



Daffodil
International
University

Faculty of Engineering
Department of Textile Engineering

Development of a Fit Sample from Designer Sketch and Measurement Chart

Course Title: Project (Thesis)

Course Code: TE 4214

Submitted By

Adnan Sanzid Ali 211-23-999

Supervised By

Dr Md Saifur Rahman

Professor

Department of Textile Engineering

Daffodil International University

**This report is presented in partial fulfillment of the requirements for the
degree of Bachelor of Science in Textile Engineering**

Advanced in Apparel Manufacturing Technology

Fall 2024

LETTER OF APPROVAL

To
The Head
Department of Textile Engineering
Daffodil International University
Daffodil Smart City, Birulia, Ashulia 1216

Subject: Approval of project report of B.Sc. in TE Program

Dear Sir,

I highly appreciate it if you would kindly accept and consider this project report Final assessment. I'm just writing to let you know that this project is titled report as “Development of a Fit Sample from Designer Sketch and Measurement Chart” has been prepared by Adnan Sanzid Ali, bearing ID 211-23-999 is completed for final evaluation. On this basis the whole report is prepared along with proper investigation and inhibition through critical analysis of empirical data and necessary items. Student was directly involved in his project activities and the report becomes important for sparking many valuable information to the readers.



Your Sincerely

Dr Md Saifur Rahman

Professor
Department of Textile Engineering
Daffodil International University

Author's Declaration

I declare that I am the sole author of this capstone project report. It is the actual copy of the report that was accepted by my advisor including any necessary revisions. I also grant Daffodil International University permission to reproduce and distribute electronic or paper copies of this project report.


.....

Adnan Sanzid Ali

211-23-999

ali23-999@diu.edu.bd

Department of Textile Engineering
Daffodil International University

Statement of Contributions

I have received invaluable support from many individuals since the commencement of this capstone project to whom I offer my sincere thanks and gratitude. I am thankful to Mr Ridoy Dey, Assistant Merchandiser of DBL Group for his support to conduct the tasks related to this project. Sincere gratefulness is due to Dr Md Saifur Rahman, Professor, Department of Textile Engineering, Daffodil International University for his continuous guidance, supervision and encouragement to successfully complete this project.

Executive Summary

This project involves performing all operations needed to develop a garment fit sample under a specific purchase order from a multinational fashion retailer named Hennes and Mauritz AB, popularly known as H&M, based in Sweden for their womenswear premium brand *ARKET*. This highlights the significance of fit sample development in the initial stage of purchase order confirmation and describes the difficulties a manufacturer encounter in producing perfect samples. By emphasizing the key documents such as the *tech pack*, which lists specifications like fabric types, trims, and design details etc., the study seeks to offer a thorough grasp of the sample development process, from initial stages to final approval. This paper analyzes the sample development process by looking at the different steps and requirements needed to get buyer approval. Specification sheets, fabrics, care labels, accessories, and style sketches are all thoroughly evaluated in this regard. The results demonstrated the need for accurate documentation and effective communication between the personnel involved in the sample development process to successfully produce a faultless fit sample.

Acknowledgments

First and foremost, I want to thank the Almighty for giving me the chance to complete this project successfully. I am extremely grateful for the guidance and direction that I received from Dr. Md. Saifur Rahman, Professor in the Department of Textile Engineering, Faculty of Engineering, Daffodil International University, whose vast knowledge and enthusiasm in textiles and clothing field inspired me to devote my full energy into this project. This work was greatly influenced by his unrelenting patience, academic leadership, unceasing encouragement and constructive criticism. In addition, I would like to express my gratitude to all faculties and staff of the department of Textile Engineering for their help and support in completing this project report. Finally, I want to express my sincere gratitude to my parents and friends for their unwavering encouragement and support along this journey.

Table of Content

LETTER OF APPROVAL	ii
Author's Declaration.....	iii
Statement of Contributions	iv
Executive Summary	v
Acknowledgments.....	vi
Table of Content	vii
List of Figures	ix
United Nations Sustainable Development Goals	xi
Similarity Index Report.....	xii
CHAPTER 01: INTRODUCTION	1
1.1 Background of the study	2
1.2 Aims and Objectives	3
1.3 Scope of the Study	3
1.4 Limitations	3
CHAPTER 02: LITERATURE REVIEW	4
2.1 Sample Development.....	5
2.1.1 Receiving Tech Pack.....	7
2.1.2 Sourcing of Material and Accessories.....	7
2.1.3 Printing and Embroidery Design Development	7
2.1.4 Cutting and Sewing the Garments	7
2.2 Purposes of Developing a Sample	7
2.3 Information Containing by the Sample Details Card.....	8
2.4 Sample Types Required to Complete an Order.....	9
2.4.1 Proto Sample	9
2.4.2 Fit Sample	9
2.4.3 Size Set Sample.....	9
2.4.4 Salesman Sample (SMS).....	9
2.4.5 Photo Shoot Sample	10
2.4.6 Development Sample	10
2.4.7 Counter Sample.....	10
2.4.8 Pre-Production Sample	10
2.4.9 Top of the Production Sample	10
2.4.10 Shipment Sample	11

2.4.11 Digital Garments Sample	11
2.5 Buyer ARKET	11
2.5.1 SOP of Buyer ARKET	11
CHAPTER 03: METHODOLOGY	12
3.0 Sample Development Process.....	13
3.1 Studying the Technical Package	13
3.2 Development/Procurement of Fabric	13
3.2.1 Stripe Instructions	14
3.3 Sourcing of Accessories.....	15
3.4 Pattern Development.....	15
3.5 Fabric Cutting	16
3.6 Sewing/ Joining Parts of the Garment.....	16
3.7 Ironing & Packing.....	17
CHAPTER 04: Result, Discussion & Project Demo	18
4.1 Project Demo	19
4.2 Discussion	23
CHAPTER 05: Social Ethics	24
5.1 Codes and standards used in design approach	25
5.2 Ethical principles and professional commitment involvement.	25
5.4 Impact of project on the environment and sustainability	26
CHAPTER 6	27
6.1 Conclusion	28
REFFERENCES	28

List of Figures

Fig. No	Description	Page No.
01	Sample details card	08
02	Fabric Quality & Trims	13
03	Shell Fabric Booking	14
04	Rib Fabric Booking	14
05	Neck Binding Fabric Booking	14
06	Stripe Repeat of Shell Fabric	14
07	Stripe Repeat of Neck Rib	15
08	Pattern Developing	15
09	Measurement Chart	15
10	Fabric Relaxation	16
11	Fabric spreading & cutting	16
12	Sewing of Different Parts of the Garments	16
13	Sewing instruction	17
14	Finished Good	17

15	Front Part of Full Sleeve Ladies T-Shirt	19
16	Back Part of Full Sleeve Ladies T-Shirt	20
17	Front Right Part of Full Sleeve Ladies T-Shirt	21
18	Front Left Part of Full Sleeve Ladies T-Shirt	22

United Nations Sustainable Development Goals

The Sustainable Development Goals (SDGs) are the blueprint to achieve a better and more sustainable future for all. They address the global challenges we face, including poverty, inequality, climate change, environmental degradation, peace and justice. There is a total of 17 SDGs as mentioned below. Check the appropriate SDGs related to the project.

- ☐ No Poverty
- ☐ Zero Hunger
- ☐ Good Health and Well being
- ☐ Quality Education
- ☐ Gender Equality
- ☐ Clean Water and Sanitation
- ☐ Affordable and Clean Energy
- ☐ Decent Work and Economic Growth
- ☐ Industry, Innovation and Infrastructure
- ☐ Reduced Inequalities
- ☐ Sustainable Cities and Communities
- ☐ Responsible Consumption and Production
- ☐ Climate Action
- ☐ Life Below Water
- ☐ Life on Land
- ☐ Peace and Justice and Strong Institutions
- ☐ Partnerships to Achieve the Goals

Similarity Index Report

The following student have compiled the final year capstone project report on the topic given below for partial fulfillment of the requirement for bachelor degree in Textile Engineering.

Development of a Fit Sample from Designer Sketch and Measurement Chart

Sl. No.	Student Name	ID Number
1	Adnan Sanzid Ali	211-23-999

This is to certify that a plagiarism test was conducted on the complete report, and overall similarity index was found to be less than 20%, with maximum 5% from single source, as required.



.....
Signature and Date

Dr Md Saifur Rahman

Professor

CHAPTER 01:

INTRODUCTION

1.1 Background of the study

The development and presentation of sample are crucial operations in the apparel industry that have a big impact on the relationship between the buyer and the manufacturer as they can determine whether garment purchase orders are secured or lost. A garment sample is a typical product that shows the overall production quality and capability of the manufacturer or exporter. Samples are made and inspected to make sure that they meet the buyer's requirements and standards before it goes for bulk production.

Sample development is the first step toward developing a new style and merchandisers play an important role in this process. The development process transforms a two-dimensional pattern into a three-dimensional garment, taking into account both measurement and aesthetic factors. Since collaboration promotes time management and quality control, communication and information flow between the buyer, sample room personnel and merchandisers are crucial.

Once a *tech pack* containing technical specification of a particular garment is obtained, the sample development process begins. Important aspects of the sample such as fabric color, measurement, print, embroidery and washing effect must be meticulously monitored during sample development. The merchandising team oversees the progress of sample development, addresses any delays and ensures timely completion. After samples are developed, they are presented to the buyer, who assess them for approval or rejection. Feedback from the buyer is vital; if issues are identified, samples may need to be revised or additional types, such as mock-ups, may be requested. Different terminology is used throughout the sample development process, including design sample, fit sample, 3D samples, counter sample etc. reflecting the sample type during the development process. Upon receiving final approval, a manufacturer can initiate bulk production, which involves calculating costs and negotiating terms with buyers. Overall, the sample development process represents a collaborative effort between designers and apparel merchandisers, combining creativity and practicality to meet market demands effectively.

1.2 Aims and Objectives

The motivation for this project stems from the understanding that in a highly competitive market, the quality and presentation of samples can be decisive factors in securing orders. By focusing on the systematic approach that merchandisers employ, from interpreting technical specifications to ensuring accurate and timely sample approval, the study aims to identify best practices that can improve collaboration between design and merchandising team.

Additionally, the study aims to clarify the significance of feedback and communication between the members of design and merchandising team throughout the sample development procedure. A manufacturer's ability to manage modifications, navigate buyer assessments, and satisfy different sample criteria can have a big impact on their business. The ultimate goal of this project is to offer insights that can enhance quality control, innovation and efficiency of the garment sample development process, thus boosting the supply chain's overall effectiveness.

1.3 Scope of the Study

- I. Create a detailed appraisal framework for buyers to evaluate sample quality, production techniques, and cost-effectiveness.
- II. Conduct studies to analyze successful buyer-supplier relationships by investigating factors that contribute to effective partnerships and strategies for sustainable growth in apparel merchandising.

1.4 Limitations

1. The limited time available for this project affects the depth and quality of the analysis.
2. Due to restrictions on accessing internal documents and proprietary information we couldn't collect all the available data such as accessories booking and lab test reports.
3. Among different types of samples, only fit sample was developed and evaluated.
4. The size of the mannequin in our apparel lab used to evaluate the fit sample was little bit different than the original measurement provided by the buyer.

CHAPTER 02:

LITERATURE REVIEW

An important stage in the manufacturing process, garment sampling serves as a prototype for mass production. Typically, a company has a special sample department managed by merchandisers who communicate with consumers about samples and their requirements. Sample is very important for obtaining export contracts and drawing customers because it serves as a model for them to evaluate before confirming their orders. In short, clothing samples are garments that must be made to satisfy buyer's specifications for approval before mass production. To ensure that the remaining items will meet the requirements of the buyer, the term "sample" suggests a stage of preparation for bulk production. Therefore, to expedite the approval of mass production, samples of garments should be made in line with the specification of the buyer.

2.1 Sample Development

Sample development and approval process are considered vital in procuring purchase orders for the export-oriented apparel industry in Bangladesh. The merchandising department in the apparel company faces this challenge of creating samples within a strict timeline to meet the demand of the foreign customers. The challenge is crucial for securing bulk orders from international market and ensuring customer satisfaction.

Full sleeve T-shirt is very popular today among young generation specially women. In apparel industry, full sleeve T-Shirt is a common item produced in huge quantities in various types of stripes, design and color. With same fabric construction, the end product may appear fully different because of variations in stripe, style and color.

In this particular capstone project, I have attempted to develop a fit sample of full sleeve lady's T-shirt using a single jersey black stripe fabric to get a practical understanding of the sample development process.

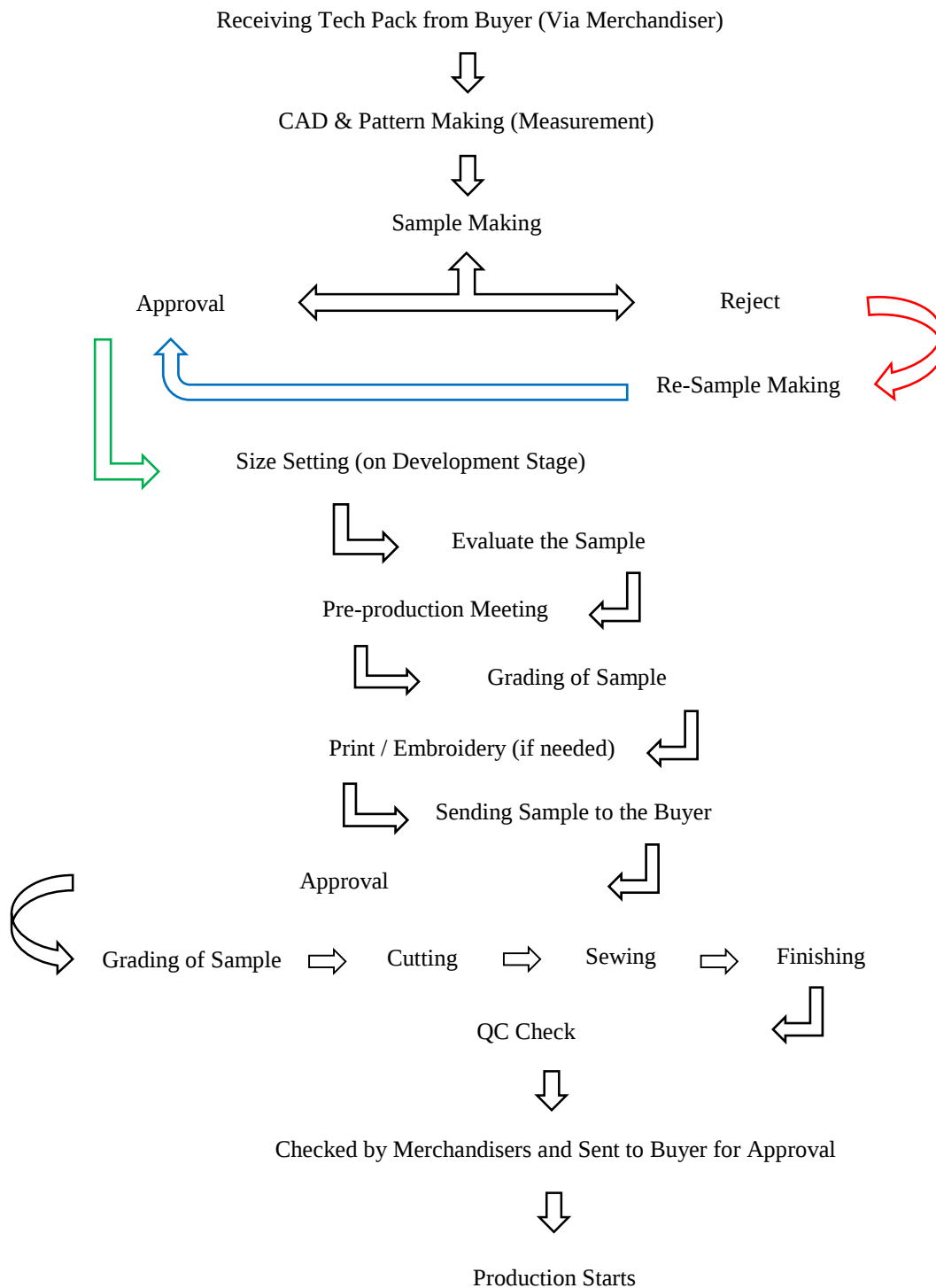


Fig 2.1.1: Flow Chart of Sampling process

This is the process of producing a sample of the fabric or item of clothing that will be marketed. In order to attract clients, sampling and sample development are two of the most significant processes in the apparel sector. Since clients usually place orders when they are pleased with the quality of the samples. Garment sampling is given significant importance. It impacts whether buyers place future orders, which will generate revenue for a company that produces or exports apparel. Sampling is a crucial pre-production phase in the apparel industry. To get authorization for big orders, a manufacturer will test different styles. Four fundamental processes are followed while developing a sample for all types of buyers. Sometimes these steps are called the heart of the development process. These are –

2.1.1 Receiving Tech Pack

Buyer provides a tech pack to the manufacturer. It describes clearly about all information such as fabrication, specification of yarn, printing and embroidery details, essential measurements that are required for developing a sample.

2.1.2 Sourcing of Material and Accessories

It is necessary to gather all the raw materials required for the creation of samples. It includes fabrics, sewing threads, trims, accessories etc. It is also mandatory to inform the entire department about the upcoming product.

2.1.3 Printing and Embroidery Design Development

If any embroidery or printing design is mentioned in the tech pack then the garment is handed over to the respective person for completing the embroidery according to the buyer's specifications.

2.1.4 Cutting and Sewing the Garments

When measurement wise pattern, fabric and accessories are available in the department then cutting is done and sewing is also done for the respective garments.

2.2 Purposes of Developing a Sample

- To let the buyer, assess the producer's level of manufacturing capability.
- To offer a way for the bulk production process to be adjusted.

- To enable the manufacturer to create cost quotes and assess the consumption of thread and fabric.
- To inform the buyer about an exporter's potential.

2.3 Information Containing by the Sample Details Card

Once the order has been confirmed, a tag is used to connect the technical specifications to each sample that is provided to the buyer. It includes information about the buyer's request as well as the supplier's fabric, trims, and accessories, including hang tags, band rolls, care labels, price codes, bar codes, and more.



Fig 2.3.1: Sample details card

➤

PRODUCT

➤ O/N DEPT

➤ SUPPLIER

➤ SIZE

➤ M-CHART

➤ PATTERN / LAST REFERENCE

➤ MATERIAL REFERENCE

➤ CONSUMPTION

➤ CONSTRUCTION

➤ YARN COUNT

➤ GAUGE

➤ WEIGHT

➤ COLOR

➤ COMMENTS

2.4 Sample Types Required to Complete an Order

- | | |
|--------------------------|---------------------------------|
| 1) Proto Sample | 7) Counter Sample |
| 2) Fit Sample | 8) Pre-Production Sample |
| 3) Size Set Sample | 9) Top of the Production Sample |
| 4) Salesman Sample (SMS) | 10) Shipment Sample |
| 5) Photo Sample | 11) Digital Garments Sample |
| 6) Development Sample | |

2.4.1 Proto Sample

The very first sample asked by the buyers is known as a proto sample. This is prepared according to the requirements of the buyer. This type of sample is normally made up from available fabric in the sample department because of unavailability of the actual fabric. In this stage at least three samples are made. Among these three samples two samples are sent to the buyer and the third one is kept by the sample department.

2.4.2 Fit Sample

The most important parameters of garments design is garments fitting. This type of sample is made according to the art work and measurement of the spec sheet. The purpose of developing a FIT sample is to check the garments fitting wearing by the human model or mannequin. FIT sample is developed after proto sample and prior to size set sample.

2.4.3 Size Set Sample

The purpose of this type of sample is to check the garments fitting through multiple sizes. This sample is made up from the actual fabric. If the actual fabric is not available then similar quality fabric can be used by taking permission from the buyer. Before getting the approval for the size set sample the bulk cutting for mass manufacturing does not start.

2.4.4 Salesman Sample (SMS)

These samples are intended for use in retail spaces such as showrooms. Additionally, it goes by the name of Promotional Sample. Manufacturers designed it according to the buyer's desire to

procure orders from local shops. Because the products are imported and they sell to other retail outlets through their salesperson, these buyers are referred to as WHOLESALE BUYERS.

2.4.5 Photo Shoot Sample

This sample is demanded by buyers who run clothing retailers around the entire nation. These customers regularly check through their product catalog. They are commonly known as catalog buyers. This catalog contains all required information including the season, style number, price range and the photographs of models after wearing the outfits.

2.4.6 Development Sample

The development sample includes the proto, fit and size set samples.

2.4.7 Counter Sample

A factory produces two to three extra samples for internal use when it produces samples for various buyer sample approvals. The term "counter sample" refers to these samples. A counter sample may be the PP sample, the counter size set, the counter of the fit sample, or the counter SMS. A duplicate of the original samples is called a counter sample. The factory may use the counter sample by providing the internal merchandising or quality team if permitted samples are unavailable when requested or if multiple teams require the sample at the same time.

2.4.8 Pre-Production Sample

A pre-production sample containing various real materials, including fabric, trimmings, and so on, is provided to the customer prior to mass production. It is also known as a pilot run sample. A PILOT RUN, or test run, should be planned before starting mass production. Before actual production can begin, the pre-production sample needs to receive final clearance.

2.4.9 Top of the Production Sample

Following approval of the PP sample, the factory begins mass manufacturing. Following the start of bulk production, a small number of clothing items are chosen at random from the first production run's output for quality control by the buyer's QA.

2.4.10 Shipment Sample

After passing the final inspection, the buyer needs this sample. When the completed and packaged clothing is prepared for shipment, the buyer receives shipment samples. When the clothing is shipped straight from the buyer's warehouse, these samples are sent. To examine the finished item and its packaging. It indicates whether or not every accessory is in order.

2.4.11 Digital Garments Sample

A digital garment sample is one that has been created with software that shows the garment's three-dimensional form. The digital sample allows a customer to see the fit, fabric fall, and pressure points (tight fitting) of the garment in both still and moving images. The computer model on the screen is animated. Thanks to technology, a large number of purchasers and made-to-measure customers select digital clothing samples, which also speeds up the sample approval process. The client acknowledges that the screen display is comparable to a tangible sample, upon which remarks and suggestions are made.

2.5 Buyer ARKET

ARKET is a modern Nordic design and lifestyle destination, offering collections for women, men, children, and the home, along with a seasonal vegetarian café and coffee shop. Inspired by simplicity, nature, and the aesthetics of slow living, the assortment features garments, objects, and food carefully made and artfully curated for a more beautiful everyday life.

2.5.1 SOP of Buyer ARKET

- Pre-proto Sample
- Proto Sample
- Fit Sample
- Size set Sample
- Gold Seal Sample
- PP Sample
- Shipment Sample

All these stages of sample need to develop for ARKET in the sampling Stage.

CHAPTER 03:

METHODOLOGY

3.0 Sample Development Process

1. Studying the Technical Package
2. Development/Procurement of Fabric
3. Sourcing of Accessories
4. Pattern Development
5. Fabric Cutting
6. Sewing/Joining parts of the garment
7. Ironing and Packin

3.1 Studying the Technical Package

The buyer i.e., H&M, provided a technical package to the merchandising department of the manufacturer. It contained all information such as fabrication, specification of yarn, printing and embroidery details, essential measurements that are required for developing a sample. In my case, the buyer asked the manufacturer for yarn dyed single jersey 100% BCI cotton having 150 GSM for shell fabric. Besides, yarn dyed 95% BCI cotton blended with 5% elastane, 1x1 L rib full feeder (Lycra was used in every yarn feeder) having GSM of 210 for neck rib. Moreover, for neck binding the buyer instructed to use similar fabric as used in the shell fabric.

3.2 Development/Procurement of Fabric

As mentioned in the technical package, the required knitted fabric was booked through requisition to the knitting department. The figures shown below indicate detailed information about the booked fabric and trims required to develop the sample. A total of 26 kg fabric has been booked which splitted into 15 kg for shell fabric (fig 3.2.2), 7 kg for neck rib (fig 3.2.3) and 4 kg for neck binding (fig 3.2.4). Fabric construction for shell fabric and neck binding are same i.e. single jersey yarn dyed 100% BCI cotton having GSM 150 and for neck rib the fabric construction is single jersey yarn dyed 95% BCI cotton blended with 5% elastane 1x1 rib full feeder.

SOLID STYLES:		
FABRIC QUALITY:		
SUPPLIER / ARTICLE BODY	AMBIKA	P11-YP-SJ-32ELS-28GG-WITH ENZYME
STITCH / COMPOSITION	SINGLE JERSEY	100% BCI COTTON
WEIGHT		150 g/m2
SUPPLIER / ARTICLE TRIM	1X1RIB	P11-YP-TRIM-32ELS-7GG
THREAD QUALITY TOPSTITCH:		COL DTM SHELL FABRIC
SUPPLIER / REFERENCE	COATS	
THREAD COUNT (TICKET NO):		EPIC
THREAD COLOUR:		120
		DTM SHELL FABRIC

Fig 3.2.1 Fabric Quality & Trims

SL No.	StyleNo	StyleName	KFS No.	Color	Use of Fabric	Process Type	Color	FABRICATION				Finish Qty	Grey Qty	LAB DIP	REMARKS
								Fibre Composition	FabricType	GSM	Special Notes				
1 (1)	Nina SJ LS			09-090+12-220 <i>116 17 color</i>	SHELL + SLEEVE + BNT	Yarn Dyed	0	100% BCI COTTON	S/J	150		15.00	15.00	-	11- Pantone: 09-090 = 09-090 H&M standard ; 12-220 = 13-0905 TCX. Repeat: 09-090+12-220=10 mm + 22mm =
2 (2)	Nina SJ LS			09-090+11-105	SHELL + SLEEVE + BNT	Yarn Dyed	0	100% BCI COTTON	S/J	150		15.00	15.00	-	11- Pantone: 09-090 = 09-090 H&M standard ; 11- 105= follow sample 0/N2311207. Repeat: 09-090+11-105=10 mm + 22mm =

Fig 3.2.2 Shell Fabric Booking

SL No.	StyleNo	StyleName	KFS No.	Color	Use of Fabric	Process Type	Color	FABRICATION				Finish Qty	Grey Qty	LAB DIP	REMARKS
								Fibre Composition	FabricType	GSM	Special Notes				
3 (3)	Nina SJ LS			09-090+11-105	RIB	Yarn Dyed	0	95% BCI Cotton, 5% Elastane	1x1 L Rib Full Feeder	210		7.00	7.00	-	11- Pantone: 09-090 = 09-090 H&M standard ; 11- 105= follow sample 0/N2311207. Rad= any Rad. Repeat: 11-105+09-090+11-105+Re (h= 2.7 cm + 1.2 cm + 2.7 cm+ 1 mm =
4 (4)	Nina SJ LS			09-090+12-220	RIB	Yarn Dyed	0	95% BCI Cotton, 5% Elastane	1x1 L Rib Full Feeder	210		7.00	7.00	-	11- Pantone: 09-090 = 09-090 H&M standard ; 12-220+13-0905 TCX. Rad= any Rad Repeat: 12-220+09-090+12-220+Re (h= 2.7 cm + 1.2 cm + 2.7 cm+ 1 mm =
5 (5)	Nina SJ LS			12-220	NECK BINDING	Normal Yarn Dyed	0	100% BCI COTTON	S/J	150		4.00	4.00	-	11- Use dyed yarn

Fig 3.2.3 Rib Fabric Booking

SEASON/PHASE : S/S															
SL No.	StyleNo	StyleName	KFS No.	Color	Use of Fabric	Process Type	Combo	FABRICATION				Finish Qty	Grey Qty	LAB DIP	REMARKS
								Fibre Composition	FabricType	GSM	Special Notes				
6 (6)	Nina SJ LS			11-105	NECK BINDING	Normal Yarn Dyed	0	100% BCI COTTON	S/J	150		4.00	4.00	-	Use dyed yarn

Fig 3.2.4 Neck Binding Fabric Booking

3.2.1 Stripe Instructions

According to the technical package 10*22 mm black and white portion is demanded for shell fabric (fig 3.2.1.1) and adjusted stripe ratio for neck rib is 2.70*1.20*2.70 mm white-black-white has demanded (fig 3.2.1.2).

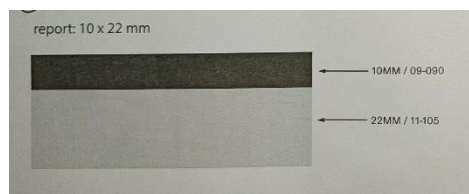


Fig 3.2.1.1 Stripe Repeat of Shell Fabric

Stripe repeat of Nina sweat shirt		
Neck rib		
	2.70 cm	12-220
	1.20 cm	09-090
	2.70 cm	12-220
	1 mm raw	42-101



Fig 3.2.1.2 Stripe Repeat of Neck Rib

3.3 Sourcing of Accessories

Sewing thread was sourced together with the body fabric through the knitting department so that the color of the thread matches with the body fabric. They prepared the dyed yarn and thread as per the technical package.

3.4 Pattern Development

Pattern is developed according to the measurement chart provide by the buyer. From the adjusted measurement chart recommended by the buyer a small size pattern is made by manual method.



Fig 3.4.1 Pattern Developing

*=rev. m-ment	XXS	XS	S	M	L
QC 1 ½ CHEST	40	42	46	50	54
QC 2 ½ BOTTOM	42	44	48	52	56
3 LENGTH FROM SHOULDER POINT	62.5	63.5	65.5	67.5	69.5
QC 4 SCYE DEPTH	20.5	21	22	23	24
QC 5 SHOULDER TO SHOULDER	34	35	37	39	41
QC 6 NECK WIDTH *	16.85	17.25	18	18.75	19.5
7 NECK DROP FRONT *	9.25	9.5	10	10.5	11
8 NECK DROP BACK *	3.2	3.2	3.2	3.2	3.2
QC 9 SLEEVE LENGTH	62.5	63	64	65	66
10 ½ BICEPS	14.25	14.75	15.75	17	18.5
11 ½ BOTTOM SLEEVE *	10	10.25	10.75	11.25	11.75
QC 12 ½ MINIMUM EXTENDED NECKLINE	30	30	30	30	30
13 BACK WIDTH	31.25	32.5	35	37.5	40
QC 14 FRONT WIDTH	30.35	31.5	33.8	36.1	38.4

Fig 3.4.2 Measurement Chart

3.5 Fabric Cutting

After keeping the fabric in relaxation (fig 3.5.1) for twelve hours. Because it is composed of 100% cotton and the standard relaxation for cotton is twelve hours. Firstly, fabric is spread on the table carefully and tape is attached to give the fabric extra security during cutting. Then the pattern paper is placed onto the lay and marked by using a pen very carefully to help the cutting. Finally, fabric cutting is done carefully by matching the stripe properly and accurately (fig 3.5.2).



Fig 3.5.1 Fabric Relaxation



Fig 3.5.2 Fabric spreading & Cutting

3.6 Sewing/ Joining Parts of the Garment

The different parts of the garments are assembled (fig 3.6.1) by following the buyer instruction that mentioned in the art work (fig 3.6.2).



Fig 3.6.1 Sewing of Different Parts of the Garments

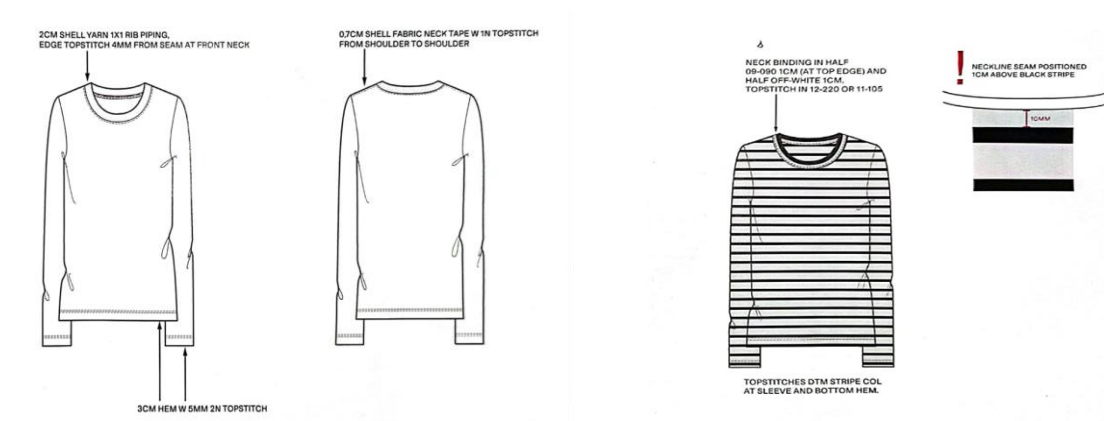


Fig 3.6.2 Sewing instruction

3.7 Ironing & Packing

Finally, the sample garment is ready to packing after ironing is done.



Fig 3.7.1 Finished Good

CHAPTER 04:

Result, Discussion & Project Demo

In this chapter we will discuss the development stages of the sample according to the artwork and buyer-provided measurement chart in the Textile Apparel Lab, DIU.

4.1 Project Demo

After finishing the counter sample, we got our final garments. Then we put the t-shirt on the mannequin and check the fittings.



Figure 4.1.1 Front Part of Full Sleeve Ladies T-Shirt



Figure 4.1.2 Back Part of Full Sleeve Ladies T-Shirt



Figure 4.1.3 Front Right Part of Full Sleeve Ladies T-Shirt



Figure 4.1.4 Front Left Part of Full Sleeve Ladies T-Shirt

After developing the small size fit sample, I put the it on the mannequin. Mannequin looks well fitted but I observe that there was loose fitting in some points. After modification the counter sample again put onto the mannequin and it was fitted onto the mannequin perfectly then.

4.2 Discussion

After completing all the process, I was successful to develop the fit sample. In that journey I learned that clear communication is very crucial for maintaining smooth relationship between merchandiser and the buyer. The main challenge for a merchandiser is to source the right materials with buyer specific requirement for developing a sample. One most challenging factor is to matching the sewing thread to the shell fabric. To avoid this risk sewing thread is also dyed while the yarn is dyed for the shell fabric respectively. Sometimes, approval of color from the buyer seems difficult while the swatch is submitted to the buyer through picture, because of proper regulation. Moreover, it is important to make the concept clear to the design team so that they can produce the sample perfectly. Thus, maintaining the relationship through clear communication can carry out the perfect development sample accurately.

CHAPTER 05:

Social Ethics

5.1 Codes and standards used in design approach

Codes: A code is a set of laws, regulations, and rules issued by a recognized authority or government agency. It is also known as a building code or safety code. The purpose of these codes is to guarantee the safety, security, and efficiency of structures, systems, and procedures.

Standard: A specification or document created by an official organization responsible for creating guidelines is called a standard. Standards are voluntary recommendations that provide a standardized and accepted method for operating a system, product, service, or process. Unlike codes, adherence to a standard is often not legally required, but it is often recognized as a symbol of excellence, safety, and best practice.

Federal Laws:

- The Bangladesh Labor Act (2006) provides guidelines for minimum wages, overtime compensation, child labor, working hours, and other labor rights.
- BNBC, or Bangladesh National Building Code, this code establishes electrical installation, fire safety, and structural integrity requirements for garment companies.

Moreover: Bangladesh Garments Manufacturers and Exporters Association (BGMEA): Members of this industry association are expected to adhere to their own code of conduct. It promotes ethical and sustainable behavior and is in line with international standards.

5.2 Ethical principles and professional commitment involvement.

Ethical Principles:

- Worker rights
- Livable wages
- Reasonable working hours
- Environmental sustainability
- Transparency and accountability

Professional Commitment:

- Brands and retailers: Brands and retailers have a responsibility to ensure that the factories they partner with follow ethical standards and source clothing ethically. This can include conducting audits, lending to organizations like the Fair Labor Association, and promoting supply chain transparency.

- **Garment Manufacturers:** It is their professional responsibility to comply with all applicable national and international regulations, fund employee safety training, and provide a safe and healthy working environment for their employees.
- **Factory Organization:** Bangladesh Garment Manufacturers and Exporters Association (BGMEA) advocates for change in the sector and encourages ethical behavior among its members.
- **Consumers:** They have the power to change the world by supporting companies that value ethical production and seeking certifications like Fair Trade or organic cotton.

5.4 Impact of project on the environment and sustainability

All manufactured goods have some impact on the environment even it is too little. The goods or product which have lesser negative impact on environment during manufacturing, uses and disposal is considered environmentally friendly. My developed t-shirt is a cotton t-shirt. It is mostly a dry process that is why it has very little environmental impact in yarn dyeing stage. But the industry practices the certified process of dyeing which leads less impact on environment than general. Besides the factory have a Water treatment plant (WTP) and effluent treatment plant (ETP) & they use it properly. Again, the wastage of clothing is also polluting environment because it does not rot easily. For this reason, 100% BCI cotton fabric is used which is environmentally friendly.

CHAPTER 6

6.1 Conclusion

After completing the project, I went through the complete journey of a garment manufacturer from art work to finished goods. This project helped me to acquire knowledge about different unknown things and significance of every section of a garment producing factory. This journey of a developing a full sleeve t-shirt and put it into the mannequin of our apparel lab, I faced different types of problems and managed to cope up those problems by taking help from my supervisor and concerned persons in the factory. I learnt almost all major operations required to develop a complete garment through this project and realized the significance of effective collaboration between the buyer, merchandiser and sample department essential to develop a perfect and flawless fit sample.

REFERENCES

1. <https://www.textiletoday.com.bd/reducing-fit-test-and-production-pp-approvals-delay-of-garment-production>
2. <https://www.onlineclothingstudy.com/2018/08/14-different-types-of-garment-samples.html>
3. <https://www.arket.com/en/about.html>
4. <http://dspace.daffodilvarsity.edu.bd:8080/handle/123456789/10461>
5. https://www.researchgate.net/publication/328883910_Md_Anwar_Hossain_Cost_Minimisation_in_Sample_Development_and_Approval_Process_by_Proper_Merchandising_Action_for_kids_and_Ladies_Garments
6. https://www.researchgate.net/publication/350753711_A_COMPARATIVE_STUDY_ON_CONSUMER_BUYING_BEHAVIOR_AT_WEB_STORE_PURCHASE_AND_SERVICE_STORE_PURCHASE_OF_ENTERTAINMENT_SERVICES_IN_NASHIK_CITY
7. https://www.researchgate.net/publication/274998490_Knitwear_Product_Development_Process_A_Case_Study