



**FACULTY OF ENGINEERING  
DEPARTMENT OF TEXTILE ENGINEERING**

**Industrial Attachment on**

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<b>Submitted By:</b>	<b>ID Number</b>	<b>Group (AM)</b>
<b>Md. Shobuj Mia</b>	<b>TEX1802014003</b>	<b>C</b>
<b>Afjal Hosan</b>	<b>TEX1802014050</b>	<b>C</b>
<b>Md. Rajon</b>	<b>TEX1802014059</b>	<b>C</b>

**Academic Supervisor Kamrul Hassan Bhuiyan**

**Lecturer Department of Textile engineering**

**Sonargaon University (SU).**

**146 Mohakhali, Wireless Gate. Dhaka.**

This report we have presented in partial fulfillment of the requirement for the Degree of Bachelor of Science in Textile Engineering.

**Submitted Date: 24 October, 2021**

## DECLARATION

We hereby declare that, this Industrial Attachment on **Viyellatex Limited**, of Bangladesh is done by us under the supervision of **Kamrul Hassan Bhuiyan, Lecturer Department of Textile engineering Sonargaon University (SU)**.

We also declare that, this Industrial Attachment report has not been submitted anywhere for award, degree or diploma. We ensure that, any part of this attachment has been presented anywhere.

\_\_\_\_\_  
**Md. Shobuj Mia**  
**TEX1802014003**

\_\_\_\_\_  
**Afjal Hosan**  
**TEX1802014050**

\_\_\_\_\_  
**Md. Rajon**  
**TEX1802014059**



## PERMISSION OF INDUSTRIAL TRAINING

This is to certify that **Md. Shobuj Mia-*Tex1802014003***,

**Afjal Hosan-*Tex1802014050***, **Md. Rajon-*Tex1802014059*** B.Sc.in  
Textile Engineering program, 14B Batch have successfully completed  
their Industrial Internship on Apparel Manufacturing Technology under  
my supervision. I do hereby approve their report. I also recommend  
accepting their report for partial fulfillment of Bachelor of Science in  
Textile Engineering (BSCTE) Degree.

.....

**Kamrul Hassan Bhuiyan**

Lecturer Department of Textile engineering

Sonargaon University (SU).

146 Mohakhali, Wireless Gate, Dhaka.



## ACKNOWLEDGEMENTS

All pleasure goes to the Almighty Allah who has given me the ability and strength to complete this project.

I am grateful to” **Kamrul Hassan Bhuiyan**” Lecturer Department of Textile Engineering Sonargaon University (SU) Dhaka.

Textile Engineering my Academic Supervisor. As well as to

“**Md. Faysal Halim**”CFOO of my factory supervisor of The Civil Engineer, Viyellatex Limited. Bangladesh.

Being working with them I have not only earned valuable knowledge but was also inspired by their innovativeness which helped to enrich my experience to a greater extent. Their ideas and way of working was truly remarkable. I believe this report could not be finished if they did not help me continuously.

I would like to thanks the Chairman, General Manager, Production Manager, Sample Manager, Finishing Manager, Washing Manage, Maintenance Manager, Quality control Manager, Factory Manager & Costing Sr. Manager of Standard Group. Who has given us scope for doing industrial attachment in the factory as well as for giving scope to work in their respective section. We also would like to thanks to production **PM & APM “Md. Harunur Rashid, Md. Sojol Ahmed, Md. Mijanur, Md. Sayeed Jubayer with others persons”** for their proper management & taking necessary procedure about our industrial attachment.

I am also very much grateful to Standard Group Authority/ Management for giving me opportunity to do my internship work in their factory. Last but not the least, thanks go to all the workers, supervisors, Line Chife and Floor in charge who have assisted, helped and inspired me to complete this task at various stages

## **ABSTRACT**

The project is on industrial training in garments. Traditionally operated garments industries are facing problems like low productivity, longer production lead time, high re-work and rejection, poor line balancing, low flexibility of style changeover etc. These problems were addressed in this study by the implementation of lean tools like cellular manufacturing, single piece flow, work standardization, just in time production etc. After implementation of lean tools results observed were highly encouraging. Some of the production time decreased by 8%, number of the operations required to produce equal amount of garments decreased by 14%, rework label reduced by 80%, work in process inventory stays at maximum of 100 pieces from around 500 to 1500 pieces. Apart from these tangible benefits operator multi skilling as well as flexibility of style changeover has been improved. This study is conducted in the stitching section of shirt manufacturing company. This study includes time study, the conversion of traditional batch production into single piece flow and long assembly line into small work cells

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# PART-01

## CHAPTER 01

### EXECUTIVE SUMMARY

#### **Introduction**

Textile & garments sector is the biggest and fastest growing sector in Bangladesh. Textiles and clothing will always be essential goods for human beings. Spinning and weaving were the main activities that drove the industrial revolution in the 18th century. Since then the textile industry has been a leading industry in the initial phases of industrialization in many countries and in different periods of time in the world. Bangladesh is an important producer & exporter of knit RMG product. There are about 4500 garments factories running in Bangladesh. Growth of garments factories started in Bangladesh around 1980. but now nearly 79% of our foreign currency is earned from RMG. At present Bangladesh is producing & exporting more than 60 items of garments. Garments are exported to USA, Canada, Japan, Australia, Middle East and many other countries in the world. Cheapest labor cost is the biggest advantages for Bangladeshi garments producers & exporters. Science is going to be flourished day by day. Almost every invention becomes successful due to the development of science. Technology, the modified segment of science makes the thing possible, which was impossible yesterday. Education provides important leanings of the modern inventions & the theories and also gives me a combined knowledge over theoretical and practical studies. Literatures provide the right information which I have been learned through my university. On the other hand practical knowledge increases the practices of theoretical perception clear and more efficient. Internship has made these opportunities. Because I have learned theoretical knowledge last four years but due to lack of proper industrial knowledge on my course, I would not be said a complete engineer. Industrial attachment did work for me. I have taken part in this industries attachment in VTL & Viyellatex Limited, Industrial attachment is an important and essential part of 4 year B.Sc. in Textile Engineering Course. Actually industrial attachment is the practical experience for every Textile Engineer which is needed to be familiar not only the industry but also

all over the necessary job related to continue in any industry. During student life a student cannot know about the practical condition so its badly needed for every student for attain for the industrial attachment .The VTL & Viyellatex Limited is truly an excellent industry from our point of view. All types of modern technology are well arranged here. Every section in here helps us so much by giving information during our training period which was unbelievable.

Especially IT Department maintain the Management Information System a vital role for the companies smooth operation and development, we are so satisfied and lucky student to complete our Industrial Attachment in VTL & Viyellatex Limited. We think this Industrial Attachment will be outstanding helpful in our future car



## CHAPTER 02

# PROJECT DESCRIPTION

### **Project Description**

The VTL & Viyellatex Limited is a composite textile-manufacturing complex built on an area of 43 acres of land at tongi, about 20 km away from Dhaka on the bank of river Turag. It is one of the largest complexes of its kind in South Asia producing high quality yarn, gray fabrics, dyed fabrics, printed fabrics and knit fabrics. Swiss, Italian, German, and French made computer-controlled machineries have been installed in each of the divisions to deliver quality textiles, which meet the demand of European and American customers.

Major portion of turnover of the textile segment are for RMG units. Total fabrics requirement for the group RMG segment is around 50 million yards per year. Out of the same, the textile units supplied around 18 million yards per year. To mention apart from cost advantage, sourcing from own backward linkage ensures quality of the product as well as lead-time advantage for the RMG segment.

The Viyellatex Limited RMG division has an annual capacity of 6 million dozen of RMG unit with a lead time of 60-75 days. It comprises of 28 companies with 170 standards production lines and a total covered factory space of 9,72,000 square feet. The main product of VTL are in both woven and knit fabrics; such as – shirts, pants, shorts, short – all, jumpers, overalls, jackets, vests, sportswear, sleep wear, ladies dresses, T-shirts, and fleece items, with imported fabrics from all over the world. Most of the main RMG companies of the group are based in their VTL. VTL & Viyellatex Ltd, one of the largest companies of the group, established in 2005 is in the VTL and has 16 lines of Denim RMG production.

### **Factory Profile**

**Company Name:** Viyellatex Limited (Garments Manufacturing Division)  
Viyellatex Limited (Spinning, weaving, Dying Division)  
Medlar Group (Garments Manufacturing Division)

**Status:** Private Ltd. Company

**Type & Business of the company:** Export of RMG

Export of Textile Products as backward linkage of RMG

**Year of Establishment:** 1984

**Buyers :** 1. AMC, 2. American Eagle, 3. Celio, 4. H & M, 5. Cortefiel, 6. Dorby Frocks, 7. GAP, 8.

Gymboree, 9. Charming Shoppes, 10. J.C. Penney. 11. Jhon Forsyth of Canada, 12. Joni Blair 13. Levi

Strauss, 14. Mervyns, 15. Phillips Van Heusen, 16. Regatta, 17. Scarlet, 18. Sears, 19. Seined Sticker, 20.

Squeeze, 21. Target, 22. V. F. Asia etc.

**Factory Location :** Tongi, Gazipura Satais.

**Address :** Head Office: Chandra, Sripur  
297, Tongi, C/A

Merchandising Office (Gazipura 27)

297, Khairtul, Gazipura Satais, Tongi.

Merchandising Office (Gazipur)

297, Khairtul, Gazipura Satais, Tongi

**Hong kong Office:** Joyful Miles

Ltd. 16B, Alpha House 27-33

Nathan Road Tsimshatsui, Hong

kong. **U.S.A Office:**

8409 Haalli Ford Ct, Plano Texax: 75025

**Payment Terms:** Confirmed Irrevocable Letter of Credit.

**Main Production:** The main product of VTL are in both Knit & Woven fabric, such as Shirts, Pants, Shorts, Short-all, Jumper, Jacket, Sports Wear, Sleep Wear, Ladies Dresses, T-shirts, and Fleece item.

**Main Market :** EU, USA, UK & Canada.

## **Social Policy**

The Viyellatex Limited is committed to the best human workplace practices. Their goal is to continuously improve their Human resource policies and procedures through education, training, communication and employees involvement.

To that end Viyellatex Limited has identified eight (8) areas of importance. The company commits to management review, employees open communication, policy development and coordination with the SA 8000 standard to comply with all state/local laws and industrial/factory laws of peoples republic of Bangladesh to provide a favorable employment environment that respects understands the needs of its employees.

The company commits to inform all employees of its policy and position on the SA 8000 standard. All employees will be made aware of the policy and company statement upon implementation. Going forward all new employees will be trained on SA 8000 in new employees' orientation. Periodically throughout the year the company will reaffirm its commitment to the SA 8000 policy through employee communications such as office notice, demonstration and payroll stuffers.

### **The eight (8) identified areas are:**

1. Child labor
2. Forced labor
3. Health & Safety
4. Freedom of assembly/ Right to collectively bargain
5. Discrimination
6. Disciplinary practices
7. Working hours
8. Remuneration/ Compensation

Number of machine : 10200

Production Line : 170

Capacity / day (all line) : 170000—204000 Pieces

# **PART-02**

## **CHAPTER 03**

### **MAN-POWER MANAGEMENT**

#### **MAN-POWER ORGANOGRAM OF ADMISISTRATION**

- Chairman
- Managing Director
- Director □ General Manager

#### **MANPOWER ORGANOGRAM OF PRODUCTION**

- Production Director
- Production Manager
- Assistant General Manager
- Quality Manager
- Admin Manager
- Admin
- Assistant Admin
- Line Chip
- Supervisor
- Quality Controller
- Operator
- Helper
- Labor

# CHAPTER 04

## MACHINE DESCRIPTION

### **Production Machine Description:**

#### **Pattern making machine:**

1. High speed and accuracy supported by servomotor, straight lead rail and integrated circuit block.
2. Easy to operate.
3. Compatible with any CAD software. 4, Stable performance with long using lifetime

#### **Marker drawing machine:**

Gerber plotter

XLp Plotter Series

The XLp's intuitive LCD display panel and software interface allow for reduced operator learning curves and increased ease of use. The Gerber Win Plot software seamlessly integrates with marker making software and can plot a variety of file formats. **Feature**

- \_ An affordable inkjet plotter with high level of sophistication and quality
- \_ Highest value proposition in terms of price/square meter in its category
- \_ Low maintenance cost; backed with Gerber worldwide service support
- \_ Ink-saving mode to help extend the life of cartridges
- \_ Easy to install and train to minimize disruptions to CAD room.

#### **Cutting Machine:**

Brand name: HIKARI **Description**

- Special base and knife stand. Smooth cutting, labor-saving. There won't cause errors while cutting from both sides.

- Improved knife sharpener prolongs lifetime of knife. Elaborate abrasive belt ensures the sharpness of knife blade.
- Balanced motor, precise startup and stop. No vibration while starting.
- Special gears. No noise when sharpening.
- The parts are finished by CNC processing machines once, which are standard and precise.
- Directly cut the pattern pieces from the fabric lays
- Cutting speed high
- Sharp and heavy corners can be cut
- Blade is very sharp
- Blade height 10-33 cm
- Blade stropped 2.5 cm-4.5 cm

### **Sewing Machine Description**

#### **Which are used in sewing section:**

- Plain m/c
- Over lock m/c
- Flat lock m/c
- Kansai m/c
- Chain stitch m/c
- Vertical m/c
- Eye late hole m/c
- Two needle m/c
- Feed off the Arm m/c
- Zigzag m/c
- Bar tack m/c

- 
- Button Holing m/c
  - Button attach m/c
  - Snap Button attach m/c

**Description of the Plain Machines Are Bellow:**

**Properties**

- One needle
- Two tensionless
- Three guide
- One hook
- Two thread
- One bobbin case
- One magnate guide

**Applications**

- Bottom hemming
- Belt top seem stitch
- Belt joint stitch
- Loop tack stitch
- Pocket joint stitch
- Jip per joint
- Flap make
- Flap top stitch

**Flat lock m/c:**

**Properties**

- 
- 4 tensioned
- 3 thread
- Contain a holder □ 2 needle

### **Applications**

- Zigzag stitch
- Knit hemming □ Loop making

### **Over lock sewing m/c:**

Overlook stitching was invented by the Marrow Machine Company in 1881. An overlook stitch sews over the edge of one or two pieces of cloth for edging, hemming or seaming. Usually an overlook sewing machine will cut the edges of the cloth as they are fed through (such machines are called 'serge's'), though some are made without cutters. The inclusion of automated cutters allows over lock machines to create finished seams easily and quickly **Specifications**

- This over lock sewing machine is applicable to cover edging operation of thin, moderate and thick fabrics. Due to its automatic lubricating device.
- The machine operates perfectly and smoothly at low sewing tension, and perfect stable stitches even at high speed seaming □ Suitable for thin, moderate and thick fabrics.

### **Properties**

- 5 thread
- 4 tensioned
- 2 knives (up / down)
- 2 needle for 5 threads
- 1 needle for 3 threads
- 3 looper for 5 threads
- 2 looper for 3 threads



## **Applications**

- Over lock stitch

## **Bar tack m/c:**

The high speed bar tacking machine is designed for making reinforced stitching or various kinds of clothing such as suits/jeans and working clothes and also for eye let button hole tacking. Tack length can be easily adjusted. Reduction gear and some mechanism simplified to get improved durability and reliability.

## **Feature**

- New type V belt with double tier mechanism which is simple and much more reliable has been adopted which eliminates thread breaking at high speed.
- Space on machine helps superior cloth movement.
- Independent auto thread trimming mechanism.
- Smoother feed cam adjustment helps in easier tack size control.

## **Applications**

To created Barack stitches in garments. Bar tacking is a specialized sewing stitch designed to provide immense tensile strength to the garment or equipment it is used on. Bar tacking is commonly used on backpacks, tents, tactical gear, and other heavy wear sewn items where normally sewn stitches might give way at a crucial moment. In general, bar tacking is a sign of good quality, although the rest of the product should always be looked over carefully as well. When a sewing pattern calls for bar tacking, it indicates that the designer feels that section of the pattern is a critical area that needs extra reinforcement and following areas it can used.

- Loop attach
- Fly make

- Pocket side
- Front side
- Back pocketing
- Zipper lay  In seem

### **Kansai m/c:**

Kansai sewing machine is suitable for zigzag sewing, embroidery, abutted seam on light and medium material. It has excellent performance ratio and is conveniently arranged. It has bobbin winder integrated in the arm cover with in operator's view. It is suitable to sew underwear, corset, waist sections of ladies body suits, and swim suits.

### **Properties**

- 2 needle
- 4 thread
- 8 tensioned
- 21 lopper point (used two lopper depends on distance of stitches)

### **Applications**

- Back yoke stitch
- Back belt stitch

### **Chain stitch m/c:**

Chain stitch is a sewing and embroidery technique in which a series of looped stitches form a chain-like pattern. Chain stitch is an ancient craft – examples of surviving Chinese chain stitch embroidery worked in silk thread have been dated to the Warring States period (5th-3rd century BC). Handmade chain stitch embroidery does not require that the needle pass through more than one layer of fabric. For this reason the stitch is an effective surface embellishment near seams on finished

fabric. Because chain stitches can form flowing, curved lines, they are used in many surface embroidery styles that mimic “drawing” in thread

### **Properties**

- 2 needle
- 2 looped
- 4 thread & 4 tensioned (back 2/front 2)

### **Applications**

- Back rise stitch
- Back yoke stitch Top sin ¼ stitches

### **Feed off the Arm m/c:**

#### **Properties**

- 2 needle
- 2 Lopper
- 4 thread (Lopper 2/needle 2) ➤ Contains T & Magnate guide
- 3 tensioned

#### **Applications**

- Back rise stitch
- Inseam stitch
- Back yoke top sin

### **Button Holing m/c:**

Buttonholes are holes in fabric which allow buttons to pass through, securing one piece of the fabric to another. The raw edges of a buttonhole are usually finished

with stitching. This may be done either by hand or by a sewing machine. Some forms of button, such as a Mandarin button, use a loop of cloth or rope instead of a buttonhole. **Properties** 2 thread

- 1 needle
- 2 tensioned
- Contains bobbin case, hook & knife

### **Applications**

- To attached button in garment

### **Button Attach m/c:**

- This is a single needle chain stitch button sewing machine which inherits the excellent sewing capability and hassle free operation.
- The four hole button sewing mode can be easily switched over to two whole button sewing.
- Number of stitches and stitching patterns are easily adaptable.
- The machine ensures consistence sewing performances even at maximum speed 1500 spm. □The thread trimming mechanism helps to produce beautifully finished seam with lesser thread consumption. □Suitable for all kinds of shirts suits and work uniform.

### **Applications**

- To attach button in get.

### **Embroidery Designs machine**

Embroidery is an ancient variety of decorative needlework in which designs and pictures are created by stitching strands of some material on to a layer of another material. Most embroidery uses thread or wool stitched onto a woven fabric.

**Machine Description:**

Category Commercial Embroidery, 1 Head Region Detroit, MI Title Melco Saurer Amaya XT Description 2 machines, 2007, 16 Needle commercial embroidery machine.

**Washing machine:**

ONELLO, Industrial washing machine for stone washing, model G1 300, matr. 0284, with opening sampling pass thought, max load 200 Kg power supply 300 volts, 50 Hz, 40 kw, complete with control panel, size approx. 2700x2400x3100h, with stainless steel tank for introducing products, year 1990.

**Dryer machine:**

NEW HORIZON

Ngai shying new horizon Co. Ltd

# CHAPTER-05

## RAW MATERIAL & STORE

### Types of Raw Materials

Fabric: Woven and Knit Fabric

Accessories: Thread, Button, Zipper, Fuse, Hook, Clip, Elastic, Hanger, Poly, Hang tag, Main Level, Size level, C/O level, Tag pin, Patch level, Price Ticket, Button, etc.

Washing Chemical: Necessary raw materials required for stone, Pigment, Acid, bleach & Enzyme Wash These very according to the order of the buyer

**Sources of Raw Materials** Required raw materials are purchased from following countries through agent:

- Hong- Kong
- Taiwan
- Philippines
- India
- Germany
- Brazil
- Pakistan □ South china

### Store

It has big store room within fabric, trimming, accessories, box, readymade garments, contains difference types materials electrical and machinery accessories. Mainly it two sections such types of section are **Technical Store:**

- It contains various types electrical, machinery & materials which supply in many section of garments, such as
- Various types of sewing m/c and their parts
- Guide Clamp Shuttle carrier Zipper guide Belt Shuttle
- Feed dog Hand glove spring
- Folder Knife Bobbin winter

- Guard Blade Screw
- Lopper Roller covers Patty
- Attachments sate Needle Finger
- Bobbin Pressure feed Rotary hook
- Bobbin case

**There are many types of standard commercial name of fabric i.e. are bellow**

- denim
- drill
- gabardine
- poplin
- jean
- shirting
- sheeting  suiting

**Denim:**

A well-known basic cotton or blended fabric it is generally 2/1 or 3/1 warped faced right hand twill. This is very durable most popular all over the world. Now this time all types of fashionable garments are made from denim mainly used in sportswear and evening wear. The fabric specification of denim= (20 x16 Ne)/ (90X60) **Drill:** A strong, warp-faced, cotton twill fabric of medium to heavy weight generally made with coarse carded yarns in in a two up, one down left- hand twill, in a dense construction. Resembles one denim bat the latter is warp faced, right hand twill. Three up one down twill is also called as drill. The fabric specification of denim= (14 x16 tex)/ (50X32cm), (27x46tex)/ (44x32cm), (38x43tex)/ (36x20cm). Used in the greige bleached, or printed state, for a wide variety of such uses as work cloths, pocketing, shoe- linings, uniforms, book bindings, coated fabrics, industrial fabrics.

**Gabardine:**

A tightly woven, warp- faced made with 45 or 63 degree angle twill and given a clear finish. The warp generally employs twice the number of the yarns per inch as thus filling at the diagonal rib or cord is distinct, closely set and raised. Made with carded or combed, single or ply yarns of worsted, cotton, silk, manufactured staple and various combinations in dress and suiting weights. This types of fabrics are mainly used in men's, women's, children's wear, sportswear, suit's, uniforms riding habits, rain coats, sky wear, fabric shoes.

**Poplin:**

A durable plain weave fabric having fine cross ribs produced by employing work that are finer then the filling yarns, with about two or three times as many end per inch as picks. It is produced from combination of such types of fibers such as silk, cotton, wool. It is mainly used in women's wear, sportswear, shirt, pajamas, and decorative fabrics. The specification of a poplin fabric = (14/2 x 60 Ne) / (60 x 14).

**Jeans:**

It is warp-faced fabric. It is also three harness cotton or cotton blend twill fabric. In Jean fabrics generally woven of corded yarns in weights lighter than drill, it has more



yarn per inch and finer twill line than drill. Jeans occasionally are made with cotton warp and low-grade wool or Soddy filling. It is used backing of the coated fabrics children's sportswear, decorative fabrics. The specification of a jeans fabric = (30 x 30 Tex) / (36 x 26 cm).

### **Sheeting:**

It made in higher counts for domestic uses such as bed sheets, table sheets and floor sheets. Sheeting is made in medium and heavy weight in the following classification: coarse, ordinary lightweight, narrow, soft-fillet and wide. It also may form of linen or nylon yarns. It may be needed sheeting fabric which is used in fitted crib and bed sheet. Industrial sheeting's are made from cotton yarns. These types of fabric are mainly used in wall cloth, floor covering, rubberized goods, windows shads and furniture covering.

### **Suiting:**

Suiting is more important types of fabrics that have body and tailor well. It is general term for a draoad. It is used for men's women's suits, sportswear and occasionally dresses. Wool manufactured fibers, especially spun types; cotton, linen and other fiber are used either alone or in blends and combination.

### **Voile:**

a light-weight, sheer fabric with a crisp, wiry hand, made of hard twist yarns in a low count plain with weave. Voile fabric is made from cotton, silk, rayon, acetate and worsted. Voile fabric generally has substantially more twist than warp yarns. It is used in women's wear as blouses certain and dress etc. **Fabric accessories There many types of fabric accessories are used in garments manufacturing sectors, which are below-**

- Thread
- Button
- Zipper
- Fuse
- Hook
- Clip

## CHAPTER 06

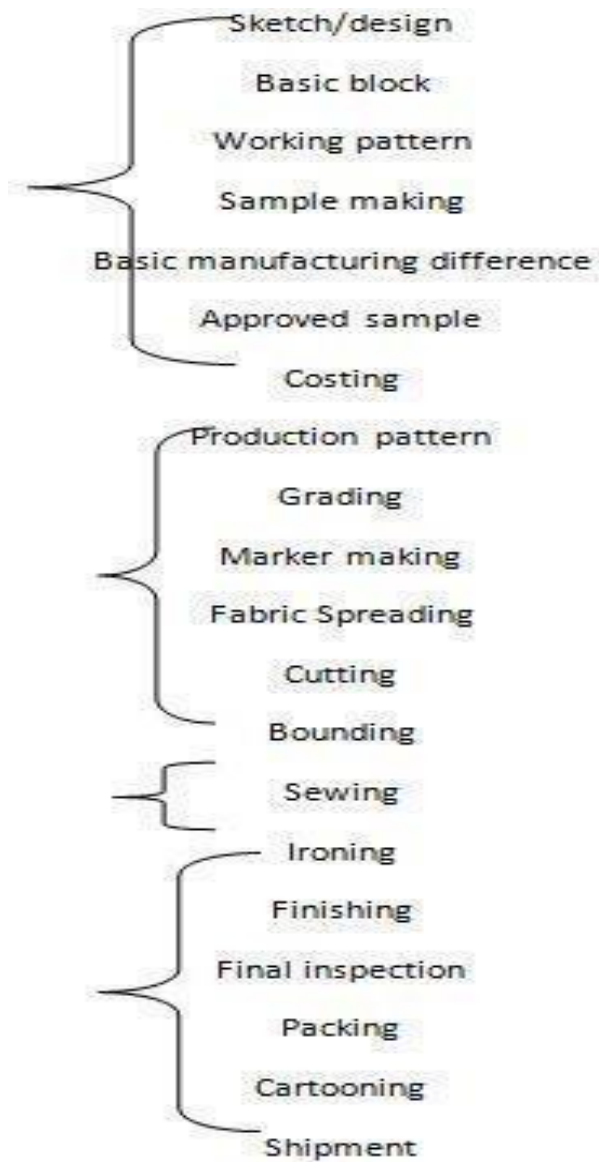
# PRODUCTION PLANNING, SEQUENCES & OPERATION

### Swatch Making

Swatch making is more important work garment sector. In line to line m/c to m/c work continue according to swatch card. A card which contains garment making fabric and fabrics accessories such as – threads, buttons, elastics, level, japers e.g. . These types of card are called as swatch card. E.g. in bellow- **Swatch card contains following items–**

- Fabric
- Buttons
- Threads
- Levels
- Hocks
- Elastics □ Zippers, etc.

### Sequence of garment manufacturing proce



## **CAD, Pattern & Marker Department**

### **CAD:**

Computer-aided design (CAD) is the use of computer technology for the design of objects, real or virtual. CAD often involves more than just shapes. As in the manual drafting of technical and engineering drawings, the output of CAD must convey information, such as materials, processes, dimensions, and tolerances, according to application-specific conventions.

CAD may be used to design curves and figures in two-dimensional (2D) space; or curves, surfaces, and solids in three-dimensional (3D) objects.

CAD is an important industrial art extensively used in many applications, including automotive, shipbuilding, and aerospace industries, industrial and architectural design, prosthetics, and many more. CAD is also widely used to produce computer animation for special effects in movies, advertising and technical manuals. The modern ubiquity and power of computers means that even perfume bottles and shampoo dispensers are designed using techniques unheard of by engineers of the 1960s. Because of its enormous economic importance, CAD has been a major driving force for research in computational geometry, computer graphics (both hardware and software), and discrete differential geometry.

**Pattern:**

An ornamental design in a fabric Pattern may be produced either by the construction of the fabric by applying designs, by other means for printing, embossing or embroidery.

**Marker:**

It is a thin paper which contains all the necessary pattern pieces for all sizes for a particular style of garments. It gives special instructions for cutting. It can be done both manually and computerized method.

In computerized method all information's are stored in the pre-fashioned data file and an operator helps the computer to make the best choice.

Maker width is taken according to the fabric width. Fabric spreading should be done by taking the guideline from maker width **Points should be considered before maker making:**

- Fabric width must be higher than maker width (1/2").
- Fabric length must be higher than maker length (1"+1").
- When pattern pieces are laid down on the layer of fabric, the grain line should be parallel to the line of the warp in a woven fabric and Wales in knit fabric where pattern pieces are laid across the layers, the line is kept parallel to weft / course.
- All the pattern pieces of a garment should be along the same direction when laid down on an asymmetric fabric.

Length of cutting table should be considered.

Plan for garments production should also be considered.

For the efficient marker, it is required to ensure the following things:

- One should be easily see the full length.
- To know about the appropriate width.
- The marker starts with the large pattern pieces. Then fits the smaller pieces in the gap of the larger pieces. Thus the fabric wastage is minimized and efficiency is increased.
- After that the patterns are shuffled in various directions to reduce the marker length. It also helps to increase maker efficiency.

1. Sample section

2. Cutting section

3. Sewing section

4. Washing

5. Finishing section

### **Sample Department**

Sketch received from buyer to, manufacturers containing design including measurement of the style. Assimilating of diagram of net dimension on paper each and individual part which is called pattern when move with it throughout the whole manufacturing processes. After getting all the specs the sample is made and then it tested, inspected and other standard tested method when sample is ok, then it is sent to buyer for identify the faults of sample and point it. After that it returned to sample department .after rectify the sample is again sent to buyers. If it is ok, then start manufacturing processes.

### **Flow chart of sample department**

#### **Sketch/design**

(It is given by buyer for make sample and products are made according to that style of designed) **Basic block**

(Without any allowance)

### **Working pattern**

(To make of garment according to design) **Sample making**

(Sample is made by sample man)

### **Basic manufacturing difference**

(Critical path is identify)

### **Approved sample**

(Sample approved by buyer)

### **Costing**

(To esteemed the making charge, trimming, fabric required and profit)

### **Cutting**

#### **Section Fabric**

#### **cutting:**

The definition of fabric is very complex. In garments industries fabric is cut from lay and spreading accuracy and properly which is termed as fabric cutting.

#### **Production pattern**

(To make production pattern for fabric cutting)

#### **Grading**

(It is done according to difference size) **Marker**

#### **making**

(To make marker according to various parts of production pattern)

#### **Fabric spreading**

(To spread the fabric for cut) **Cutting**

(To cut the fabric) **Bunding**

(To make the bundle according to various types of garment parts)

#### **Requirements of fabric cutting:**

- In cutting
  - Precession of cut
  - Clean edge
  - Infused edge
- Consistency  Support of the lay

### **Lay Preparation:**

- Layers shall collect lay slip, cutting job card, lay sheet from the misusing person.
- Layers shall lay the fabric according to the lay slip details.
- Layers shall collect rolls of only one shade and one width for the lay at a time, if any shade change is noticed then use separators- i.e. lay sheet has to be placed for identification.
- The cutting in charge has to decide upon the kind of lay such as – face-toface, face to back, face up, face down, grain line, and nap direction during the PP meeting stage upon the analysis of the garment. Use laid separator sheets to separate rolls of different shades if used in the same lay—the shade category should be mentioned on every lay separator sheet also. **Lay**

### **Precaution:**

- During lying the layers should check the lay-to-lay shade variation & also center to selvedge variation as a part of online check procedure.
- QC shall inspect the lay for lay tension, width, length, grain line, nap direction etc. End wastage for lying of fabric shouldn't be more than 1 cm.

### **Bulk Cutting:**

- Lay wise manpower requirement must be planned.
- Cutters must be trained on the methods of accurate cutting, especially for parts with deep curves.

If possible diagrammatic representation of the direction of movement of the cutter needs to be illustrated.

- Cutters shall inspect the cutting machine for oil leakage, straightness of the blade, sharpening quality, evenness in sharpening of the blade, dust accumulation before cutting.
- Cutters shall cut lay as per the mark up using straight knife m/c and move the parts to band knife as per the discussion in PP meeting.
- QC shall inspect all the cut parts using patterns and initiate corrective action upon the detection of defect.
- Prepare 1st cut bundle inspection report; notify fabric defects and cutting defects to FM/PM.
- QC should have a cutting checklist against which 1st bundle audit has to be conducted. Checklist should have details of allowances, tolerance included in pattern, notches and embellishments placement markings details.
- The size of the straight knife for cutting lightweight fabrics should be 6" only.
- Straight knife must be uniformly sharpened from top to bottom as frequently required; this ensures even sharpening along the full length of the knife/blade.

**Note: If sharpening of blade is uneven / inconsistent, it would result in uneven depth of notch marks and variation in cutting too...**

- For Band knife cutting, patterns preferably made of tin should be used.
- The patterns used for band knife must be changed regularly upon monitoring the wear and tear on the pattern, due to frequent usage.

**Method of fabric cutting:**

There are three method of cutting are follow



- Manual
- Hand operated scissor.
- Manually operated power knife
  - Straight knife
  - Band knife
  - Round knife ➤
  - Die knife
    - Notched
    - Drill
    - Computerized
    - Knife
    - Laser
    - Water knife □ Plasma torch

**Straight knife cutting machines are used in Opex & Sinha Textile Group. Because it has some advantages from others which are follows.**

- Comparatively cheap
- Can be transferred easily
- Easily operated
- Round corner can cut smooth easily
- Fabric can be cut from any angle
- Directly garments components separated from fabric lays

The quantity of fabric which is required to produce a garment is called consumption. We can calculate and determine the consumption of fabric by the following two systems:

#### I. Marker planning system

##### **Marker Planning System:**

In the system mentioned here studying the range of size, following six pcs of six sizes can be sorted out from size range. As in XS, S, M, L, XL, XXL Besides these we can choose three pcs of three size or twelve pcs of twelve sizes for our convenience. It depends on our intelligence and the size range; thereafter paper pattern can be made by grading to the above garments as per measurement sheet. Having made the paper pattern it should have to lay each parts of the paper pattern on a marker paper of similar fabric width. After marking the paper pattern if we measure marker paper to length wise, we will find an aggregate consumption of six pcs of garment. If the aggregate is divided by six, we will find a consumption of one pc garment as such we will find a consumption of one dozen garments from the above system calculations.

##### **Mathematical system:**

Whatever is the fabric consumption of a garment or whatever quantity of fabric is required to produce a garment is measured by mathematical system. Mathematical system is a system of rough estimation.

Consumption of a sample garment or consumption as per measurement sheet is calculated mathematically by measuring the area of length and width of each parts of each pcs of garment

##### **Fabric Consumption Calculation of a Basic Pant:**

Fabric width =60" -1"

$\frac{1}{2}$  waist circular =46cm +8(seam allowance) =54cm

Front rise =28cm including WB +8(seam allowance) =36cm

$\frac{1}{2}$  thigh circular =36cm+6(seam allowance) = 42cm

Inseam length =82cm +3(seam allowance) =85cm

# Consumption formula = (½ waist cir x front rise) x2 + (½ thigh cir x inseam length)  
x 4 ÷ 36 ÷ 59 + waste %

= [ {(54x 36) x2} + {(42x85) x4} ÷ 36 ÷ 59 + 5% ] cm

= [(3888+14280) ÷ 6.45 ÷ 36 ÷ 59 + 0.05] yds/piece

= (1.326+0.05) yds/piece

= 1.72 yds/piece

= 1.78 yds/piece

### **Numbering:**

Sorting out the components according to size and for each size make individual bundle

Cutting no: 3

Bundle no: 2

Style no: 1700

Quantity: 10

Color: Red

Parts name: Pocket

Size's M L: 8c

Serial no:

145170=26 **Bundle**

### **card:**

The bundle card is most important in the garments section. In export qualify garments any type of shading and size mistake is not accepted, so it is used. Because buyer can not accepted any types of shading and size mistake garments.

### **Bundle number: 08**

Company name: VIYELLATEX LIMITED

Top:

Sample:

Color: Dark wash

Style no: 45721

Quantity: 10 pies

Figure of bundle card 26. Understanding the information in a Bundle card

Company name: Bundle card contains name of it manufacturing company. Color: It contains names of color. Because garment has many types color such as Red,

Black, Yellow, Blue, Green etc.

Style no: Company gives various types of style number. Normally it has five digit number ex. 45216, 54213, 58746.

Quantity: which amount of pcs of garment contains in a bundle, it is write on the bundle card. Ex- 10, 12, 14.

## **Sewing Section**

### **Flow chart of sewing section for working process:**

#### **Production pattern**

(To make pattern for garment)

#### **Grading**

(It is done according to difference size) **Marker**

#### **making**

(To make marker)

#### **Fabric spreading**

(To speared the garment for cutting)

#### **Cutting**

(To cut the fabric for garment manufacturing) **Bunding**

(To speared the various parts of garment)

#### **Sewing thread inspection:**

Thread inspections are able to move 140-160 km speed per hours during into the needle eye of sewing machine.

Strength of thread must be 2-32 due to friction between the threads and parts of machine.

**Criteria of sewing thread:** The following are the tests done to identify thread construction.

- Thread count
- Thread ply

- Thread number of twist
- Thread balance
- Thread tenacity □      Thread elongation

Quality control if sewing section

The following three defects should be identify and must make defect three in the quality control section. **Sewing defects:**

- Needle damage,
- Skipped stitch,
- Tread drawn off,
- seam pucker,
- Wrong stitch density,
- Uneven stitch,
- staggered stitch,
- Defected stitch,
- Oil spot.

**Seaming defects:**

- Uneven width
- Uneven seam line
- Not secured by back stitch
- Twisting
- No matching of check or stripe
- No matching of seam
- Unexpected materials are attached with the seam

Not sewn by matching face side or back side of fabrics

Use of wrong stitch type

Wrong shade matching of

## thread **Assembly**

### **defects:**

- Defected finished components by size
- Imperfect garments size
- Use of wrong ticket
- Missing of any parts of garments
- Imperfect alignment of components
- Wrong placing
- Folding
- Looseness
- Shade variations
- False direction of fabric part
- Imperfect matching of trimming in the garments.

## **Embroidery Designs Section**

Embroidery is an ancient variety of decorative needlework in which designs and pictures are created by stitching strands of some material on to a layer of another material. Most embroidery uses thread or wool stitched onto a woven fabric.

Embroidery has traditionally been used to decorate clothing and household furnishings including table linens, tray cloths, towels and bedding, but you can literally embroider anything as long as it is made out of an evenly woven fabric and can be held firmly in the hand or in a special embroidery hoop or tapestry frame. The art of hand embroidery is a painstaking and laborious process, but today garments are often decorated with machine embroidery instead.

Embroidery has also been used as a form of art and for decoration, through the creation of embroidered or cross-stitch samplers, tapestries, wall-hangings and

other works of textile art. Annemieke Mein is one example of a contemporary textile artist who creates embroidered work. **Embroidery Styles and Techniques**

**Some embroidery styles include:**

- Assisi Embroidery
- Bargello or Florentine embroidery
- Black work Embroidery
- Bunka Shishu
- Canvas work
- Counted-thread embroidery
- Crewel embroidery
- Cross-stitch (can mean the particular stitch or a style of embroidery)
- Drawn thread work
- Gold work
- Hard anger embroidery
- White work

**Washing Unit**

Production in washing plant **WASHING:**

- Garments wash
- Enzyme wash
- Stone wash
- Stone + enzyme
- Bleach wash
- Acid wash
- Monkey wash
- Sand blast

- Tint wash
- Pigment wash
- Garments over dyeing
- Heavy garments wash

**DYEING:**

- a. Garments dyeing
- b. Direct dye
- c. Reactive dye.

Production planning, sequences & operation in washing plant

**Production parameters:**

Mismatching / shade variation of fabric

Spotted garments

Machine breakdown

Variable ratio of water and chemicals

20% wastage accepted

**DESCRIPTION OF PRODUCTION PROCESS:**

The general production process is given below-

Store-washing manager –washing in charge – dyeing master / chemist- normal/  
enzyme wash

Store shade matching –drying hydro extracting – shade matching dyeing

**Chemicals used**

- Acetic acid
- Anti stain lp-301/pa310
- Ansipan de paste
- Bleaching powder
- Enzymes/j90
- Hydrogen per oxide



- Hypo
- Soda ash
- Deny light ail
- Solo soft – mw
- Eosin mac-99
- Hotspur wc
- Enosize hts
- Silicon oil-1070
- Pumic stone
- Flickering ffr/wrd
- Gobar salt
- Waiting agent
- Brightener
- Common salt
- Potassium per manganese
- Staple
- Apriton
- Aluminum oxide □      Occuplex-dnnt

**SAMPLE WASHING:**

**1. Normal wash:**

- For 3 or 4 pieces garments Softener 100-200 gm.
- Silicone 100-300 gm. □ For denim in case of normal wash any of the desizing and softener step is done.

## 2. Pigment wash:

- Ionize hits pigments will be catalyzed at 300- 500 gm.
- Water 70 litter. ○ 20-30 minutes ○ 2 rinse ○
  - 4 types of pigments are used ○ Cold water used to dissolve the color ○ Machine will start run by using 50 litter water. ○ Temp will start run by using 50 litter water. ○ 20 to 30 minutes to beat the color ○ Machine will start run by using 50 litter water ○ Temp will be color brightener are used 100 gm for 2-3 minutes
- 2rinse
- Dryer used to dry □ 3. Bleach wash ➤
  - For denim 2 to 3 pieces
- Desizing agent used 150 gm and anti-stain agent used 200 gm.
- 60 degree temp
- 10 minutes
- 2 rinse
- Enzyme used 150to 200 gm and stone 5 kg
- Time 30 to 40 minutes
- 2 rinse will take 15 to 30 minutes
- Bleach is used 1 kg
- 5to 10 minutes
- to destroy the smell of the bleach hypo is used after bleaching 300 gm for 2 legs for 1 to 2 minutes
- Next acetic acid is used 100 to 150 gm.

- 1 rinse
- Softener is used 100 to 200 gm.
- 2 minutes.
- Dryer.

#### **4. Enzyme + stone wash:**

- Desizing agent used 150 gm and anti- stain agent used 200 gm.
- Temp 60 degree
- Time 10 minutes
- 2 rinse
- Enzyme used 150 to 200 gm. And stone 5 kg
- Time 30 to 40 minutes
- 2 rinse
- Softener 100-200 gm.
- 2 minutes. □ Dryer

#### **5. Acid wash**

- Desizing agent 150 gm and anti-stain 200 gm.
- Tem, 60 degree
- Time 10 minutes
- 2 rinse □ Dryer

#### **Sand blasting and other dry process**

Sand blasting is a mechanical process of faded affect formation on garments fade from heavy fabrics like denim and jeans, this process is followed by a wash of dying process. Aluminum oxide is used for sand blasting. These aluminum oxides are blown at very high pressure through a gun, the gun has a switch to start and stop

flow of aluminum oxides. Garments to be sand blasted are placed on the bed of closed chamber. Then the gun is operated by hand, when the switch of the gun is operated, aluminum oxides from a feeding chamber through pipe and gun starts blowing. the blowing of aluminum oxides are done on the garments surface , the area of the garments fabric surface is instantly faded by the flowing action of aluminum oxide due to frictional effect of aluminum oxide the blow of the aluminum oxides on the garment fabric surface is controlled at 10 degree to 20 degree angle. Higher the blowing angle, higher the fading affect and higher the risk of garments fabric damage.

### **OTHER DRY PROCESS:**

1. Hand rubbing
2. Hand carping
3. Wrinkle
4. Grinding and destroy
5. P. P. spray
6. P. P. sponging

### **Finishing Section**

The process by which unwanted crease and crinkle are removed with the view of increasing smoothness, brightness and beauty of the garments is called pressing. In the garments industries it is called ironing.

This process plays an important role to grow attractiveness to the buyers.

### **Materials used in garment Finishing:**

- Iron Muster cartoon box
- Hanger Size sticker
- Elastic clip Poly bag
- Joker Inner box
- Gum taps Neck board
- Full board Tag pin

- Tissue paper AI pin
- Hand tag Ball pin
- Back board Blister

**Flow chart of working processes in Finishing  
Section Of Opex & Viyellatex Limited is  
gives in bellow:**

**Inside quality control**

(To checked inside of a garments)

**Get up quality control**

(To checked all processes of garments making)

**Ironing**

(To iron the garments)

**Measurement checking**

(To measure all parts of the garments for accuracy)

**Waist**

(To attach Waist)

**Button attach**

(To attach button) **Re-ironing**

(To iron again)

**Again checking**

(To check again) **Hand**

**tagging**

(To attach hand tag)

**Folding / hungering**

(To folding/hungering according to buyer requirement)

**Shading**

(To separate various shade of garments)

### **Packing**

(To pack in the poly bag) **Cartooning**

(To keep on carton on buyer requirements)

### **Cartooning**

Cartooning is very important every production manufacturing company for final product shipment.

Types of carton:

**DEPEND ON PAPER:** 1. Khaki Carton or Brown Carton

2. Duplex Carton

3. Box Carton

**DEPEND ON STITCHING:** 1. Stitching Carton

2. Now stitching /Gum Pasting Carton or Metal Free Carton

3. **DEPEND ON PLY:** 1. 3 Ply Carton

2. 5 Ply Carton

3. 7 Ply Carton

4. **DEPEND ON LINER:** 1. Both Side Liner Carton

2. out Side Liner Carton

5. **DEPEND ON SIZE:** 1. Master Carton

: 2. Inner Carton

### **Carton measurement:**

FORMULA (1) = (L+W) (W+H) X2 in cm (Without Wastage)

100X100

FURMULA (2) = (L+W+6) X (W+H+4) X 2/10000 (Include Wastage)

PRICE = (L+W) (W+H) X 2 x Rate per Square Meter

100x100

= Rate/Pc

Example 1: Here,

Length: 30,

Width: 40,

Height: 20,

Ply: 7cm

Quantity: 20000 pcs

From (2) =  $(30+40+6) \times (40+20+4) \times 2/10000$

= 0.97 Square Meter.

Rate for 7 PLY = .60 USD [For GMTS Export Natural 7 Ply Used

5 PLY = .39 USD (.55X 5/7) (Less wt. Master Carton)

3 PLY = .23 USD (It is used as inner carton)

1 carton = 24pcs

24 pcs = 1 cartoon

1

So, 1, =  $\frac{1}{24}$  ,

24

1X20000

So, 20000, =  $\frac{20000}{24}$  ,

24

= 833.33,

= 834.00 (approx.) Cartoon

Total cartoon number for shipment = 834.00

### **Final Inspection**

Garments are inspected by AQL. In this system samples are collected inspected by statistically from the lot size and will decide the lot of garments to be granted or rejected. AQL is mainly used in final inspection after garment making.

Acceptable quality level (AQL) sample inspection methods have been proven to be accurate over a long run. However, the quality level of merchandise at destination is sometimes lower than the per-shipment inspection results. This may be due to transport, handling, change in environment and/or reliability problems. Buyers are therefore advised to take this into consideration when deciding the AQL levels. Defect Classification: The client defines the AQL and the maximum number of

defective goods allowed in the sample size. Defects detected during visual inspection are usually classified within 3 categories:

“Critical”, “Major” and “Minor”

Critical: likely to result in unsafe condition or contravene mandatory regulation or reject by import customs.

Major: reduces the usability/function and/or sale of the product or is an obvious appearance defect. Minor: doesn't reduce the usability/function of the product, but is a defect beyond the defined quality standard more or less reduces the sale of the products.

An Individual with defect(s) is called defective sample. In the inspection process, one defective sample is counted one for the most serious defect only no matter how many defects found in the said sample. Clients can specify what points are minor, major or critical in a defect classification checking-list together with the inspection criteria and product specification.



# CHAPTER 7

## EFFLUENT TREATMENT PLANT (ETP)

### **Introduction:**

In this industrialized age, environmental pollution is a matter of great concern. Surface water pollution is one of the elements of environmental pollution. Chemical processing industries especially textile processing industries are claimed to produce huge effluent to discharge in our rivers. A complex mixture of hazardous chemicals both organic and inorganic is discharged into the water bodies from all these industries, usually without treatment.

It is well known that textile mills consume large volume of water for various processes such as sizing, desizing, scouring, bleaching, mercerizing, dyeing, printing, finishing and washing. Due to the nature of various chemical processing of textiles, large volumes of wastewater with numerous pollutants are discharged every day. In Bangladesh most of the industrial units are located along the banks of the rivers and they do not use Effluent Treatment Plant (ETP) for wastewater. As a consequence, industrial units drain effluent directly into the rivers without consideration of the environment.

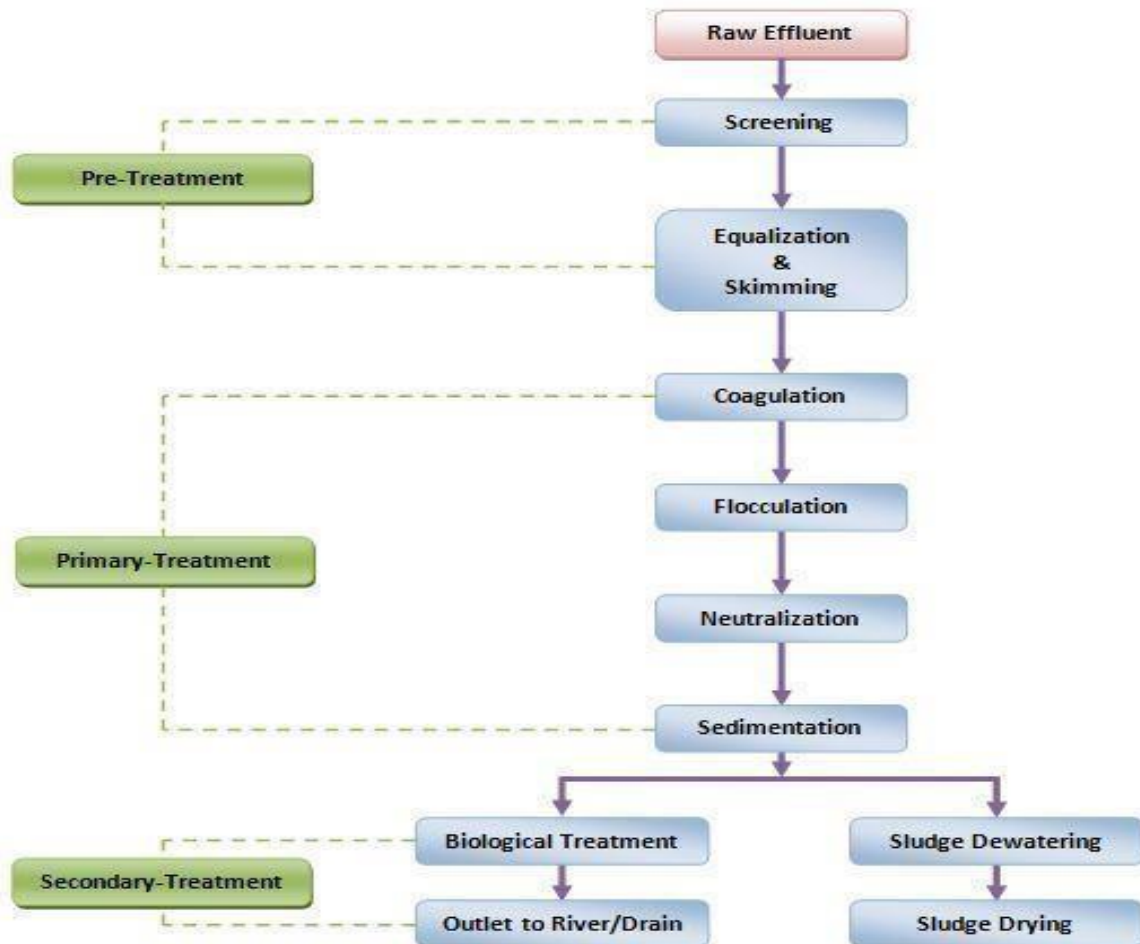
Setup an effluent treatment plant is mandatory for a factory today. Authority gives no permission of electricity and gas connection to a new factory without ETP.

<b>Flow Rate</b>	<b>30 m<sup>3</sup>/hr</b>
PH	8-14
BOD	400-600 PPM
COD	1000-1200 PPM
TSS	200-500 PPM
TDS	3000-6000 PPM
Oil & Grease	30-60 PPM
Colour	Dark Mixed
Temperature	600C

**Outlet Effluent Parameters (Bangladesh Standard):**

Flow Rate	30 m <sup>3</sup> /hr
PH	7-8
BOD	< 50 PPM
COD	<250 PPM
TSS	<100 PPM
TDS	<2000 PPM
Oil & Grease	<10 PPM
Colour	Clean
Temperature	<300C

**Process-flow-chart**



**Pre-Treatment Screening:**

The raw waste water (Raw Effluent) from the process of the plant would be first screened through a manual bar screen strainer channel, where all particles with dia. > 5mm as well as small pieces of the fiber and floating suspended matters like polythene paper, polythene bags, rags and others materials removed by bar screen net. The bar screen consists of parallel rods or bars and is also called a bar rack. These devices are used to protect downstream equipment such as pumps, lines, valves etc. from damage and clogging by rags and other large objects. The bar screen is cleaned manually by means of rakes. The screening is disposed of suitably after they are de-watering. The screened clean effluent flows by gravity to an equalization tank.

### **Equalization and Skimming:**

The raw waste water from the screen chamber is collected in the equalization tank, where it is equalized with respect to its characteristics and homogenous flow and an uniform pollution load as well as to make bacteria acclimatized the waste water is stored in a tank. High speed bottom fixed aerating device which blows air through the waste at a rate about 0.1 CUF of air per gallon of effluent. The rising air tends to coagulate the grease and oils and cause them to rise to the surface where they can be removed by a scraper mechanism. Besides, in order to accomplish a proper equalization of both varying loading and flocculating pH values. The equalization tank is designed for hydraulic retention time of around 6 hours.

A substantial part of the COD will also be removed by the dissolved air flotation process.

### **Primary-Treatment**

#### **Coagulation & Flocculation:**

The homogenized effluent is then pumped to a flash mixing tank followed by a flocculation tank. Where added coagulants like lime (Calcium Hydroxide) and Ferrous Sulfate ( $\text{FeSO}_4$ ) for coagulation of the total dye particles. The basic idea of adding coagulant is to bring together all the suspended and dye particles so that they can precipitate out in a flash mixing and coagulation mechanism. Adequate quantity of poly electrolyte polymer solution are dosed to enhance the process of color removal by the flocculation process.

#### **Precipitation and Sedimentations Tube Settler-1:**

The flocculated effluent is taken by natural gravity in to the tube settler-1 from flocculation tank for precipitation of dyes and suspended particles. The flocs formed are removed in the downstream tube settler-1 by the help of tube settler media. The effluent will further flow by overflow system to a pH correction tank where requisite quantity of acid will be dosed and pH will be adjusted as per the requirement.

**pH Correction:**

The overflow effluent from tube settler-1 tank is then taken by gravity into the pH correction channel for neutralization. 33% HCl acid is dosed for neutralizing the pH from around 10 to 7. The pH correction channel is designed for hydraulic retention time of around 10 minutes and is provided with slow speed agitator for thorough mixing of waste with acid. A pH indicator is installed in the tank for measuring the pH (optional).

**Secondary-Treatment****Biological Reactor 1 & 2:**

The neutralized effluent is taken by gravity into the biological treatment aeration tank for treatment of organic matter to reduce BOD/COD aerobically. The biological reactor is designed on extended aeration principle. The aeration is provided with fixed type surface aerator for providing the required oxygen for the biological degradation of BOD and COD. The air is supplied by means of the bubble diffusion.

**Tube Settler- 2:**

After aerobically treatment effluent flows by gravity to the tube settler – 2, the biological solids generated are removed from the tube settler – 2 by the help of tube settler media.

**Filter Feed Pump:**

The effluent from tube settler – 2 overflow into the pressure sand filter and activated carbon filter feed pump. From here the disinfected effluent is pumped by means of the pressure sand filter feed pump to the pressure sand filter. The pump is normally operated automatically with interlock to the level switch in the filter pump.

**Pressure Sand Filter:**

The effluent is pumped to the pressure sand filter. The filtration takes place in the downward mode. The filter is filled with a layer of graded sand media supported by a layer of graded gravel. The suspended matter in the effluent is filtered out in this unit, the effluent is then flown into the activated carbon filter.

**Activated Carbon Filter:**

The filtered effluent from the pressure sand filter flows into the activated carbon filter. In this unit the feed flow is downward through a layer of granular activated carbon filter in which dissolved organics in the effluent are absorbed.

**Treated Effluent Tank:**

The effluent emanating from the activated carbon filter is collected in the treated tank. From this sump the final treated effluent is disposed off. As indicated before, this effluent is utilized for backwashing the pressure sand filter and activated carbon filter units.

**Sludge Treatment:**

The sludge generated in tube settler-1, tube settler-2 and biological reactor is taken to a sludge sump and pumped to a sludge thickener where sludge is concentrated. The thickened sludge from the thickener shall be pumped to sludge drying bed for de-watering. The de-watered sludge is formed into cake by natural dry or a centrifuge. The dried cake will be disposed in a tank. The overflow from the sludge thickener will be flow back to equalization tank for further treatment.

# CHAPTER 08

## QUALITY ASSURANCE SYSTEM

### Quality Assurance

VTL & Viyellatex Limited has a quality policy for quality assurance. The quality policy of VTL & Viyellatex Limited is to manufacture and export different kinds of high quality readymade garments to its customers.

The objective of VTL & Viyellatex Limited is to attain & enhance customer satisfaction by providing competitive price, on time delivery of contracted quality and quantity of readymade garments with reliability and also to increase efficiency of work force.

To attain these objectives the management of VTL & Viyellatex Limited has decided to adapt the following:

- To create awareness regarding customer's requirements throughout the organization.
- By providing training to develop efficiency/awareness of the employees.
- To collect customer feedback regularly to know about their conception about the company and to take appropriate action timely. To reduce the percentage of rejection/wastage to maximum 2% per annum.

### Quality Objectives

The management and Employees VTL & Viyellatex Limited works to implement quality in all steps of their activity starting from selecting raw materials through all steps of productions to the ultimate finished products. To ensure quality at all levels they adhere the following objectives:

- 100% Follow – up customer feedback promptly.
- Encourage every employee to suggest/recommend for improvements.
- Prompt reply to customer complaints to build their confidence and satisfaction.
- Minimizing the downtime for every machine.



- To increase 5% export every year.
- To decrease 8% customer complain every year.
- To minimize 5% rejection of products every year.
- Ensure timely shipment.

**VTL & Viyellatex Limited has largest Quality control lab for maintain product Quality within production process.**

### **Quality control lab**

Quality refers to the ability of a product or service to constantly meet or exceed customer expectations. It is a predictable degree of uniformity and dependability at low cost and suited to the market.

Quality Control is a systematic and scientific system involving the application of all known industrial and statistical techniques to control the quality of the manufactured goods. It is the systematic control of those variables encountered in a manufacturing process which affect the excellence of the product.

**VTL & Viyellatex Limited has all kinds of garments testing equipment, textile test machine, fabric tester.**

1. Fabric tensile strength tester,
2. Fabric bursting strength tester,
3. Fabric tearing strength tester,
4. Peeling strength tester,
5. Hosiery stretching instrument,
6. Abrasion and pilling tester,
7. Snagging tester,
8. Flammability tester,
9. Light fastness tester
10. Color fastness tester
11. Crock meter, perspiration tester,
12. Launder-o-meter
13. Yarn strength tester,

14. Fiber strength tester,
15. Moisture regain oven,
16. Fiber tester
17. Yarn tester
18. Sliver tester
19. Skeins tester
20. Portable pH/ORP Meter

### **Digital Tensile Strength Tester:**

Digital Tensile Strength Tester which are made using quality raw material. textiles, finished products such as yarns belts are known for their tensile strength and elongation. These properties raw materials determine ideal application of the product.

### **Some of the specifications of our range is given below:**

1. Testing Machines offer an affordable way to determine the tensile strength and flexibility of a variety of raw materials
2. These are based on constant rate of traverse principle where one end of the test specimen is held in a and the other in a screw arrangement
3. A load exerted on the stable grip which is measured by a pendulum dynamometer

Due to the application of load, here the angular movement of the pendulum is converted into the movement of a pointer on a calibrated circular dial which indicates the load directly in kilograms or Newtons.

1. Dummy pointer which indicates the maximum load exerted by the test specimen before it fails
2. load measurement range is further divided into three or four sub ranges which is obtained by adding or removing the calibrated disc weights from the pendulum
3. The stretch of the test specimen can be measured on a linear scale which is fixed on the frame of a tester that indicates the distance between the grips

## Water Permeability

### Tester: Product Details:

- Place of Origin    Hong Kong
- Brand Name    FYI
- Model Number    DW1320
- Power    Electronic
- Usage    Universal Testing Machine
- Color    Read
- Voltage    220V,50HZ
- **Application**

Vertical geosynthetic water permeability (hydraulic conductivity) tester (constant head method), this equipment used to determining products water permeability characteristics normal to the plane, without load for geotextiles or geotextile-related. It is a constant head test in uncompressed state. **Features**

- transparent construction
- Wide international accepted testing method
- Lowest water head loss during a test; Equipped with water cycling utilizing system;

### Specification

- Specimen Dia                    52mm
- Water head                    Adjustable (0-300)mm
- Specimen thickness            0.1-10mm
- Temperature range            5-450C
- Dimension                    850×500×400 mm (L×W×H)
- Weight                        170kg

### **Crock Meter Hand Operated:**

We offer a comprehensive range of Crock-meter Hand Operated machines which are made using quality raw material. Our range is used to ascertain color fastness for rubbing of textile fabric and yarn on leather under either dry or rub conditions. These machines are operated by a gear motor in which the arm moves in an oscillating motion on the test specimen with a specified load & dia of the finger.

Fig: Crock Meter Hand Operated

### **Some of the specifications of our range is given below:**

- A rubbing finger is available with a flat base which is covered with a piece of standard white crocking cloth
- These are help by a stainless steel spring clip to help it move over the test specimen in a oscillating motion
- Each crocking cloth picks up the color lost by the specimen at the time of testing
- A 3 digit reset counter is provided which enables to record the desired No.â€™s of rub and same is displayed in the digital counter
- The test specimen is held by the abrasive paper with the help of acrylic plat which is mounted on the solid base
- The equipment is painted with a metallic paint

### **Specification**

Diameter of the finger ( for all fabrics & Textiles) 16 mm

Force on the finger ( for all fabrics & Textiles) 9 N

Size of Crocking Cloth 9 N

Dia of the finger 5 x 5 mm

Force on the finger 25 mm

Size of Crocking Cloth 7 x 7 cm

Length of the traverse of the finger 100 + 4mm

Digital Counter 4 digit counter

Grating of stainless wire 1mm. dia & a width of mesh of about 20mm.

### **Digital Tearing Strength Tester:**

Use to determine the tearing resistance of fabrics. Friction pointer fitted with a brass lined hub maintains constant friction of the pointer and carries a spring loaded ball for increasing the friction. The Tearing Strength Tester conforms to ISO and ASTM standards.

### **Product details**

- Brand Name: FYI
- Fig: Digital Tearing Strength Tester
- Model Number: YG033C
- Place of Origin: Hong Kong
- Usage: Textile Testing Instrument
- Power: MECHANICAL

### **Application**

Digital Elmendorf Tearing Tester is designed the ballistic tearing strength of military uniforms, canopy sails, tents, umbrella, hammock and other woven fabric, and sometimes is used to access the durability (or brittle) of fabric after resin finishing, additive or coating, etc.

### **Features**

- Digital decoder technique ensures accuracy test result up to  $\leq \pm 0.5\%FS$ ;
- Measure tearing force automatically, no need to read gauge value manually, get fast test speed;
- Support PC control, man-machine interface friendly, operate easy;
- Support print test report, and data inquiring;
- Pneumatic clamping, automatic cutting, reduce operation complication and ensure test result with high repeatability;

- Choose related test unit to conform requirements of different test standards;
  - Alarm when within invalid measurement range, and clearly displayed on LCD panel;
- Automatic corrections function for pendulum fiction damping to improve test accuracy.

### **Application**

These help to evaluate the color samples under various light sources as the color appears differently in different light conditions. Various specifications of our range is mentioned below:

- The light booth color matching cabinet is used to stimulate different lighting conditions which helps to attain the objective assessment of color everywhere
- Our color matching cabinet light booth offered by us creates a defined lighting condition which is independent of location and environmental influences
- It is easy to compare standard and sample in color-neutral surroundings
- These are used to check the color accuracy of raw material and various components procured from the suppliers by predetermining the color standards
- It can also be used to maintain the quality during the production stages as well as for doubling the production by utilizing plant capacity during night.

### **Features**

Use Philips lamps and electronic ballast control, they make light more even, accurate, Overvoltage and over current protection.

Automatically time setting, recording lighting duration to assure accuracy of lighting Offer various special lighting as user specifies.

### **Lighting box**

- Artificial Daylight D-65.
- A filament lighting
- Tungsten Filament Light Domestic Light INC A.

- Ultra Violet Black Light Whites and Fluorescent Dyes UVB.
- CWF point of office lighting
- Triphosphor Fluorescent Light Point of Sale TL-84
- CWF point of office lighting

## Application

Digital Thickness Gauge for Textile suits to determine the thickness of various woven and knitted fabrics under a certain pressure. Model number:YG141D

### Features

Lifting up and down electrically; display thickness automatically by digital LED.

With continuous and single measuring function, improve measuring efficiency.

Pressuring time pre-settable, 10s or 30s, avoid error caused by manual operation.

Provide two units of thickness for choosing, mm or in.

### Specification

Range of thickness 0.1~10mm

Measuring accuracy 0.01mm

Area of pressing foot 50mm<sup>2</sup>, 100mm<sup>2</sup>, 500mm<sup>2</sup>, 1000mm<sup>2</sup>,  
2000mm<sup>2</sup>

Pressing weight 50cN (2pcs), 100cN (2pcs), 200cN (1pcs)

Pressing duration 10s, 30s

Power supply AC 220V 50Hz 40W

Dimension 410×160×300 mm (L×W×H)

Weight 25Kg

### Spray Rating Tester:

### Application

Spray Rating Tester applies to determine the resistance of any fabrics, which may or may not have been given a water-repellent finish, to surface wetting by water. It is not intended to predict waterproofness, since it does not measure the penetration of water through fabric.

## Features

Main parts made by stainless steel, the instrument is durable.

Special designed specimen ring clamp, operate easy and keep the result more objective.

## Specification

Glass funnel	Φ150mm×150mm
Specimen gradient	45°
Distance between nozzle and center of specimen	150mm
Diameter of specimen rack	Φ150mm Matched
graduate	500mL
Dimension	500×400×500mm(L×M×H)
Weight	5kg

## GSM Cutter & Circular Sample Cutter:

### Product details

Model NO.: Z01B

Brand name: GESTER

Place of origin: China

### Application

Sample Cutter. To cut out circular specimens of fixed diameter rapidly, accurately and safely. Virtually any type material can be accommodated, including woven, nonwoven and knitted textiles, carpet, paper and board. **Features**

Cutter body uses Aluminum alloy shaped by extrude molding.

Provided with screw to adjust height of blade, also fitted with lock bolt for safe operation.

Use GILLETTE™ Blade, Easy to change and maintain.

### Specification

Available area	100 cm <sup>2</sup> (Z01B), 11.3cm <sup>2</sup> (ZB01KI), 154 cm <sup>2</sup> (ZB01KII)
Specimen thickness	<5mm
Cutting depth	0~5mm
Specimen diameter	ø112.8mm (Z01B), ø38mm (ZB01KI), ø140mm (ZB01KII)
Instrument Weight	1.5kg (Z01B), 1.2Kg (ZB01KI), 2.0Kg (ZB01KII)



## **Electronic Balances:**

Model number: XY-luck

### **Application**

Electronic Balances consists of an accuracy electronic balance with different kind of capacity and precision, 200g-0.01g/200g-0.001g/1000g-0.01g/5000g-0.1g/6000g1g, which can satisfy the various requirements. And this instrument can connect printer through RS232C to printout test result. It is also applicable for count system of sliver, roving and yarn. Other capacity and accuracy is available on request.

Can be expanded function to yarn count system as specified.

### **Features**

Equipped with standard weight, easy to calibrate the unit.

Provided with weigh below hook, be able to measure mass of test specimen by be hang to the hook, such as determination of density, moisture content of yarn, etc.

With RS-232C port to support printer computer connection.

Can be operated by battery, 4\*1.5V instead of AC power supply.

### **Specification**

Model XY 200-0.01 200-0.001 1000-0.01 5000-0.1 6000-1

Capacity 200g 200g 1000g 5000g 6000g

Precision 0.01g 0.001g 0.01g 0.1g 1g

Power supply AC220V 50HZ (or specified by user)

Size 343x217x307mm

Weight 1.5Kg 1.5Kg 2Kg 3kg 4kg

Wrap Reel Hand Operated Tester  
equipment:

### **Product details**

Brand Name Greenmac

Model Number YG(B)086

Place of Origin Guangdong, China (Mainland)

Power: AC220 50Hz 100w

Dimension: 780\*660\*480mm

## CHAPTER 09

# MAINTENANCE DEPARTMENT

### **Maintenance department Maintenance**

#### **Definition:**

British Standard Glossary of terms (3811:1993) defined maintenance as:

The combination of all technical and administrative actions, including supervision actions, intended to retain an item in, or restore it to, a state in which it can perform a required function.

Maintenance is a set of organized activities that are carried out in order to keep an item in its best operational condition with minimum cost acquired.

#### **Maintenance Activities:**

Activities of maintenance function could be either repair or replacement activities which are necessary for an item to reach its acceptable productivity condition or these activities, should be carried out with a minimum possible cost.

#### **Maintenance Objectives:**

- Maintenance objectives should be consistent with and subordinate to production goals.
- The relation between maintenance objectives and production goals is reflected in the action of keeping production machines and facilities in the best possible condition.
- Maximizing production or increasing facilities availability at the lowest cost and at the highest quality and safety standards.
- Reducing breakdowns and emergency shutdowns.
- Optimizing resources utilization.
- Reducing downtime.
- Improving spares stock control.
- Improving equipment efficiency and reducing scrap rate.
- Minimizing energy usage.
- Optimizing the useful life of equipment.

- Providing reliable cost and budgetary control. Identifying and implementing

**Types of Maintenance:**

1. Run to Failure Maintenance (RTF)
2. Preventive Maintenance (PM)
3. Corrective Maintenance (CM)
4. Improvement Maintenance (IM)
5. Predictive Maintenance (PDM)

**Run to Failure Maintenance (RTF):**

The required repair, replacement, or restore action performed on a machine or a facility after the occurrence of a failure in order to bring this machine or facility to at least its minimum acceptable condition.

**Preventive Maintenance (PM):**

It is a set of activities that are performed on plant equipment, machinery, and systems before the occurrence of a failure in order to protect them and to prevent or eliminate any degradation in their operating conditions.

**Corrective Maintenance (CM):**

In this type, actions such as repair, replacement, or restore will be carried out after the occurrence of a failure in order to eliminate the source of this failure or reduce the frequency of its occurrence.

**Improvement Maintenance (IM):**

Shutdown improvement maintenance which is a set of improvement maintenance activities that are performed while the production line is in a complete stoppage situation. Engineering services which include construction and construction modification, removal and installation, and rearrangement of facilities.

**Predictive Maintenance (PDM):**

Predictive maintenance is a set of activities that detect changes in the physical condition of equipment (signs of failure) in order to carry out the appropriate maintenance work for maximizing the service life of equipment without increasing the risk of failure.

## Maintenance tools

### Maintenance tools/equipment's

Adjustable wrench

Air suction

Spanner

Socket spanner Handle system

Hammer

Screw driver

Punch

Lock opener

Hack saw

Outside calipers

Inside calipers

Cutting pliers

Pulley key

Chain ton

Welding machine

Grinding machine

Tester

Pliers

star driver

steel tape

chisel

L-key

File

### Machine maintenance Process

Daily maintenance Sewing machine

Monthly maintenance Cutting machine, Embroidery machine, Printing machine, Inspection machine, etc.

Yearly maintenance Boiler machine, Power generator,

### Functions

Used for setting nut and bolts

For cleaning machine

Fixed spanner for nut & bolts fitting

for nut & bolt fitting

To apply load where required

To release any screw

Used to fit any worn pul shaft

To open the clip of bearing

To cut any metallic thing

To measure inside dia

To measure inside dia

To cut thin wires

To loosen pulleys

To lift heavy load

To join metallic parts

To make the smooth fabrics

To test electric circuit

To grip anything & cut anything

Screw unlocking

To measure length, width & height

To cut any metal

For loosen & tighten the screw

To smooth the rough surface

## **General machine Problem**

### **The Following Problem to be checked**

1. Gap stitch
2. Tension
3. Fabric
4. SPI( up date change)
5. Set change
6. Measurement change
7. Needle defective
8. Oil spot
9. Part change
10. Thread change

# CHAPTER 10

## COMPLIANCE

### **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.

**List of compliance issues:** Here is the 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 amusement policy

- ✓ Working hour policy
- ✓ Hiring /recruitment policy
- ✓ Environment policy
- ✓ Security policy
- Buyers code of conduct
- Health and safety committee
- ✓ Canteen

**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

**T  
oi  
le  
t:**

- ✓ 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

**F  
i  
r  
e  
:**

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

**Safety Guard:**

- ✓ Metal gloves 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
- ✓ Welfare officer
- ✓ Others
- ✓ Room temperature
- ✓ Lighting facilities

## CHAPTER 11

# INDUSTRIAL ENGINEERING & PLANNING

### **Industrial Engineering:**

The main function of this department is to re-engineering the garment from the sampling stage so that it would be production friendly for the production as well helps to increase the productivity through machine layout, time and motion study. In the sewn products industries we must continually ensure that we remain competitive and profitable whilst also striving to improve our personal and community's standard of living.

### **Productivity improvements may be achieved through:**

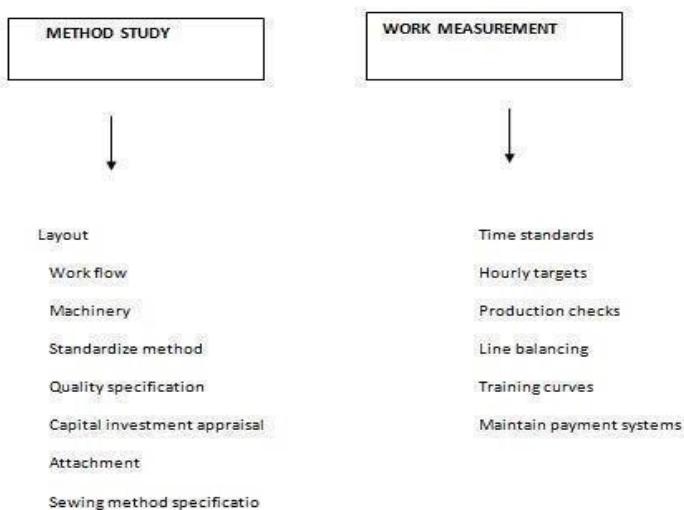
#### **Industrial Engineering Department:**

- To follow up the production process
- Work process development
- SMV calculation & Line target
- Efficiency control
- Time study
- Capacity study
- Workers training
- M/C sequence lay out
- Thread consumption
- Operator Interview **Duties and Activities of a Work Study Officer:**
  - tile details collect
  - SMV make
  - Layout make
  - Machine arrange
  - Attend P.P meeting

- First week production plan
- Line feeding
- Work aid arrange
- Method study (innovation) & take video & record
- Time study
- Line capacity find out
- Bottle neck operation find out
- Individually follow up bottle neck operation and try To increase production
- Capacity & efficiency wise target setting & try to achieving
- Line balancing
- Motivation the worker
- Maximum time stay in production line & try to solve any kinds of production related problem
- Monitoring the production achievement hourly & daily
- Loss time record
- Overall, try to increases the productivity.

All work study- techniques are classified into two main groups the specimen bellows by typical:

**Fig:**



## Method Study

### May be defined as:

The systematic recording and critical examination of existing and alternative methods of work to facilitate the introduction of more efficient and cost effective methods  
The basic procedure:

Select: identifies the areas where results can be achieved these are usually where there are:

Bottlenecks increased cost persistent overtime working,  
Excess fatigue safety hazards high labor turnover high absenteeism

Record: Record through observation all of the exact details of an operation with regard to:

Machinery used attachments used operator method quality specification  
Handling system work place layout sequence position online

Examine: critically examine all of the recorded method details. Question each detail:

Can it be eliminated? Can it be combined?

Can the sequence be changed? Can it be simplified? **Easy**

### **motions characteristics**

The methods analyst should strive to incorporate the following into methods:

**Minimum:** Using finger, wrist, and elbow movements rather than making shoulder and body movements.

**Simultaneous:** Using both hands at same time whenever possible.

**Symmetrical:** Left and right arms moving at the same time in opposite directions.

**Natural:** Free sewing movements are faster and easier than controlled movements.

**Continues:** Continuous curve movements are better than straight line movements involving sudden or Sharpe changes in directions.

**Rhythmic:** Smooth automatic movements must be encouraged.

**Habitual:** Movements that have become automatic as they do not require additional

### **Concentration**

### **Workplace layout:**

The layout of a workplace impacts directly on the pattern of movements and consequently time taking to perform and operation

When analyzing a method the following steps should be considered:

**Step 1:**

Sketch the existing workplace layout.

Sketch the shape of the work table noting any modification to the standard, e.g. extensions or cut downs Sketch the position and clearly identify any work aids or attachments e.g. guides, reel feed etc.

Sketch in the position of products parts before they are processed; clearly identify the part of parts

Sketch where the parts are placed after processing

**Step 2:** analyze how to products parts are moved within the work place.

How part is first obtained how the operators holds the part Where the part is move to how the part is presented to the machine How the part is disposed of by the operator where the part is disposed to.

**Step 3:**

Describe the method in simple movements; GSD is the best analysis tool for this.

The motions are typically:

Pick up

Position

Align

Sew

Measure Cut/ trim

& Place aside

**Step 4:**

From the list of movements the key points for attention should be identified

Finger/ hand position

Number of sewing bursts

Quality specification- tolerances, notch alignment, fabric position etc.

Special skill requirements

**Step**

## 5:

The critical examination stage:

Identify and eliminate excess movements' e.g. checking, smoothing and positioning motions that are not fundamental to the method or company policy. Identify and eliminate stretching or body movements.

Strive to achieve a method that contains only motions with "Easy Characteristics"

### **Work measurement:**

There are number of different techniques that can be used to carry out work measurement within the sewn products industries, the traditional alternative to general sewing data is time study. The skills required are:

- The ability, skill and experienced to read and operate a stopwatch.
- The ability, skills and experienced to assess the rate of working (performance) of individuals workers.

### **Time study:**

This is the process by which we calculate the SMV (standard minute value) in "in process inspection".

There are two types of SMV such as estimate SMV and garments SMV. It is done by following formula, Take a stop watch and take times for 10 times for an operation and finally calculate the SMV of this operation and production per hour.

### **Steps in taking time study:**

A glossary of terms is contained in the manual so that the student may refer to it for specific definitions.

Prior to commencement it is essential that there are commutations to all interested parties.

Manager's supervisor's workers representative's operators

Ensure the prevailing conditions are suitable for a reliable time study.

- The operators are properly trained and skilled – not trainees □ The materials being used are of the correct quality.
- There is sufficient work available for a time study to be completed without interruption.
- The machine, equipment and work aids are correct and in working order

- Ensure that health and safety rules are observed  The work place and working method meets the official special specifications.

It is vital that all relevant details are recorded before the start of study e.g.

- Study number date name of work study Eng. Date of study product type
- Style reference size color fabric type trim details quality specifications
- Department line/team/section machine type machine speed stitch density Attachments work aids.

Before commencing the study break the operations down into elements so that observed assessment of rate of working and time taken can be recorded during the study. **After completing the study:**

1. Record the watch elapsed time and calculate the observe study time. Then calculate unaccounted time and watch error. The tolerance allowed –  $\pm 2\%$
2. Extend the observe elemental /operation rating and times into basic time
3. Calculate the average basic time for each element /operation cycle.
4. Apply the appropriate relaxation, Delay and contingency allowances to the basic times in order to calculate the standard time either for each element or the operation as a hole.
5. Where an appropriate some all of the elemental standard times in order to compile a standard time for the operation.
6. As appropriate convert the standard time to the standard time allowed time by applying the appropriate performance factor to the standard time using the formula below.

### **Line balancing:**

Line balancing is the allocation of sewing machine according to style and design of garment. It depends of that what type of garment we have to produce.

### **The Objectives of Line Balancing:**

Line balancing is a main part of a mass production. These kinds of systems, regardless of being different in details, are workstations in a sequence. Raw material is included in the line at the beginning or in the middle. Parts included in the system transfers from one workstation through the other and at the end leaves the system as a completed product. Transfer lines uses manpower very little when compared to assembly lines. The certain properties of Transfer lines are transfer and process of a product automatically through a line.

### **Objectives that should be gained balancing an assembly line are as follows;**

- Regular material flow
- Maximum usage of man power and machine capacity
- Minimum process times
- Minimizing workstations
- Maximum outputs at the desired timed
- Reduce production costs

### **Importance of Line Balancing:**

- ❖ The importance of line balancing could be summarized as follows –
- ❖ Good line balancing increases the rate of production;
- ❖ This is the pre-condition for smooth production;
- ❖ Line balancing helps to compare the required machinery with the existing one and make a balance;
- ❖ It also helps in the determination of labor requirement;
- ❖ Good balancing reduces production time;
- ❖ Profit of a factory can be ensured by proper line balancing;
- ❖ Proper line balancing ensures optimum production at the agreed quality;
- ❖ It reduces faults in the finished products;
- ❖ Line balancing helps to know about new machines required for new styles;
- ❖ It becomes easier to distribute particular job to each operator;



It becomes possible to deliver goods at right time at the agreed quality for least costs.

### **Steps in Line Balancing:**

Now-a-days, Standard Minute Value (SMV) is used as a tool for the line balancing, production control and the estimation of efficiency. In a similar way, the time taken to do a job for making garments like shirt/trouser/blouse/dresses could depend upon a number of factors like –

- The length of the shirt/trouser/blouse/dress;
- The number of stitches per inch;
- The presentation of item; The pricing of garments.

### **Planning Department:**

When the factory gates a new order planning department needs to follow up some very important points those are given below –

1. Before start sewing, select sewing line and fixed target to sit with IE & Production AGM.
2. Before start production ensure size set measurement report.
3. After correction pattern given 1st line before  $\frac{3}{4}$  days to give the other line.
4. Given schedule to all department like Sewing, Cutting, Washing & Finishing section.
5. Before start sewing ensure fabric and trim in-house status.
6. After start 1st line, ensure initial inspection within 3 days & before bulk cutting should not give others line.
7. Ensure to give production sample before 1 week to 1st shipment.
8. Ensure denim & over dye process garments production 5-7 days before from the shipment date.

There are some other aspects which Planning Department ensures. Makes a whole month's shipment plane regularly follow-ups the everyday production rate and works on how to improve the production.

They also make a plan about approximate production days needed for the individual style's production & and make sure full production is complete in estimated time. Which style goes in which line, thoroughly check and quarry about the individual line's production for the in time shipment, makes a whole planning about fabric inhouse to sewing production line then wash to shipment.

## CHAPTER 12

# MERCHANDISER DEPARTMENTS

### **Garment merchandising**

Merchandising is one of the most important parts for garments trade. Without merchandising this trade never be fulfill. Merchandiser deals or handles all the things from buyer to production. He is the center for all the tasks. After getting an order, merchandiser calculate all the things, what he need to complete this order & make a nice plan by which he can do the shipment in time with buyer's requirement. In factory level, merchandiser makes all the orders for accessories needs for an

order like; fabric need, sewing thread, button, washing if necessary, carton, polybag, shipment arrangement etc. Actually merchandiser make looks on the whole progress. Normally, the production people are always try to do work in delay, thus many trouble can come for the shipment. But, merchandiser always makes a good follow-up to work in time with right quantity & right quality. In the other hand, merchandiser deals with the buyer's about order approval & comments.

At last, we can say that, merchandising is the heart of garments trade. Without this garments trade is valueless.

### **Definition of merchandising:**

The “Merchandizing” is known to the persons specially involved in garments trade. The term merchandising has been derived from the merchandise. Merchandise means goods that are brought & sold. The term Merchandizing may be defined as: Person who merchandising the goods, specifically for exports purposes. Garments merchandising means buying raw materials & accessories, producing garments, maintaining required quality level and exporting the garments within schedule time. From the above definitions, we can say that a person involved in garments merchandising needs a wide range of knowledge & skill to perform his job successfully. The job itself is technical and general as well.

### **Merchandiser is data bus between buyer & seller:**

Merchandiser is he or she, who builds up a relationship with the buyer and acts as a seller. He plays a vital role in an organization in a sense that he bears more responsibility than other in regards to execution of an order. The responsibility which he bears on the job is as follows:

- He represents as a buyer to a factory.
- He represents as a seller to the buyers.
- he inspects quality as a buyer(from the buyer's point of view)
- He or she negotiates a price for the sellers

- He looks at deal from sellers point of view
- He looks into the business to flourish more in the future
- He or she tries to offer the deal more competitive without compromising the quality
- His or her object is to satisfy the buyers to progress more of the future business His or her aim is to impress the buyer by means of:
- Right products, quantities & qualities. □ Right time & Honesty.

### **Function of a merchandiser:**

When an export order is placed to a merchandiser, He or she has to schedule the following main functions to execute the order perfectly on time:

- Fabric requirement calculations
- Accessories requirement calculation (e.g. thread, button, label, polybag, carton etc.) Sourcing of yarn & fabrics & accessories.
- Possible date of arrival of fabrics & accessories in the garments factory
- Costing
- Garments production planning with the help of production DGM.
- Pre –shipment inspection schedule □ Shipping documents.

All the main functions, mentioned above are important but the procurement of the fabric & accessories are most important as there are many technical parameters involved in specification in this area. In most collection of fabric for the garments is to collect in time is a major problem.

### **Types of Merchandiser:**

1. Junior Merchandiser

2. Senior Merchandiser **Activities of a senior merchandiser in a factory:**

- Sample development
- Price negotiation

- Order confirmation
- L/C opening
- Opening summary
- Sourcing
- Material collection
- Production planning
- Production monitoring
- Quality assurance
- Arrange final inspection
- Arrange shipment
- Main task is "production monitoring"
- Collect "inventory report" from store
- Swatch making ,sample making & getting approval from buyer
- Arrange preproduction meeting in order to prepare a schedule for smooth production
- Place order to different production unit
- Collect "Daily Production Report & Daily Quality Report" ☐ If any shortage in store, arrange locally.
- Arrange final inspection

### **Activities of Junior Merchandiser in a factory:**

Merchandiser

Export order collect

Send to the Buyer

If Ok, Then making the different types of sample according to the buyer requirement

### **Costing**

- ✓ Negotiation with Buyer
- ✓ Get Approval
- ✓ Preproduction meeting
- ✓ In house accessories & fabrics
- ✓ Line balancing
- ✓ Production continuing (follow up)
- ✓ Inspection of the produced garments
- ✓ Assembling with poly bag, cartoon Etc
- ✓ Shipment/Delivery

**Process flow chart of a merchandiser: Qualities of a merchandiser:**

- Good knowledge about fiber, yarn, fabric, dyeing, printing, finishing, dyes, color fastness, garments production, etc.
- Clear conception of the usual potential quality problems in the garments manufacturing.
- Good knowledge of the usual raw materials inspection systems & garments inspection system Knowledge of the quota system used in each of the production countries, duty rates, custom regulation, shipping and banking documentation etc.
- Right consumption knowledge of various goods
- Costing knowledge of raw materials
- Order getting ability
- Sincere& responsible
- Hard worker

**Negotiation with buyers:**

The most critical work is the procurement of garment export order. Normally garment export order is found from the potential garment importers called garment buyer.

Anybody wants to collect garments export order, should be able to convince the buyer. When the buyer is convinced about garment production, garments quality, garments costing and shipment ability of a garments exporter, he or she can think about issuing garments export order.

Without clear confidence among buyer & exporter from both sides, may be a risky business deal. If a garment exporter can continuously deal with only three or four buyer with buyer's satisfaction, it will be sufficient enough to run garment production & garment export business smoothly round the year. A successful negotiation outcome does not generally occur through luck, but by following a clear process. The process reflects the different levels of knowledge of the subject of negotiation, various parties and the way they communicate at various stages in the negotiation. The following is an outline of steps essential to effective negotiation:

### **Letter of credit (L/C)**

Business transactions usually begin with a purchase order placed by a buyer with a seller. It is very easy to understand, the order, or fax received from the buyer, is not something very reliable and secure. Although the order should be treated as an agreement binding both parties, the buyer and the seller, it is not a guarantee or an instruction for the seller to use to obtain payment for the merchandise shipped. For this reason, the "L/C" comes into the picture.

Letters of credit (L/C) is in general a conditional document extended by the bank in connection with presentation of export value. L/C plays a very dominant role in this matter. On receipt of this document from the buyer, the exporters become sure that they would obtain foreign currency after the peaceful shipment of the consignment directed by the buyer in the L/C. and for monetary transactions in this connection the negotiation banks stand as a symbol of surety for the exporters. Negotiating bank act on behalf of the exporter and is held liable or responsible for realization of exporter's money from the L/C opening bank.

A credit may be advised to a beneficiary through another bank (the advising bank) without engagement on the part of the advising bank, but that bank shall take



reasonable care to check the apparent authenticity of the credit which it advises. All credit will always clearly indicate whether they are available by sight payment, by differed payment, by acceptance or by negotiation. Moreover every credit must nominate the bank (nominated bank) which is authorized to pay (paying bank) or to accept drafts (accepting bank) or to negotiate (negotiating bank), unless the credit allows negotiation by any bank (negotiating bank). The nominated bank unless is the issuing bank or the confirming bank, its nomination by the issuing bank does not constitute any undertaking by the nominated bank to pay, accept or negotiation.

When an L/C issuing bank instructs a bank (advising bank) by any telegrams mission to advise a credit or a amendment to a credit, and intends the mail confirmation to be the operative credit instrument, for the operative amendment, the Tele-

Transmission must state "full details to follow" (or words of similar effect) or that the mail confirmation will be the in that case, operative credit instrument or the operative amendment. The issuing bank must forward the operative credit instrument or the operative amendment to such advising bank without delay.

In spite of production of all related documents with the banks, the exporters however, became victims to some unpleasant situations which push them towards the uncertainty of realization of money. This results from the absurdity or ambiguity of L/C. And in most cases from faulty presentation of documents to be required in exports connection. So unless exporters have a clear conception and apprehension about exports business and be aware beforehand about all these documents, they would certainly face some major troubles, in per exports and post Exports process, Exporters will after all have first-hand knowledge about L/C. they must be in the climax of knowledge. It is L/C which act a medium of money during the time of execution of exports order and this give secretly the exporters that their dues would be obtained in due time.

In fact, in the whole exporter and import process four sides are connected. /in absence of any one of them the process cannot take full shape. These four sides are, exporter, importer, exporter's bank and importers bank principally. The success of import and export business lies in the exchange of proper and accurate

correspondence, any fault in these may cause in total disaster in whole importers and export business. So in order to avoid the ambiguous, absurd and understandable correspondence, both the sides are to exercise special and particular attention. They should remember that the success of export and import business depends mainly upon the careful execution of these things.

In export business, the first thing to do is to make sale contract with the buyer. And this may be made in the presence of both of the importers and exporter. In most cases this may not be done formally. Yet, it plays a very significant role in the preliminary stage of export business. If this is not done formally, then exchange of letters, fax and email between them from time to time is taken for granted as the contract of the business. This may be styled as verbal contract. This also leaves importance in the business. These exchange documents are important for this reason that many a time this are required by negotiating bank of the exporters. Any loss of these may bring in fault in the business.

**There are some methods of payment of export value. These are as follows:**

1. through letters of credit
2. through advance T.T remittances
3. Deferred payment
4. C.A.D basis etc.

Of all the methods referred to above, letter of credit method is most popular and it is in fashion.

**Letters of credit may be of different kind and nature:**

1. Revocable L/C
2. Irrevocable L/C
3. Confirmed letter of credit
4. Confirmed and irrevocable letter of credit
5. Transferable or divisible letter of credit
6. Back to back letter of credit

7. Red clause letter of credit
8. Sight letter of credit
9. Unseen letter of credit
10. Revolving letter of credit
11. Stand by letter of credit

All letter of credit therefore, should clearly indicate whether they are revocable or irrevocable. In the absence of such indication the credit shall be deemed to be revocable.

A revocable L/C:

May be amended or canceled by the issuing bank any moment and without prior to the beneficiary.

In case of revocable credit, however, the L/C issuing bank is bound to:

a) Reimburse a branch or bank with which a revocable credit has been made available for deferred payment, if such branch or bank has prior to receipt by it for notice of amendment or cancellation, taken up documents which appear on their face to be accordance with the terms and conditions of the credit.

B) Reimburse a branch of bank with which a revocable credit has been made available for sight payment, acceptance or negotiation, for any payment, acceptance or negotiation, for any payment, acceptance or negotiation

Made but such branch or bank prior to receipt by it for notice of amendment or cancellation, against documents which appear on their face to be accordance with the terms and conditions of the credit.

An Irrevocable L/C:

Constitutes a definite undertaking of the issuing bank, provided that the stipulated documents are presented, the term and conditions of the credit are complied with:

The full name of "L/C" i.e. irrevocable letter of credit which means once it is issued by the bank for the buyer and accepted by the beneficiary (the seller) , it cannot be cancelled or withdrawn by the buyer or the opening bank, unless with the consent of the beneficiary. In short, once the buyer opens the L/C form his bank to cover the goods he has purchased, he will have to pay for the goods when the seller ships the

goods exactly as per as the terms stipulated in the L/C. Therefore, as far as the seller is concerned, the sooner he has the L/C on hand, the safer he is.

L/Cs can be opened in many ways, but in essence, it is a promise the buyer's bank makes to the supplier, to pay home when he does certain things with evidence to prove. The things the LC opening bank wants the supplier to do are called "terms". Therefore, when the supplier receives an L/C, he must read the term carefully to make sure he is capable of fulfilling them all exactly as they are written. If some terms are beyond his capable of fulfilling them all exactly as they are written if some terms are beyond his ability to fulfill, he must point them out to the buyer and explain why he cannot comply with those terms, and request the buyer to amend them by means of an official amendment through the bank.

) Confirmed letter of credit:

This is such a credit for which exporter's bank gives all Shorts of surety for the advance of payment.

2) Confirmed and irrevocable letter of credit:

Which combines the quality of clause (2)

and (3) 3) Transferable or divisible L/C:

A Transferable credit is a under which the beneficiary has the right to request the bank called upon to effect payment or acceptance or any bank entitled to effect negotiation to make the credit available in whole or in part to one or more other parties(second beneficiary)

A credit can be transferred only if it is expressed designed as "transferable" by the issuing bank. Terms such as "divisible", "fractional" assignable" and "transmissible" and nothing to the meeting of term" transferable" and shall not be used, in that case the bank requested to effect the transfer (transferring bank), whether it has confirmed the credit or not shall be under no obligation to effect such transfer expect to the extent and in the manner expressly consented to by such bank. Bank charges in respect of transfers are payable by the first beneficiary unless, otherwise specified.

A transferable L/C can be transferred once only. The credit can be transferred only one the terms and conditions specified in the original credit, with the exception of the amount of the credit.

Back to back L/C:

This type of L/C is opened against the original master L/C.

Red Clause L/C:

In this credit, the export's bank is directly to advance his dues even before they produce all export documents to the bank. And some clause is attached there. The manufacture must have maintained this clause. Sight L/C:

It means when the shipper ships the goods covered by the L/C, and presents the document to the bank for negotiation, the bank (the negotiation bank) will credit the proceeds to the shippers account immediately after checking and finding the documents in order. When the documents are sent by the negotiation bank to the L/C opening bank, the L/C opening bank will effect payment to the negotiation bank immediately.

Such L/C usually says "AT SIGHT" which means "pay when the bank sees the documents".

Unseen L/C:

It means L/C with time allowed for the opening bank to make payment of a foreign bill of exchange. Or, put in another way, payment from the L/C opening bank to the negotiation bank will only be made after a period of time as stipulated in the L/C. The length can be worked out between the buyer and the supplier, sometimes 60 days, sometimes 90 days or 120 days.

Revolving L/C:

It means that the beneficiary can draw money from such L/C up to the amount specified by means of documents, and after drawing, the amount drawn will automatically be replenished and is available for another drawing and so on.

### **COSTING:**

Costing of garment is a very necessary and important task. In this factory costing is carried out by the merchandising dept. Firstly, merchandiser contacts with the buyer and collects order. Then he is provided a sample from sample section according to the buyer's specification. The sample section also supplies the fabric consumption. Cost of the fabric is determined according to this consumption. Then he makes the

costing of other raw materials, accessories, trimmings etc. He adds then all the production cost, transport cost, commission (buying house, C & F agent) and profit.

**Documentation for shipment**

- Packing list
- U.D
- Commercial invoice  Bank account.

# CHAPTER 13

## DISCUSSION & CONCLUSION

### Discussion

VTL & Viyellatex Limited is a garments manufacturer & exporter. The STANDARD GRPUP Ltd. is committed to the best human workplace practices. Their goal is to continuously improve their Human resource policies and procedures through education, training, communication and employees involvement. Right from inception the policy of the company has been to provide total customer satisfaction by offering quality garment in time. Working on new concepts in styling & content of the garment is a continuous activity in VTL & Viyellatex Limited with an objective to up the quality and the value of merchandise. To meet the commitments of quality and prompt delivery VTL & Viyellatex Limited Decided to integrate the manufacturing process in a planned manner for achieving their goal, VTL & Viyellatex Limited has recruited a high profiled human resource team. The production is controlled by skill persons. All of the decision makers of production sector in VTL & Viyellatex Limited are skill workers.

The goal of VTL & Viyellatex Limited is to get high production & to maintain the quality of the product at a minimum cost. The VTL & Viyellatex Limited is notable to produce all types of garment. I think their accuracy will increase to a maximum level. For sewing them is using modern m/c I think their product quality will be higher. For cutting they are using manual straight knife cutting m/c but if they use computerized cutting m/c their accuracy will increase & their efficiency will increase to a maximum level. I think if they improve the above things I think their product quality, their efficiency & their accuracy will be maximum.

## **Conclusion**

Now-a-days Textile field becomes very competitive & the buyer wants 100% quality product. For this reason it is very important to know about the latest technologies in textile sector. To produce a quality product, as a textile engineer I must have a vast knowledge about the

Production parameters & how to produce a high quality product. To accommodate the theoretical study with technical and practical things industrial training (Internee) is very important. In my training period I have observed that Crystal Composite Ltd. produce high quality fabric and fulfill the special requirements from the different types of buyers by following different internationally recommended standard method. In my training period I have learned many things such as different types of machines and their functions, techniques of productions and the management system. In this training period I have also learned how the desired product is made ready for shipment from the starting to the end i.e. from merchandising to the packaging. In this training period I have got an idea about the responsibility of different departments of the factory. So I think this industrial training will help me in future.