



Daffodil
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Various Type of Single Jersey knit Exported from bangladesh

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of

Bachelor of Science in Textile Engineering

Advance in Fabric Manufacturing Technology

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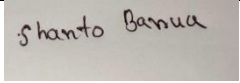

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DECLARATION

We hereby declare that This thesis is done under by our supervisor **prof. D. Md. Mahbubul Haque professor** Department of Textile Engineering, Daffodil International University. Beside we also declare that nothing from this content have been published elsewhere only for the purpose of completing degree.

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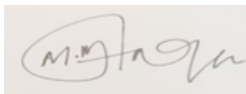
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LETTER OF APPROVAL

Throughout the whole process of making this “**Various Type of Single Jersey knit Exported from bangladesh**” we do proper research and it is completed by us Shanto Barua 193-23-5754 and Saidul Islam 193-23-5753. Hereby this thesis papers are Request to be Approve by the board of examiner, Faculty of Engineering for completing the degree of bachelor program.

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DEDICATION

First of all, we like to thanks our almighty god who give us this opportunity to do this work. Without help of God we couldn't able to complete the work. Beside our supervisor **prof. D. Md. Mahbul Haque professor** helps to provide guidance about this work. With his guidance our work became much easier and we understand the topic profoundly. During the process of making thesis, it teaches us how to being punctual, be more productive and be harder worker. Through countless time and efforts, we finally reach to the end point. Finally, it is an honor for us to work with our supervisor and so many new people through this journey.

ABSTRACT

The purpose of this thesis is to know about types of single jersey and its export in Bangladesh. Before knowing export, we need to know about basic which is knitting process flow chart, and different types of characteristics in different fibers which is used in single jersey. WPI, CPI and relation between GSM with SL going to be discuss throughout this thesis. Beside it will helps to gain better knowledge about in dept quality of fabric. In processing of knit fabric there are different stage occurred which will also be discussed and what kind of commercial name used in fabric. Knowing commercial name used in fabric will increase better relation with buyers.

Table of Contents

Various Type of Single Jersey Fabrics Export in Bangladesh.....	I
DECLARATION.....	II
LETTER OF APPROVAL.....	III
ACKNOWLEDGEMENT.....	IV
DEDICATION.....	V
ABSTRACT.....	VI
CHAPTER-1.....	1-2
Introduction.....	2
1.1. Objectives.....	2
Chapter-2.....	3-15
2.1 Single jersey properties.....	4
2.2 Various types single jersey.....	5
2.2.1 Single Lacoste.....	5
2.2.2 Fleece.....	6
2.2.2.1 Two thread fleece fabric.....	6
2.2.2.2 Three thread fleece fabric.....	7
2.3 Single lycra jersey.....	8
2.4 Velour fabric.....	8
2.5 Jacquard knit fabric.....	9
2.6 Silver knit fabric.....	9
2.7 Intarsia fabric.....	10
2.8 French terry.....	10
2.9 Bird's Eye Knit Fabric.....	11
2.10 Cable fabric.....	11
2.11 Different Machine Parts of Circular Knitting Machine.....	12
2.11.1 Creel zone.....	12
2.11.2 Aluminum tube.....	13
2.11.3 Feed zone.....	14
2.11.4 Needle & Sinker.....	14
2.11.5 CAM.....	15
2.11.6 Fabric dispatch.....	15
CHAPTER-3.....	16-27
3.1 Machine Specification of Circular Knitting Machine.....	17
3.2 Calculating per yard cost in weight.....	18
3.2.1 Single Jersey Cost in weight.....	19
3.3 Different Types of Single Jersey Fabrics Construction.....	20
3.3.1 GSM For Single Lacoste Fabric.....	21

3.3.2 GSM For Terry Fabric.....	22
3.3.3 GSM For Double Lacoste Fabric	23
3.3.4 GSM For Fleece fabric	24
3.3.5 GSM For Plain Fabric.....	25
3.3.6 GSM For Polo Pique Fabric	26
3.4 Commercial name of Single jersey	27
Chapter-4	28-36
4.1 Comparison between stitch length and GSM of various types of single jersey knit fabric	29
4.2 Single Jersey Cost in Weight.....	30
4.3 Relation Between Stitch Length And GSM For Single Lacoste	31
4.4 Relation Between Stitch Length And GSM For Terry Fabric	32
4.5 Relation Between Stitch Length And GSM For Double Lacoste Fabric	33
4.6 Relation Between Stitch Length And GSM For Fleece Fabric.....	34
4.7 Relation Between Stitch Length And GSM For Plain Fabric.....	35
4.8 Relation Between Stitch Length And GSM For Polo pique.....	36
Chapter-5	37
5.1 Conclusion.....	38
Chapter-6	39
6.1 REFERENCE	40

List of Table

Table 1 Single Jersey Cost in Weight	18
Table 2 Different Types of Single Jersey Fabrics Construction	20
Table 3 GSM for Single Lacoste Fabric.....	21
Table 4 GSM For Terry Fabric	22
Table 5 GSM For Double Lacoste Fabric	23
Table 6 GSM For Fleece Fabric	24
Table 7 GSM For Plain Fabric	25
Table 8 GSM For Polo Pique Fabric	26
Table 9 Commercial Name Of Single Jersey	27

List of graphs

Graph 1 Comparison between stitch length and GSM of various types of single jersey knit fabric.....	29
Graph 4.2 Single Jersey Cost in Weight	30
Graph 4.3 Relation Between Stitch Length And GSM For Single Lacoste.....	31
Graph 4.4 Relation Between Stitch Length And GSM For Terry Fabric	32
Graph 4.5 Relation Between Stitch Length And GSM For Double Lacoste Fabric.....	33
Graph 4.6 Relation Between Stitch Length And GSM For Fleece Fabric.....	34
Graph 4.7 Relation Between Stitch Length And GSM For Plain Fabric	35
Graph4.8 Relation Between Stitch Length And GSM For Polo pique	36

CHAPTER 01

INTRODUCTION

Introduction

In fabric there are two types of fabrics are made mostly those are woven and knit. In woven two threads are interlaced together but on the other hand knit fabrics are interloop but with single thread of yarn. Besides knitting also have many types which are called single jersey, double jersey interlock etc. As the topic say single jersey so further discussion will be talk about single jersey. Among the fabric types knit fabric also hold most popular one and single jersey is no different. In single jersey one set of needles is used and technical front and back loop has different appearance. Such as technical front has “V” shape loop and back side have U shape. That’s another way to identify the single jersey.

1.1 Objective:

- To know about single jersey.
- To know about different types of single jersey.
- To know about Single Jersey Circular Knitting Machine.

CHAPTER 02

LITERATURE REVIEW

Literature review

2.1 Single jersey properties:

As the most used Fabric among the knit fabrics, it has some good properties which makes it good competitor against others. There are some important things need to consider when it comes to properties such as how much economical is it. The simple structure can lead to higher production value can create higher valuable than other knit fabrics in the market. Beside there are various types of knit fabric available all of it doesn't share same characteristics but here it is an overall Single jersey property which makes it much valuable.

- Front and back different appearance.
- Single set of needles used in single jersey which is called Cylinder needle
- Due to structure, it is tended to be curl.
- Single jersey tends to be less thick.
- Due to weft knitting extensibility is higher in weft direction compare to length direction.
- Unraveling in single jersey is much easier.
- Knitting structure is simple.
- Cost of production is rather low.
- Much more comfortable.
- Curl tendency higher.
- Dimensional stability is lower due to single layer structure.

2.2 Various types of Single Jersey

Single jersey is part of knit types but this single jersey has various types those are Single Lacoste, two thread fleece terry, three thread fleece terry, Single Lycra jersey etc. These fabrics are different by its structure, raw material or can be appearance. Now all those various types of fabrics are being discussed.

2.2.1 Single Lacoste:

Single Lacoste is another derivatives of single jersey and it is most widely used for polo t shirt it has some unique feature which makes it unique than other single jersey derivatives. Due to knit and tuck pattern design it creates some space between the fabric for that reason air permeability is higher compare to others. Now about the raw material it is mostly used cotton and the cotton blended with polyester one. There are other options too which are Pima cotton where it is only use the long staple. Long staples are mostly good for fabrics because it has less end breaks.

End Use:

- Polo shirts
- T shirts
- Sports wear
- Undergarments

2.2.2 Fleece fabric:

Fleece is another derivative of single jersey where it is used to make some home textile products but the main thing about it has some extra properties like terry towel woven fabric where it used three set of yarn and extra set of yarn used to create pile in the surface of fabric where 2 set of warp yarn used to make pile surface of fabric but in case of fleece fabric in here it used 2 or three threads of yarn use first one ground yarn, tier yarn and fleece yarn. Both fleece and terry towel work same purpose but their way of making is different. On the other hand, it has mostly two types which are two thread fleece and three thread fleeces.

2.2.2.1 Two thread Fleece fabric:

Two threads of fleece fabric are another part of fleece fabric. Now fleece has many uses but main uses are to provide insulation to our human body by creating pile formation on the surface of fabric. In case of two thread fleece the process is slightly different than three thread fleece fabric. The reason is in two thread fleece.

End Uses:

- Blankets
- Gloves
- Lower track suits

2.2.2.2 Three thread fleece fabric:

It is another category of fleece fabric where three types of yarn used those are ground yarn, tie yarn and fleece yarn. Now if we discuss about the process of how it produces fabric with these three yarns then let's demonstrate. At first the needle rises up to catch the fleece yarn but lower down in tuck position of sinker, in this tuck position needle rest with fleece yarn and the again rise up to catch tier yarn. After that needle again downward in tuck position to intermesh with fleece yarn. When the yarn completes the meshing process with fleece yarn it again rises up from tuck position to catch face or ground yarn and move downward fully to intermesh with existing or previous loop.

End Use:

- Winter garments
- Sports wear

2.3 Single lycra jersey:

Single lycra jersey is none other than raw material wise fabric where the composition of fabric changes by raw material. In case of lycra it is mostly used with blend cotton fiber single jersey fabric. Lycra is a trade make name of spandex fiber. Lycra fiber helps to add extend ability in fabric which add extra feature. Beside it helps to fit to the body easily. Lycra fibers insert into the yarn which cannot be detect easily it is a man-made fiber. Beside lycra fiber place between base yarn. By using lycra it increase break load of that particular fabric.

2.4 Velour fabric:

Velour is similar version of velvet woven fabric where pile formation occure on the surface of fabric. In velvet the pile form by weaving process but in here it is done by knit process. Velour fabric gives smooth feeling and appeare makes more lusture for that reason it makes this fabric much popular. Nowadays velour fabric does use that much but sustability is higher than velvet fabric. Beside polyester as a raw material used in velour higher than any other existing one. As it is used polyerster fiber which is 8ecycled fiber for that reason it has low impact on environment.

End Use:

- Curtain
- Jackets
- Tracksuits

2.5 Jacquard knit fabric

As it is already known that jacquard have higher uses in woven fabric for complex design. The reason behind of it's higher uses that it can control individual warp to create any design as it required to. In woven jacquard it uses pattern card where it controls the single warp yarn. Woven jacquard most of the time used for label which use in fabric for knowing the brand and composition of raw materials used. Jacquard knit fabric produce in different way but have some similarities toward woven jacquard. There are some changes from the normal knit which is cam track, according to the cam box it can contain only 4 tracks of cam but when it comes to produce jacquard knit it needs to be produced complex design which cannot be done in 4 track cam system, in that case we need to use jacquard cam box which can produce more design by using peg box. This peg box can produce more design which cannot be done in 4 track cam boxes. Peg box connect with selector jack which moves up and down to the latch needle for creating tuck, knit and miss loop. It also mixture with knit and weaving.

End Use

- Leggings
- Socks

2.6 Silver knit fabric:

Silver knit fabric is another type of single jersey where it uses pile fabric to create fur on the surface of fabric which similar to velour fabric but the but the pile is larger than the velour fabric which looks almost animal fur. This kind of fabric provides good amount of heat to the body. Beside there is another type which is used for protection during dangerous work. These protection gloves are made from metal thread and process is same as single jersey.

End use:

- Jackets
- Coats
- Blanket

2.7 Intarsia fabric

Intarsia fabric is another derivative of single jersey where multi color yarn is used in single course now that kind of fabric used according to the requirement. The design doesn't pile up on the surface of fabric because during the course making process it doesn't overlap with existing one but rather become one. The fabric making process is same but the pattern making is different than normal single jersey. The design produce from multi color yarn looks identical on the both sides.

End use:

- Home furnishing
- Sweater

2.8 French terry:

French terry is kind of similar to terry woven fabric where the pile is used but the process method is different cause of structure of fabric. The pile of this French terry is smoother and absorbent than woven knit terry fabric. The thing about French terry is it does not brush like woven terry because it is already cozy enough to provide desire characteristics. Beside the technical back of this fabric used as technical face cause of fabric structure which makes a reverse.

End use:

- Casual cloth
- Sweat pants

2.9 Bird's Eye Knit Fabric:

In knit fabric the types can be divide by structure wise, raw material and design wise so, birds eye fabric is one of those derivatives in knit fabric where the tuck and knit stitch makes the hole effect which is called birds eye. In here tuck stitch is the main reason behind the creation of bird's eye effect beside the tuck stitch are placed far way between knit stitch. Sometime the multi color yarn also used according to the design this multi color earn enhance the design effect.

End use:

- Pillow cover
- Sportswear
- Luggage

2.10 Cable fabric

Cable fabric is a special fabric where the fabric is made form loop transfer from one needle to another needle. That kind of loop transfer can be done in V bed knitting machine where both beds can produce fabric. Certain time interval the loops or whales are transferred into one needle to another one. After that the cable will appear on the surface of fabric.

End use:

- Sweater
- Jackets

2.12 Different Machine Parts of Circular Knitting Machine

- Yarn feeder guide
- Needle
- Cam box
- Cylinder
- Belt
- VDQ pulley
- Sinker cam
- Sinker ring

2.12.1 Creel zone:

In this process the cone packages are feed into the creel stand to supply yarn to the machine. If the cone package doesn't come first hand, then it needs to be covert into cone package which can be done by auto coner. The creel stand storage can be different.



2.12.2 Aluminum tube:

This aluminum tube work as guide and protect yarn from dust. In fact, the yarn will go the exact location without hassle cause sometimes yarn could go off control which hamper the production.



2.12.3 Feed zone:

This feed zones have so many parts which are present during this process. First comes the yarn guide which helps to lead the yarn into the Memminger which work as positive feeder. Positive feeder means we can control the yarn tension and also control the yarn flow rate. There is another part which is present in that process which is called accumulator. This accumulator works as store the yarn for next process without stopping the machine. By doing this yarn will not have improper tension. On the other hand, driver pully works important roles because it is totally connected with VDQ pully which control the stitch length, if the stitch length higher than the positive feed rate will lower.



2.12.4 Needle and Sinker:

When the yarn comes from accumulator it passes through yarn guide and receive by needle. This needle and sinker help to form loop which is the main structure of fabric. In here latch needle is used where it catches the yarn by the hook and sinker helps to intermesh new loop with the old one because sinker hold the old loop till it intermesh with the new one.

2.12.5 Cam:

Cam is called track for needle movement which is set according to the design this operation is called cam arrangement. Generally, four cam track presents in cam box and number of cam box determine number of feeders. This cam has different types of track such tuck, knit and miss all those tracks placed according design.

2.12.6 Fabric dispatch:

After creating the fabric when it is ready to dispatch it store into the roller after finishing it ready to packaging.



CHAPTER 03

METHODOLOGY

3.1 Machine Specification of Circular Knitting Machine

- M/c Type: Single Jersey
- Brand Name: YONTHIN
- Made in: China
- Model No: YX-HS3F
- Diameter: 30 inch
- Feeder: 90 F
- Gauge: 24 G
- Needles: 2262
- R.P.M.: 18 m/min



3.2 Calculating per yard cost in weight

For that calculation we are going to use some formula

Weight of fabric = Fabric area * GSM

Per kg cost is 6.5\$

If we want to get single lactose cost then,

$1.486 * 0.180 = 0.2\text{kg}$

$0.26 * 4 = 1.07\$$

From that answer we get that per yard fabric weight 0.2kg and the cost will 1.07\$. So, we can find others too by this method.

3.1.1 Single Jersey Cost in Weight:

No.	Fabric name	Gsm	Charge per kg (TK)
1	Single Jersey	165	117
2	Single Jersey with Lycra	192	136
3	Auto striper	180	128
4	Auto Striper with lycra	200	143
5	Fleece	220	157

Table 1: Single Jersey Cost in Weight

From above this charts it contains some data about fabric cost per kg. In knit fabric cost always determine by the help of weight due to present dimensional stability. Now Single jersey with 165 gsm the cost will be 117 tk but when it adds with lycra then the cost also increased cause lycra add extra properties to the fabric like more extensibility with less breakage. Beside the gsm also increased. In case rib it also similar to the above situation where adding lycra increase the overall fabric price. It is well to be known that more gsm can increase the price of a fabric on the other hand Auto striper fabric use multi color yarn which is pre dyed and the cost of multicolor yarn add with gsm.

3.2 Different Types of Single Jersey Fabrics Construction



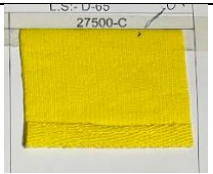

NO.	Fabric Name	Raw Material	Yarn count	Diameter	CPI	WPI	SL mm	GSM	Sample
1	Single Lacoste	100% cotton	30/1	64"	54	32	1.67	180	
2	Single jersey	100% cotton	26/1	72"	57	39	1.25	170	
3	Fleece	CVC (70% cotton, 30% polystar)	(30 Nc+20N c)	65"	55	34	2.5	240	
4	Single jersey with Lycra	90% cotton, 5% Spandex	22/1	70"	73	58	2.73	192	
5	Polyester	100 % polystar	30/1	63"	71	38	2.55	165	
6	Viscose	100% Viscose	24/1	58"	55	34	2.7	180	
7	French Terry	CVC (80% cotton, 20% polystar)	32/1	65"	55	34	2.5	280	

Table 3: Different Types of Single Jersey Fabrics Construction

From table 3 it shows some fabric construction with sample picture which gives a better understanding about the particular fabric. Beside it is noticeable that different types of fabric have different gsm which lead to unique construction. Suppose fleece fabric have different construction where 3 / 2 thread of yarn used to create pile on the surface of fabric for that reason the gsm become higher than usual. The gsm can be connect to the raw material used in fabric so different types of raw material can cause different result in gsm.

3.2.1 GSM For Single Lacoste Fabric

Types of Fabric	Yarn count in Ne	Stitch Length in mm	GSM (Gm/m ²)
Single lacoste	30/1	2.55	154
			153
			155
			155
			158
		2.60	152
			152
			154
			153
			154
		2.65	151
			152
			152
			150
			150
		2.70	149
			149
			150
			149
			148

Table 4: GSM For Single Lacoste Fabric

From table 4 it describe the different stitch length produce different Gsm. For getting good result the testing had done multiple times. It is well to be known that SL has relation with Gsm the more SL have the less Gsm will be above that chart it shows when the SL goes higher the Gsm become lower.

3.2.2 GSM For Terry Fabric

Types of Fabric	Yarn count in Ne	Stitch Length in mm	GSM (Gm/m ²)
Terry	(30 Nc+20Nc)	3.84	245
			248
			249
			241
			242
		3.93	228
			226
			227
			228
			226

Table 5: GSM For Terry Fabric

From table 5 it shows about terry fabric stitch length relation with gsm beside it use different types of yarn count where one yarn for ground and other for pile. If the values are being average then the result will be higher stitch length will have less gsm.

3.2.3 GSM For Double Lacoste Fabric

Types of Fabric	Yarn count in Ne	Stitch Length in mm	GSM (Gm/m ²)
Double lacoste	30/1	2.55	159
			158
			158
			160
			160
		2.60	154
			155
			153
			152
			151
		2.65	151
			152
			150
			151
			151
		2.70	151
			150
			151
			149
			149

Table 6: GSM For Double Lacoste Fabric

From table 6 it shows double lacoste fabric relation between stitch length and gsm where multiple data had been collected for better result. This chart also shows higher stitch length will decrease the gsm cause the loop length also increased. Double lacoste fabric is double jersey where the design starts with tuck and knit loop.

3.2.4 GSM For Fleece Fabric

Types of Fabric	Yarn count in Ne	Stitch Length in mm	GSM (Gm/m ²)
Fleece	(30 Nc+20Nc)	4.00	237
			239
			238
			238
			238
		4.10	226
			228
			222
			221
			223

Table 7: GSM For Fleece Fabric

From table 7 we can see Fleece fabric which is another types of single jersey where the design is unique because in here it creates fabric by using three thread yarn where one for ground formation and others two is for creating and holding the fleece yarn. This chart also shows higher SL can decrease the gsm.

3.2.5 GSM For Plain Fabric

Types of Fabric	Yarn count in Ne	Stitch Length in mm	GSM (Gm/m ²)
Plain Fabric	30/1	2.55	138
			143
			142
			138
			139
		2.60	125
			127
			125
			122
			126
		2.65	117
			119
			118
			116
			120

Table 8: GSM For Plain Fabric

From table 8 it shows relation between stitch length and gsm of plain fabric which is known as single jersey. In that case there some testing's are done which give an idea about that higher stitch length decrease the value of gsm because of higher feed rate which increase the loop length.

3.2.6 GSM For Polo Pique Fabric

Types of Fabric	Yarn count in Ne	Stitch Length in mm	GSM (Gm/m ²)
Polo Pique	30/1	2.55	139
			139
			138
			139
			140
		2.60	133
			135
			132
			137
			138
		2.65	131
			134
			135
			134
			131
		2.70	129
			130
			132
			132
			132

Table 9: GSM For Polo Pique Fabric

From table 9 Polo pique which is another derivative of single jersey where knit and tuck stitch formation create. Above this chart shows multiple result for particular stitch length but the final result is higher stitch length will lower the gsm value because the feed rate of yarn will be higher and loop length which is stitch length will also increase gradually.

3.3 Commercial Name of Single Jersey:

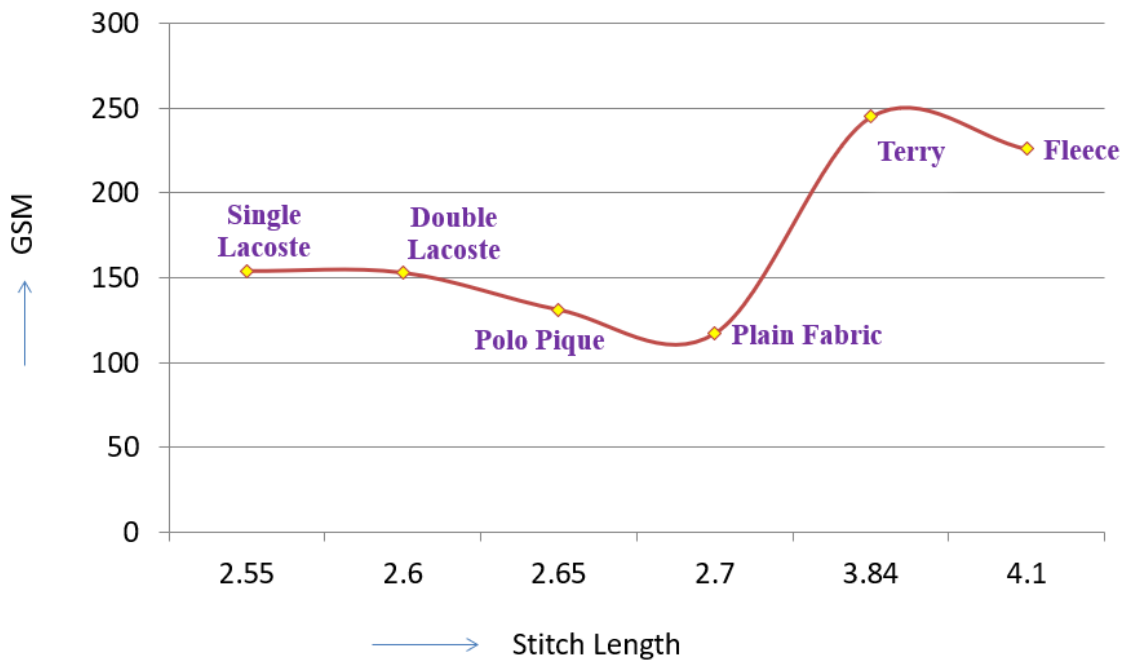
No.	Fabric name	Commercial name
1	Single Lacoste fabric	Pique fabric
2	Fleece fabric	Super soft short plush fabric
3	Lycra fabric	Spandex fabric
4	Polyester fabric	Terylene fabric
5	Waffle fabric	Honey comb fabric
6	Polar fleece fabric	Polartec fabric

Table 10: Commercial Name of Single Jersey

From table 10 it shows the different types of single jersey fabric with commercial name. Some of those fabric names are named by the fiber and also by the unique construction. Fleece fabric name for its own characteristics. For polyester single jersey fabric, it has different name based on the fiber but we show only one which is mostly used in UK, USA. Viscose also known as rayon and waffle fabric also called as honey comb because of design.

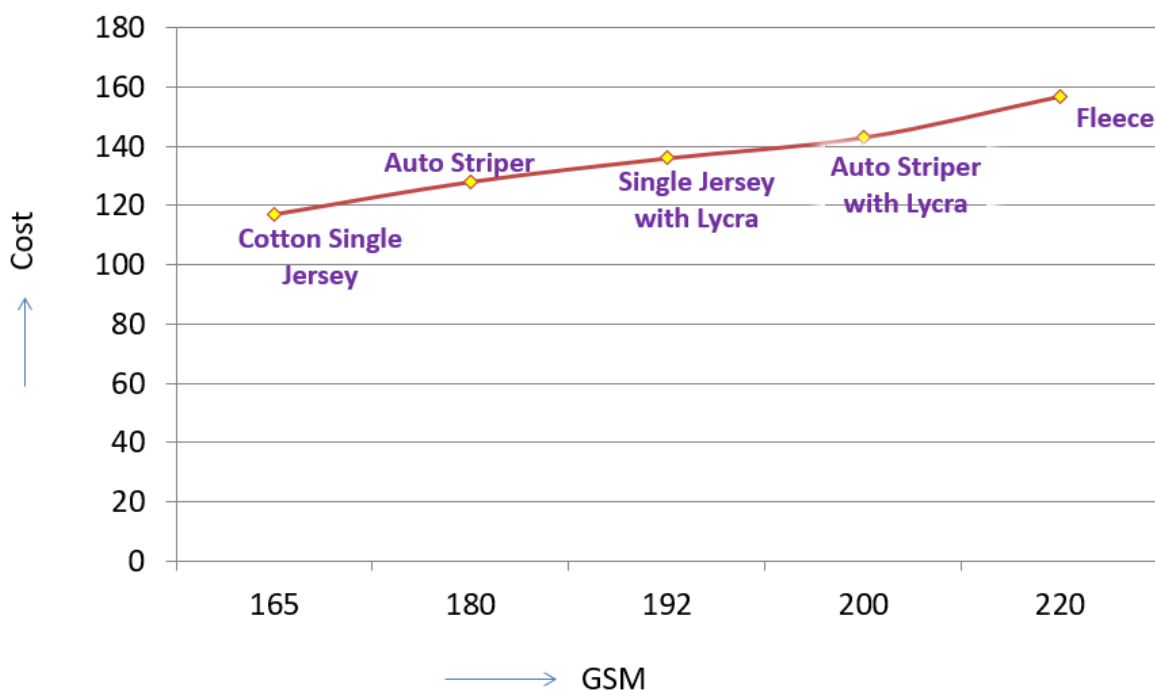
**CHAPTER 04
DISCUSSION
AND FINDING**

4.1 Comparison between stitch length and GSM of various types of single jersey knit fabric



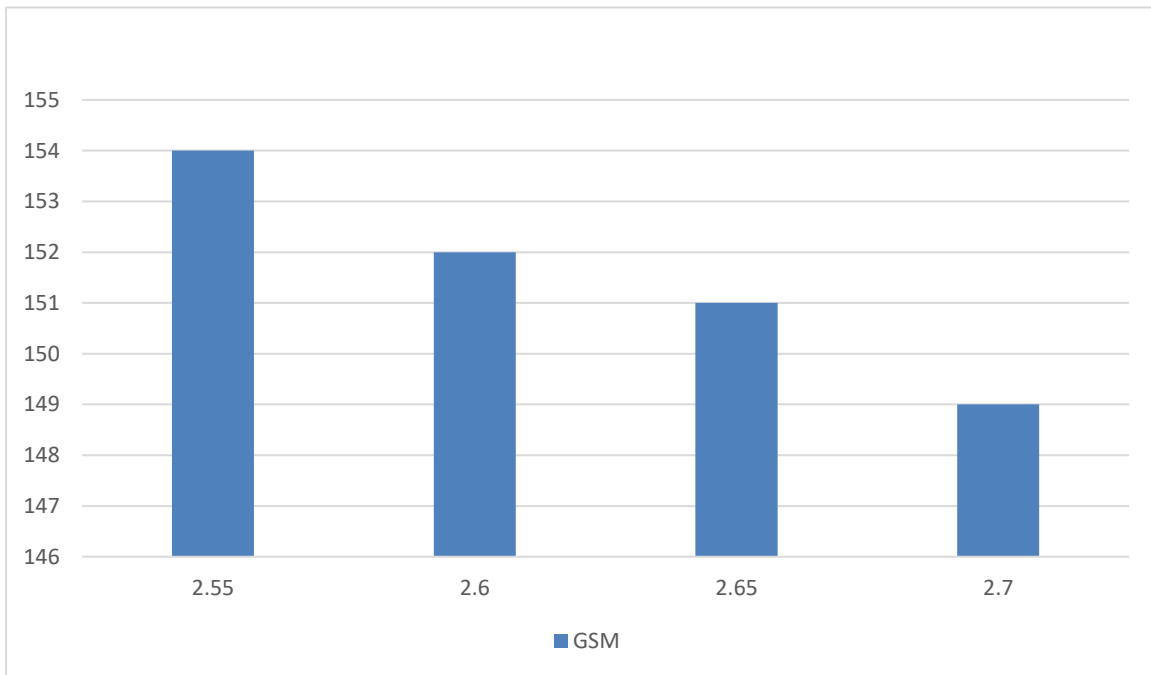
From this chart we can see various types of single jersey knit fabric GSM and stitch length comparison. Where the different stitch length shows different GSM results.

4.2 Single Jersey Cost in Weight



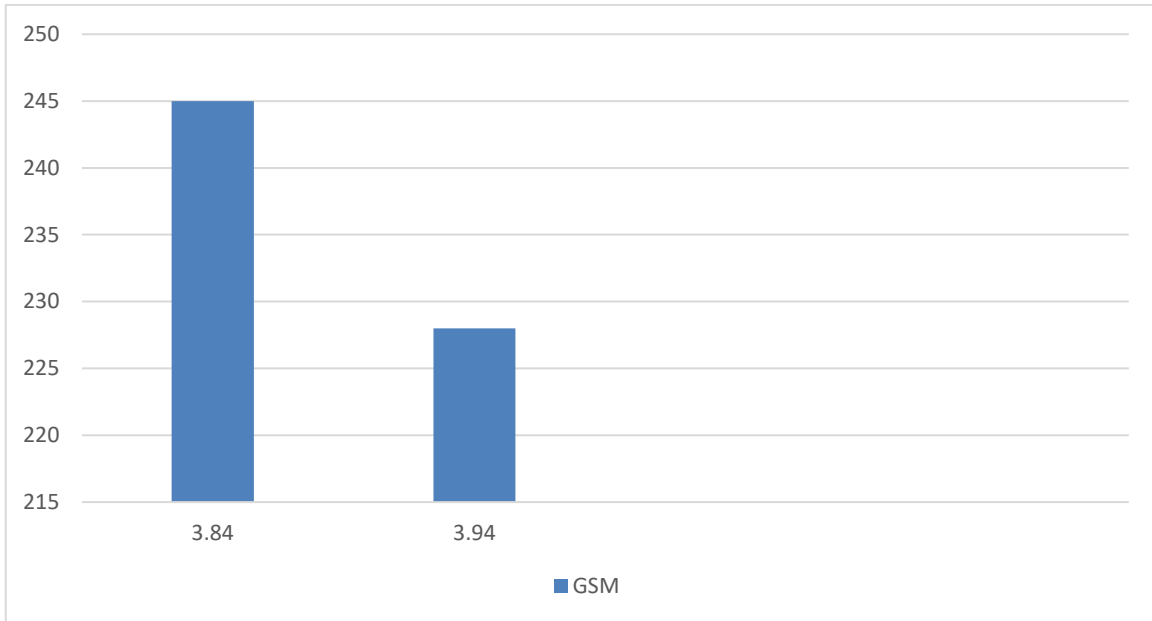
From this X Y chart it determined that higher gsm will increase the cost of fabric.

4.3 Relation Between Stitch Length And GSM For Single Lacoste

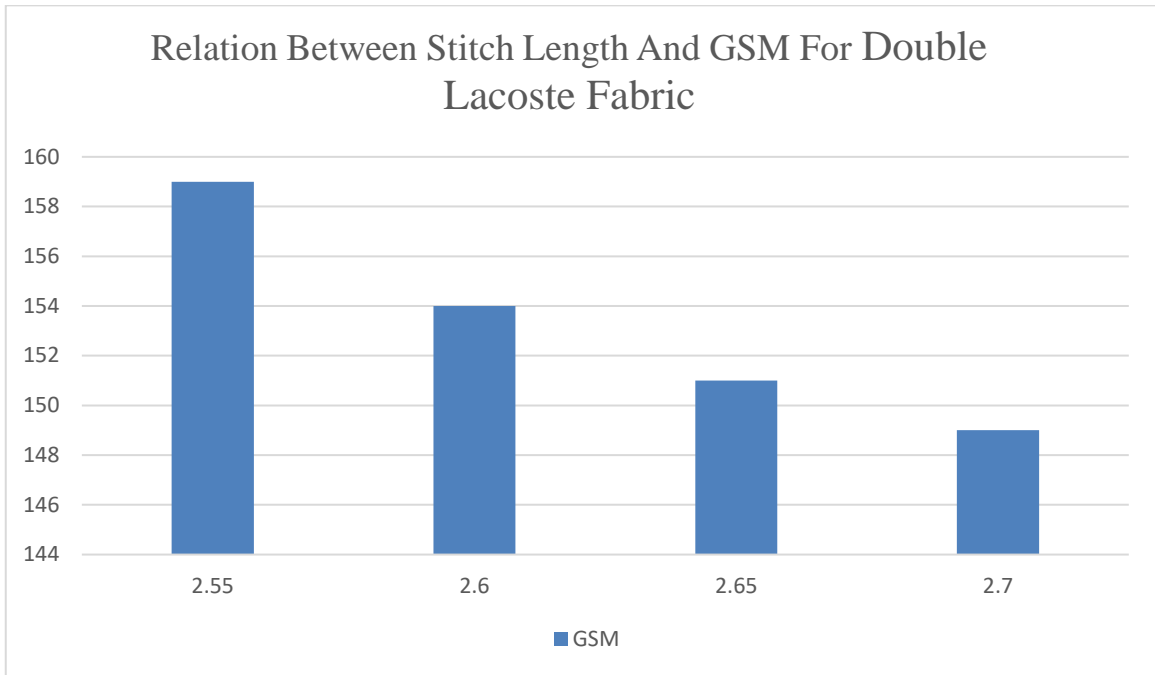


From Graph it describes the different stitch length produce different Gsm. For getting good result the testing had done multiple times. It is well to be known that SL has relation with Gsm the more SL have the less Gsm will be above that chart it shows when the SL goes higher the Gsm become lower.

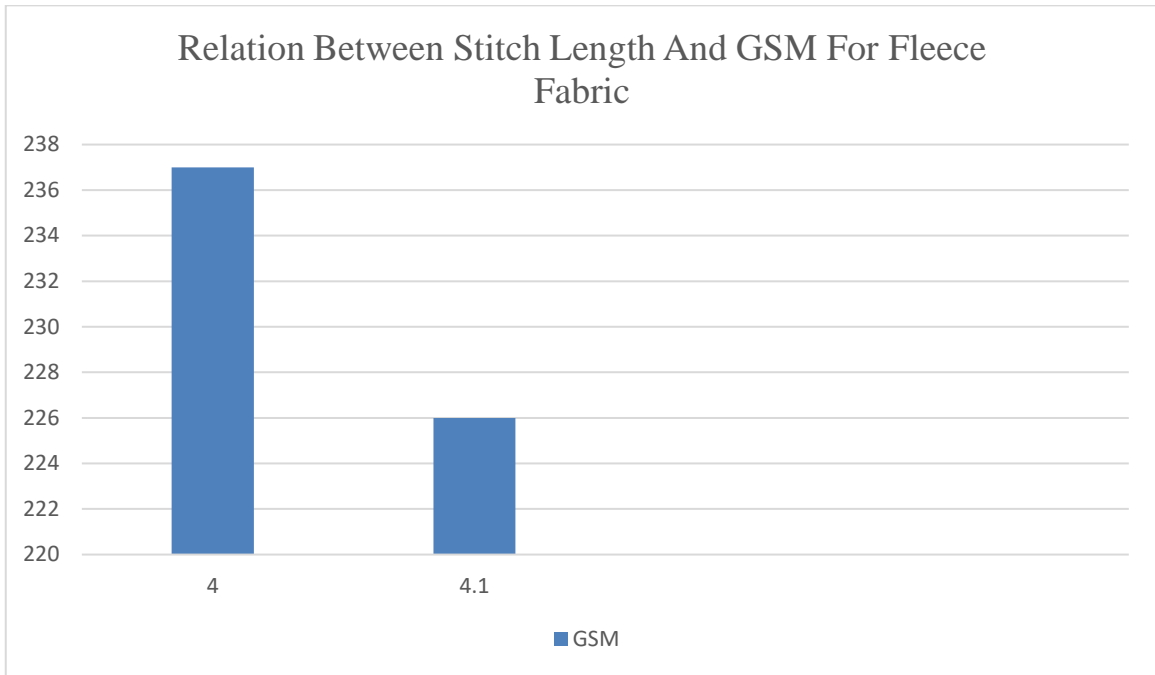
4.4 Relation Between Stitch Length And GSM For Terry Fabric



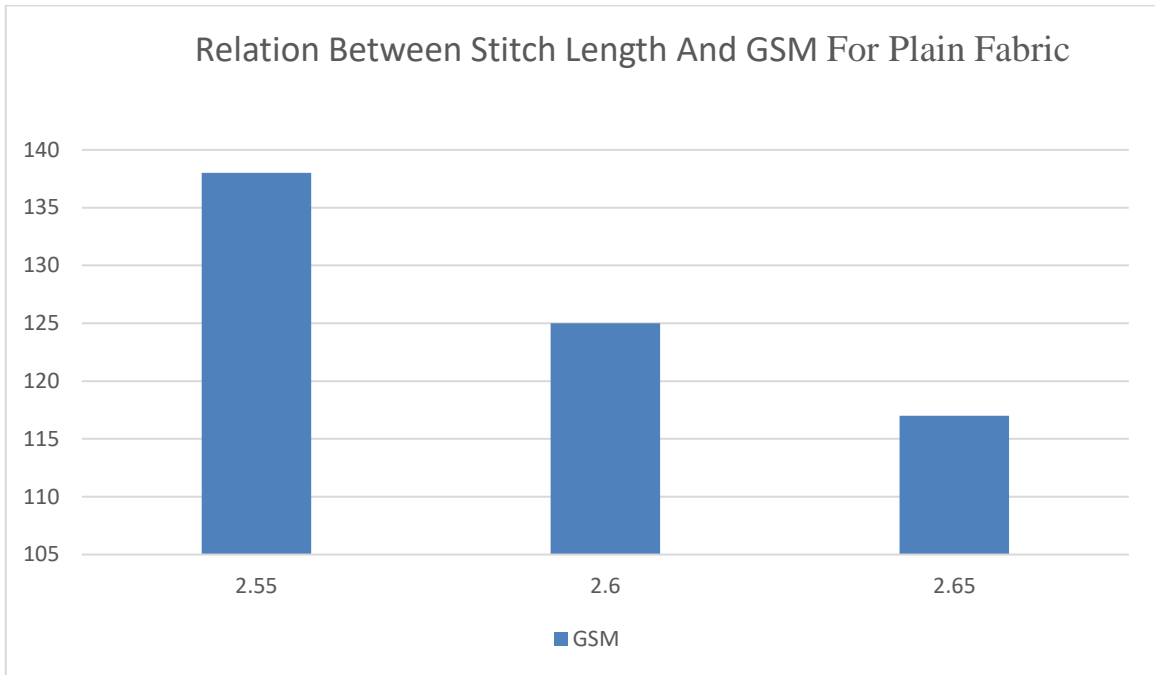
From Graph it shows about terry fabric stitch length relation with gsm beside it use different types of yarn count where one yarn for ground and other for pile. If the values are being average then the result will be higher stitch length will have less gsm



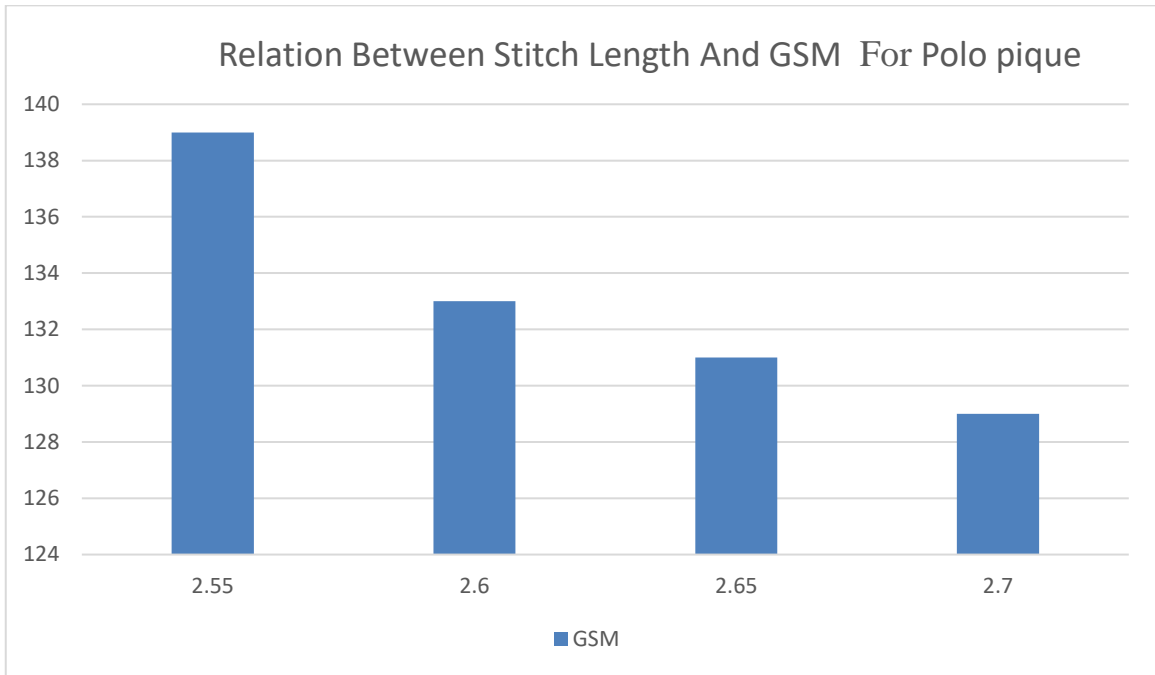
From Graph it shows double Lacoste fabric relation between stitch length and gsm where multiple data had been collected for better result. This chart also shows higher stitch length will decrease the gsm cause the loop length also increased. Double Lacoste fabric is double jersey where the design starts with tuck and knit loop.



From Graph we can see Fleece fabric which is another type of single jersey where the design is unique because in here it creates fabric by using three thread yarn where one for ground formation and others two is for creating and holding the fleece yarn. This chart also shows higher SL can decrease the gsm.



From Graph it shows relation between stitch length and gsm of plain fabric which is known as single jersey. In that case there some testing's are done which give an idea about that higher stitch length decrease the value of gsm because of higher feed rate which increase the loop length.



From Graph Polo pique which is another derivative of single jersey where knit and tuck stitch formation create. Above this chart shows multiple result for particular stitch length but the final result is higher stitch length will lower the gsm value because the feed rate of yarn will be higher and loop length which is stitch length will also increase gradually.

CHAPTER 05

CONCLUSION

Conclusion:

Above this topic we know many things like wpi, cpi, stitch length, commercial name etc. Beside knowing about different derivatives of single jersey was also new knowledge because it helps us to create a scenario that which single jersey are export from our country, on the other hand knowing costing calculation comes very handy. Process flow chart was another part of this topic which learn not only basic procedure but also machine parts which related to the process. So, at the end gaining new knowledge can move forward to new findings.

CHAPTER 05

REFERENCE

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