare
- National festival holiday
- Compensation for holiday
- Leave with wages
- Health register
- Accident register
- Workman register
- Equal remuneration
- Overtime register
- Sexual harassment policy
- Child labor abolition policy
- Anti-discrimination policy

- Working hour policy
- Hiring/recruitment policy
- Security policy

CONCLUSION

Industrial attachment program send us to the expected destiny of practical life. Through The completion of Two Month industrial attachment at **The Delta Composite Knitting Ind. Ltd (DCKIL)**, we have got the impression that the factory is one of the most knit dyeing projects in Bangladesh. Though it was established 15 years ago, it has earned very good reputation for its best performance over any other knit dyeing project.

During our industrial attachment program we had tried to our best to done our duty. Our supervising officer also satisfied to us & offer co-operation in every steps. It is completely a new experience in our life, which will be very effective in our service life. During our training period we realized that practical experience is valuable for service life.