



BRAC Institute of Governance and Development

BRAC University, Dhaka

Post Graduate Diploma in Knitwear Industry Management (PGD-KIM)

KIM-300: Industry Attachment (Internship)

Internship Report

On

**“The Dynamic Productivity Change through
Industrial Engineering”**

Submitted to

Academic Supervisor

Mehnaz Rabbani

Assistant Professor

BRAC University

Industry Supervisor

Golam Mustafa

Assistant General Manager

Industrial Engineering Department

Submitted by

Md. Sadique Hasan

ID# 18281001

Intake-01

Date of Submission: August 01, 2019

DECLARATION

This is to certify that the internship report on “The Dynamic Productivity Change through Industrial Engineering” is a unique attempt to identify the real quality of the organization. This report is submitted for the **Post Graduate Diploma in Knitwear Industry Management (PGD-KIM)** from BRAC Institute of Governance and Development.

I also agreed in principle not to share the vital information with any other person outside the organization. This has been undertaken for the purpose of partial fulfilment of PGD-KIM program.

Md. Sadike Hasan

ID# 18281001

Intake- 01

Batch-B

Letter of Transmittal

01st August, 2019

Mehnaz Rabbani

Lead, Research (RPGG) BIGD,

BRAC University.

Subject: Submission of the Internship report on “The Dynamic Productivity Change through Industrial Engineering”.

Dear Sir,

I am hereby submitting my Internship Report, which is a part of the **Post Graduate Diploma in Knitwear Industry Management (PGD-KIM)** Program curriculum. It is great achievement to work under your active supervision.

I believe that knowledge and experience I gathered during the internship period will be helpful in my professional life. A Learning on Epyllion Group”. I have strained my level finest to follow your procedures in every aspect. I have attempted my level best to influence it as right as would be prudent and I to have attempted my best to assemble related data from every single accessible source. I am fairly grateful for your suggestion during the preparation of this report. I will be grateful to you if you accept the report.

Yours sincerely,

Md. Sadike Hasan

ID# 18281001

Intake- 01

Batch-B

To Whom It May Concern

This report entitled as “The Dynamic Productivity Change through Industrial Engineering” has been submitted in particular fulfillment of the requirement of **Post Graduate Diploma in Knitwear Industry Management (PGD-KIM))** from BRAC Institute of Governance and Development. Md. Sadike Hasan, **ID: 18281001**. This report is based on three months industrial training under executive development program.

I wish all success in his profession and academic life.

Academic Supervisor

Mehnaz Rabbani

Assistant Professor

Lead, Research (RPGG) BIGD,
BRAC University.

To Whom It May Concern

As an industrial supervisor I am pleased to recommend Md. Sadike Hasan, who is working in our company as Assistant Manager (Industrial Engineering Department). During this time of internship under my supervision, he worked with various departments & tried to accumulate and enrich his knowledge about garment manufacturing process. In this time period his attendance & activities were really satisfactory.

I wish for his great future & academic success.

Industry Supervisor

Golam Mustafa

Assistant General Manager

Industrial Engineering Department

Acknowledgement

At the very beginning, I would like to express my deepest gratitude to almighty Allah for giving me the strength and the composure to complete my **Post Graduate Diploma in Knitwear Industry Management (PGD-KIM)** courses and prepare this report within the scheduled time.

I express my deepest thanks to **Mr. Golam Mustafa**, Assistant General Manager, Industrial Engineering Department-Epyllion Group for taking part in useful decision & giving necessary advices and guidance and arranged all facilities to make life easier. I choose this moment to acknowledge his contribution gratefully.

I am grateful to my Academic supervisor, **Ms. Mehnaz Rabbani**, faculty of Lead, Research (RPGG) BIGD, BRAC University. She allowed me to encroach upon his precious time freely right from the very beginning of this research work till the completion of my internship. Her guidance, encouragement and suggestions provided me necessary insight into the research problem and paved the way for the meaningful ending the work in a short duration.

I perceive as this opportunity as a big milestone in my career development. I will strive to use gained skills and knowledge in the best possible way, and I will continue to work on their improvement, in order to attain desired career objectives. Hope to continue cooperation with all of you in the future.

Sincerely,

Md. Sadike Hasan

ID# 18281001

Intake- 01

Batch-B

EXECUTIVE SUMMARY

This report summarizes my internship program from May 2019 to July 2019 covering 646.5 hours on going internship. This internship assisted me to have a practical idea about different department & factory of Epyllion Group which was not possible for me by working only my own department. Epyllion Group is one of the largest Knit Composite Garments & Textile industries in Bangladesh which is equipped with all kinds of modern machineries and other facilities. Epyllion Group Ltd always try to provide their level best support to all of their Buyers with better Quality. It has not only a large production capacity but also has a smart quality team to provide quality product to their customers. They work closely with their clients to effectively manage quality assurance needs throughout their supply chains and mitigate risks in terms of quality, health, safety, social responsibility and environment, thus protecting brand reputation and minimize costs. This report has been presented based on my observation and experience gathered from the company. The organization has many divisions and departments but the internship focuses on – Industrial Engineering. Thereby I had to play a vital role as Industrial Engineer of the company. Throughout the whole report initially I have tried to portrait different department of our organization followed by the self-analysis and evaluation report.

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INTRODUCTION

Epyllion Group is one of the country's leading knit composite factories. It is a 100% export oriented composite knit textile unit with the commitment to cater the global needs of 21st century for knit & casual clothing. The project has employed the state-of-art technology in its every piece of investments. Aiming at the context of the changing global demand pattern, international environment on trade specially the withdrawal of quota system and GSP and the availability of craftsmanship in the country, the project has encompassed the knitting, dyeing and processing of fabrics and ready-made garments production to be available from one stop service.

The project ensures sampling to supply of finished ready-made garments all from one source, ensuring in time delivery & complying quality. The machines & equipment setup for this project are procured from world class brand, names that are renowned for their high quality, product integrity & dependable production.

The manpower engaged in this project to carry out the day to day business is all highly skilled, purely professional, vastly experienced. The unique combination of organized managerial and technical term in one hand and latest, advanced and balanced technology on the other hand made the project one of the top to be referred in this field in the country. Epyllion group is committed not only to deliver world class product but also to quality assurance, price affordability & social accountability.

OBJECTIVE

- To enhance our knowledge regarding industrial work process and work environment.
- To relate our theoretical knowledge with practical application.
- To observe work sequence of different departments of the factory.
- To develop professional awareness and communication skills.
- To develop the ability to understand different issues and provide & execute fruitful solution accordingly.

FACTORY PROFILE

Epyllion Group is one of the country's leading Readymade Garments (RMG) Company. It is 100% export oriented knit garment company which has own textile unit & accessories hub with the commitment to cater the global needs of 21st century for knit & casual clothing. The project has employed the state-of-art technology in its every piece of investments. Aiming at the context of the changing global demand pattern, international environment on trade specially the withdrawal of quota system and GSP and the availability of craftsmanship in the country, the project has encompassed the knitting, dyeing and processing of fabrics and ready-made garments production to be available from one stop service.

The manpower engaged in this project to carry out the day to day business is all highly skilled, purely professional, vastly experienced. The unique combination of organized managerial and technical term in one hand and latest, advanced and balanced technology on the other hand made the project one of the top to be referred in this field in the country. Epyllion group is committed not only to deliver world class product but also to assure quality, price affordability & social accountability.

VISION OF THE COMPANY

Vision of Epyllion Group is to become a window through which all their interacting parties can see and feel their prospect and dream about their success. The Company will become a lifestyle towards its employees, suppliers, buyers and above all shall become a role model of a green corporate house which will be regarded as an icon brand in the country.

MISSION OF THE COMPANY

Epyllion will be known as an entity whose main driven force is its human resources, with such a motivated, high skilled and professional workforce. Epyllion has started marching towards its glory of success which is not the profit but to enjoy the joy of life.

CORE PHILOSOPHY & ETHICAL VIEWS

- Human Spirit
- Ethical Business Practice
- Protecting Environment

“Epyllion Group is known as an entity whose main driven force is its human spirit.”

CONCERN OF EPYLLION GROUP

Forward Linkage

- Dekko Knitwears Limited
- Mirabella Dresses Limited
- Epyllion Knitwears Limited
- Epyllion Style Limited
- Epyllion Style Limited(Extension)

Backward Linkage

Textile Unit

- Epyllion Knitex Limited
- Epyllion Fabrics Limited

Testing Laboratory

- Epyllion Testing Lab Limited

Washing Unit

- Epyllion Washing Limited

Supporting Unit

- Epyllion Limited – Accessory Hub
- Epyllion Limited – C&F

Real Estate

- Nina Holdings Limited

Food & Beverage

- Epyllion Food And Beverage Limited

Retail Business

- Epyllion Holdings Limited
- Sailor

GENERAL INFORMATION ABOUT THE COMPANY

Company Name	Epyllion Group
Type	100% Export oriented composite knit garment factory
Name of the Owner	Mr. Reaz Uddin Al Mamoon

Year of Foundation	1995
Company Logo	
Corporate Office Address	NINAKABBO 227/A, Tejgaon-Gulshan Link Road Postal Code: 1208 Dhaka, Bangladesh. Level: 12-13
Contact No.	+88029840223
E-mail	info@epylliongroup.com
Website	www.epylliongroup.com
Factory Address	<i>Forward Linkage</i>
	Epyllion Knitwears Limited (EKWL) Plot No. I/6, Road No. 06, Section No. 07, Mirpur Industrial Area, Mirpur, Dhaka-1216. Contact No. +88029006747, +88029016994.
	Dekko Knitwears Limited (DKL) Plot No. M/2-1, Road No. 7, Section No. 7, Mirpur Industrial Area, Mirpur, Dhaka-1216. Contact No. +88028013883, +88029007142.
	Dazzling Dresses Limited (DDL) Ismail Plaza, 51/52 Shah Kabir Mazar Road, Moushair, Dakkhin Khan, Uttara, Dhaka-1230. Contact No. +88028953407, +88028932599.
	Epyllion Style Limited (ESL) Bahadurpur, Bhawal Mirazapur, Gazipur Sadar, Gazipur-1703. Contact No. +8801713069146.
	Epyllion Extension Jangalia Para, Bhawal Mirazapur, Gazipur Sadar, Gazipur-1703. Contact No. +88029205619.
	<i>Backward Linkage</i>
	Epyllion Knitex Limited (EKL) Jangalia Para, Bhawal Mirazapur, Gazipur Sadar, Gazipur-1703. Contact No. +88029205619.

	Epyllion Fabrics Limited (EFL) Jangalia Para, Bhawal Mirazapur, Gazipur Sadar, Gazipur-1703. Contact No. +88029205619.
	Epyllion Washing Limited (EWL) Jangalia Para, Bhawal Mirazapur, Gazipur Sadar, Gazipur-1703. Contact No. +88029205619.
	Epyllion Testing Lab Limited (ETLL) Jangalia Para, Bhawal Mirazapur, Gazipur Sadar, Gazipur-1703. Contact No. +88029205619.
	Epyllion Limited Kutubpur, Kanchpur, Sonargaon, Narayangonj.
	Supporting Unit Epyllion Limited (C&F Unit) Nirman SS Tower, 7th Floor, 1817, SK Mujib Road, Mazar Gate, Agrabad, Chittagong. Contact No. +880312514634

PRODUCTION CAPACITY

<i>Capacity at a Glance</i>	
Knitting	34,000 kg/day
Dyeing	38,000 kg/day
Yarn-Dyeing	150,000 kg/month
Finishing	32,000 kg/day
Cutting	3,535,000 pcs/month
Printing	1,000,000 pcs/month
Embroidery	5,100 million stitch/month
Drawstring	870,000 yards/month
Twill Tape	1,015,000 yards/month
Elastic	650,000 yards/month
Sewing	3,500,000 pcs/month
Washing	1,200,000 pcs/month
Label	500,000 doz/month
Price Ticket	167,187 doz/month

Poly	65,000 kg/month
Gum Tape	54,000 pcs/month
Auto Carton	1,300,000 pcs/month
Manual Carton	520,000 pcs/month

PRODUCTS

Knitted Fabrics	• Single Jersey • Single Lacoste (Single Tuck Back Pique) • Polo Pique • Double Lacoste • 1X1 Rib • 2X1 Rib • Automan Rib • Terry: 2T Fleece, 3T Fleece
Garments	• Men's Knit Polo/T-Shirt, Sweatshirt, Cardigan, Knitted Bottom. • Boy's Knit Polo/T-Shirt, Sweatshirt, Cardigan. • Lady's T-Shirt, Sweatshirt, Cardigan, Knitted Bottom. • Girl's Knit Polo/T-Shirt, Sweatshirt, Cardigan. • Kid's & Baby's Knit Polo/T-Shirt, Sweatshirt, Cardigan.
Accessories	• Drawstring • Twill Tape • Elastic • Price Ticket • Poly • Gum Tape • Auto Carton • Manual Carton

SECTIONS OF THE FACTORY

Epyllion Textile Division (EKL & EFL):

- HR, Admin & CSR
- Operations
- Industrial Engineering
- Planning, Monitoring & Control (PMC)
- Knitting
- Quality Assurance (Knitting)
- Batch Preparation
- Formulation Lab
- Dyeing
- Quality Assurance (Dyeing)
- Finishing
- Quality Assurance (Finishing)
- Research & Development
- Maintenance
- Security

Epyllion Washing Limited:

- HR, Admin & CSR
- Operations
- Production
- Industrial Engineering

Epyllion Knitwears Limited:

- Product Development Center/Sampling Section (Corporate Office)
- Merchandising (Corporate Office)
- HR, Admin & CSR
- Material Control
- Cutting
- Quality Assurance (Cutting)
- Sewing

- Quality Assurance (Sewing)
- Finishing
- Quality Assurance (Finishing)
- Industrial Engineering
- Maintenance
- Security

AWARD & RECOGNITIONS

Recognitions		
Organization Name	Organization Logo	Details
BSCI		In 2003, Foreign Trade Association (FTA) created the Business Social Compliance Initiative (BSCI) to provide companies with a practical and efficient system to improve social compliance in global supply chains. BSCI is a leading supply chain management system that supports companies to drive social compliance and improvements within the factories and farms in their global supply chains.
SEDEX		SEDEX, the Supplier Ethical Data Exchange, is a non-profit membership organization dedicated to driving improvements in responsible and ethical business practices in global supply chains. As the largest collaborative platform for sharing ethical supply chain data, SEDEX is an innovative and effective supply chain management solution, helping you to reduce risk, protect your company reputation and improve supply chain practices. (Epyllion has got in 2009, Auditor SGS)

OEKO-TEX BL AND 100		The STANDARD 100 by OEKO-TEX® is a worldwide consistent, independent testing and certification system for raw, semi-finished and finished textile products at all processing levels, as well as accessory materials used. (Awarded in 2009, Standard 100 Certified)
Organic Content Standard OCS Blend 100		Organic Content Standard OCS Blend 100 is a standard for tracking and documenting the purchase, handling and use of 100% certified organically grown cotton fiber (organic in conversion cotton fiber) in yarns, fabrics and finished goods. (Awarded in 2009, OCS 100 and OCS Blended, Registration No: CU 807720)
C-TPAT		C-TPAT is a voluntary government-business initiative that builds co-operative relationships that strengthen and improve overall international supply chain and US border security. C-TPAT is widely recognized as one of the most effective means of providing the highest level of cargo security through close co-operation with international supply chain business such as importers, carriers, consolidators, licensed customs brokers and manufacturers. Through this initiative, US Customs and Border protection (CBP) is asking business to ensure the integrity of their security practices and communicate and verify the security guidelines of their business partners within the supply chain. (Awarded in 2008, Score 92.00)
CRAB		CRAB, Credit Rating Agency in Bangladesh, under capital adequacy regulatory framework (BASEL II implementation framework) of Bangladesh Bank, all the leading ventures of Epyllion Group have been awarded credit rating bearing A2 by CRAB for financial year 2011-12. The latest award has been enhanced from the previously attained A3. The award expresses that Epyllion Group possess strong capacity to meet the financial

		commitments and judged to be very high quality subject to low credit risk.
LEED		LEED or Leadership in Energy and Environmental Design is the most widely used green building rating system in the world. Epyllion Group is a LEED Gold certified company.
ISO 26000		ISO 26000 is the international standard developed to help organizations effectively assess and address those social responsibilities that are relevant and significant to their mission and vision; operations and processes; customers, employees, communities, and other stakeholders; and environmental impact.
UNGC		The United Nations Global Compact is a strategic policy initiative for business that are committed to aligning their operations and strategies with ten universally accepted principles in the areas of human rights, labor, environment and anti-corruption. When joining the Global Compact, companies make a commitment to issue as annual Communication on Progress (COP), a public disclosure to stakeholders (e.g. investors, consumers, civil society and Governments) on progress, made in implementing the ten principles of the UN Global Compact & supporting it.
Awards		
Best Supplier Award of C&A in 2004		

BUYERS OF EPYLLION GROUP

Buyers Name	Country	Logo
M&S (Marks & Spencer)	UK	M&S
Celio	France	celio*
s.Oliver	Germany	s.Oliver®
C&A	Belgium	C&A
Carhartt	USA	carhartt
H&M (Hennes & Mauritz)	Sweden	H&M
River Island	UK	RIVER ISLAND
Original Marines	USA	ORIGINAL MARINES
Verner Group	Norway	VARNER

G Star Raw	Netherlands	
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SHIFT CHANGE

Production Shift of 8 Hours at EKL, EFL & EKWL:

- 6:00 am – 2:00 pm
- 2:00 pm – 10:00 pm
- 10:00 pm – 6:00 am

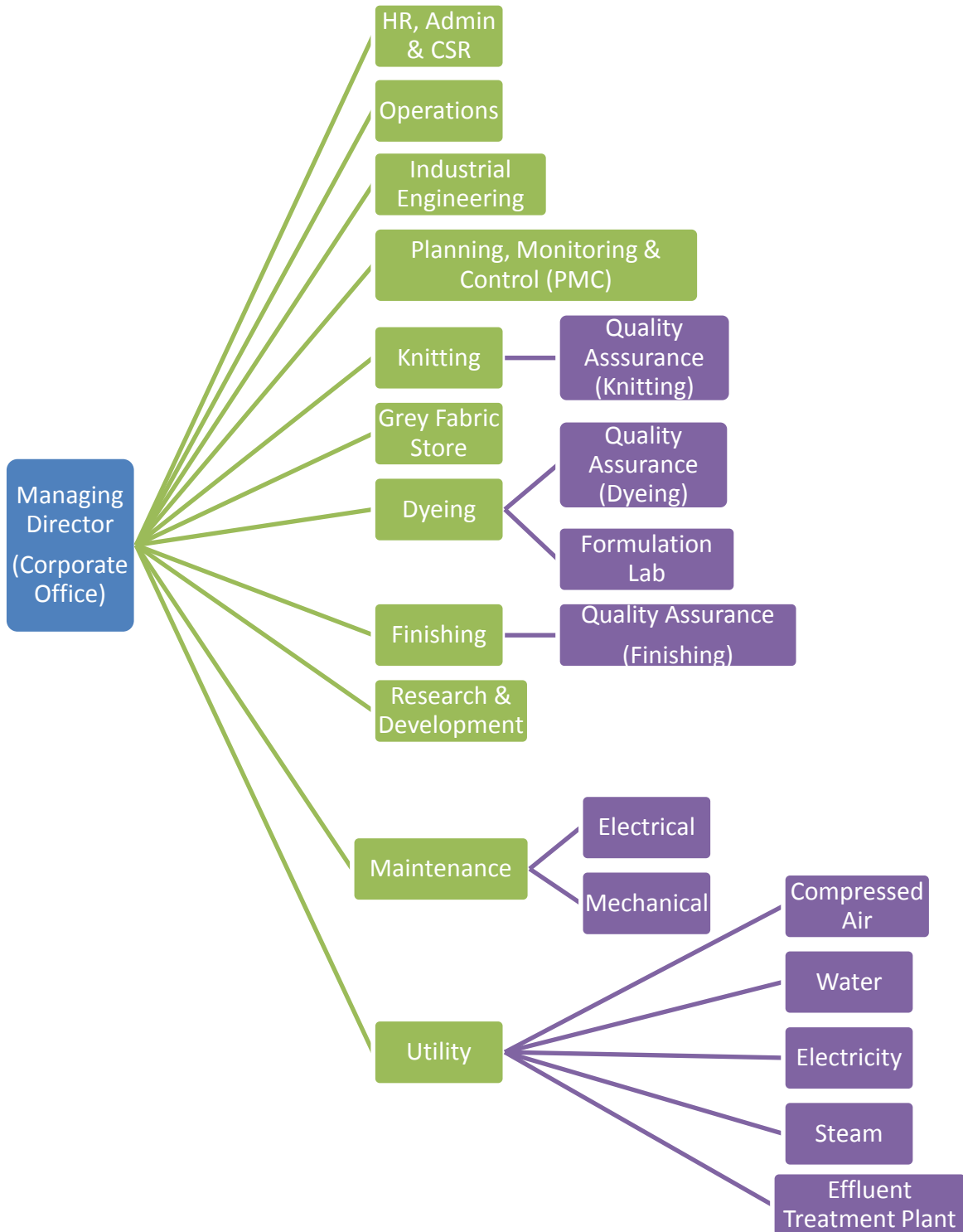
General Shift: 9:00 am – 6:00 pm (1 Hour Lunch Break)

Shift for ESL: 8:00 am – 5:00 pm (1Hour Lunch Break)

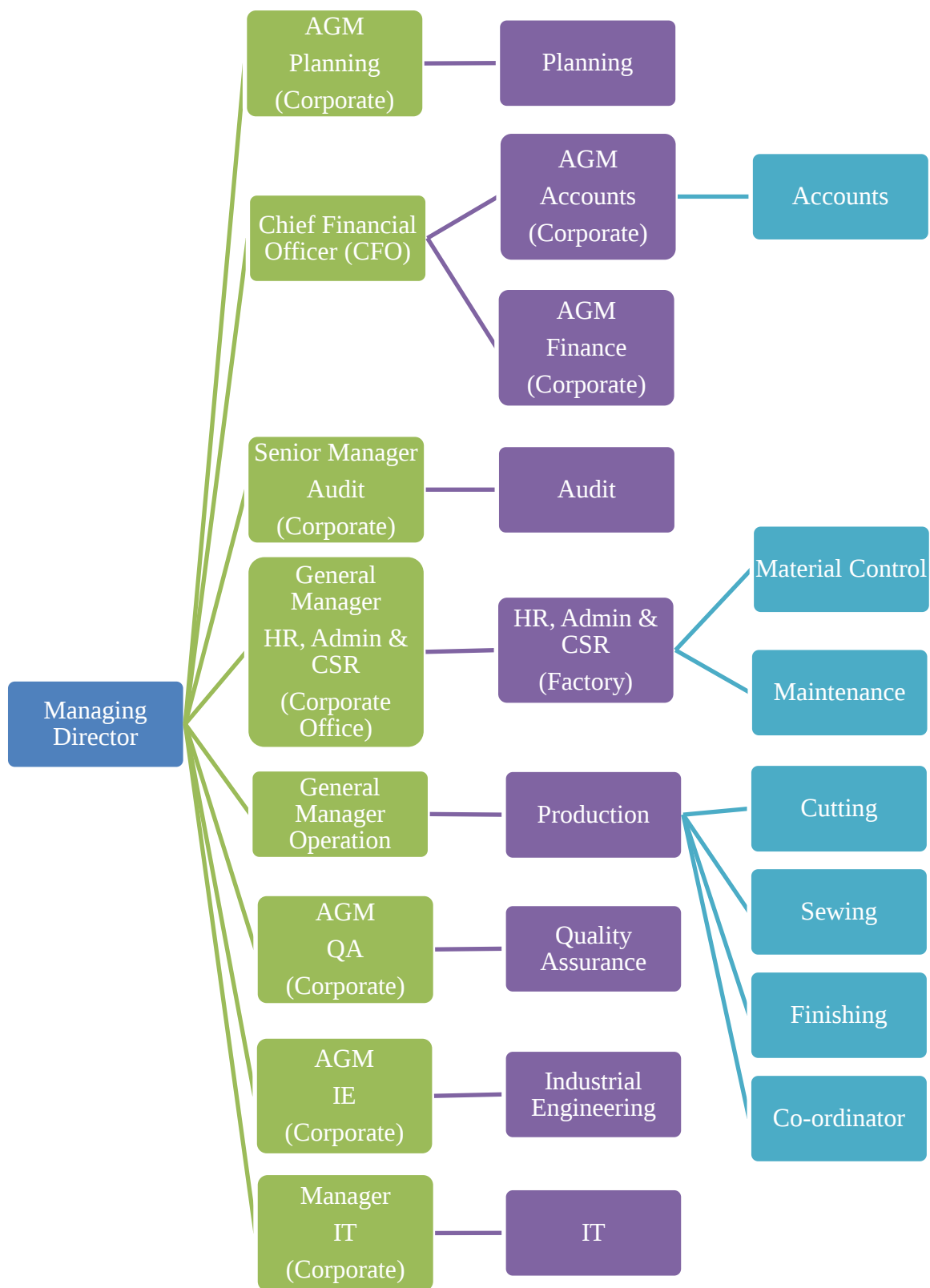
MANPOWER MANAGEMENT

ORGANIZATIONAL STRUCTURE OF EPYLLION GROUP

ORGANOGRAM OF EPYLLION TEXTILE DIVISION



ORGANOGRAM OF EPYLLION KNITWEARS LIMITED



MANPOWER

MANPOWER OF EPYLLION GROUP

Epyllion Textile Division (EFL & EKL)	
Total Employee (Staff + Worker)	2600

Epyllion Washing Limited	
Total Manpower (Staff + Worker)	170

Epyllion Knitwears Limited	
Total Employee	1770
Staff	270
Worker	1500

PLANNING, MONITORING & CONTROL (PMC)

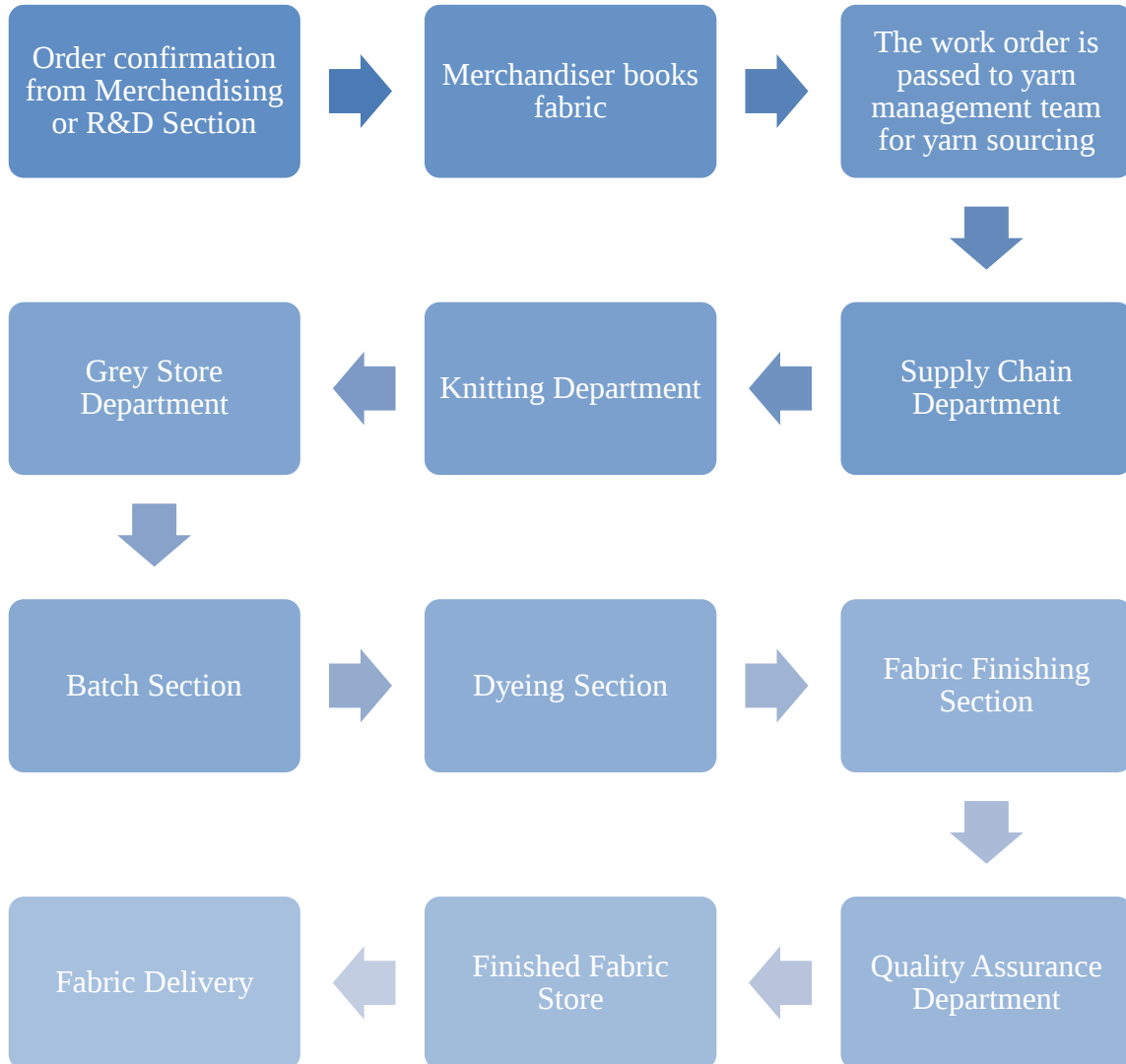
INTRODUCTION

Planning, Monitoring and Control is considered as the heart of textile division as it controls the operation of the both EKL and EFL unit of textile division. It initially provides the work plan for manufacturing a particular fabric and then monitors the perfect execution of the provided plan from the start of fabric production till its end. PMC department may also bring changes in their working plan if necessary for the betterment of manufacturing system.

KEY TASKS

- Fabric Production and Dyeing Planning & Follow up the production from start to end.
- Prepare Time and Action Calendar

OPERATIONAL SEQUENCE



FABRIC KNITTING SECTION

HISTORY OF KNITTING

The term knitting describes the technique of constructing textile structures by forming a continuous length of yarn into columns of vertically intermeshed loops. It relies heavily on the availability of fine, strong, uniformly spun yarn. The term 'Knitting' dates from the mid-sixteenth century, earlier words such as the Saxon 'cnyttan' and the Sanskrit 'nahyat' being less precise, indicating that knitting probably evolved from sources such as the experience gained by knotting and Coptic knitting. In Coptic knitting or Nalbinding, an upside-down looped structure is produced using a single-eyed needle (like a sewing needle) containing a short length of yarn. Normally, crossed loops are formed. The technique can achieve fashioning, closing, circular knitting and stitch patterning. Leicester's Jewry Wall Museum possess a sock of cross stitch construction from the Antinoe site in Roman Egypt dating from the fifth century AD.

KNITTING SECTION OF TEXTILE DIVISION AT A GLANCE

Epyllion Textile Division is formed of three individual knitting unit under the title of Epyllion Knitex Limied, Epyllion Fabrics Limited and Epyllion Fabrics Limited (Unit-2). Epyllion Textile Division is equipped with modern Auto Stripe and Jacquard Knitting machine. There is also a collar-cuff knitting section producing collar and cuff especially for polo shirt. Usually, white fabrics made with white yarn are produced in Epyllion Knitex Limited to avoid fly dust contamination from colored yarn. Colored fabrics are produced in Epyllion Fabrics Limited and Epyllion Fabrics Limited (Unit-2) but in Epyllion Fabrics Limited (Unit-2) the machines are of very high speed then that of Epyllion Fabrics Limited.



CIRCULAR KNITTING MACHINE

KEY TASKS

- Receive fabric manufacturing order from PMC.
- Generate knit fabric manufacturing plan.
- Produce required fabric within due time.

KNITTING CAPACITY

KNITTING CAPACITY OF DIFFERENT UNIT

Name of the Unit	Capacity
Epyllion Knitex Limited	5 ton/day
Epyllion Fabrics Limited	10 ton/day
Epyllion Fabrics Limited (Unit-2)	7-8 ton/day
Sub-Contract (To fulfill the requirement)	12-15 ton/day
Collar-Cuff	5000 Set (Collar: 5000 & Cuff: 10,000)

YARN USED IN KNITTING

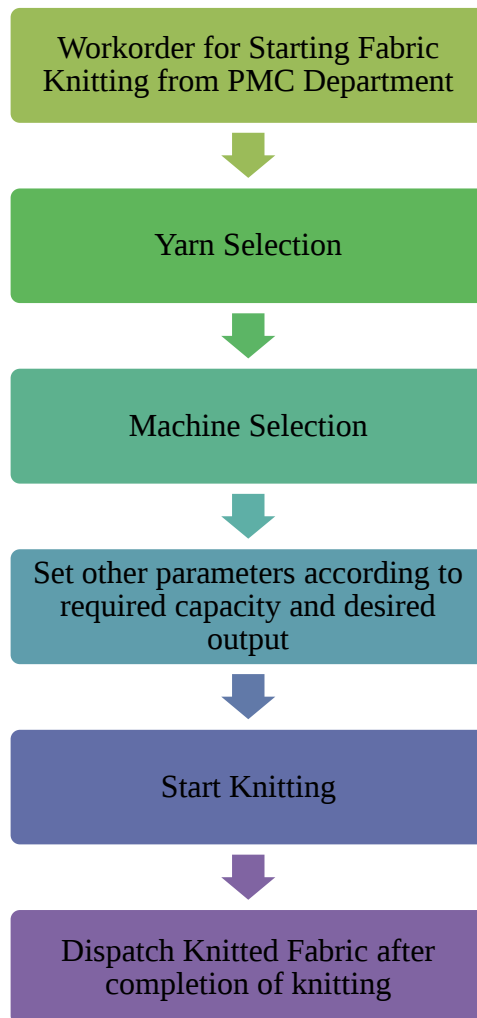
YARN USED IN KNITTING

Types of Yarn Used	Yarn Count
Cotton	20Ne,24Ne,26Ne,28Ne,30Ne,32Ne,34Ne,40Ne
Polyester	70D,72D,75D,100D
Lycra	20D,40D,70D
Melange	26Ne,28Ne,30Ne
CVC (Chief Value Cotton)	24Ne,26Ne,28Ne,30Ne

Yarn Imported From:

- India
- China
- Indonesia
- Vietnam

OPERATIONAL SEQUENCE



LIST OF KNITTING MACHINERIES

Machine Category	Brand Name	Country of Origin	Machine Model No.	Machine Diameter × Machine Gauge	Number of Feeder	Number of Needle	Total Number of Machine Present	Unit
Single Jersey	Wellknit	Taiwan	NS/3 OF-PF	30×28	90	2640	27	EFL
Single Jersey	Wellknit	Taiwan	WS/3 OF-PF	30×28	90	2640	3	EFL
Rib	Lisky	Taiwan	LF9/96 FSI-4	30×20	96	1880	4	EFL
Single Jersey	Zenit	China	Zenit F	30×20	90	1880	3	EFL
Interlock	Wellknit	Taiwan	WD/2 8F-G	36×24	64	2710	4	EFL
Interlock	Wellknit	Taiwan	WD/1 8F-G	30×24	54	2256	2	EFL
2T Fleece	Wellknit	Taiwan	WS/3 OF-PF	28×24	84	2112	3	EFL
Single Jersey	Wellknit	Taiwan	WS/3 OF-PF	28×24	84	2112	1	EFL
Rib	Pailung	Taiwan	PL-XS3B/A/CE	34×24	102	2560	1	EFL
3T Fleece	Wellknit	Taiwan	WS/3.OF-PFFB	30×20	90	1896	6	EFL
Single Jersey	Wellknit	Taiwan	WS/3.OF-PFFB	30×28	90	2640	3	EFL
Single Jersey	Wellknit	Taiwan	WS/3.OF-PFFB	30×20	90	1896	1	EFL
Rib	Ssangyong	Korea	UI2.O	44×18	88	2486	1	EFL
Interlock	Pailung	Taiwan	PL-XS3B/A/CE	34×24	102	2560	2	EFL
Interlock	Pailung	Taiwan	PL-XS3B/A/CE	36×24	108	2712	2	EFL
Rib	Pailung	Taiwan	PL-XS3B/A/CE	22×18	66	1240	1	EFL
Rib	Pailung	Taiwan	PL-XR2.5B/CE	44×18	106	2484	2	EFL
Auto Stripper	Mayer & Cie	Taiwan		30×24	48	2268	4	EFL2
Auto Stripper	Terrot	Germany		30×24	48	2268	4	EFL2

Auto Striper	Wellknit	Taiwan		30×24	48	2268	1	EFL2
Single Jersey	Orizio	Italy	JOHN/C	30×28	90	2580	5	EKL
Single Jersey	Orizio	Italy	CO5N	30×24	72	2260	1	EKL
Single Jersey	Wellknit	Taiwan	WS/3 OF-PF	30×28	90	2640	15	EKL
Rib	Orizio	Italy	CMOAN	30×18	90	1696	5	EKL
Rib	Terrott	Germany	XS/R3	30×18	90	1696	2	EKL

BATCH PREPARATION SECTION

INTRODUCTION

Batch Preparation Section is responsible for preparation of fabric batch according to the requirement provided by dyeing section. They are also responsible for turning the fabric upside down as most of the fabric is dyed on its back side. Tuck Stitch is given in the batch preparation section to open width fabric if needed.

KEY TASKS

- To receive grey fabric from knitting section.
- Turn the fabric (if required).
- To give tuck stitch to open width fabric.
- To prepare fabric batch for dyeing according to following criteria:
 1. Order Sheet
 2. Types of Fabric
 3. Dyeing Shade
 4. Machine Capacity
 5. Available Capacity
 6. Priority of Work

MACHINERIES OF BATCH PREPARATION SECTION

Back Sewing Machine / Re-tube Machine

Manufacturer: Jun Shuenn Machinery, China

Number of Machine Present: 2

Function: Provides tuck stitch to open width fabric at an SPI ranging from 6-18

Overlock Machine:

Manufacturer: JUKI, Japan

Number of Machine Present: 5

Function: To join the fabric at its end and maintain the continuity of fabric roll lengthwise.

Air Turner Machine:

Number of Machine Present: 2

Function:

- a. Unroll Fabric.
- b. Provide overturn to fabric mostly with low GSM (140-150).

INTRODUCTION

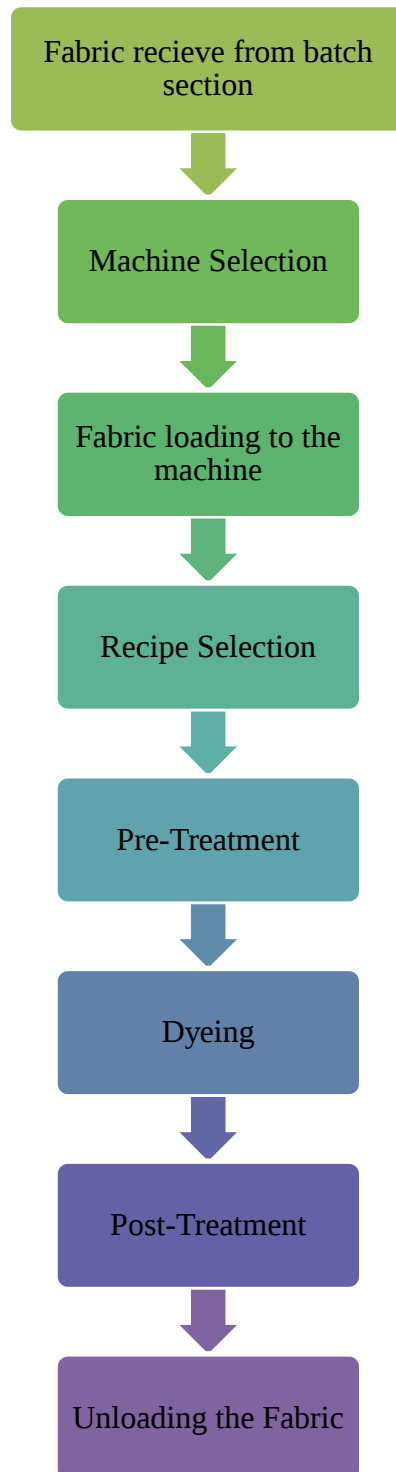
Dyeing is the process of coloration of fiber, yarn, fabric or garment. In dyeing section of Epyllion Group, only fabric is dyed in rope form. The dyeing section of the factory consists of a formulation lab as well alongside the dyeing floor. Mostly Cotton, Polyester, Mélange, etc. fabric is dyed using reactive and disperse dye.



KEY TASKS

- Prepare suitable recipe according to color shade and fabric to be dyed.
- To fully conduct dyeing process of the fabric and ensure proper color shade throughout the batch.

OPERATIONAL SEQUENCE



DYEING CAPACITY

DYEING CAPACITY

Name of The Unit	Capacity (Approximately)
Epyllion Knitex Limited	10 Ton
Epyllion Fabrics Limited	30 Ton

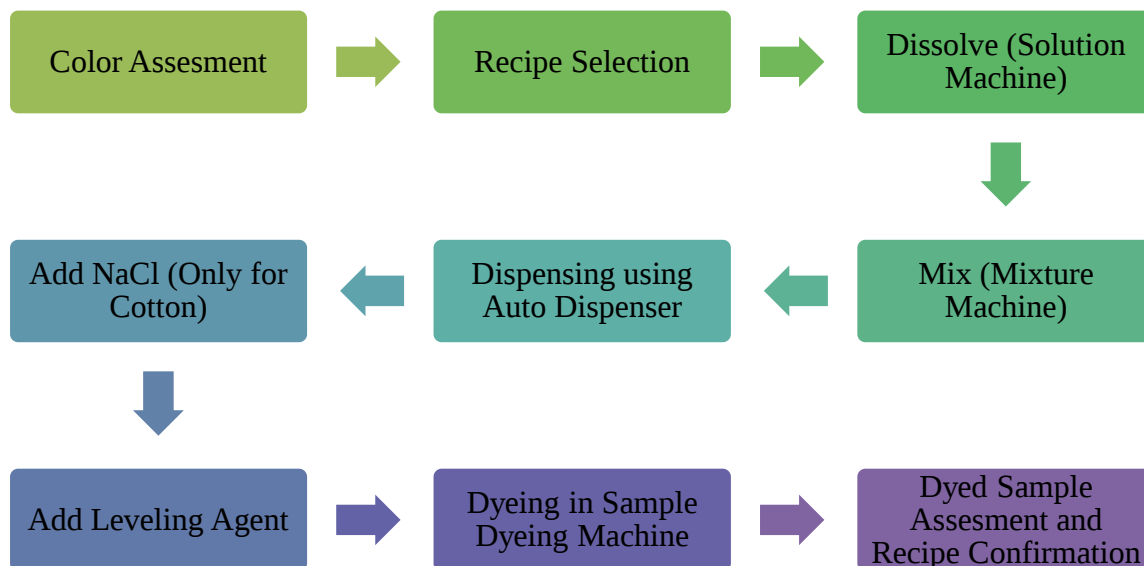
FORMULATION LAB

Formulation lab is the core of dyeing where fruitful recipe for conducting dyeing process is provided before going for bulk production. Small amount of sample fabric is dyed using sample dyeing machine.

MACHINERIES OF FORMULATION LAB

- Sample Dyeing Machine
- Auto Dispenser (Autolab TF-80)
- Mixture machine
- Sample Padder

OPERATIONAL SEQUENCE OF FORMULATION LAB



LIST OF DYEING MACHINERIES

LIST OF DYEING MACHINE

Machine Type	Brand	Country of Origin	Capacity (Kg)	Number of Machine	Unit
Sample Dyeing	Sontech	China	10	2	EKL
Sample Dyeing	Sontech	China	30	1	EKL
Sample Dyeing	Sontech	China	15	2	EKL
Bulk Dyeing	Theis	Germany	350	2	EKL
Bulk Dyeing	Fong's	China (Hong Kong)	500	2	EKL
Bulk Dyeing	Fong's	China (Hong Kong)	250	1	EKL
Bulk Dyeing	Fong's	China (Hong Kong)	750	2	EKL
Bulk Dyeing	Fong's	China (Hong Kong)	1000	1	EKL
Bulk Dyeing	Sontech	China	75	1	EKL
Bulk Dyeing	Sontech	China	150	1	EKL
Sample Dyeing	Sontech	China	10	1	EFL
Sample Dyeing	Fong's	China	10	2	EFL
Bulk Dyeing	Sontech	China	150	1	EFL
Bulk Dyeing	Sontech	China	75	1	EFL
Bulk Dyeing	Sontech	China	30	1	EFL
Bulk Dyeing	Fong's	China (Hong Kong)	30	3	EFL
Bulk Dyeing	Fong's	China (Hong Kong)	60	1	EFL
Bulk Dyeing	Fong's	China (Hong Kong)	150	2	EFL

Bulk Dyeing	Fong's	China (Hong Kong)	250	1	EFL
Bulk Dyeing	Fong's	China (Hong Kong)	550	2	EFL
Bulk Dyeing	Fong's	China (Hong Kong)	700	3	EFL
Bulk Dyeing	Fong's	China (Hong Kong)	1000	1	EFL
Bulk Dyeing	Theis	Germany	1000	3	EFL
Bulk Dyeing	Theis	Germany	750	1	EFL
Bulk Dyeing	Theis	Germany	1500	2	EFL
Bulk Dyeing	Theis	Germany	550	1	EFL



FONG'S DYEING MACHINE



THEIS DYEING MACHINE

DIFFICULTIES OF DYEING SECTION

- Energy crisis (Power Failure)
- Huge machine breakdown (Old Machineries)

FABRIC FINISHING SECTION

INTRODUCTION

Fabric finishing section is the final section consisting of heavy machineries to provide fabric its desired look. Here fabric comes to its desired shape and some problems like GSM control and Shrinkage can also be handled in finishing section.



FINISHING SECTION

KEY TASKS

- To provide fabric its desired appearance and properties.
- To give dimensional stability to fabric.

OPERATIONAL SEQUENCE OF FABRIC FINISHING SECTION

- Tubular Fabric Finish



- Open Width Fabric Finish



- Special Finish



TYPES OF FINISHING

- Mechanical Finishing (Used to control dimensional stability)
- Chemical Finishing (Used to make glossy protection. To improve performance and service ability)

LIST OF FINISHING MACHINERIES

LIST OF FINISHING MACHINERIES

Machine Name	Brand	Model	Country of Origin	Unit
Hydro Extractor	HAN SEONG Machinery MFG. CO. LTD.	E60	Korea	EKL

De-watering Machine	Corino	Stradestatal e n-231	China	EKL
Slitting Machine	Bianco	TELTP 00164 G0498	Italy	EKL
Dryer	Entema	CURLU TURKIYE	Turkey	EKL
Dryer	Santex	CH-9555	Switzerland	EKL
Compacting Machine (Tube)	Santex	Santaspread 140	Switzerland	EKL
Compacting Machine (Open Width)	Santex	CH-9555 Tobel	Switzerland	EKL
Stentering Machine	SEIREN		China	EKL
Hydro Extractor	HAN SEONG Machinery MFG. CO. LTD.	H260	Korea	EFL
De-watering Machine	Corino	Stradestatal e n-231	China	EFL
De-watering Machine	Corino	299/14	China	EFL
Slitting Machine	Ferrado	TUMT-A	Italy	EFL
Stentering Machine (8 Chamber)	LK & LH CO. LTD.	FWS-920 TKM	Taiwan	EFL
Compacting Machine (Open Width)	Santex	CH-9555 Tobel	Switzerland	EFL
Compacting Machine	Tube.Tex	BM 101116	USA	EFL
Stentering Machine	Monforts		Germany	EFL

Stentering Machine	Santex	Santashrink	Switzerland	EFL
Stentering Machine	ACC	TPG/2400-7	Turkey	EFL
Slitting Machine	Bianco	TGLFP 00166 CO 808	Italy	EFL
Compacting Machine	Ferrado	Comptex-RC 800	Italy	EFL
Brushing Machine	Lafer	10GR21910	Italy	EFL
Brushing Machine	Lafer	10GR43378	Italy	EFL
Sueding Machine (Ultrasoft-Y)	Lafer	10GSY2269	Italy	EFL
Sueding Machine (Ultrasoft-L)	Lafer	10GSY3289	Italy	EKL



CORINO DEWATERING MACHINE



BIANCO SLITTING MACHINE

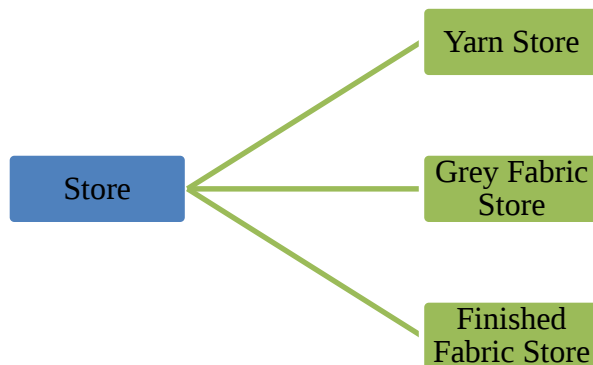


COMPACTING MACHINE

STORE (EPYLLION TEXTILE DIVISION)

Store is the place where yarn and fabric (Grey or Finished) is stored following certain criteria.

Textile Division of Epyllion Group comprises of Yarn Store (Bonded Warehouse), Grey Fabric and Finished Fabric Store.



KEY TASKS

- To store yarn, grey fabric and finished fabric ensuring that the fabric retain its appropriate condition while stored.
- To ensure proper dispatch of goods.

OPERATIONAL SEQUENCE

FINISHED FABRIC



GREY FABRIC



DIFFICULTIES OF STORE

- Extra Space Consumption
- Authorization for issue
- Material Handling

UTILITY

EPYLLION GROUP is a big project and so of course having a vast project of utility service. The utilities are:

- Water
- Gas
- Electricity
- Compressed Air
- Steam

GAS

The source of Gas is TITAS GAS LTD. The gas is supplied to gas generator or different section (Boiler- for heating water) from the main line of the TITAS GAS LTD.

ELECTRICITY

Gas Generator is used for supplying electricity for the dyeing, knitting & office of the Epyllion Group.

Total power produced by Gas Generator - 1344KW

Factory (Dyeing & Knitting) Power Needed for Installation –

About 1200 KW Factory (Dyeing & Knitting)

Power needed at running stage – About 720 KW

Power Needed for Office - About 250 K

COMPRESSED AIR

Compressed air is produced by air compressor. There are two air compressors for producing compressed air.

STEAM

Steam is produce by Boiler. From the water treatment plant water is stored in a reserve tank and from there water goes to boiler & steam in produced.

There are some machine also available.

- Generator
- Reservoir
- W.T.P. Machine
- Boiler

INTRODUCTION

In textile world washing carry a wide meaning & plays a vital role. In textile languages washing means making shade, dry process, dyeing and so many process according to requirement. Washing is the process to achieve desired look on the garments according to Buyers requirement.



WASHING SECTION

KEY TASKS

- To bring desired garment look.
- To bring or remove hairiness effect.
- To bring abrasion effect.

WASHING CAPACITY OF EPYLLION WASHING LIMITED

CAPACITY OF WASHING

Capacity At A Glance	
Washing Capacity	700,000 pcs – 1,200,000 pcs

TYPES OF WASH

WET PROCESS

- Normal Wash
- Silicon Wash
- Bleed Control Wash
- Fixation Wash
- Soda Wash
- Heavy Garment Wash
- Enzyme Wash
- Tint Wash
- PP Spray
- Color Spray
- White Paste Spray
- Burnout
- Pigment Dyeing
- Reactive Dyeing
- Tie Dye
- Dip Dye
- Wave Dye
- Bleach Wash
- Acid Wash
- Tie Dye
- Towel Bleach

DRY PROCESS

- Whiskering
- Sand Blasting
- Scarping
- Laser Blasting

LIST OF MACHINERIES

LIST OF WASHING MACHINERIES (1)

Machine Name	Capacity (Kg)/(Small, Medium, Large)	Number of Machine
Hydro Extractor		6
Tumble Dryer	Small (20 kg)	10
Tumble Dryer	Medium (30kg-40kg)	8
Tumble Dryer	Large (40kg-100kg)	4
Belly Wash Machine	40	12
Front Loader Wash Machine	100	1
Front Loader Wash Machine	80	2
Front Loader Wash Machine	40	1

LIST OF WASHING MACHINERIES (2)

Machine Name	Brand	Country of origin	Number of Machine
Wash Machine Automatic	Avantec	Italy	6
Wash Machine Semi-Automatic	Tong Zin	China	12
Tumble Dryer Automatic	Avantec	Italy	2
Tumble Dryer Automatic	Triventa	Italy	2
Tumble Dryer Semi-Automatic	Tong Zin	China	18



TUMBLE DRYER

E-Flow Machine:

Brand Name: Jeanologia Eco

Country of Origin: Italy

Number of Machine: 1

Function: To bring smooth hand feel in garment by spraying softener without using any extra chemical and water ensuring 0% wastage of chemical and water.

EFFLUENT TREATMENT PLANT (E.T.P.)

Effluent is the gaseous, solid or liquid waste, treated or untreated that flows out of a treatment plant, sewer or industrial outfall. Generally refers to waste discharged into surface waters. Considering the pollution volume and load of the liquid waste, wet processing industries are receiving greater attention world-wide and effluent plant (ETP) is becoming an integral part of the industry. Regulating bodies of national & international level are trying to make sure that the legal aspects are not ignored any more. The characteristics of the discharge that exceed consent limit must be treated in some way to conform to the standards set up by them.

CHARACTERISTICS OF LIQUID WASTE

-BOD (Biological Oxygen Demand), COD (Chemical Oxygen Demand), AOX (Absorbable Organic Halogen), Metal ion, pH temperature etc.

- The most widely used method for measurement of pollution is the biological oxygen demand after 5 days. It is the measure of the quantity of organic material present in water which is accessible to bacterial attack. Another method is to determine chemical oxygen demand which refers to oxygen consumed in the reaction with a strong oxidizing agent.

PURPOSE

At least five distinct categories of waste from the textile industry can be recognized:

- Oxygen demanding materials.
- Settle able & suspended solids.
- Many materials impart acidity and alkalinity.
- Heat.
- Toxic compounds.

PRODUCT DEVELOPMENT CENTER

INTRODUCTION

Product Development Center of Epyllion Knitwear's Limited is responsible for preparing and conducting all sort of sample work as per buyer's specification. They have a complete forward linkage unit under their supervision in miniature form just to produce different types of sample and get approval against the sample to go for bulk production.



SAMPLE SECTION OF EKWL

KEY TASKS

- PDC is responsible for all sort of sampling work according to buyer's requirement.
- Product Development Center is also responsible for all sort of pre-production work.

WINGS OF PRODUCT DEVELOPMENT CENTER

- CAD Section (Automated)
- Pattern Section (Manual and Automated)
- Cutting Section
- Sewing Section
- Finishing Section

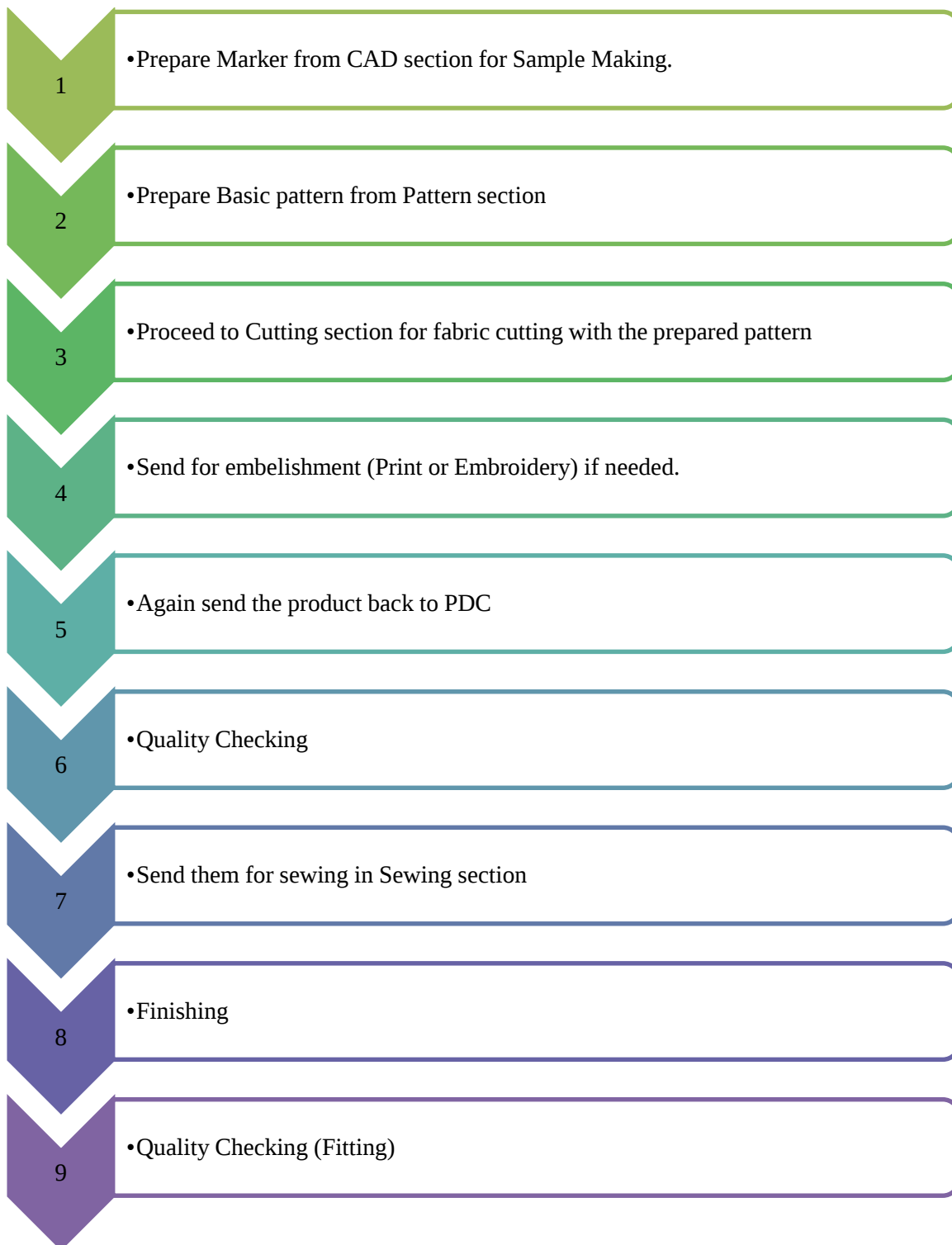
DIFFERENT TYPES OF SAMPLES PREPARED BY PRODUCT DEVELOPMENT CENTER

- Buyers/Development Sample
- Red Tag Sample (Fitting concerned and with actual fabrication and fittings)
- Size Set Sample (According to Grading)
- Gold Seal Sample (Final Sample)
- Washing Sample
- Color Sample
- Advertisement Sample
- PP or Pre-Production Sample
- Marketing Sample/Design Studio Sample

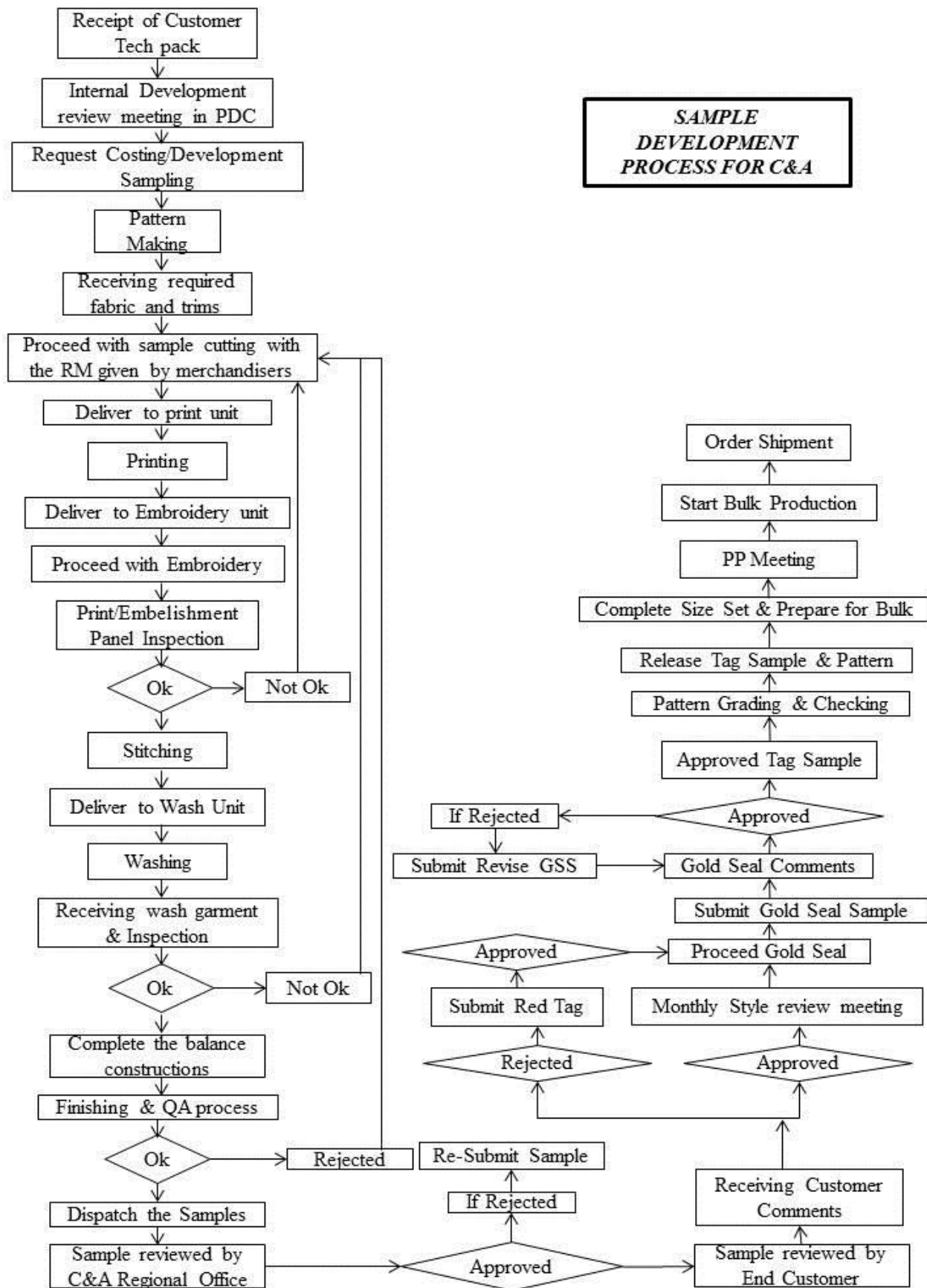
CHALLENGES FOR PRODUCT DEVELOPMENT CENTER

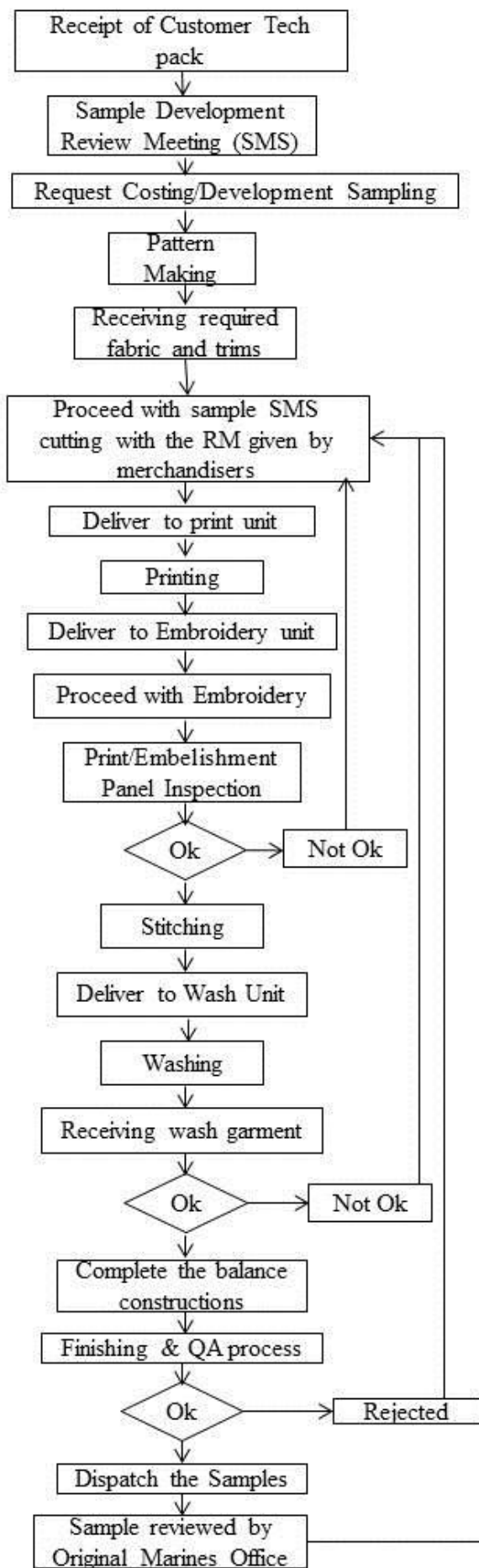
- Short Lead Time
- On Time Delivery
- Fabric Consumption
- Sample Approval

OPERATIONAL FLOWCHART FOR PRODUCT DEVELOPMENT CENTER

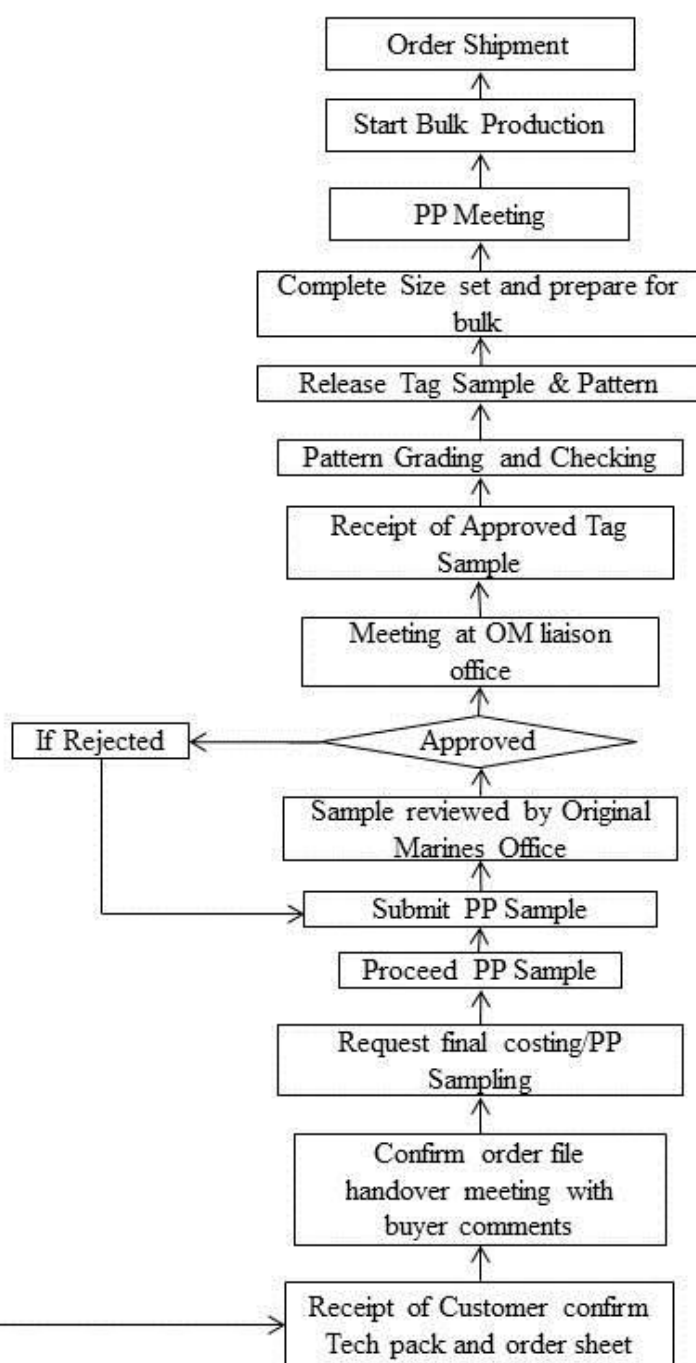


OPERATIONAL SEQUENCE FOR SAMPLE PRODUCTION

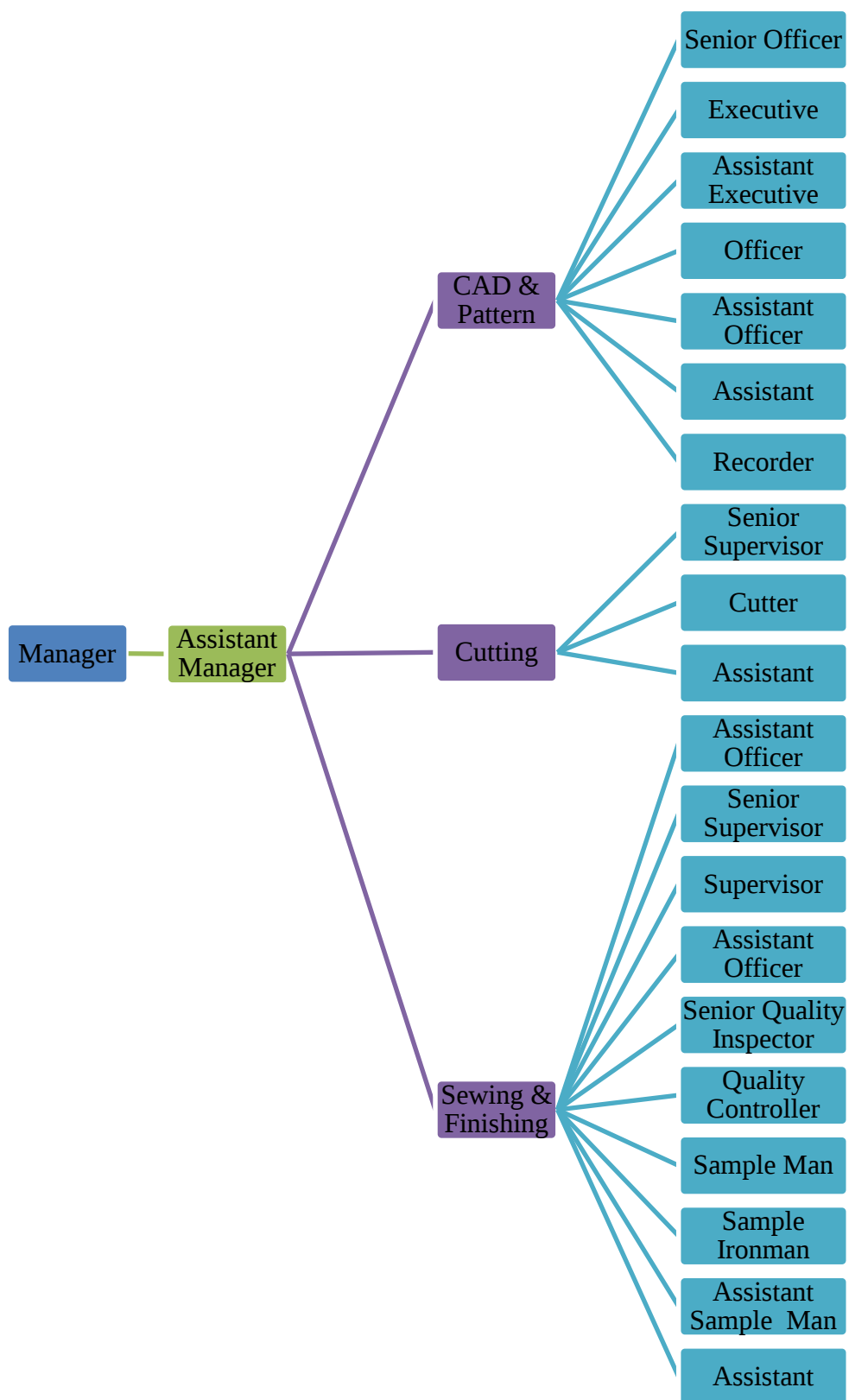




**SAMPLE
DEVELOPMENT
PROCESS FOR
ORIGINAL MARINE**



ORGANOGRAM OF PRODUCT DEVELOPMENT CENTER



LIST OF MACHINERIES FOR PRODUCT DEVELOPMENT SECTION

LIST OF MACHINERIES OF PDC

MACHINE NAME	BRAND	COUNTRY OF ORIGIN
Plain Machine (Auto/Manual, 1-Needle/2-Needle, Vertical Trimmer)	JUKI/Brother	Japan
Chain Stitch (1-Needle/2-Needle,3-Needle)	JUKI	Japan
Overlock Machine (With Collar Cuff Cutter, 3/4/5/6-Thread, Latus/Gathering)	JUKI	Japan
Flat Lock Cylinder Bed Machine	JUKI/Pegasus	Japan/China
Flat Lock Flat Bed Machine	JUKI/Pegasus	Japan/China
Feed of the Arm Machine		
Kansai Special Machine	Kansai	Japan
Kansai Back Tape Machine	Kansai	Japan
Kansai Picoting Machine	Kansai	Japan
Button Holing Machine	JUKI	Japan
Button Stitching Machine	JUKI	Japan
Bar Tack Machine	JUKI	Japan
Snap Button Attaching Machine	YKK/Prym/Ngaishing	Japan/Mozambique
Rib Cutter	SVEGA	Sweden
Cycle Stitch Machine		
Cylinder Bed V.T.A	Yamato	Japan
Fusing Machine	Hashima	Japan
Cutter Machine		
Plotter Machine	ASSYST	Germany
Digitizer Machine	ASSYST	Germany

TIME AND ACTION PLAN

TABLE OF T&A

90 Days Calendar	
Number of Days Remaining	Action
90	Order Confirmation
83	Fit Comments (1 st)
76	Fabric in House
75	Cutting
72	Printing
70	Embroidery
69	Trims in House
66	Stitching
65	Dispatch
59	Fit Comments (2 nd)
4 Days	
59	Gold Seal complete in house test
55	Gold Seal Submit
45	Gold Seal Approval
1	Order Shipment

120 Days Calendar	
Number of Days Remaining	Action
120	Order Confirmation
110	Fit Comments (1 st)
103	Fabric in House
102	Cutting
99	Printing
97	Embroidery
95	Stitching

94	Dispatch (2 nd Fit)
84	Fit Comments (2 nd)
15 Days	
69	Gold Seal complete in house test
65	Gold Seal Submit
55	Gold Seal Approval
48	Order Shipment

CAD, PATTERN AND MARKER SECTION

The textile Industries are being modernized day by day. Now-a-days, the designs are produced in different textile Manufacturing process by CAD.

PATTERN MAKING

This department provides patterns of different designs. After receiving an order in most cases buyer gives them a complete pattern and they make sample according to given pattern. But in some cases they prepare the pattern by own when buyers don't provide any pattern. In this case, patterns are produced according to design for sample preparation.

In Epyllion Knitwears Ltd. patterns are created by Winda and Assyst software and then pattern paper laid down on the Pattern Cutting Machine where pattern is made & cut by the machine automatically.



This pattern goes for Buyer's approval. After the sample is approved, final pattern is made with approximate allowance & other parameters. Then grading is preferred for the further process.

CAD SECTION

CAD means computer aided design. It is very much popular in the factory because of its accuracy & preciseness. It includes:

- Grading
- Marker making
- Costing consumption
- Booking Consumption

In Epyllion Knitwears Ltd. patterns are created by Winda and Assyst software

CAD SECTION MACHINERY

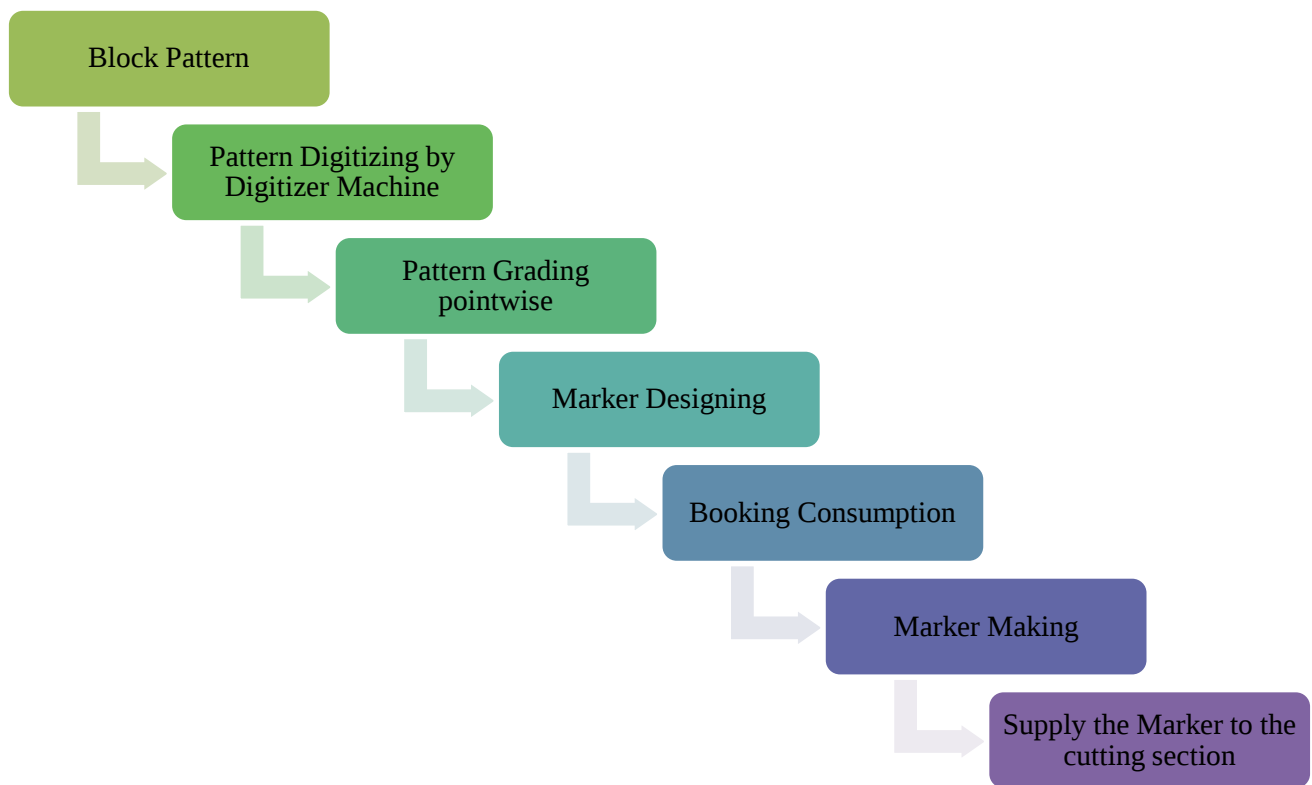
Machine Name: Plotter Machine

Number of Machine: 2

Brand: ASSYST

Country of Origin: Germany

CAD SECTION WORK FLOW



MARKER MAKING

The most commonly used system of marker making is computerized method. In this system, a man performs it by himself using computer software (CAD and CAM) and it requires considerably less time than manual system.

TYPES OF MARKER MAKING

Two types of marker are generally made using computerized system –

a. Full size marker:

Using Digitizer the pattern pieces are input into the computer. Computer uses software and a marker paper is printed out that will be used in the production.

b. Miniature type marker:

Only for learning and planning purposes this type of marker is printed from the computer.

Computerized system is also of two types –

a. Interactive:

Manually it is done by using computer. Generally a computer operator can do it and requires less time.

b. Automatic:

The pattern pieces are replaced on to the marker by programming. A high technician can do so and it requires more time.

FACTORS CONSIDERED DURING MARKER MAKING

The important factors considered during marker making are –

- Nature of the Fabric
- Lay planning of patterns

- Washing products
- Alignment of the pattern pieces according to the grain line
- Requirements of cutting
- Production planning
- Size of marker

MARKER EFFICIENCY

The ratio between the total areas of the pattern pieces to the total area of the marker Paper is technically termed as Marker Efficiency. It is expressed in percentage. If it is Denoted by the symbol η , then

Marker Efficiency (η) = (Areas of the pattern pieces/Total area of the Marker paper) $\times 100$

FACTORS INFLUENCING MARKER EFFICIENCY:

The factors which influence the Marker Efficiency –

- Manufacturers of the marker;
- Size of pattern pieces;
- Length of the marker;
- Pattern Engineering;
- Nature of the fabric;
- Method of marker making;
- Marker width;
- Kinds or design of garments.

FABRIC WASTAGES DUE TO MARKER:

- Inside wastage
- Outside wastage
- Ends of the ply losses
- End of fabric losses
- Selvage losses
- Purchase losses

MATERIAL CONTROL DEPARTMENT

Material Control Department is considered as a bonded warehouse of an export-oriented garments factory. Therefore, MCD management is a very prior issue. MCD is fully responsible for all sort of material flow especially raw material for garment manufacturing which also includes needle, light, hook and such accessories items.



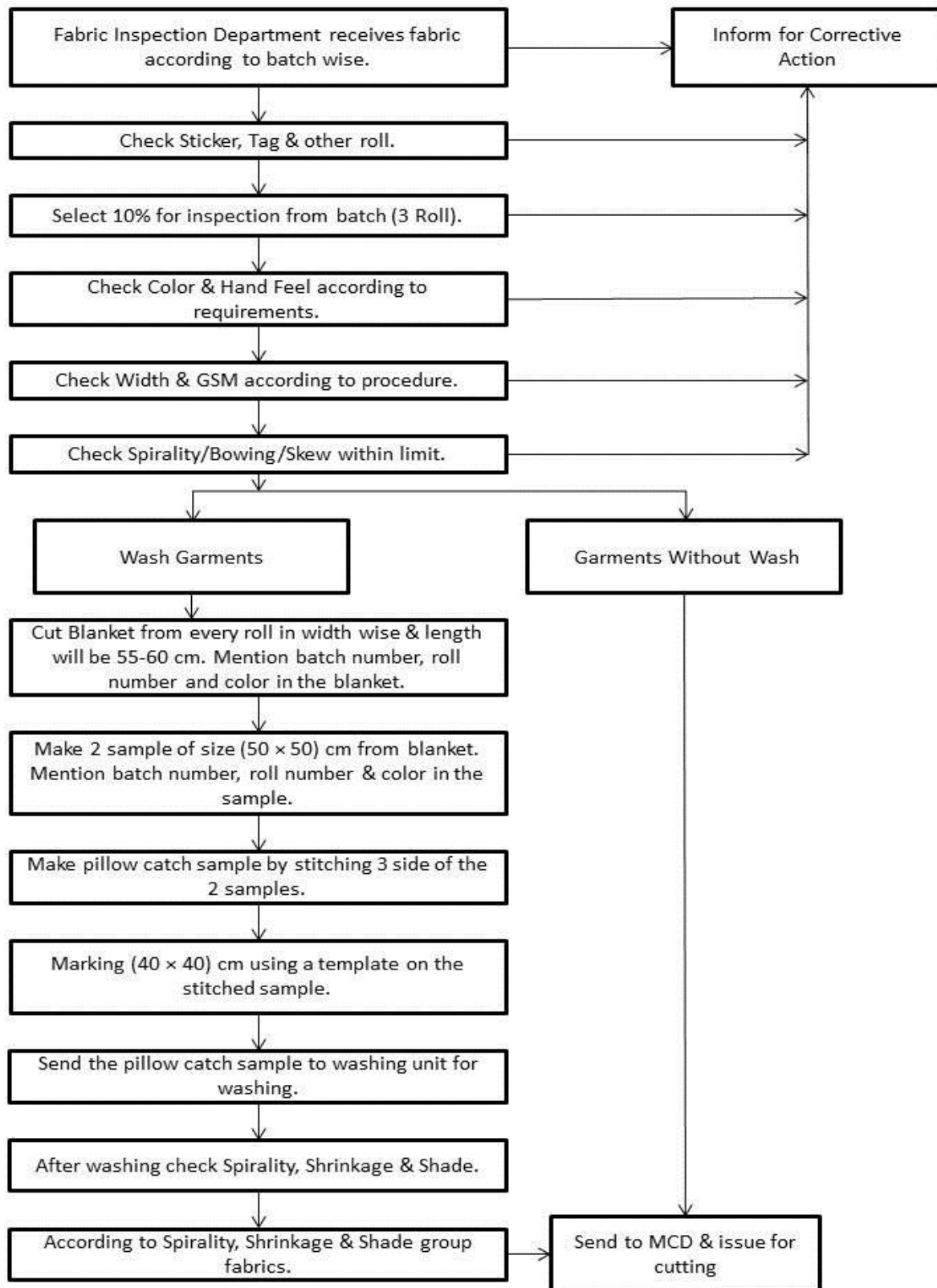
FABRIC STORE CONTROLLED BY MCD

MCD of EKWL mostly monitors the flow of following materials:

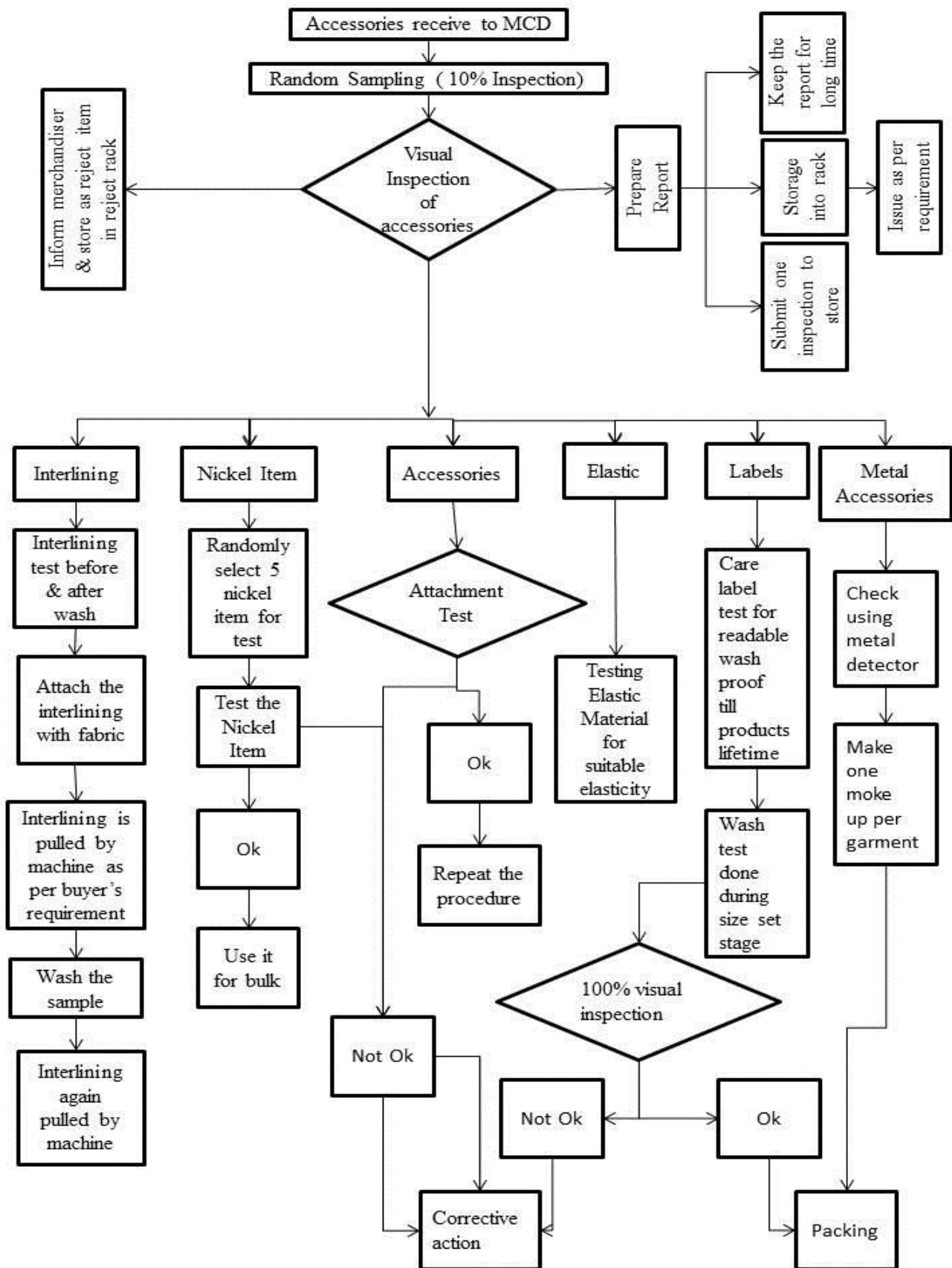
- a. Trims & Accessories:
 - Sewing Thread
 - Button
 - Zipper
 - Hanger
 - Hang Tag
 - Main Label
 - Care Label
- b. Sewing Needle
- c. Fabric

Material Control Department receives fabric and all sorts of trims & accessories by maintaining a certain standard operating procedure to ensure perfect quality.

STANDARD OPERATING PROCEDURE FOR FABRIC INSPECTION



STANDARD OPERATING PROCEDURE FOR TRIMS AND ACCESSORIES



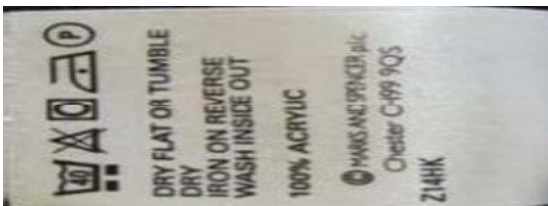
ACCESSORIES USED IN EPYLLION KNITWEARS LIMITED



MAIN LABEL



SIZE LABEL



CARE LABEL



ELASTIC



BARCODE



ORGANIC HANG TAG



DRAWSTRING



PULLER



BUTTON



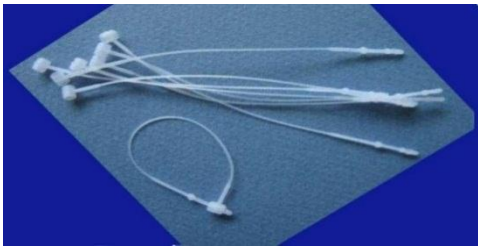
ZIPPER



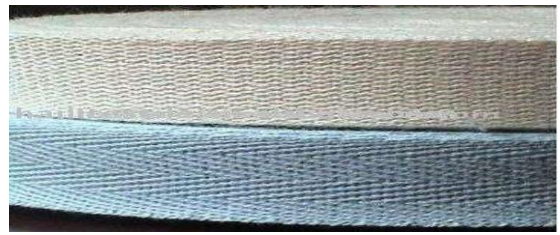
BRAND TAG



PRICE LABEL



TAG PIN



TWILL TAPE



SNAP BUTTON



LYCRA TAG



POLYBAG



HANGER



HANG TAG



GUM TAPE



CARTON

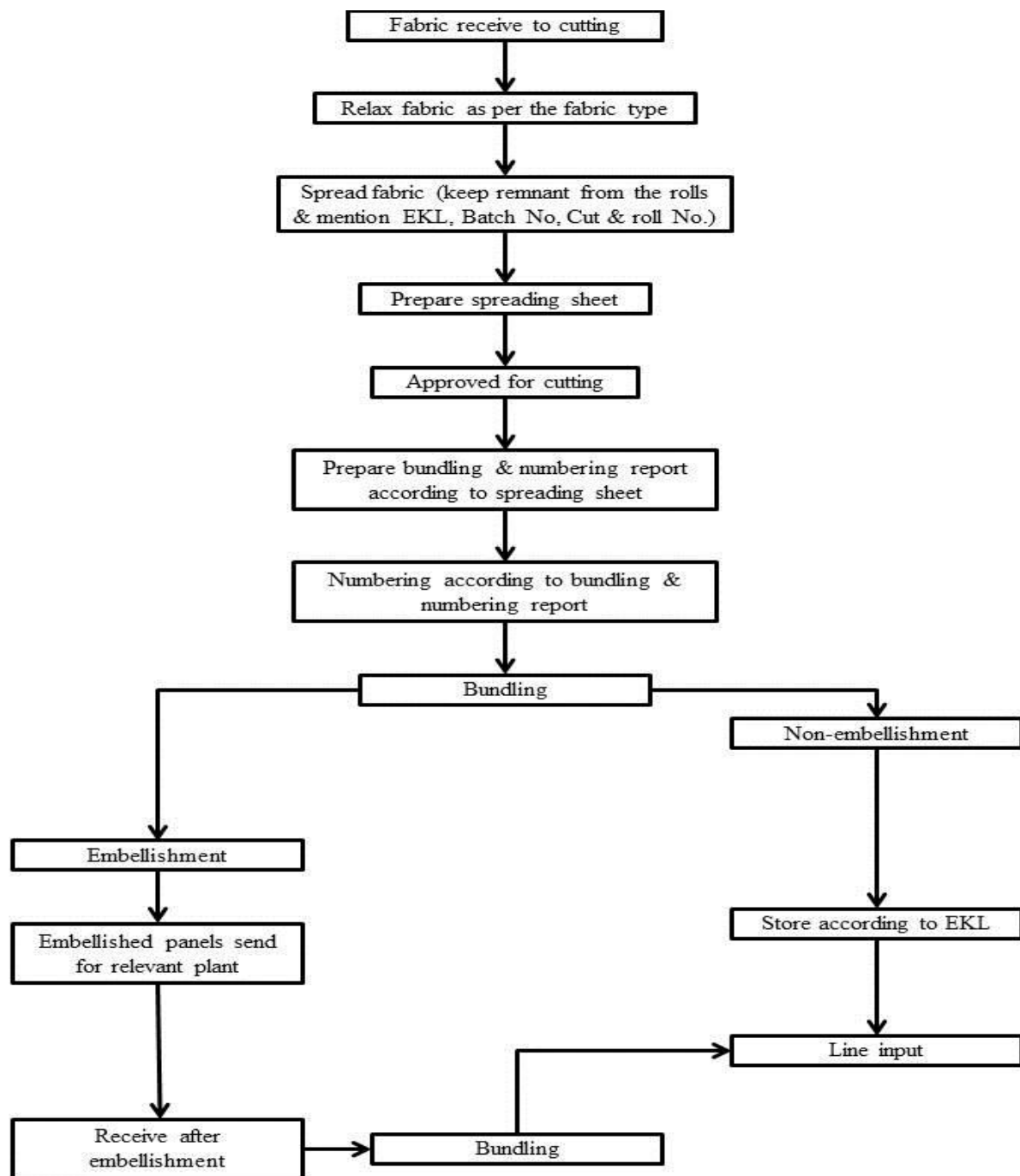
CUTTING SECTION

Cutting is the process of cutting out the pattern pieces from specified fabric for making garments. Using the markers made from graded patterns and in accordance with the issued plan, fabrics are cut to prepare garment assembly. This is the major operation of the cutting room. Cutting section is responsible for cutting fabrics and feeding the sewing department with cut panel. The cutting section's capacity is planned on the basis of daily feeding required for sewing line.



CUTTING SECTION

OPERATIONAL FLOWCHART FOR CUTTING SECTION



FABRIC RELAXATION

When the fabric comes from the dyeing and finishing, the fabric remains a slightly hot. In dryer, stenter and compactor heat is applied on fabric. So moisture is removed from the fabric and it is not in actual condition. But if we keep the fabric in normal temperature and pressure for a certain time, the fabric absorbs moisture from the atmosphere and regains its original nature. This process is called fabric relaxation. Another cause of fabric relaxation is to maintain the dimensional stability of produced garments. When the fabric is being processed in different finishing machines, it goes under certain heat and pressure to give it proper shape. But when the heat and pressure is being withdrawn, the shape may change. So, if the dimension is became stabilized before cutting, no chance of strain in garments. So relaxation is very important for fabric before cutting to retain its original shape.

RELAXATION-PERIOD

Fabric relaxation is performed for a certain period. This time varies from fabric to fabric. But the minimum time of relaxation is twelve (12) hours. This time also may vary according to the buyer's recommendation.

STANDARD TIME FOR FABRIC RELAXATION

Fabric Type	Time to Relax
Lycra Fleece	48 Hours
Lycra mix with other fabrics	24 Hours
Interlock	24 Hours
Pique	24 Hours
Viscose	24 Hours
Polyester	48 Hours

FABRIC SPREADING

Spreading means the smooth laying out of the fabric in superimposed layers of specific length. The cutting marker paper is laid in the top of the fabric layer. During spreading number of plies depends on the thickness of the fabric and the height of the cutting knife.

After collection of all the documents and fabrics from the store spreading is done manually or by using spreading machine according to the order of the CAD section. Fabric Spreading means smooth lying of fabrics as per marker direction. Fabric spreading is the preparatory process for cutting.

REQUIREMENTS OF FABRIC SPREADING

Spreading must achieve a number of specific objectives:

- Alignment of fabric plies
- Correct ply tension
- Elimination of fabric faults
- Correct ply direction and adequate lay stability
- Elimination of static electricity
- Avoidance of fusion of plies
- Avoidance of distortion in spread
- Easy separation of the cut lay into bundles
- Fabric must be flat
- Matching checks or stripes.

PRECAUTIONS WHILE FABRIC SPREADING

- Use paper for the first ply in case the table surface is rough or when fine fabrics are being spread.
- Identify the defects noticed in the fabric by stickers.
- Use lubricated paper for spreading layers in order to prevent fusing due to static current in the synthetic fabrics.
- Ensure that required number of ply count & height of the spread is achieved.

STANDARD LAY HEIGHT AND LAY LENGTH

STANDARD LAY HEIGHT AND LAY LENGTH

Fabric Type	Lay Length (Yards)	Lay Height (Inch)	Number of Ply
100% Cotton Fleece	9	4-4.5	70
100% Cotton Single Jersey	9	3-3.5	110
Cotton Pique	8	3-3.5	90
Lycra/Terry Fleece	6	3-3.5	80
Interlock Fabric	6	2.5-3	70
100% Cotton Rib	6	3-3.5	50
Lycra Pique	6	2.5-3	80
Lycra/Viscose/Polyester	6	2.5-3	85

CUTTING

Cutting section is one of the most important sections for manufacturing garments in Garments Factory. To cut out fabric according to pattern pieces of garment components as per exact dimension of the patterns from a fabric lay is called fabric cutting. The term fabric cutting is only applicable for garments manufacturing technology. Fabric is cut with the help of fabric cutting machines suitable for the type of cloth. Normally, straight knife cutting machine is used in EKWL for cutting purpose.

REQUIREMENTS OF FABRIC CUTTING

The following points must be fulfilled in fabric cutting:

- Precision of fabric cutting:

Fabric cutting should be done accurately as per exact dimension of the pattern pieces in the marker. Accurate cutting depends on methods of cutting and marker planning. If manual cutting method is used, then cutting accuracy depends on sharpness of knife, skill of operator, and attentiveness of operator. Computer controlled cutting and die cutting have their self-cutting accuracy.

- Consistent cutting:

Whatever be the cutting method used for fabric lay cutting, it should be ensured that the shape of the cut components from top to bottom lay are of exact size and shape, otherwise the garments produced will be defective.

- Infused edge:

During fabric cutting, the friction between the fabric and the blade produces temperature in the blade; the temperature may be up to 300°C. If the fabric contains synthetic fibers e.g. nylon, polyester, acrylic or their blends, then fused edge may result in the fabric. Because most of those fibers melt at around 250°C. Therefore, sticking of cut edge of fabric will increase the fabric wastage. Moreover, the fused edge after cooling will form hard bid, which will be a problem of irritation during use of garments.

To avoid the problem of fused edge formation, the following steps may be taken:

- Reduce the height of the lay
- Reduce the cutting speed
- Use anti-fusion paper in the lay at regular interval
- Lubricate the knife during cutting
- Supporting of the lay:

Surface of the cutting table depends on methods of fabric cutting. The table surface should be capable to support the lay as well as to ensure that all the plies are cut at a time during fabric cutting.

CUTTING WASTAGE

- Edge loss for needle mark (1"-1.5")
- End loss
- Splice point loss
- GSM Cutter hole
- Different fabric fault
- Wash fault
- Embellishment fault

NUMBERING

The sticker number maintains cutting number, size number, serial number. Sticker is a small paper which contains a size wise serial number, which is done by sticker m/c. It is done for remove shade variation in the same size or same parts of garments.



NUMBERING MACHINE

BUNDLING/SORTING

This step requires much precision because making bundles of mismatched patterns can create severe problems. On each bundle there are specifications of the style size, EKL number all are attached with it.

MACHINERIES OF CUTTING SECTION

LIST OF MACHINERIES OF CUTTING SECTION

Machine Name	Brand & Country of Origin	No. of Machine
Straight Knife Cutting Machine	China	13
Cutting Table		6
Band Knife Cutting Machine	Eastman EC-700N (China)	1
Heat Press Machine	China	2
Fusing Machine	Hashima (Japan)	1
Heat Seal Machine	China	1
Hand Scissor	Bangladesh	



STRAIGHT KNIFE CUTTING MACHINE

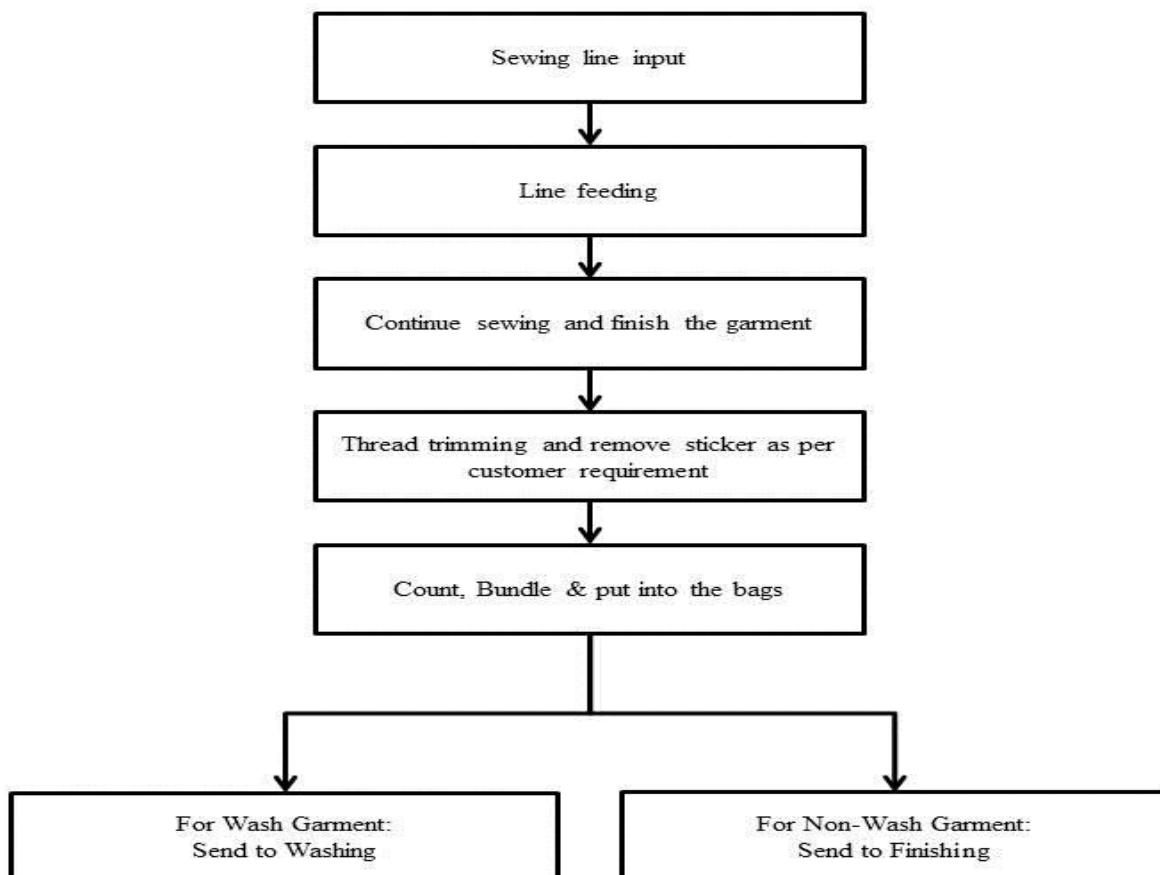
SEWING SECTION

The process of joining of fabrics by the use of needle and sewing thread or by other techniques is called sewing. The sewing process is the attachment of different parts of the cut pieces. In this work place there are many operators who perform single operation. One operator may make only straight seams, while another makes sleeve inserts. Yet another two operations can sew the waist seams, and make buttonholes. All this factor decides what parts of garment can be sewn at that station. Finally, the sewn parts of the garment, such as sleeves are assembled together to give the final form of the garments.



SEWING SECTION

OPERATIONAL SEQUENCE FOR SEWING



LIST OF MACHINERIES OF SEWING SECTION



LOCK STITCH (PLAIN) SEWING MACHINE

LIST OF MACHINERIES OF SEWING SECTION

MACHINE NAME	BRAND	COUNTRY OF ORIGIN	NUMBER OF MACHINE
Plain Machine (Auto/Manual, 1-Needle/2-Needle, Vertical Trimmer)	JUKI/Brother	Japan	260
Chain Stitch (1-Needle/2-Needle, 3-Needle)	JUKI	Japan	39
Overlock Machine (With Collar Cuff Cutter, 3/4/5/6-Thread, Latus/Gathering)	JUKI	Japan	195
Flat Lock Cylinder Bed Machine	JUKI/Pegasus	Japan/China	69

Flat Lock Flat Bed Machine	JUKI/Pegasus	Japan/China	60
Feed of the Arm Machine			5
Kansai Special Machine	Kansai	Japan	5
Kansai Back Tape Machine	Kansai	Japan	6
Kansai Picoting Machine	Kansai	Japan	1
Button Holing Machine	JUKI	Japan	11
Button Stitching Machine	JUKI	Japan	10
Bar Tack Machine	JUKI	Japan	13
Snap Button Attaching Machine	YKK/Prym/Ngaishing	Japan/Mozambique	12
Rib Cutter	SVEGA	Sweden	4
Cycle Stitch Machine			2
Cylinder Bed V.T.A	Yamato	Japan	3

LAYOUT FOR A BASIC T-SHIRT

LAYOUT FOR A BASIC T-SHIRT

NUMBER OF OPERATION	NAME OF OPERATION	MACHINE NAME
1	Shoulder one side Join	Over Lock Machine
2	Hanger tag at Back Part Join	Lock Stitch Machine
3	Neck Piping	Flat Lock Machine
4	Neck Tuck	Lock Stitch Machine
5	Shoulder another side Join	Over Lock Machine
6	Neck Snap tuck	Lock Stitch Machine
7	Sleeve matching according to Number	
8	Sleeve Join	Over Lock Machine
9	Sleeve side hem tack	Lock Stitch Machine
10	Side seam	
11	After sleeve join snap tack	Lock Stitch Machine
12	Sticker remove	
13	Care Label attach	Lock Stitch Machine
14	Bottom Hem	Flat Lock Machine
15	Extra Thread Cut	
	Quality Inspection	

FINISHING

Finishing section is the last part of production. When sewing completed then finishing and packing started. Thread cutter workers are cutting loose thread. Ironman workers are ironing goods. Then Packing-man workers are putting goods into polybag and export carton. But there should have balance process from thread cutting to carton process. Boiler should be always in normal condition because steam is necessary for ironing.

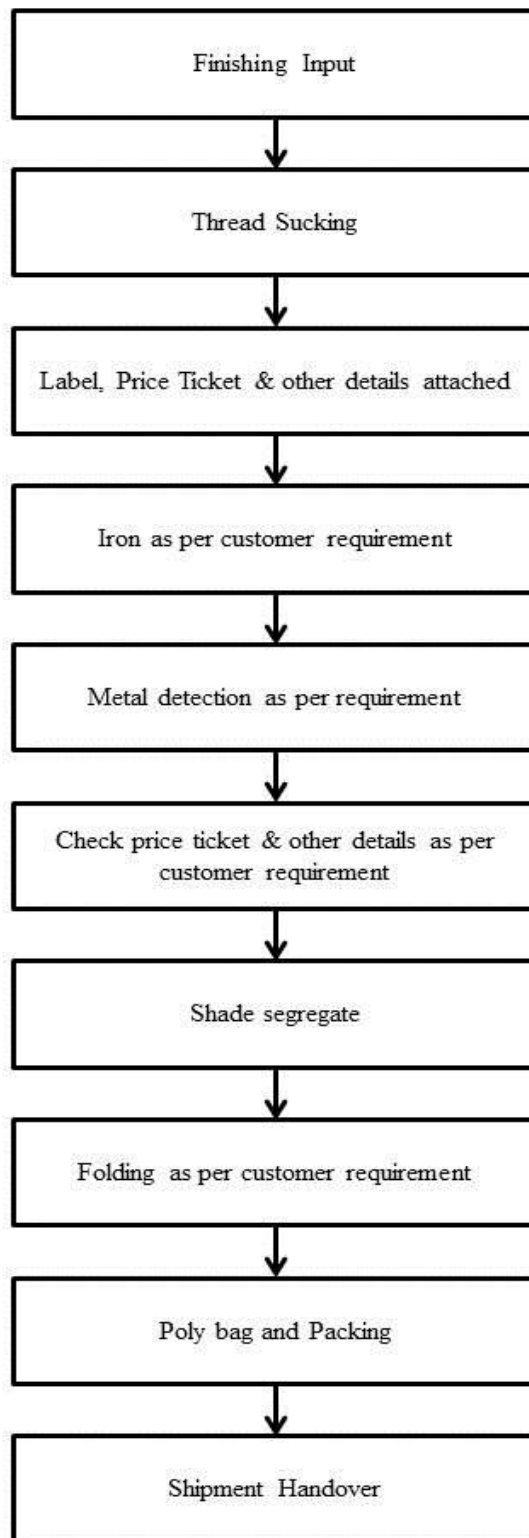


FINISHING SECTION

FUNCTION OF FINISHING

- Make a unique look of the product to the customer.
- Thread sucking to remove extra thread from the garments.
- Ironing the garments.
- Check measurement according to Buyer's requirement.
- Check appearance of the garments.
- Attach all types of Tag (Hang tag, Price tag, size tag etc.)
- Check the garments from any metal by Metal Detector Machine.
- Folding as per Buyer's requirement.
- Packaging as per Buyer's requirement.

OPERATIONAL FLOWCHART FOR FINISHING DEPARTMENT



LIST OF MACHINERIES OF FINISHING DEPARTMENT

LIST OF MACHINERIES OF FINISHING DEPARTMENT

Name of Machine	Brand & Country of Origin	Number of Machine
Iron	Silver Star (Korea)	35
Spray Gun		
Tag Gun		
Needle Detector	Hashima (Japan)	2
Tape Dispenser		
Thread Sucking Machine	OSHIMA	Taiwan

DIFFERENT TYPES OF TAG USED IN FINISHING SECTION

- Brand tag
- Size tag
- Price tag/Ticket
- Bar code
- Hang tag
- Extra Organic tag

DIFFERENT TYPES OF FOLDING USED IN FINISHING SECTION

- Half Folding
- Full Folding
- Board Folding
- Hanger Folding
- Flat Folding

DIFFERENT TYPES OF CARTON USED IN FINISHING SECTION

- 3 ply
- 5 ply
- 7 ply

Garments are aligned in the carton according to Buyer's requirement. Details about the product and the Blister (6 garments packaging together) are mentioned in the outer surface of the carton.

QUALITY ASSURANCES

Quality means a standard which is accepted by a buyer or customer. Quality Assurance is one of the major section in a Garment Factory. Product Quality is ensured by the Quality Assurance Department. To provide the product to the buyers according to their requirement & customer satisfaction is the main principal of the Quality Assurance Department.

QUALITY:

Q = Quick action.

U = Under control (All stage of production to be control)

A = Assurance / Awareness (Checking good, find out defect)

L = Look (Look for defect by quality inspector and control by m/c operator)

I = Identify/ Investigate (Find out why come, how solve, what is problem)

T = Take action.

Y = You/Your (Responsibility/Commitment)

QUALITY CONTROL

Quality means a standard which is accepted by a buyer or a customer & the process of maintain or control this quality throughout the process is called quality control.

QUALITY ASSURANCE

Quality assurance (QA) is a way of preventing mistakes or defects in manufactured products and avoiding problems when delivering solutions or services to customers.

PRINCIPLES OF QUALITY ASSURANCE

- The main objective is to prevent errors by early detection and action.
- The need to make the requirement complete and clear at all levels, from this specification of a large system to the individual work construction and terms of reference.
- The detection error by monitoring both product and the method by which is produced.
- The prevention of errors at all earliest stage.
- The total involvement all concerned of the contribution to the final products quality.
- Establish a total forward and backward control system, allowing flexibility for change.

FABRIC INSPECTION & QUALITY ASSURANCE (QA)

FAULT & THEIR CAUSES IN FABRIC

DEFECTS OF FABRIC WITH CAUSE AND REMEDY

Faults	Causes	Remedies
Barre mark	-This is basically a fabric fault which is found in the course wise. This is due to	-Ensure uniform Yarn Tension on all the feeders.
	-Count variation in the lot	-The average Count variation in the lot should not be more than +0.3
	-Shade variation in the dyed yarn	-Ensure that the yarn being used for Knitting is of the same Lot.
	-Needle is too loose or tight in trick.	-Ensure that the hardness of all the yarn packages is uniform using a hardness tester
Holes	This is a fabric fault	-Ensure uniform yarn tension on
	which could be due to machine or yarn	all the feeders with a Tension Meter.
	-Thick thin place in the yarn	-Rate of yarn feed should be strictly regulated as per the required Stitch Length.
	-Too much tension of yarn causes friction	-The fabric tube should be just like a fully inflated balloon, not too tight or too slack.
	-Too much speed of the machine	-The yarn being used should have no imperfections like; Slubs, Neps & big knots etc.
	-Defective needle	-The gap between the Cylinder & the Dial should be correctly adjusted as per the knitted loop size.

	If the position of cylinder & Dial is not accurate	
	-If the screw of feeder is loose then it cannot feed	
	-Due to wrong capacity	
Sinker mark	-Faulty sinker use in the machine	-Replace all the worn out or bent sinkers causing Sinker lines in the fabric.
	Combination of old & B20new sinker in the machine	-Remove the fibers clogging in the
	-Due to dust in the needle	Sinker tricks (Groove).
Crease mark	-Due to tension of take up roller & take down roller; diagonal line appears	-Proper timing of the machine.
		-Uniform tension during take down should be maintained
	-Wrong timing	
Pressure mark	-Due to less space between two take up roller	-Proper space have to be given according to fabric
	Due to more Tension & compress	
Oil mark	This is a mark in the fabric due to oiling in the machine. Reasons are-	-Remove all the Needles & the Sinkers of the machine periodically.
	-Too much oiling in the machine	-Clean the grooves of the Cylinder
	-Leakage in the oiling system.	& Dial of the machine thoroughly with petrol.
	-Bad quality lubricant is used	-Blow the grooves of the Cylinder Dial & Sinker ring with dry air after cleaning.
	-Mixing of one quality lubricant with another one	
Needle mark	This is a fabric fault which is found in the wales wise due to needle. The reasons are	-Inspect the grey fabric on the Knitting machine for any Needle lines.
	-Breakage of hook of needle	-Check the Needle filling sequence in the

		Cylinder / Dial grooves (tricks)
	-Breakage of latch of needle	-Change the needle after a period of time
	-Change of alignment of latch	
	-Due to improper schedule maintenance	
	-Due to old needle	
	-Due to dust in the needle	
	-Less for combed yarn & more for carded yarn due to quality.	
Wrong design	Variation of stripe in the machine	-Cam & butt arrangement should be accurate to design
	-Wrong cam arrangement	
	-Wrong butt arrangement	
Slubs	This is a fabric fault due	-Fabric area have to be covered.
	to projected fibers	-Yarn quality should be good.
	-More formation of fly from the yarn	
	-Bad quality of yarn use	
	-Due to thick thin place;	
	thick part more appears	
Count variation	-Different count of yarn package in the same lot	-Yarn quality have to be same during the operation.
	-Different quality of yarn use in the same order	-Yarn should be from one company during an operation.
	-Variation of count in the same package in different places	-Yarn count have to be measured for all the package.
	-Use yarn of another company for the same production	
GSM variation	Variation in the Stitch Length	-Make sure that all the fabric rolls
	Wrong position of the VDQ pulley	in a lot, are processed under the same process parameter.

	-Improper tension of the fabric during production	-The Knitting Machine settings, like; the Quality Pulley diameter etc. should never be disturbed
	-Wrong selection of yarn count	
Star mark	-Buckling of the needle latch	-Yarn tension should be same During production.
	-Yarn tension variation during production	-GSM have to be accurate according to design
	-Low GSM	
Thick & Thin place	-Yarn of different lot	-Use best quality yarn.
	-Yarn of different count	-Twist should be accurate
	-Due to twist problem	
Loop	-Feeder to feeder position is not accurate	-Feeder to feeder position have to be accurate.
	-Problem between feeder & yarn	-Machine setting have to be accurate.
	-Improper machine setting	
Lycra drop	-Problem in the carrier wheel	-Check Lycra carrier wheel.
		-Carefully use the air gun.
	-Lycra can change its position due to air by air nozzle	-Proper tension of the machine
	-Improper tension of the machine	
Lycra out	-Due to cut off the Lycra during production	-Careful during operation.
		-Proper tension of the machine
Needle broken	-Broken Needle in the machine during production	-Broken needle have to be replaced.
Black speeks	-Due to dust in the yarn;	-Best quality yarn have to be used
	black spot appears in the fabric	& careful during processing
Sade up	-Needle cannot catch the yarn	-Accurate machine setting according to design.
	-Needle broken	-Needle have to clean.

	-Dust in the needle	-Coarser yarn should not use
	-More coarser yarn	
Twist problem	-Improper tension	-Proper tension.
	-Wrong twist selection	-Twist should be accurate.
	-Mixing of different lot	-Yarn from same lot.
Fly contamination	Other than these there may be fault in the fabric due to dust of the area, impurities in the yarn, badly cleaned machine, impurities can be come from the operator hand due to splicing of yarn etc	-Knitting machine area have to be covered during production
Drop stitch	-Improper timing of the machine	-Machine setting should be accurate
Wheel free	-Due to free movement of wheel	-Accurate machine setting.
	-More yarn in the carrier wheel at a time	
	-Wheel can freely move if the lock is not set	
Patta	-Yarn comes from different lot	-Cam setting have to be accurate.
	-Faulty cam use in the machine	-Knot should be as less as possible.
	-Too much knots in the yarn	-Accurate setting of the machine.
	-Due to wrong timing of cylinder & dial for Rib & Interlock	-Needle have to be changed after a period of time.
	-Damaged butt in the needle	-Yarn tension have to be accurate
	-Uneven tension of the yarn	

REJECTION CRITERIA FOR COLLAR AND CUFF

No	Faults	Response
1	Wrong fly	Rejected
2	Hole	Rejected
3	Needle line	Rejected
4	Slubs	Rejected
5	Wrong design	Rejected
6	Wrong tripping	Rejected
7	Fly & contamination	Acceptable for color but not for white shade
8	First round problem	Rejected
9	Uneven tension	Discussion with Manager
10	Missing yarn	Rejected
11	Crease line	Rejected
12	Rust line	Rejected
13	Oil stripe	Rejected
14	Thick & Thin place	Rejected
15	Wrong tube	Rejected

DYEING DEFECTS

- Shade variation
- Dye stain
- Loop out
- Crease mark
- Shade variation
- Uneven shade
- Rub mark
- Chemical spot
- Dye hole

CUTTING DEFECTS

- Hand feel
- Running shade
- Bowing /Skewness/Spirality
- Contamination
- Thick & thin places
- Hole
- Slub/Knot
- Crease mark
- Oil spot/Dirty spot
- Needle Line/Drop stitch
- Dia mark
- Shining mark/Softener mark
- Miss yarn
- Lycra out/Damage
- Pin holes
- Joints
- Uneven brush effect
- Uneven dye/Dye effect
- AOP print defect
- Panel shape out/Unbalance
- Grain line bias/Slant/Wrong
- Stripe not matching
- Improper cut mark
- Bundle/Numbering mistake
- Panel Measurement

SEWING DEFECTS

- Needle damage
- Skip stitches
- Thread Breakages,
- Broken Stitches

- Seam Puckering
- Pleated Seam
- Wrong stitch density
- Uneven stitch density
- Staggered stitch
- Improperly formed stitches
- Minimizing slack times.

MAJOR FAULTS OF FINISHING:

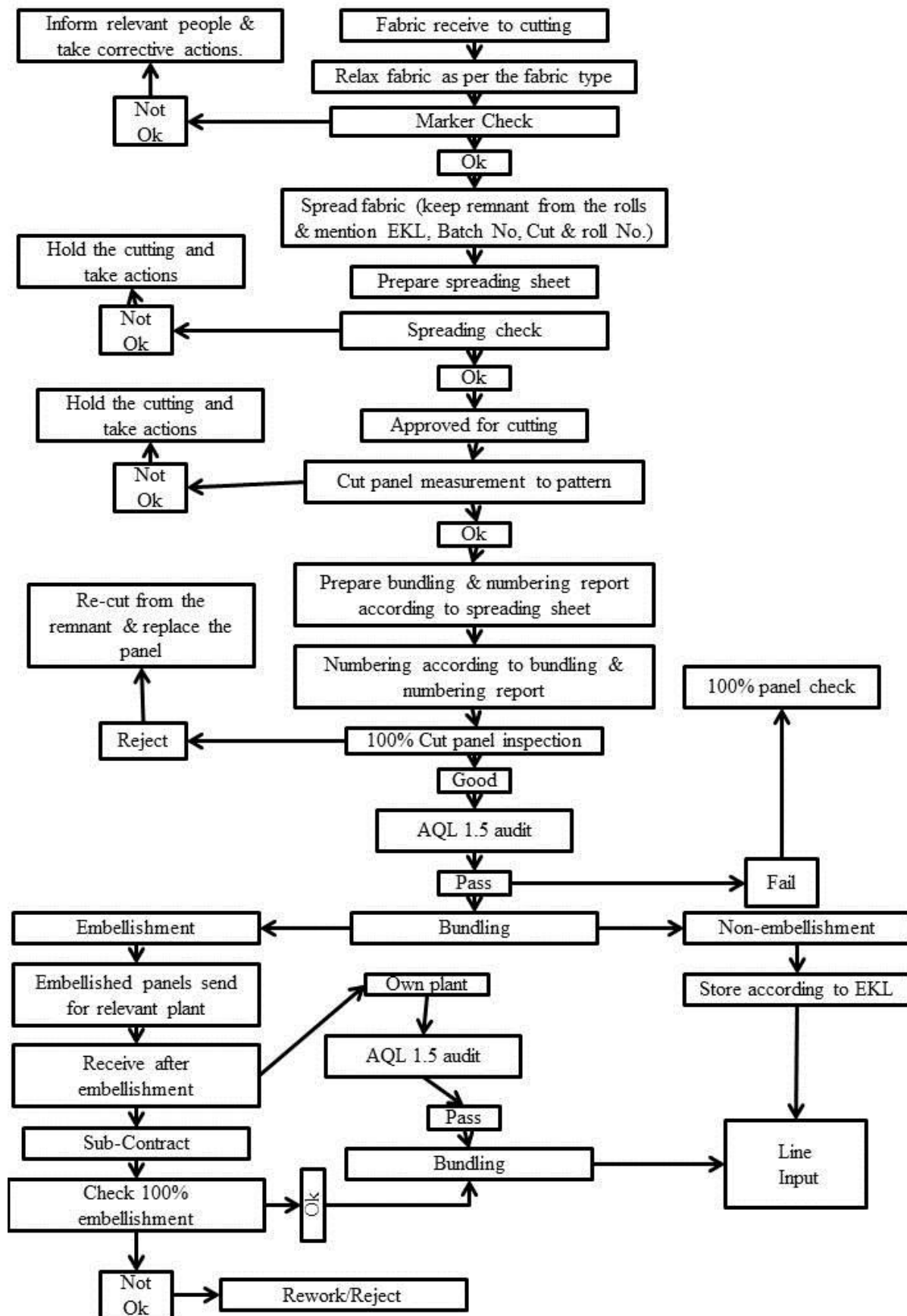
- Stenter pin hole
- Loop out
- Crease mark
- Harsh handle feel
- Wrong slitting
- Brush problem
- Yellow spot
- Shining mark
- Compaction mark
- Fabric burn
- Grease spot
- Color spot
- Wrinkle mark
- Softener sot
- Dirty spot
- Water spot

QUALITY IN CUTTING

In Epyllion Knitware Limited there is only manual process of cutting is used. Mainly machines are use:

- Scissor
- Straight knife
- Band knife
- Round knife

STANDARD OPERATING PROCEDURE FOR QUALITY OF CUTTING



QUALITY IN SEWING

The process of joining of fabrics by the use of needle and sewing thread or by other techniques is called sewing. So quality checking during sewing is very important.



IN-LINE SEWING QUALITY INSPECTION

SEWING QUALITY CHECKING POINTS

- Skip/Drop/Broken stitch
- Raw edge
- Size mistake
- Uneven hem
- Uneven cuff
- Uneven neck
- Uneven shoulder
- Uneven placket
- Uneven pocket
- Twisting
- Without care label
- Open tack

- Sleeve up-down
- Stripe up- down
- Open seam
- Four point up-down
- Shading

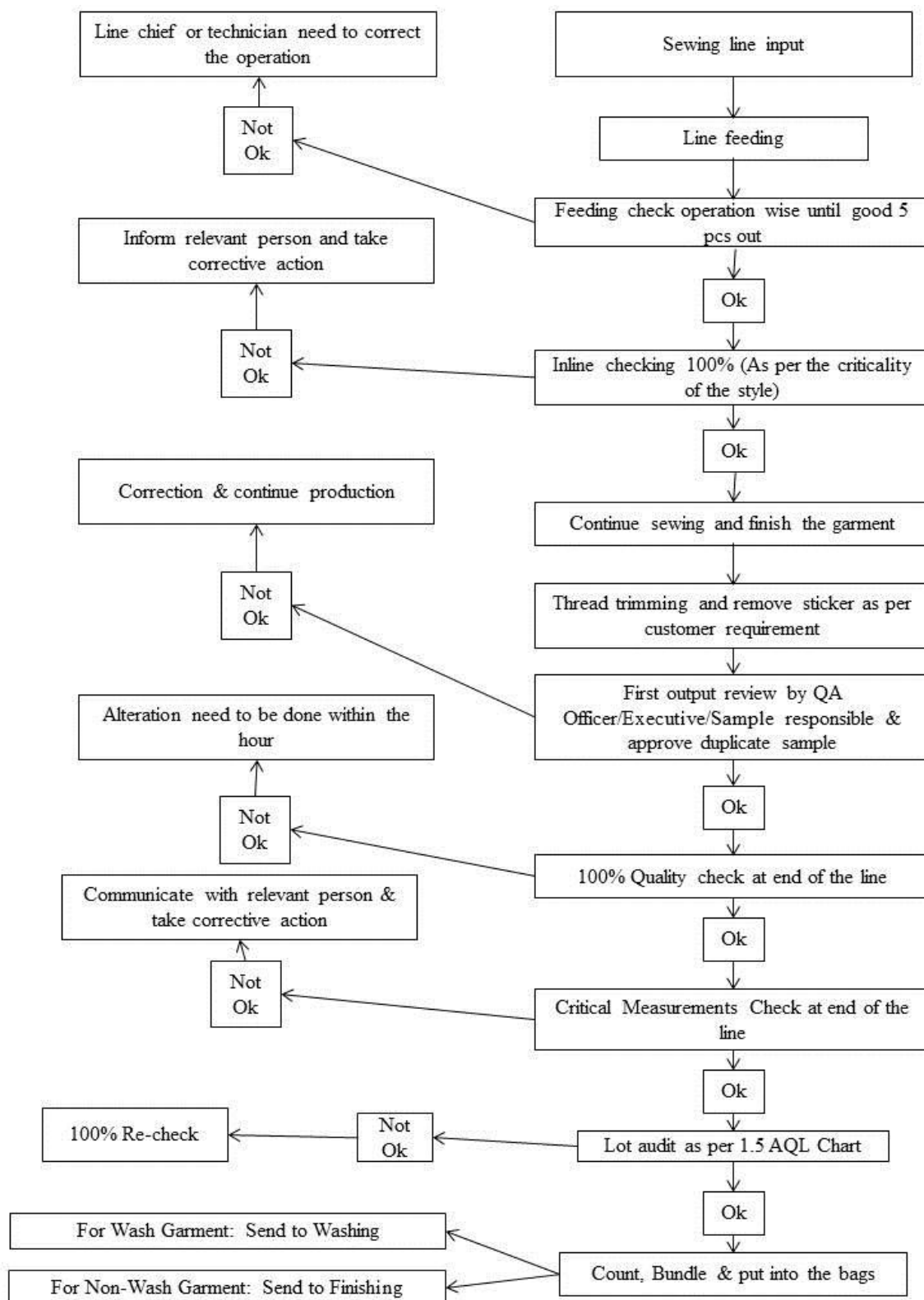
SEWING LINE QUALITY CHECK LIST:

- Buyer Approved Sample & Measurement Sheet Check.
- Sample Wise Input Check.
- Buyer Approved Trims Card Check.
- Buyer Approved Sample Wise Style Check.
- All Machine Thread Tension Check.
- Style Wise Print & Embroidery Placement Check.
- All Process Measurement Check.
- All Machine Oil Spot Check.
- All Process S.P.I Check as Per Buyer Requirement.
- Input Time Shading, Bundle Mistake & Size Mistake Check.
- Buyer Approved Wise Contrast Color Check.
- As per Buyer Requirement Wise Styling Check.
- All Machine Stitch Tension Balance Properly

SEWING TABLE QUALITY CHECK LIST:

- Style Wise Garments Check.
- All Process Measurement Check.
- Front Part, Back Part, Sleeve & Thread Shading Check.
- S.P.I Check for All Process.
- Print/Embroidery Placement Check.
- Main Label, Care Label, Size Label & Care Symbol Check.
- Size Mistake Check.
- All Process Alter Check

STANDARD OPERATING PROCEDURE FOR QUALITY OF SEWING



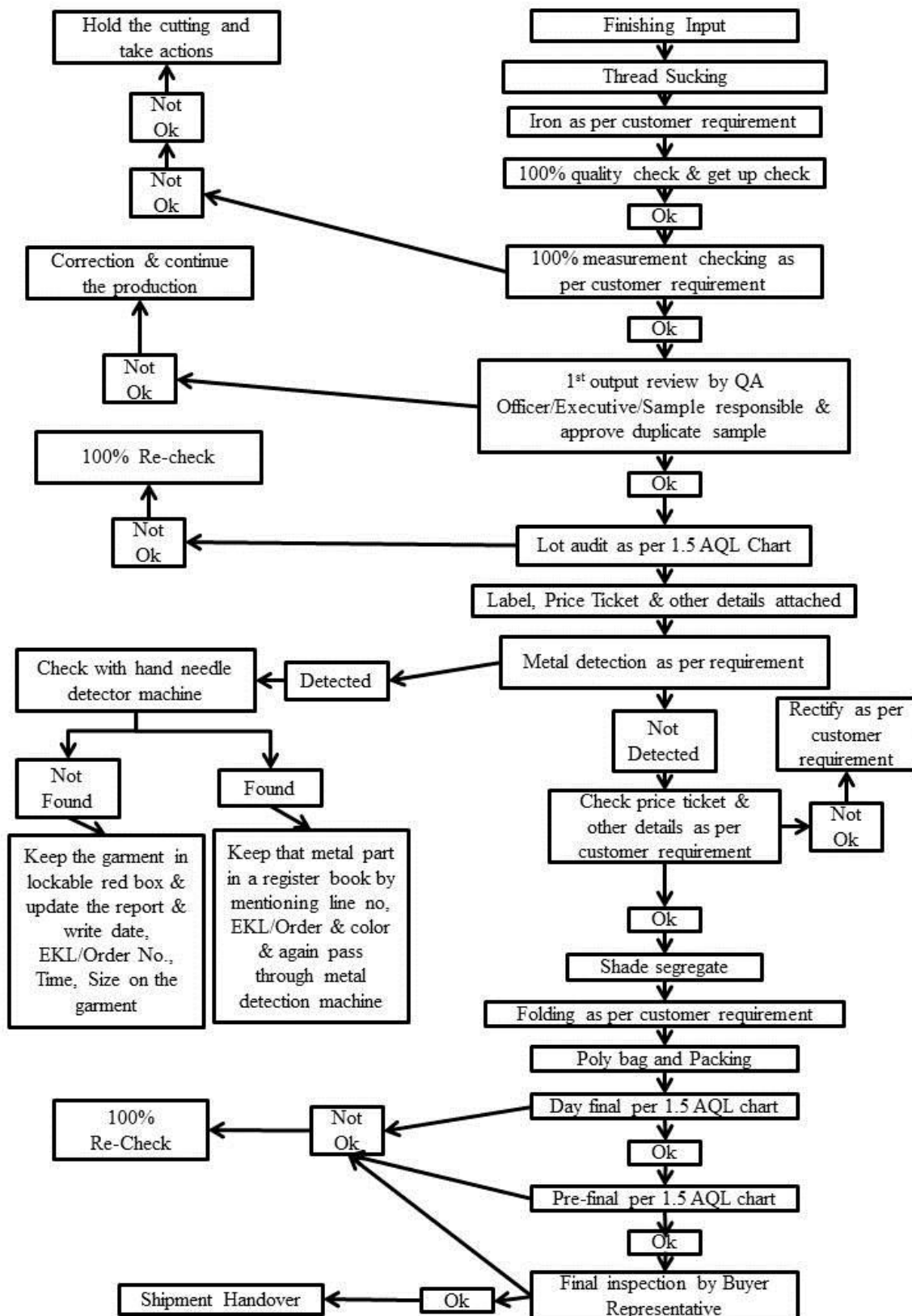
QUALITY OF GARMENTS FINISHING

Finishing section is the last part of production. When sewing completed then finishing and packing started.

FINISHING QUALITY CHECK LIST:

- As Per Buyer Requirement Wise Iron Check.
- Buyer Approved Sample Wise Style Check.
- Front Part, Back part, Sleeve, Rib Thread & Contrast Color check.
- Print/Embroidery Quality & Placement Check.
- All process S.P.I check.
- Oil Spot/Dirty Spot Check.
- Main Label Care label & Care Symbol Check.
- Any Fabric Fault & Fabric Reject Check.
- All process Measurement Check.
- Blister Poly & After Poly Getup Check.
- Hang tag & Price Sticker Check.
- Assortment Every Carton Pcs Quantity Check.
- Buyer Requirement Wise Carton Size, Poly Size, & garments Size Check.

STANDARD OPERATING PROCEDURE FOR QUALITY OF FINISHING



OTHER QUALITY CHECKING LIST OF GARMENTS INDUSTRY

STORE QUALITY CHECK LIST:

- Buyer Approved Trims Card Check.
- Buyer Approved Sample Wise Main, Size & Care Label Check.
- Buyer Approved Sample Wise Care Symbol Check.
- Thread Color Shading & Quality Check.

OUT SIDE PRINT & EMBROIDERY QUALITY CHECK LIST:

- Buyer Approved Sample or Artwork Wise Bulk Sample Print & Embroidery
- Design Check.
- Size Wise Approved Pattern Placement Check.
- As per Sample Wise Print Design, color & Quality Check.
- Bundle & Size Wise Print/Embroidery Check.
- Fabric Top Side in Side Check.
- Print / Embroidery Pattern Placement Check.
- As Per Sample Wise Print/Embroidery Design, Thread color Quality Check.
- Print/Embroidery color Wise Wash Test Check.

FINAL INSPECTION

AQL is preferred for finished garment after packing. Maximum buyer of the world follows AQL chart for inspecting their garments. When garments will be ready for shipment, an inspector should follow the acceptance level of quality products. It is applicable for all types of garments. So, this chart is very important for Quality Control and Quality Inspection of a Garment Factory will have to follow and work on the basis of AQL chart. Factory should have to submit their AQL report to the respective Buyers before shipment.

Actual Quality Level (AQL) International

Standard for Garments Product:

Serial Number	Lot/ Quantity (GMTS in units)	AQL 1.5	Max no of defective allowed	AQL 2.5	Max no of defective allowed	AQL 4.0	Max no of defective allowed
1	51-90	8	0	20	1	13	1
2	91-150	32	1	20	1	20	1
3	151-280	32	1	32	2	32	3
4	281-500	50	2	50	3	50	5
5	501-1200	80	3	80	5	80	7
6	1201-3200	125	5	125	7	125	10
7	3201-10000	200	7	200	14	200	14
8	10001-35000	315	10	315	14	315	21
9	35001-150000	500	14	500	21	315	21
10	150001-190000	800	21	500	21	35	21

Industrial Engineering is a branch of engineering which deals with the optimization of complex processes, systems or organization. Industrial engineer work to eliminate waste of time & and make the work more easy to perform. Industrial Engineering is concerned with the development, improvement and implementation of integrated systems of people, money, knowledge, information, equipment, energy, materials, analysis and synthesis as well as the mathematical physical and social sciences together with the principles and methods of engineering design to specify, predict and evaluate the results to be obtained from such systems or processes.

Industrial engineering is a branch of engineering, concern with the optimization of complex systems or process.

Industrial engineering deals with the *design, improvement* and *installation* of integrated system of man, machine and equipment.

Industrial engineering works to eliminate or minimize waste of –

- Time,
- Money,
- Materials,
- Man-hours,
- Machine time,
- Energy and
- Other resources that do not generate value.

Industrial Engineer deals with.....

Industrial engineers determine the most effective ways for an organization to use the basic factors of production - people, machines, materials, information, and energy - to produce products or services.

We are more concerned with increasing productivity through the management of people, methods and technology.

Industrial Engineers are the bridge between management goals and operational performance.

OBJECTIVE

- Eliminate waste
- Eliminate cost
- Eliminate energy
- Making the process easiest
- Finding the bottleneck
- Increase of production and efficiency

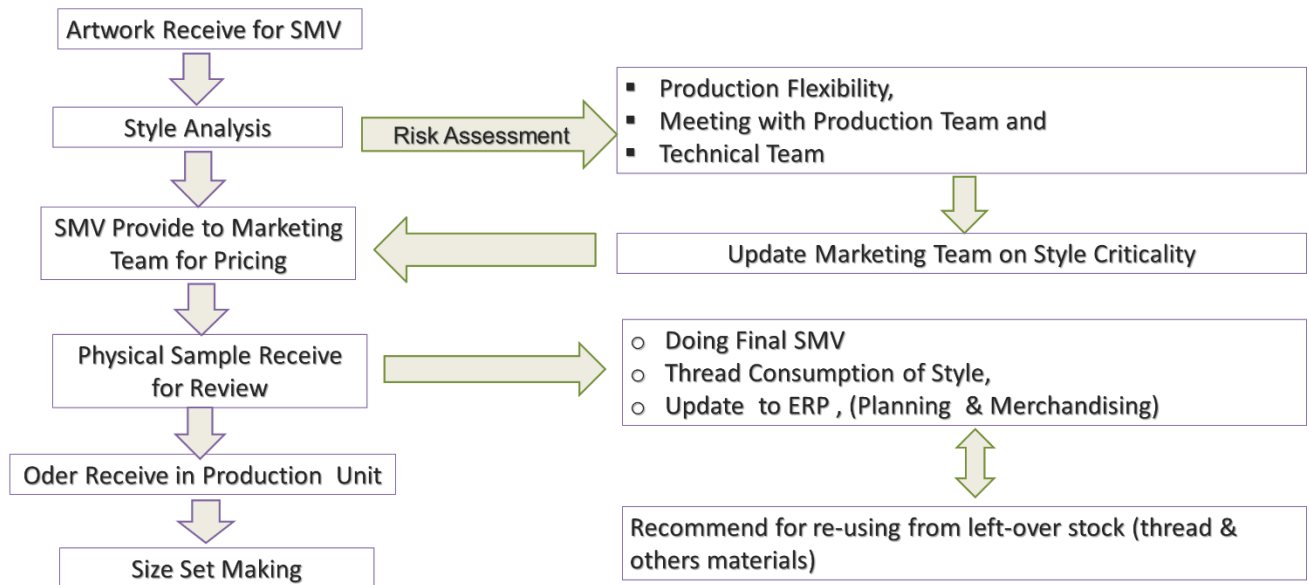
The garment manufacturing industry faces many challenges:

- ☐ Competition (Internal & Global)
- ☐ Increase production costs,
- ☐ Less productivity/efficiency
- ☐ Labor attribution.
- ☐ Decrease buyer price.

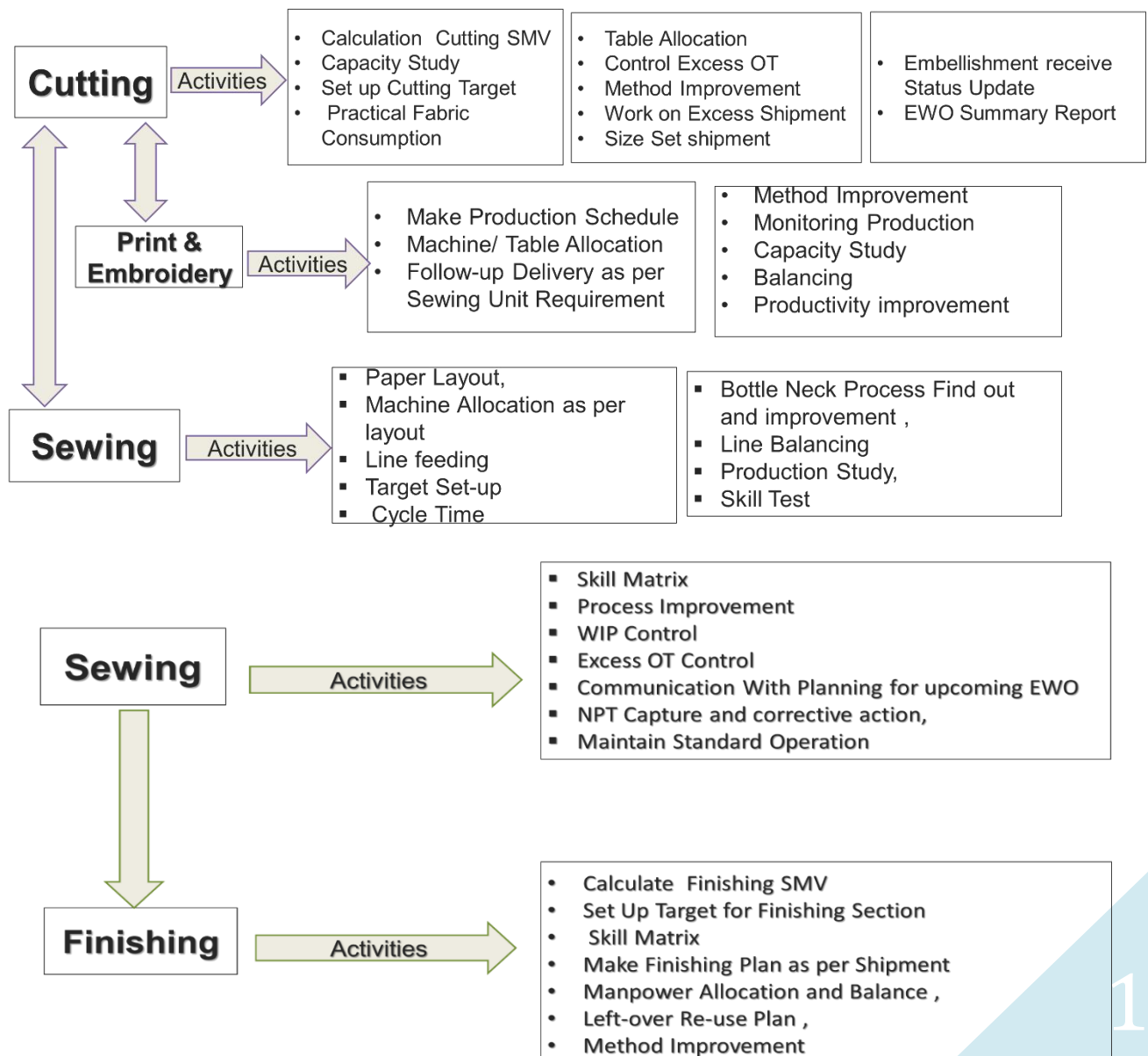
So, need to focus on identifying the real issues and take corrective actions suited to the specific industrial unit.

ACTIVITIES

- ☐ Paper Layout
- ☐ Monitoring Production flow system
- ☐ Decide the machines and attachments for all style
- ☐ Monitoring and improve the operator performance
- ☐ Operator training
- ☐ Production control system
- ☐ Quality control
- ☐ Operator skill determination and Skill matrix
- ☐ Line balancing
- ☐ Line feeding



ACTIVITIES IN DIFFERENT SECTION IN RMG



- ❑ Floor Layout - Optimum use of space and easy to control excess traveling
- ❑ Machine use optimization – inter-factory idle machine transfer based on requirement.
- ❑ New Machine & Technology installation -
- ❑ Production System Development.
- ❑ Wastage Reduction from different Section.
- ❑ Man Power Budget based on work load
- ❑ Authentic data recording & reporting.
- ❑ Problem solving by applying IE tools & required communication and
- ❑ Continuous improvement for process excellences
- ❑ Co-ordination with other department- BP, CP, Production, HR, Quality, PDC, Maintenance, Marketing, Supply Chain

IE TOOLS

Industrial engineers use various technical terms and tools when they are working in a industry or service organization. Some of the important terms and tools related to Industrial Engineering:-

SMV: “Standard Time” is the time required for a qualified worker working at “Standard Performance” rate to perform a given task. The SMV includes additional allowances for Rest and Relaxation, Machine delay and anticipated contingencies. It’s also called as Standard Allowed Minutes (SAM).

$$\text{SMV/SAM} = \text{Basic Time} + (1 \times \text{Allowance}\%)$$

$$(\text{Basic time} = \text{Average Observe time} \times \text{Rating factor})$$

Industrial Engineering Terms & Tools

SMV/SAM

Example: An operation has been calculated to have an average observe time of 20 seconds. The operator’s rating is 90%. Allowance Rate to apply is 15%.

$$\text{Basic time} = \text{Average Observe time} \times \text{Rating factor}$$

$$= 20 \times 90\% = 18 \text{ sec} = .30 \text{ min}$$

SMV = Basic time x (1 + Allowance Factor)

$$= .30 \times (1 + 15\%)$$

$$= .35 \text{ min}$$

Basic Time: Basic time is the time for carrying out an element of work at standard rating, i.e.

Basic time = Observe Time X Rating

Standard Time: Standard time is the total time in which a job should be completed at standard performance.

Rating: Rating is the assessment of the worker's rate of working related to the observer's concept of the rate corresponding to standard pace.

$$\text{Rating} = (\text{Predetermined time} / \text{Actual Time}) \times 100.$$

$$R = (P/A) \times 100$$

$$R = (1.5/2) \times 100, R = 75\%$$

Observed Rating	Speed
50	Very Slow- Not interest.
75	Steady- Unhurried.
100	Brisk- Business Like.
125	Very fast- Above average.
150	Outstanding – Unusual.

Allowance: Allowance is an addition to the basic time intended to provide the worker with the opportunity to recover from physiological and psychological effects of carrying out specified work under specified conditions and allow attention to personal needs.

Relaxation allowance 11%

Contingencies allowance 4%

Layout /Line feeding: Layout indicates flow of material and work in process from start to completion and integrates materials handling and equipment.

Basic pitch time (BPT): BPT is a ratio of total SMV of a garment and no. of workers to be set for the style.

$$\text{Basic Pitch Time (BPT)} = \frac{SMV}{\text{Total no. of Workers..}}$$

Upper Control Limit (UCL):

$$\text{Upper Control Limit (UCL)} = \frac{BPT}{\text{Expected organisation Efficiency}}$$

Lower Control Limit (LCL):

$$\text{Lower Control Limit (LCL)} = 2 \times BPT - UCL$$

Learning Curve: A new work or anything new that is being learnt or done initially follows a certain path of learning called the learning curve. It is used for repetitive work, worker gains skill, knowledge of product/process, etc. over time.

WIP: WIP or **Work In Process** is made up all garments and their parts that are not completely finished.

Workstation: An area or location, where a particular nature of job is carried out, such as; specific location in an assembly line.

Quick Change Over (QCO): Quick Change Over is lean technology which is used for continuous improvements done systematically to reduce the downtime experienced when there is change in process.

Cycle Check: Cycle check is a work measurement technique to measure the time taken the operators when they are performing their jobs. IE executive collect this time by **stop watch** and recorded in **cycle check sheet**.

Bottleneck: The lowest output point in a production line is called bottleneck.

Line Balancing: Line balancing is leveling the workload across all the processes in line for better productivity by removing bottlenecks.

Target refers to the number of units or the quantity of output is

Expected to produce in the certain period of time.

$$\text{Target} = \frac{\text{Available Hours}}{SMV} \times \text{Expected efficiency}$$

Production: Production means convert the input (Raw materials) to output (product) according to the customer requirements.

Productivity: A measure of the efficiency of a person, machine, factory, system, etc., in converting inputs into useful outputs.

Efficiency: Ability to accomplish a job with a minimum expenditure of time and effort.

$$\text{Efficiency} = \frac{\text{Output}}{\text{Input}} \times 100.$$

Efficiency express in %

$$\text{Output} = \text{Total production} \times \text{SMV}$$

(Produced Minutes)

$$\text{Input} = \text{Manpower} \times \text{Working hour (Available Minutes)}$$

Efficiency

Example: In a sewing line have 30 workers. They Produced 1500 pcs T-Shirt in 8 hrs. and SMV is 5.5 minutes.

$$\text{Input (Available hour)} = \text{Manpower} \times \text{Working hour}$$

$$= 30 \times 8 \times 60 \text{ mints.}$$

$$= 14400 \text{ mints.}$$

$$\text{Output (Produce Hour)} = \text{Total production} \times \text{SMV}$$

$$= 1500 \times 5.5 \text{ min}$$

$$= 8250 \text{ mints.}$$

$$\text{Efficiency} = \frac{8250}{14400} \times 100$$

$$= 57.29 \%$$

- Efficiency increase:

When production is increased without increase in inputs	$\frac{\text{Output}}{\text{Input}} = \uparrow$
The same production with decrease inputs.	$\frac{\text{Output}}{\text{Input}} = \downarrow$
The rate of increase in output is more compared to rate of increase in input.	$\frac{\text{Output}}{\text{Input}} = \uparrow\uparrow$
The rate of decrease in input is higher then the rate of decrease in output.	$\frac{\text{Output}}{\text{Input}} = \downarrow\downarrow$

NPT: Non Productive Time or NPT is the time that is an employee cannot give any effort for production due to unavoidable reason which is not concern him but avoidable from management aspect.

Predetermined time: A predetermined time standard is a work measurement technique whereby times established for basic human motions are used to build up the time for a job at a defined level of performance.

Work Cycle: A work cycle is a sequence of elements which are required to perform a job or yield a unit of production. The sequence may sometimes include occasional elements.

Lean: Lean is a systematic method for waste minimization within a manufacturing system without sacrificing productivity.

Lean: Lean is a systematic method for waste minimization within a manufacturing system without sacrificing productivity.

Non-Value adding:

Customer is not willing to pay for the activity, then it is non value adding.

Essential non-value adding activities:

Non-value-adding activities that are necessary under the present operating system or equipment.

Non-Essential non-value adding activities:

Activities that consume resources but create no value in the eyes of the customer. Pure waste.

Essential Lean Tools

- 5S
- Muda (Waste)
- Just-In-Time (JIT)
- Jidoka (Autonomation)
- Kaizen (Continuous Improvement)
- Takt Time
- Poka-Yoke (Error Proofing)
- 5W2H (Who, What, When, Where, Why, How, How Much/Often)
- 3R
- Bottleneck Analysis
- Genba (The Real Place)
- Hoshin Kanri (Policy Deployment)
- Kanban (Pull System)
- Andon
- Continuous Flow
- Heijunka (Level Scheduling)
- KPIs (Key Performance Indicators)
- Overall Equipment Effectiveness (OEE)
- Single-Minute Exchange of Dies (SMED)
- SMART Goals (Specific, Measurable, Attainable, Relevant, and Time-Specific)
- PDCA (Plan, Do, Check, Act)

- Root Cause Analysis

Six Big Losses (Breakdowns, Setup/Adjustments, Small Stops, Reduced Speed, Startup Rejects, Production Rejects)

- Standardized Work
- Total Productive Maintenance (TPM)
- Visual Factory
- Value Stream Mapping

❑ 5S

It is not just about housekeeping, but focused on maintaining the **standards & discipline** to manage the organization.

One of the most powerful Lean Manufacturing Tool and a **cornerstone** of any successful implementation.

5S engage people through the use of 'Standards' and 'Discipline'.

5S is a simple tool for organizing your workplace in a **clean, efficient and safe manner** to enhance your **productivity, visual management** and to ensure the **introduction of standardized working**.





Set in Order/ Seiton :

Arrange items that are needed so that they are ready & easy to use. Clearly identify locations for all items so that anyone can find them & return them once the task is completed.

Activities :

- ☐ Organize the work area for maximum efficiency
- ☐ Clearly label all items so that they can be found quickly
- ☐ Place arrows to show flows through the workplace
- ☐ Use color codes and clear signs to show the correct area;
- ☐ Make it obvious where things 'belong'
- ☐ Make sure all work and inspection areas are lit sufficiently

Benefits:

- Improve productivity (less time spent looking for things)
- Less maintenance as tools are in their proper place and less likely to get damaged
- Improves safety





Shine/ Seiso :

Clean the workplace & equipment on a regular basis in order to maintain standards & identify defects.

Activities:

- ☐ Clean the working area
- ☐ Find ways to reduce future dirt and contamination
- ☐ Remove out of date product / information / charts

Benefits :

- Reduces maintenance and machine breakdown
- Improves safety
- Easier to see issues
- Nicer work environment; improves morale



Standardize/ Seiketsu :

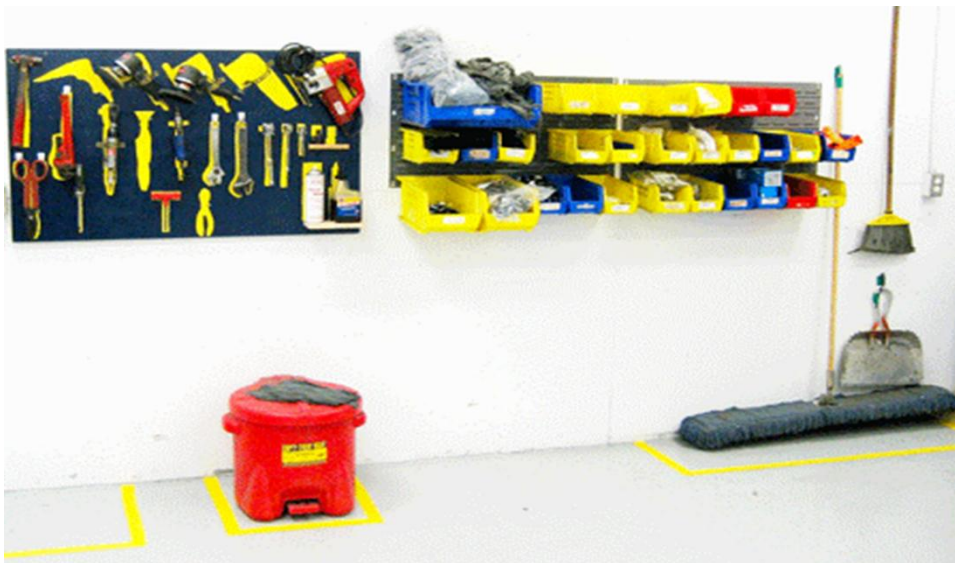
Revisit the first three of the 5S on a frequent basis and confirm the condition of the using standard procedures.

Activities:

- ☐ Establish the best practice for procedures
- ☐ Create a schedule and assign tasks so everyone knows their responsibilities
- ☐ Make sure that all items have an official place
- ☐ Ensure all processes have a set procedure
- ☐ Clean up the workplace every day

Benefits:

- Improves teamwork
- Promotes pride in the working area



TEXTILE DIVISION

Unlike RMG Industrial Engineering, Textiles IE is not developed fully in Bangladesh but with the increased manufacturing costs IE is becoming compulsory for most of the Industries in the modern manufacturing environments and demands.

Industrial Engineering is mainly focused on Eliminating Eight wastes (Figure 01), by using Work Measurement and Method Study. In addition lean manufacturing and Six Sigma techniques have been coming in to the forefront in providing additional value additions in to the manufacturing excellence Initiatives.

With RMG Industrial Engineering 20% of the work cycle has been considered as the Machine Operation and rest 80% is as handling and Manual Operation, but with Textiles Manufacturing this is total opposite of which 20 % of the work cycle can only be considered as the handling.

Textiles manufacturing process itself having more machine Processes than manual Functions. Therefore on the upcoming pages more emphasize has been given towards improving the Machine related achievements through eliminating Eight Wastes of Manufacturing.

SIX SIGMA PROJECT INITIATIVES

Six Sigma as a Metric: The term "Sigma" is often used as a scale for levels of 'goodness' or quality. Using this scale, 'Six Sigma' equates to 3.4 defects per one million opportunities (DPMO). Therefore, Six Sigma started as a defect reduction effort in manufacturing and was then applied to other business processes for the same purpose.

"Six Sigma as a Methodology: As Six Sigma has evolved, there has been less emphasis on the literal definition of 3.4 DPMO, or counting defects in products and processes. Six Sigma is a business improvement methodology"

“Defects: Failing to deliver what the customer wants”

Calculate DPMO using the formula.

$$DPMO = \frac{(\# \text{ Defects}) \times (1,000,000)}{(\# \text{ Defect Opportunities / unit}) \times (\# \text{ Units})}$$

KAIZEN

‘**Kai**’ means change and ‘**Zen**’ means good. Kaizen a continuous improvement of process is often considered to be the building block of all lean production methods. Kaizen focuses on eliminating waste, improving productivity and achieving sustained continual improvement in targeted activities and processes of an organization.

GARMENTS DIVISION

The garment manufacturing industry faces many global challenges due to various factors including competition, increased production costs, less productivity/efficiency and labor attribution. So there is a need to focus and concentrate on identifying the real issues, taking corrective actions suited to the specific industrial center of the unit, empowering the technical and managerial staff by enhancing their knowledge and ability, analyzing orders efficiently and deciding whether actions are viable for the company.

Epyllion Group try to maintain a well establish Industrial Engineering department. The department plays a vital role to increase the production and efficiency. SMV calculation is common task along with eliminating wastage.

FUNCTION OF IE DEPARTMENT IN GARMENTS

- To follow up the production process
- Work process development
- SMV calculation & Line target.
- Efficiency control.
- Time study.
- Capacity study.
- Workers training.
- Machine sequence lay out.

- Thread consumption.
- Performance evaluation.
- Analysis system design & install.
- Develop time standard and performance standard.
- Process & method selection.
- Selection and design of tools & equipment.
- System design for planning & control of production inventory, quality, plant.

THE SIX STANDARDS PHASE OF I.E

- Formulating the problem
- Constructing a mathematical model to represent the system under study.
- Deriving a solution from the model.
- Testing the model and the solution derived from it.
- Establishing controls over the solution.
- Putting the solution to work: Implementation.

APPLICATION OF GENERIC AND INDUSTRY SPECIFIC COURSE

Here I have educated many vital themes in Generic and Industry Specific Course. Generic knowledge provides me subjective knowledge which is essential to improve our technical knowledge. I find the following applications of Generic and Industry Specific Course during Internship-

APPLICATION OF GENERIC COURSE:

- After complete my generic course its help me to update Analytical skills for decision making
- I have learned how to improve leadership skill & Ethical and Sustainable Leadership skill
- I practically learn the Critical Reasoning, Cost benefit analysis, Profit and loss interpretation
- Team work and strong interpersonal skills, Self-reliance and initiative and Time management
- Practically understand the application of management skill, motivational skill, ability to work in team, importance of analytical ability
- Understand the importance of Conflict management

APPLICATION OF INDUSTRY SPECIFIC COURSE:

- I practically learn the Textile fibre and Yarn
- Analysis and interpretation of masses of logical data
- Improve knowledge about the knitting and knitted fabric, textile dyeing and finishing
- Awareness of current issues and ethical debates
- Logical thinking, numeracy and computing skills
- Clearly understand the importance of QMS and quality control
- Communication skills including report writing and making presentations

FINDINGS REGARDING THE INTERNSHIP WORK

- Lack of Workload disbursement round of the year
- Improper response of responsible person
- Lack of communication department to department
- Scope of more automation installment
- Poor Embellishments(Print, Embroidery, wash etc.) support
- Insufficient raw material supply
- Poor quality fabric
- Fabric rejection percentage is high
- Short quantity fabric input

- Lack of Line planning
- Poor communications garments Operation with merchant team
- Embellishments rejection percentage is high
- Fabric, Trims and accessories are not received from suppliers on time
- Time & Action calendar is not maintained properly
- Most of the time production duration becomes very short because all the materials (required for production) are not get on time
- Production hamper because of manpower absenteeism
- Good quality product producing is not possible within short time
- In terms of assort packing, all size set garments are not remaining in finishing in the same time that is reason of shipment delay

SUGGESTION FOR INDUSTRY IMPROVEMENT

- Need to ensure balance workload round the year
- Responsible person or department should response on time
- Develop communication department to department
- Improve automation
- Improve embellishments support/capacity
- Ensure input supply
- Good Quality fabric input
- Effective line planning

We know yarn is the major raw materials for garments industries. More than **40%** costing involve in yarn function. If we improve our yarn selection or source better yarn we will save **3.59%** fabric wastage and that is huge. After completing my PGD course we can understand the importance of yarn in readymade garments.

Here is attached our last year fabric rejection percentage and volume;

Panel Rejection Analysis Data Epyllion Group															
Buyer	Total Checked Qty	Total rejected Parts	Rejected (%)	Running Shade	Bowing/ Skewness/ Spirality	Yarn Contamination	Hole	Slub/ Knot Thick/ Thin	Crease Mark	Oil/Dirty Spot	Needle line/ Miss yarn	Pin Hole	Joints	AOP print Defects	Other Fabric Defects
C&A	4,283,066	139925	3.27%	59	0	905	26454	4103	1032	24029	14644	2058	6022	7376	53243
Carhartt	60108	2140	3.56%	23.00	0.00	0.00	279	85.00	32.00	804	122	80	9	14	692
M&S	102662	5117	4.98%	0.00	0.00	0.00	1407	178	4	874	545	0	42	0	2067
OM	1928298	73668	3.82%	2.00	0.00	198.00	7083	1481	850	18242	6384	1267	1481	5480	31200
VG	2777226	111329	4.01%	180.00	0.00	1059.00	12683	3905	3625	22230	11703	1129	3220	3063	48532
Celio	2376022	141951	5.97%	13	0	4834	58002	5074	4197	37137	13768	487	0	97	18342
H&M	6960396	214092	3.08%	0	0	17455	81377	3154	1071	64871	15005	7565	828	11964	10802
Soliver	680856	13380	1.97%	1	24	848	8298	112	43	1544	1187	91	1103	11	118
Target Australia	2626722	42497	1.62%	14	160	3148	23551	413	195	7853	3604	224	1635	1094	606
Total	21,795,356	744,099	3.59%	292	184	28,447	219,134	18,505	11,049	177,584	66,962	12,901	14,340	29,099	165,602

We have to select the greatest yarn or ideal yarn for knitting to fault free fabric or quality full fabric. So we have to vigilant about the yarn properties or for perfect yarn. The following yarn belongings should have to be said textile yarn as a perfect yarn-

1. The yarn in circular in cross-section and is uniform along its length.
2. Yarn is composed of concentric coatings of different circular.
3. Each fiber follows a uniform helical path around one of the concentric cylinder so that its distance from yarn axis remains constant.
4. A fiber at the center will follow a straight line of the axis.
5. The axis of circular cylinders coir sides with yarn axis.
6. The number of filaments or fibers crossing the unit area is constant; that is the density of packing. Fibers in the yarn are constant throughout the model.
7. Every filament in the yarn will have the same amount of twist per unit length.
8. The yarn consists of very large number of filaments.

LEARNING FOR SELF-IMPROVEMENT

Here I have erudite many valuable skills and lessons on experience working with different department of Epyllion Group. This experience will help in my career. Here I share some important point that helps for my self-improvement-

- Design the career growth tree within the organization.
- Communication skills have improved, especially how to communicate with different personality
- Create team with subordinates & train up them regarding company's requirement.
- The clear understand duties and responsibilities of the different departments
- Analyze critical point & take corrective measure perfectly
- Understand the working procedure of the different departments
- Enrich the role of Industrial Engineering department activities
- I have expanded clear information about readymade garments industry
- Improve self-confident to creative decision for generic knowledge.
- I can directly apply the knowledge and skills gained through this training in my job

CONCLUSION

RMG sector earns the prime share of foreign currency in Bangladesh. In this regard, development of this sector should be one of national concerns. Epyllion Group is standing for the purpose of expansion of this sector & their main spirit is Unveil Human Spirit. After having this training textile graduates could give their sincere effort to the future advancement of RMG and related sectors. Epyllion Group is a well-maintained Group with modern machineries, technologies, good management of course with 100% compliance. Epyllion Group is very much concerned about the Quality of their product. That's why they establish on-line & off-line Quality Control of each product. They have well equipped and modern Textile Testing Laboratory. They do all Chemical & Physical tests of the products to meet the Buyers Acceptance Limit. Moreover, best quality yarns, dyes and chemicals used in Textile Division. All kinds of best quality raw materials are also used for Garments Division. The Administration, Management and Chain of Command are well organized. The other important factor for Epyllion Group is their support for Eco-friendly attitude towards Environment. Epyllion Style Ltd. which is called 'Green Factory' is already certified for their commitment towards environment by reducing the wastages of natural resources.

REFERENCE

<http://epylliongroup.com>

www.google.com

Lean Manufacturing Tools, Techniques and How to use them By WILLIAM M.FELD

Fundamentals of Engineering Economics By CHAN.S.PARK