Faculty of Engineering

Department of Textile Engineering

Project Report on

STUDY OF THE EFFECTS OF STENTER MACHINE ON KNIT FABRICS PROPERTIES

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A Thesis submitted in partial fulfillment of the requirements for the degree of **Bachelor of Science in Textile Engineering**

Advance in Wet Processing Technology

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DCLARATION

We hereby declare that, this Thesis (project) has been done by us under supervision of **Sumon Mozumder, Assistant professor,** Department of Textile Engineering, Faculty of Engineering, Daffodil International University. We also declare that, neither this project nor any part this project has been submitted elsewhere for award of any degree or diploma.

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LETTER OF APPROVAL

This thesis (project) report prepared by **Mahabur Rahman,** bearing Id: **151-23-4221** and **Md. Nure Alam,** bearing Id: **151-23-4238**, is approved in partial in fulfillment of the requirement for the degree of **BACHELOR OF SCIENCE IN TEXTILE ENGINEERING.** The said students have completed their project work under my supervision. During the research period I found them sincere, hardworking and enthusiastic.

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Firstly, we express our gratefulness to almighty Allah for his divine blessing makes us possible to complete this Thesis (project) successfully.

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Finally, we would like to express a sense of gratitude to our beloved parents and friends for their mental support, strength and assistance throughout writing the Thesis (project) report.

We dedicate this report to our beloved parents & teachers

ABSTRACT

Stentering is the process of Stenter Machine that is use to finished the knit fabrics to control different parameters like diameter, GSM, shrinkage, spirility, shade of fabrics etc. this machine is very important for knit fabric finishing section. We work with this stenter machine for our research purpose. Here we include the definition of stenter machine, working procedure of stenter machine, specification of stenter machine, different parts name with picture, stentering process for dyeing fabrics and stentering process for undyed fabrics, we find out the changes of different parameters for this we takes different types of samples polyester single jersey, (1*1) Rib, Lycra single jersey, fleece, single jersey, waffle, cotton single jersey, single lacost etc.). The main purpose of this project is to evaluate the stentering performance on different types of knit fabrics on the basis of different GSM and different Diameter. This research mainly focused on changes of different parameters (CPI, WPI, SL, GSM, Shrinkage, and Diameter) of different knit fabrics after stentering process. The aim of this project is to measure GSM, CPI, WPI, SL, Diameter, and Shrinkage before stentering and after stentering and calculate the changes % of those parameters. After completing the research we found that the most changes of GSM on Lycra single jersey fabrics is 38.98%, and lowest changes of GSM on single jersey fabrics is 3.03%. The most CPI changes on Lycra single jersey fabrics is 36.98%, and the lowest changes on Fleece terry fabrics is 5.26%. The most changes of WPI on Lycra single jersey fabrics is 39.65%, and the lowest changes on Fleece terry fabrics is 5.88%. The most changes of SL on Lycra single jersey fabrics is 38.82%, and the lowest changes on Single jersey (160GSM) 3.53%. The most changes of Diameter on (1*1) Rib fabrics is 25.47%, and the lowest changes on polyester single jersey is 0.79%. The most changes Shrinkage is 5.81 on Waffle fabrics and lowest changes is 0.3 on single lacost. From this research we learn about how to find out changes of GSM, CPI, WPI, SL, diameter, Shrinkage % and control them.

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INTRODUCTION

CHAPTER-01

INTRODUCTION

1.1 Introduction

In knit fabric finishing section stenter machine is used for fabric stretching and stentering fabrics. Stenter machine is on kind of electrical machine. Stenter electrical machine is also called as stenter hook. Open compactor fabric is feed in the stenter machine. Generally cotton fabric shrinks for this shrinkage is controlled by over feed %. Stenter machine is very important to drying fabrics different kind of fabrics are dried by this machine like polyester, cotton, Lycra, CVC, PC blended dyed fabrics etc. To control the shrinkage of fabrics wet fabric is feed. Stretched the length of wet fabrics by a hooks system and there have a pin and grip system that grip the fabrics properly and control the fabrics diameter according to buyer requirement and retain the fabrics shape exactly. In this machine there have total seven chambers every chamber have included with heater, ducts, and fans. Fabrics are passes through the upper and lower ducts, heater is supplies through holes the high temperature and fan supply air to spread the heat everywhere equally. There have fan which discharges the injected air after passing by the fabrics. There have a lot of problem a stenter machine like waste heat recovery, hot air circulation in the chamber and over feeding from the feed roller by controlling an electronic controller and a narration controller.

The performance of stenter machine is depend on thus tree system. We can save energy by use developing options in stenter machine. One of the most important thing of stenter machine is the air injection system through ducts. We should maintain the ducts and nozzles size, and shape numerically and experimentally to correct the air injection and angle of the air injection. The fabrics drying process is analyzed by a porous medium system which partial deferential equation is described through time depended heat and mass transfer. The injection ducts system is made accurately to get uniform flow across the injecting holes. Mainly the evaluation system of stenter machine is based on the mass flow rate, velocity, and pressure used. If we use the developed ducts system we will get more uniform mass flow rates and air injecting holes than traditional system.

1.2 Objectives

The **broad objective** of this Thesis (project) to study of the effects of stenter machine on knit fabrics properties.

The **specific objectives** are-

- To know how to control the shrinkage of the fabrics and calculate the changes percentages.
- To know how to control the stitch length (SL) of fabrics and calculate the changes percentage.
- To know how to control fabric GSM and find out the changes percentages.
- To know how to control diameter of fabrics and find out the changes percentages.
- To know how to control fabrics WPI, CPI and find out their changes percentages.

CHAPTER- 02

LITERATURE REVIEW

CHAPTER- 02
LITERATURE REVIEW

2.1 Stenter machine:

Stenter is an electrical machine or apparatus that is used to fabric stretching or stentering. The main purpose of stenter machine is control diameter, GSM, Spirality, Shrinkage, fabric shade according to buyer requirement by using finishing chemicals and also maintain the dimensional stability of fabrics and recover the uniform width [1].

2.2 History of stenter Machine:

Stenter machine is very important for fabric finishing section it's also called tenter, and referred to as the stenter frame, in USA only used frame. The main function of stenter machine is to stretch the fabric and some stennters are obedient to this purpose only but majority percent of stenter machine used to stretch and dry the fabrics.

The traditional stenter was like a fixed hand frame, which was made of two parallel rails that was mounted with rows of pin to grip the fabric. When the fabric impinged on the pin manually then the rails started to move apart by cross rail. For this reason the fabric dried in the stretched state, and delivered crease free fabric and control the dimension of fabric when release. For finished lace and net fabric this system still used where of 400 inches may be uncounted. The crepe georgette fabric also dried sometimes in the hand frame which control the fabric length as well as width. The hand frames are keep in a warm room and a gentle current air is provided by large spray over frame. Sometimes narrower hand frame is arranged in tier.

The first continuous stenter machine was include with multilayer drying process, and this type continuous in the wool and worsted trade. In 1854 first stenter machine was invented by Whiteley of Huddersfield, for cotton, silk, and rayon the single layer stenter machine is used [2].

2.3 Specification of stenter machine [9].

Table. 2.3.1 Specification of Stenter Machine

Brand name	EHWHA
Company name	Dangjinsi Chungcheongnambo
Serial no	72276-0513
Origin	South Korea
Manufacturing year	2010
Temperature range	110-200 0C
Production capacity	6 ton/day
Speed range	15-40 m/min
Use utility	Gas, Electricity, steam, compress air
Maximum fabric width	103”
No. of chamber	7
Steam pressure	3 bar
Minimum fabric width	44”
Air pressure	10 bar
No. of burner	14
Applied for	Open tube fabric
Extra attachment	There have no extra attachment
M/C parts	Feed roller, Over feed roller, spirility control roller, chain arrangement, Burner, Nozzle, exhaust air fan, suction fan, and delivery roller.

2.4 Working procedure of stenter machine

The fabric is collected from batch section in case of before dyeing stentering and collected from dyeing section for after dyeing stentering. Then feed the fabric in feeding zone by feed roller for uniform feed and set the temperature and speed on monitor according to fabric construction to control dry process. Then fabric passed through over feed roller to control fabric GSM. To control spirility fabric passed on the angle roller. After crossed feeding zone fabric is passed through chain arrangement there have pin and hook to grip the fabric properly to maintain the fabric diameter, and dimention. Then the fabric passed through high temperature chamber that is include with gas burner, air flow fan, and exhaust fan in this section fabric dry and shade control by temperature. Then fabric goes through the delivery zone and delivered by delivery roller. For Lycra, TC, and CVC fabric need to heat set around 180-200 0C [10].

2.5 Different parts and zone of stenter machine

- **Fabric feeding:** Fabric feeding zone is used to feed the fabric uniformly and accurately by feed roller.

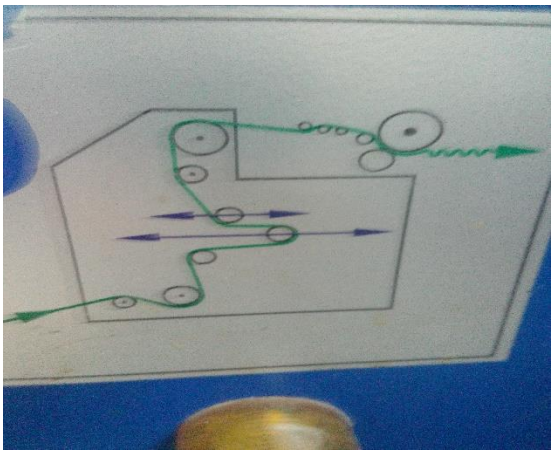


Figure. 2.5.1 Fabric feeding zone

- **Feed roller:** This roller feed the fabric into machine from batch section or dyeing section.

Figure. 2.5.2 Feed roller

- **Centering roller:** This roller helps the fabric forward to front side.
- **Spandel Roller:** Helps to fabric spreading.
- **Webster controller:** its helps loose fabric to completely ready.
- **Dia programmer:** This program consist of two sensor, sensor detect the fabric hole and helps to hold the fabric according to required diameter. By this device fabric diameter can be control.
- **Padder:** This section is consist of squeezing mangle, guide roller and chemicals. Fabrics immerse into the finished chemicals through guide roller then send to squeezing mangle. In this time finished chemicals are applied on the fabric surface and squeeze for out of extra chemicals.

Figure. 2.5.3 Padding roller

- **Softener tank:** In this tank softener is mixed with water for apply on fabric surface.

Figure. 2.5.4 Softener tank

- **Chain arrangement:** This is a mechanical application by this arrangement fabric shrinkage & width can be control. There have pin and clip to grip fabric automatically.

Figure. 2.5.5 Chain arrangement

- **Under feed:** When fabric width is lower than buyer requirement need to set under feed. It is called stretching by this fabric width can be increase.
- **Over feed roller:** GSM can be controlled by this over feed roller if fabric width is higher it need to decrease width, increase GSM by over feed. If fabric width is lower, need to increase fabric width, decrease GSM by decrease over feed%.

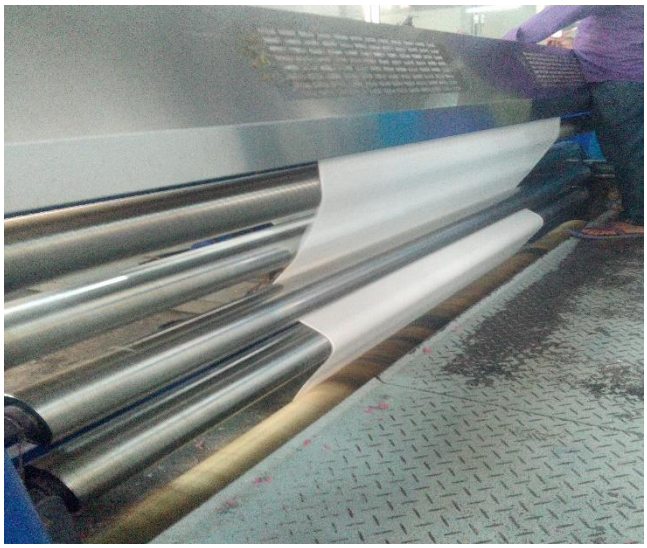


Figure. 2.5.6 over feed zone

- **Blower:** It helps to dry the fabric and supply air flow. This arrangement remove dust produce during brushing.
- **Burner:** In this section there have fourteen burner that produce heat to dry the fabric and control the fabric shade. Normally fabric running temperature remain 120-150 0C and heat setting temperature remain 180- 220 0C.
- **Exhaust system:** This system helps to exhaust moist and contaminated air.
- **Operating monitor:** Here set the all program, parameters and control the machine.
- **Angle roller:** helps to fabric strait down.
- **Delivery roller:** This roller delivered the finished fabric consist of several roller that resist to crease mark on the fabric.

Figure. 2.5.7 Delivery roller

- **Motor:** Motor is supply the all revolution force.

Figure. 2.5.8 Motor

2.6 What is stentering:

Stentering is a finishing process that is done by Stenter machine to control fabrics GSM, Diameter, Shrinkage, Spirality, Shade of fabrics etc. In this process as a finishing agents tree types of softener are used one is anionic softerner number two cationic softener and other is non-anionic softener. Sometimes only water are used for white for printed fabrics [8].

2.7 Objectives

The specific objectives of this project are:

- To calculate the before and after diameter and their changes.
- To calculate the before and after GSM of fabrics and their changes.
- To calculate the before and after SL of fabrics and their changes.
- To calculate the before and after shrinkage and their changes.
- T count the before CPI and after CPI and find out changes.
- To count the before WPI and after WPI and their changes.

2.8 Process of Stentering

There have two process of stentering

1. Dyed fabrics stentering process
2. Before dyeing fabrics stentering process

2.8.1 Dyed fabrics stentering process

Dyed fabrics stentering process is done by use of different kinds of softener, water and sometimes without water and softener according to fabrics structure. The process is below

Collected fabrics from dyeing section

Fabrics feed in the feed roller

Softener bath (anionic, cationic, and non-anionic softener used)

Paddler pressure (2-5kg)

Guide Roller

Under feed Roller

Guide Roller angle

Slander Roller

Over feed Roller

Selvedge spreader

Fixed wheel

Chain arrangement

Seven chamber

Delivery

2.8.2 Before Dyeing stentering process

Generally Lycra, CVC, fabrics need to heat set for retain their dimensional stability. So before dying process its need to heat set and there have no use softener sometimes water. In this process remain temperature normally 180- 200 0C.

Collect fabrics from batch section

No softener and water used (except buyer requirement)

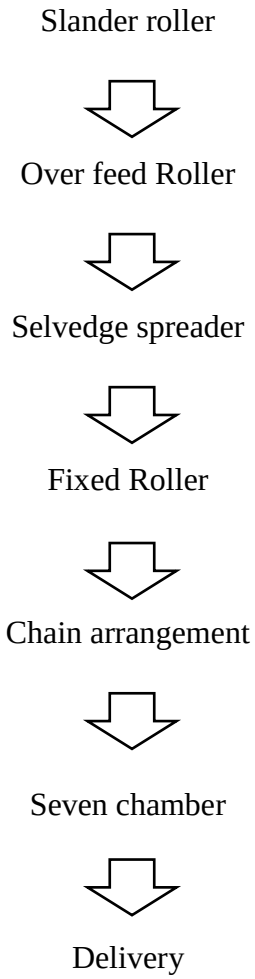
Heat setting (180-200 0C)

Paddler roller pressure (2-5kg)

Guide Roller

Under feed Roller

Guide Roller angle



2.9 What is softener & softening

Softener is one kind of finishing substrates which use to increase the softness of fabrics and increase the hand feel and also increase the fabric strength and fabric quality and softening is a process by which softener is applied on fabric surface through this process a thin layer is made on the fabric surface that increase the fabrics quality like make smooth fabrics, better hand feel, increase GSM, increase fabrics strength, give good shade etc. [3].

2.10 Different types of Softener

There have different types of softener are:

1. Anionic softener
2. Cationic softener
3. Non-ionic softener
4. Reactive softener
5. Amphoteric softener
6. Silicon based softener

But among those tree types of softener are used in **South West Composite Ltd.** for stentering process [7].

1. Anionic softener
2. Cationic softener
3. Silicon based softener

1. Anionic softener:

Anionic softener is negatively charged and hydrophilic group. They are act as a lubricating softening agents and produce fabric a full hand. In hard water and acid environment they are unstable. From fatty acid condensation we can produced anionic softener [4].

2. Cationic softener:

The cationic softener is basically quaternary ammonium salts, amino amides, and amino-esters. We can use this softener for all types of fabrics with exhaustion process in acid environment (pH 4-4.5). Cationic softener create bonds with the cationic group on fabric surface with negative electric potential. In presence of large anion they create some problems and can change the dye tone or reduction fastness to light if we dyed fabric with direct and reactive dye [5].

3. Silicon based softener:

This is low molecular weight and water insoluble for this reason it should apply on the fabric surface after dissolution in organic solvents or in the form of disperse products. They create a layer on the fabric surface and act as a moderate waterproof and lubricating [6].

CHAPTER- 03

METHODOLOGY

CHAPTER- 03

METHODOLOGY

3.1 Materials:

To complete this research we taken ten types of fabric in different GSM, we use counting class to count CPI, WPI, we use sodium perborate and detergent to test wash fastness and we used the South Korean EHWHA brand stenter machine that was include with seven chamber.

Table. 3.1.1 Specification of EHWHA stenter machine that we were used in our research

Brand name	EHWHA
Company name	Dangjinsi Chungcheongnambo
Origin	South Korea
Serial No.	72276-0513
Manufacture year	2010
Capacity	6 ton/day
Temperature range	110-200 0C
Speed range	15-40 m/min
Maximum fabric width	103”
Minimum fabric width	44”
Use utility	Gas, Electricity, Steam, Compress air
No. of chamber	7
Steam pressure	3 kg
Air pressure	10 bar
Application for	Open fabrics
No. of burner	14
Extra attachment	There have no extra arrangement
M/C parts	Feed roller, over feed roller, spirility control roller, chain arrangement, burner, nozzle, exhaust air fan, motor, chamber, delivery roller.

3.1.2 Different parts name of stenter machine that used in this research

- **Fabrics feeding Zone:** Fabrics feeding zone is used to feed the fabrics uniformly and accurately by use feed roller.

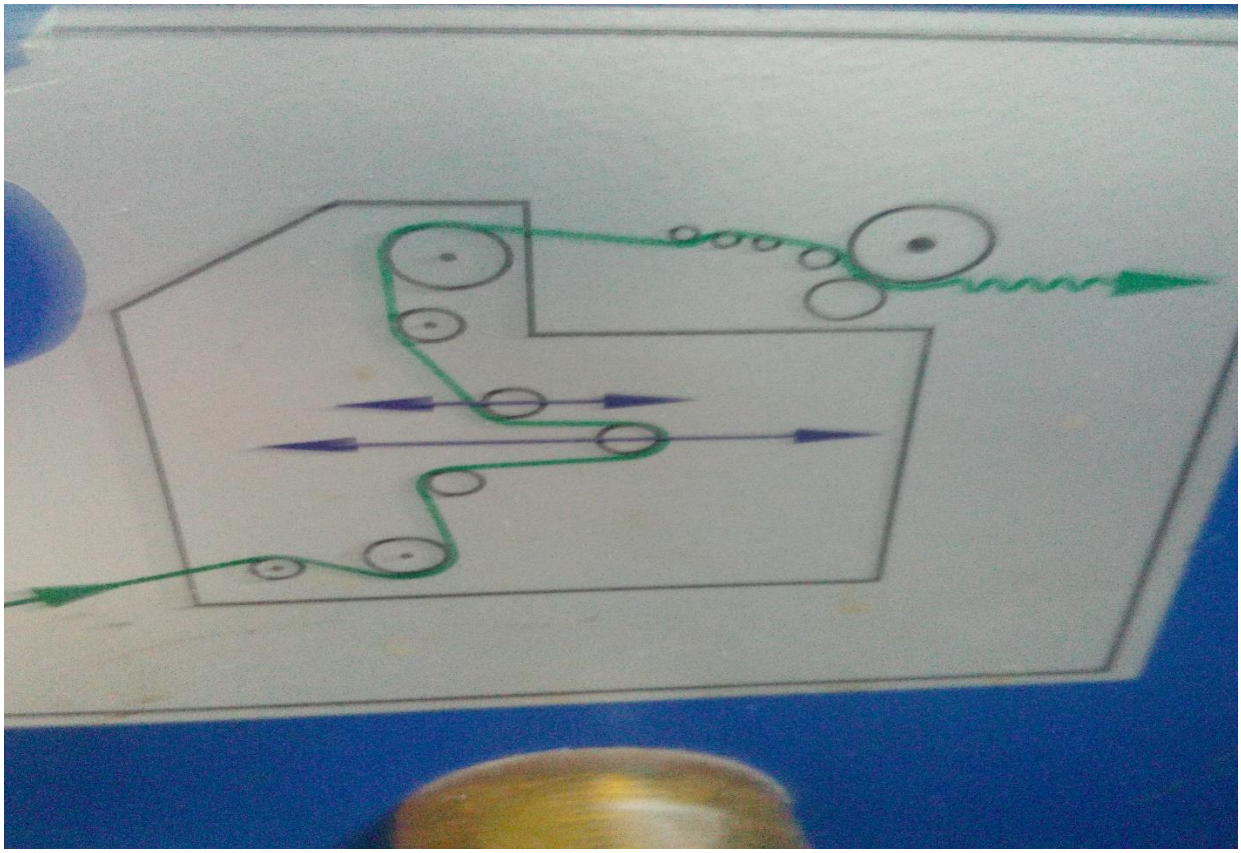


Figure. 3.2.1 Fabrics feed zone

- **Feed roller:** Feed roller feed the fabrics into the machine from batch section or dyeing section.

Figure. 3.2.2 Feed roller

- **Padder roller:** This section include with squeezing mangle, guide roller and chemicals. Fabrics immerse into the finished chemicals through guide roller then send to squeezing mangle. In this time finished chemicals are applied on the fabrics surface and squeeze for out of extra chemicals.

Figure. 3.2.3 Padding Roller

- **Softener tank:** In this tank softener is mixed with water for apply on the fabrics surface.

Figure. 3.2.4 Softener tank

- **Chain arrangement:** This is the mechanical application by this arrangement fabric shrinkage & width can be control there have pin and clip to grip fabrics automatically.

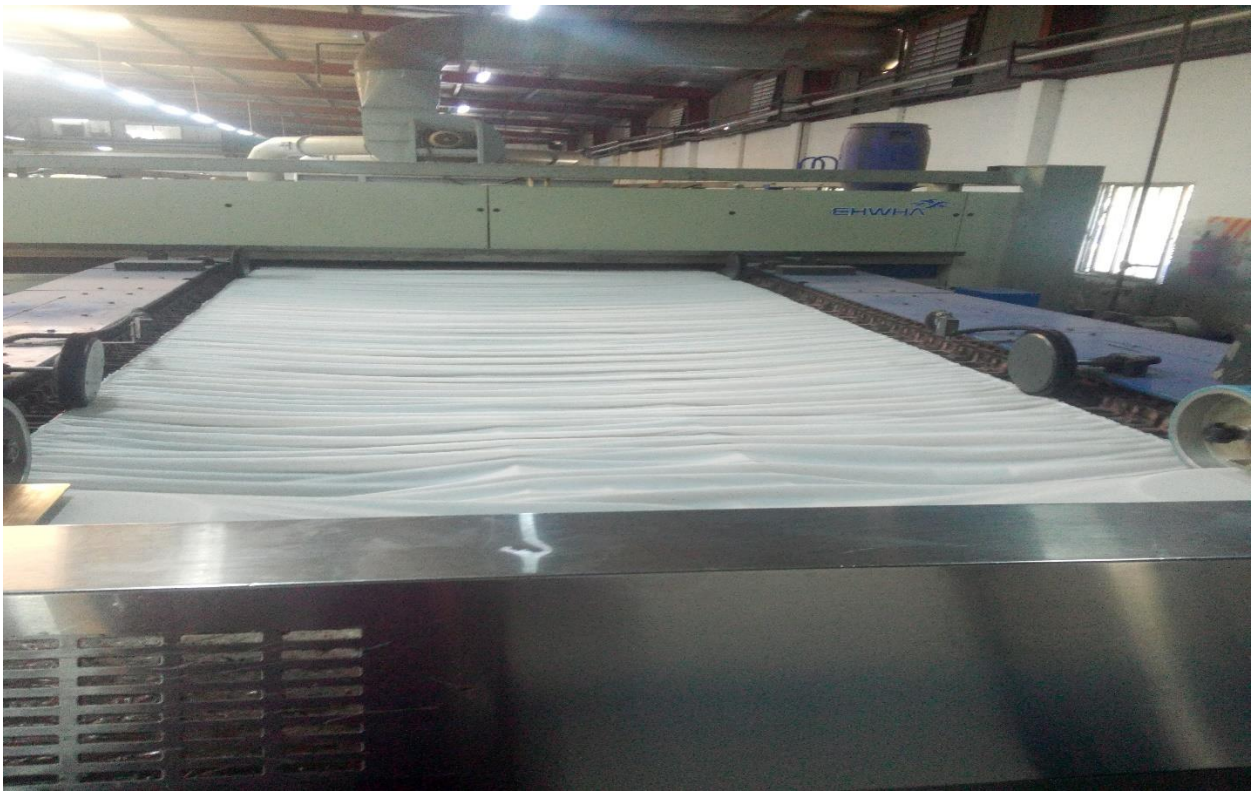


Figure. 3.2.5 Chain arrangement

- **Over feed roller:** GSM can be controlled by this overfeed system. If fabric width is higher it need to decrease width by increase GSM through increase over feed percentage. If fabrics width is lower need to decrease fabrics width by decrease overfeed percentage.

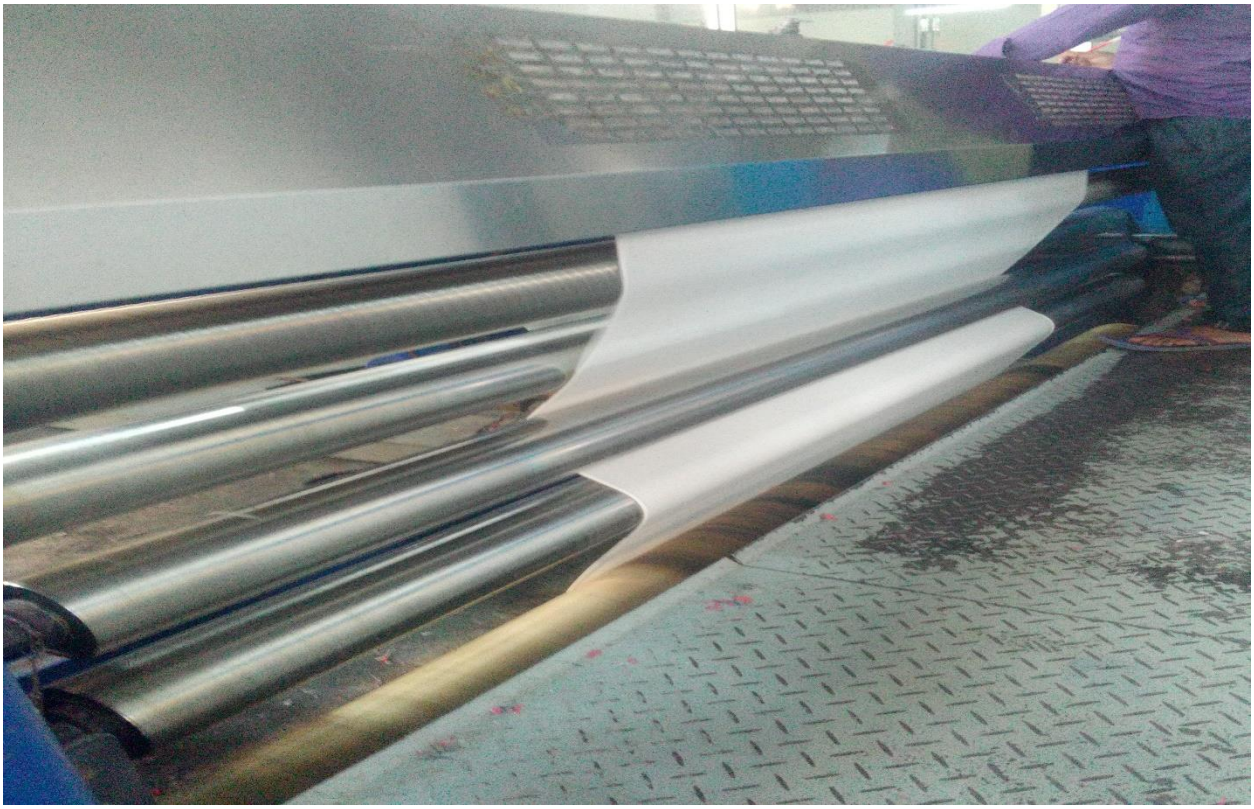


Figure. 3.2.6 Overfeed roller

- **Chamber:** Fabrics dry out in this chamber.

Figure. 3.2.7 Chamber

- **Delivery roller:** This roller delivered the finished fabrics consist of several roller that resist to crease mark on the fabrics.

Figure. 3.2.8 Delivery roller

3.1.3 Sample specification: We takes ten knit fabrics in different structure from before feed into the stenter machine.

1. Polyester single jersey:

- GSM: 165
- Diameter: 63”
- CPI: 71
- WPI: 38
- SL: 2.5 mm

2. 1*1 Rib:

- GSM: 303
- Diameter: 53”
- CPI: 56

- WPI: 41
- SL: 2.62 mm

3. Lycra single jersey:

- GSM: 192
- Diameter: 68”
- CPI: 65
- WPI: 43
- SL: 2.31 mm

4. Fleece terry:

- GSM: 240
- Diameter: 65”
- CPI:55
- WPI:34
- SL:2.5

5. Single jersey:

- GSM: 165
- Diameter: 64”
- CPI: 57
- WPI: 40
- SL: 1.7 mm

6. Waffle:

- GSM: 182
- Diameter: 70”
- CPI: 47
- WPI: 29
- SL: 2.66 mm

7. Single jersey:

- GSM: 170
- Diameter: 72”
- CPI: 57
- WPI:39
- SL: 1.25 mm

8. Single lacost:

- GSM: 180

- Diameter: 64”
- CPI: 54
- WPI: 32
- SL: 1.67 mm

9. Single jersey:

- GSM: 135
- Diameter: 72”
- CPI: 52
- WPI: 39
- SL: 2.8 mm

10. Lycra single jersey:

- GSM: 290
- Diameter: 70”
- CPI: 73
- WPI: 58
- SL: 2.73 mm

Table 3.1.4. Sample running condition

SL NO.	Fabric types	Temperature (0C)	M/C Speed (m/min)	Overfeed %
1	Polyester single jersey	110	22	2
2	(1*1) Rib	140	17	55
3	Lycra single jersey	135	20	60
4	Fleece terry	140	15	70
5	Single jersey	120	20	50
6	Waffle	140	19	70
7	Single jersey	130	24	25
8	Single lacost	140	18	70
9	Single jersey 100% cotton	130	27	70
10	Lycra single jersey	195	10	35

3.1.5 Chemicals used:

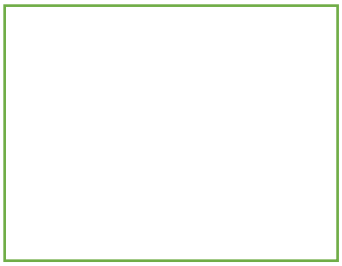
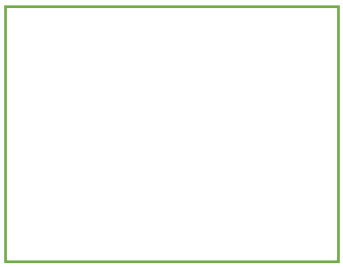
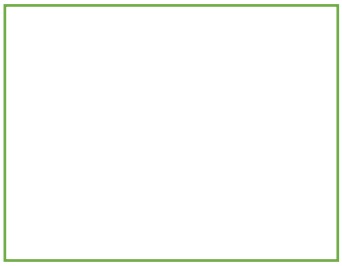
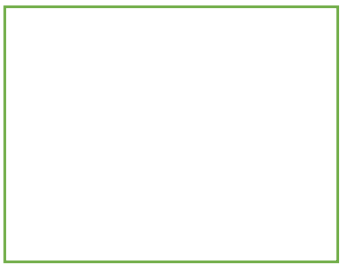
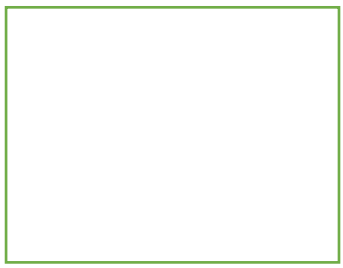
- Sodium perborate
- Detergent.
- Softener

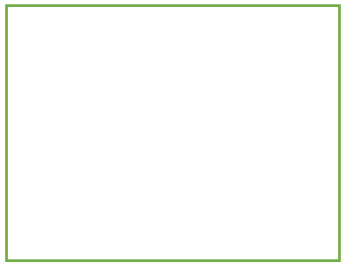
3.2 Methods:

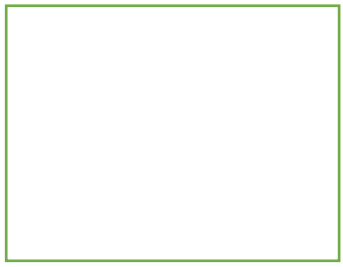
At first we takes the ten knit fabric sample before stentering and after stentering. Then we cut the GSM before stenter sample and after stenter weight the sample and find out the before stentering GSM and after stentering GSM then we calculate the changes of GSM. We are counted the CPI, WPI of both before stentering and after stentering by a counting class then calculate the changes. We wash the before and after stentering sample by sodium perborate and detergent and then find out SL, Shrinkages, and diameter changes before and after stentering.

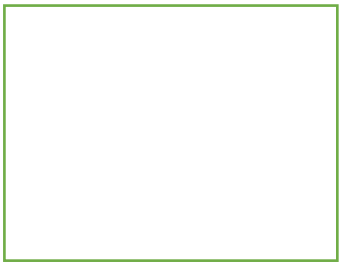
1. To find out fabrics GSM first we takes sample then two fabric sample cut by GSM cutter then take weight and average the value and multiple by 100
2. **Fabric GSM = Average the weight of cutting fabric * 100**
3. To find out the fabrics diameter we use a measuring tape. To find out the fabric SL length first we takes ten wales length then divided by 10
4. **Fabrics Stitch Length = measured length of ten wales / total no. of wales (10)**
5. To find out the fabrics CPI, WPI we used counting glass by counting glass we count WPI and CPI.
6. To find out the fabrics Shrinkage % first we take before wash fabrics length and after wash fabrics length
7. **Fabrics shrinkage % = (Length before wash sample – Length after wash sample) * 100 / Length before sample**

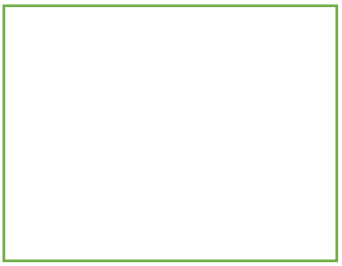
3.3 Sample attachment

Sample before stentering	Sample after stentering
	
	
	
	









CHAPTER-4

DISCUSSION AND RESULT

CHAPTER- 04
RESULT AND DISCUSSION

4.1 Effects of stentering on GSM (gram per square meter) of different knit fabrics.

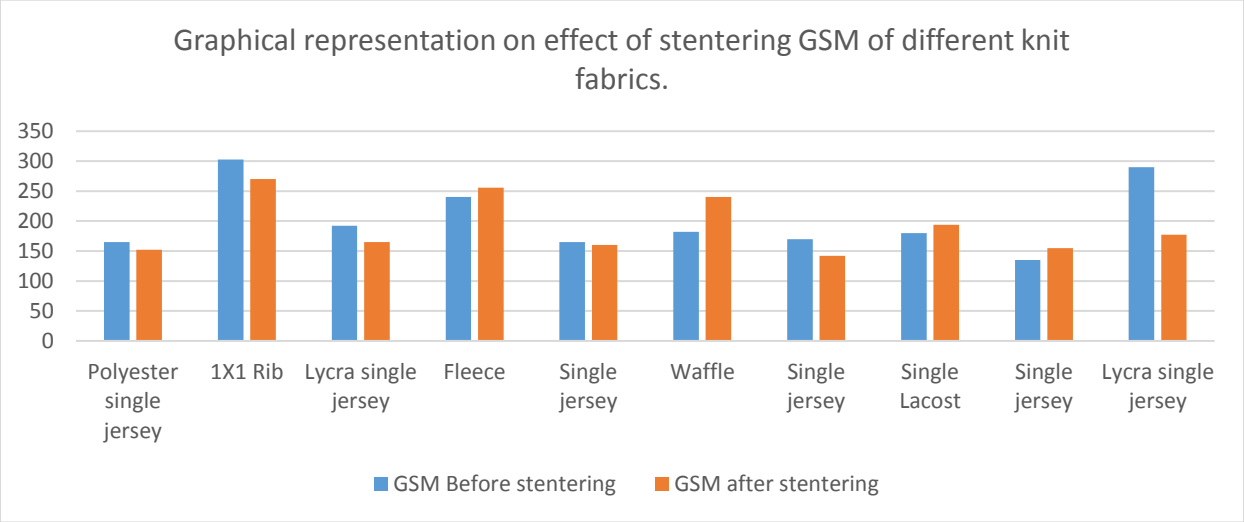


Figure. 4.1 change of different knit fabrics GSM after stentering

In column diagram we can see that change in GSM of different knit fabrics. In the column diagram different knit fabrics sample takes along with X axis and change in GSM of those fabric takes along Y axis direction. From the graph we can see that GSM of polyester single jersey fabric decrease the decease percentage is 7.87%, 1*1Rib fabric decrease the decease percentage is 10.89%, Lycra single jersey fabric decrease the decrease percentage is 14.06%, Fleece terry fabric increased the increase percentage is 6.67%, single jersey cotton fabric decease the decrease percentage is 3.30%, waffle fabric increase the increase percentage is 34.06%, Single jersey decrease the decrease percentage is 18.82%, single lacost increase the increased percentage is 7.77%, lycra single jersey decrease the decrease percentage is 38.96% most of the fabrics GSM decrease because when before stentering process there have many dirt like after enzyme finishing process lot of hairy fiber adhere on the fabric surface for this before GSM is large than after GSM. When fabrics passed through the stentering process excessive dirt dust removes and and stretched the fabrics for this decrease the fabrics GSM.

4.2 Effects of stentering on CPI (course per inch) of different knit fabrics.

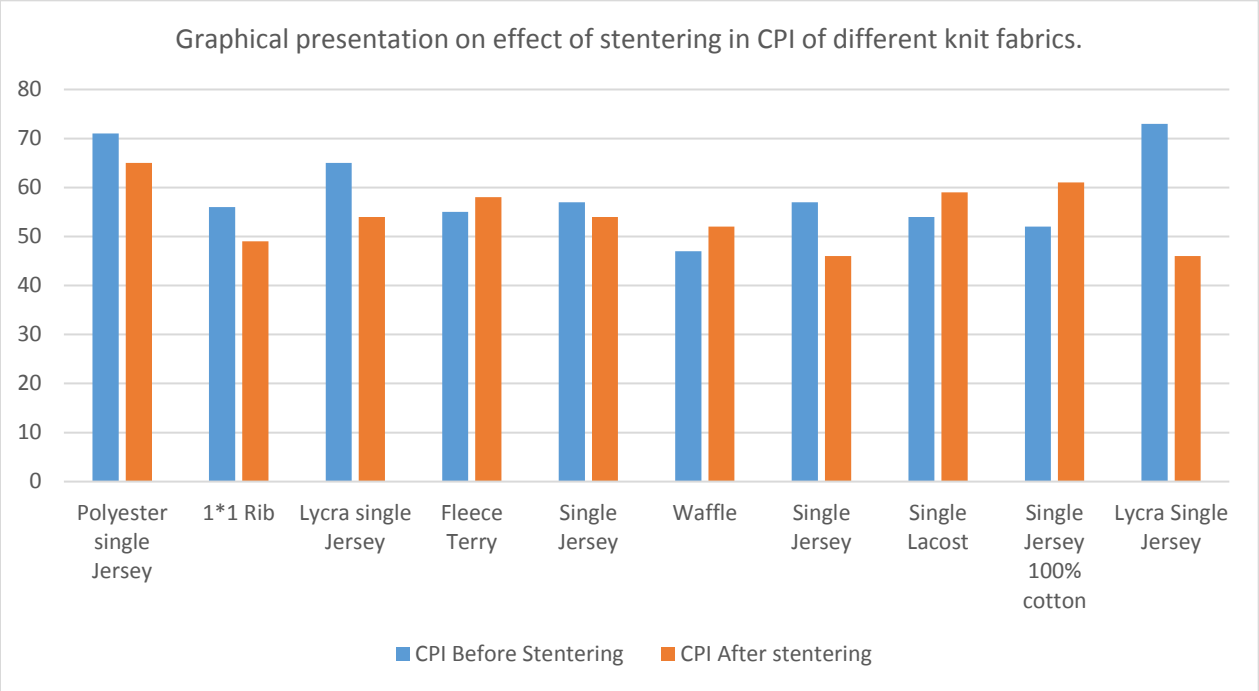


Figure. 4.2 change of different knit fabrics CPI

In this column diagram we can see that change in CPI of different knit fabrics because of stentering. In this column diagram different knit fabrics are taken along with X-axis and the CPI before stentering, afterstentring is taken along with Y-axis. We takes the ten different knit fabrics sample from before stentering and after stentering to understand the effects of stentering process. We can see from the graph that the polyester single jersey fabrics CPI decrease 8.45%, (1*1) Rib decrease 12.5%, Lycra single jersey decrease 16.92%, Fleece terry increase 5.26%, Single jersey cotton decrease 5.26%, waffle increase 10.63%, single jersey decrease 19.29%, single lacost increase 9.25%, single jersey increase 17.30%, Lycra single jersey decrease 36.98% after completing stentering process because more over feed if we set more over feed % then the fabrics GSM increase and CPI also increased after stentering, and some of fabrics CPI decrease because of stretching fabrics if we stretch the fabrics then the fabrics GSM decrease and CPI also decrease.

4.3 Effects of stentering on WPI (course per inch) of different knit fabrics.

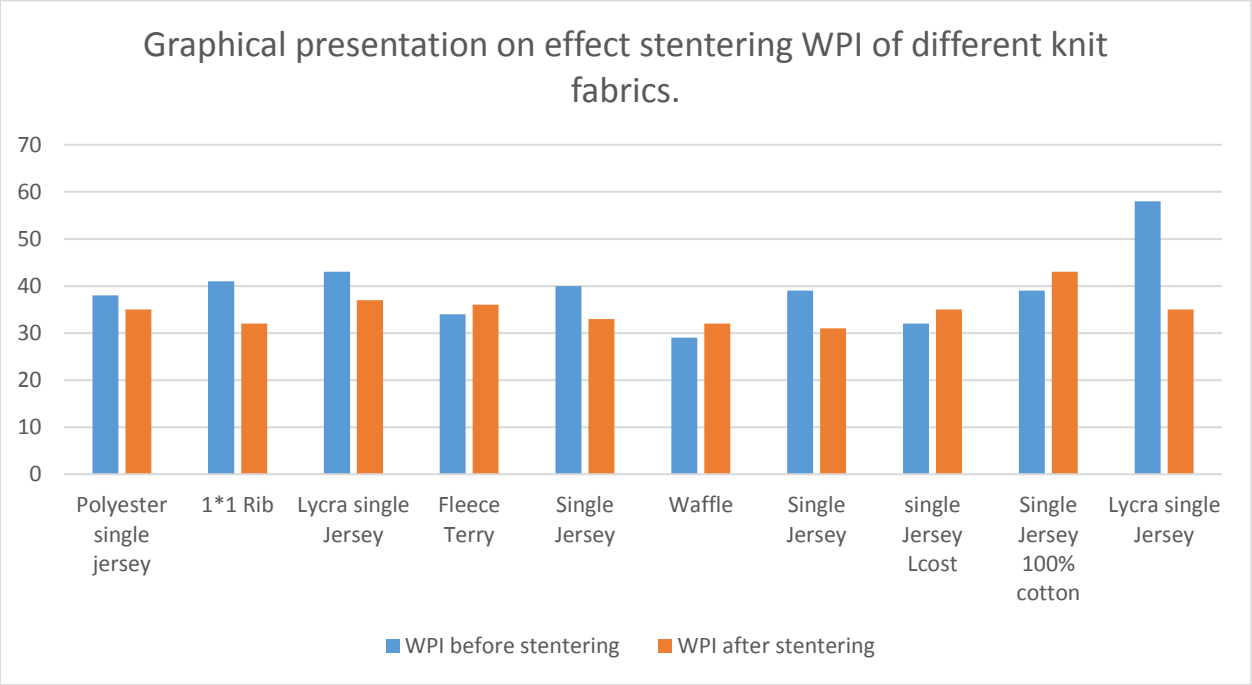


Figure. 4.3 Change of WPI after stentering process in different knit fabrics

In this column diagram we can see that the WPI changes of different knit fabrics for stentering effects we takes ten different knit fabrics sample to understands the changes their WPI. Here different knit fabrics before stentring and after stentering sample taken along to X-axis and their WPI is taken along to Y-axis. At first we takes the before stentering sample then we treated the fabric sample by stenter machine and collect the finished fabrics sample. Then we count the WPI by use counting glass. From this graph we can see that the polyester single jersey fabrics WPI decrease 7.79%, (1*1) Rib decrease 21.95%, Lycra single jersey decrease 13.95%, Fleece terry increase 5.88%, single jersey cotton decrease 17.5%, waffle increase 10.34%, single jersey decrease 20.51%, single lacost increase 9.37%, single jersey increase 10.25%, Lycra single jersey decrease 39.65%, after stentering process. After finished the fabric for stretching when we stretch the fabrics GSM is decreased and WPI also decrease, And some fabrics WPI increased for over feed % when we increase over feed % GSM is increased and WPI also increased.

4.4 Effects of stentering on SL (stitch length) of different knit fabrics.

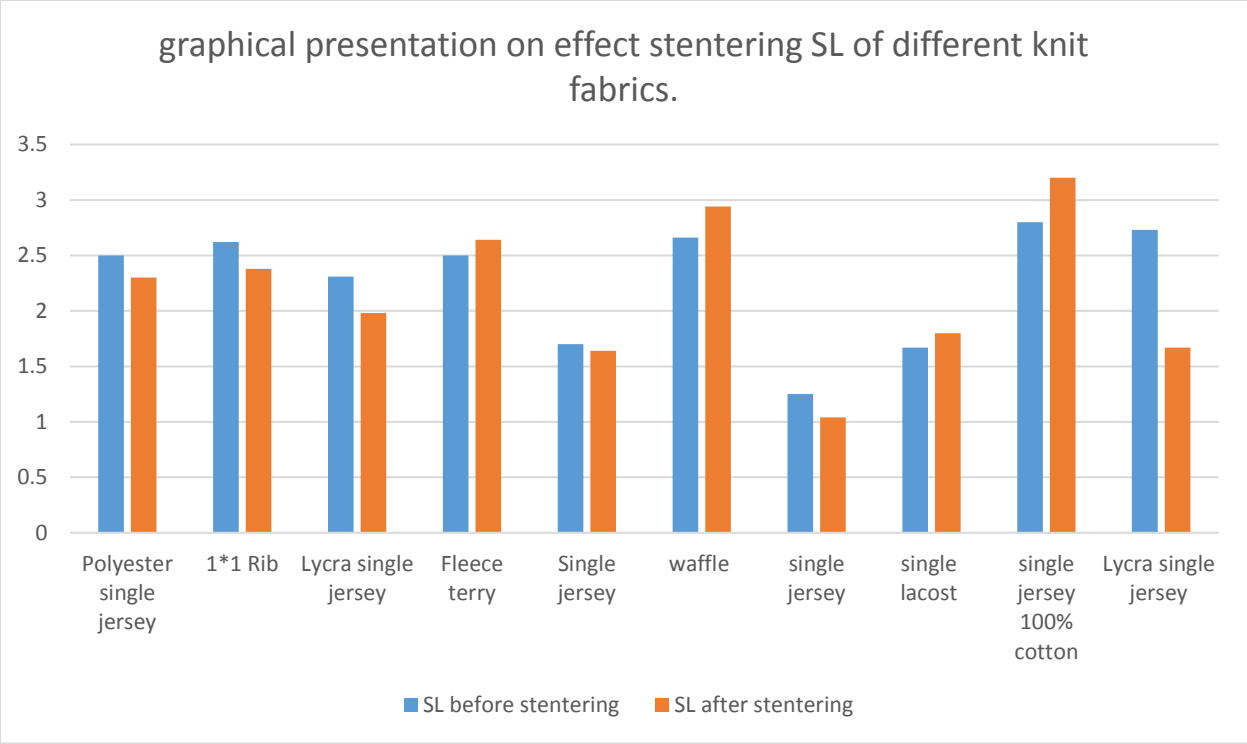


Figure. 4.4 Changes of SL after stentering process in different knit fabrics

In this column diagram we can see that the changes of SL of different knit fabrics because of stentering effects. Here we takes ten type of different knit fabrics sample before stenter and after stenter to understand the changes of SL. We were taken ten type of different knit fabrics sample before stenter and after stenter along to X-axis and their SL is taken along to Y-axis. Here we see that polyester single jersey fabrics SL decrease 8%, (1*1) Rib decrease 9.16%, Lycra single jersey decrease 14.28%, Fleece terry increase 5.56%, single jersey decrease 3.53%, waffle increase 10.52%, single jersey decrease 16.8%, single lacost increase 11.37%, single jersey increase 14.28%, Lycra single jersey decrease 38.82%, after stentering process. In finished fabrics from unfinished fabrics, because unfinished fabrics contains wax, oil, dirt, and dust this impurities is removed by finished fabrics by stenter machine and then knit fabrics loop fill up the gap where oil, wax, dust, and dirt situated so this stage SL is decreased. But we can also see that some fabrics SL is increased after stentering process because of fabrics stretching by stenter machine when we stretch the fabrics by stenter the fabrics loop increase and some gap created then fabrics SL increased.

4.5 Effects of stentering on diameter of different knit fabrics.

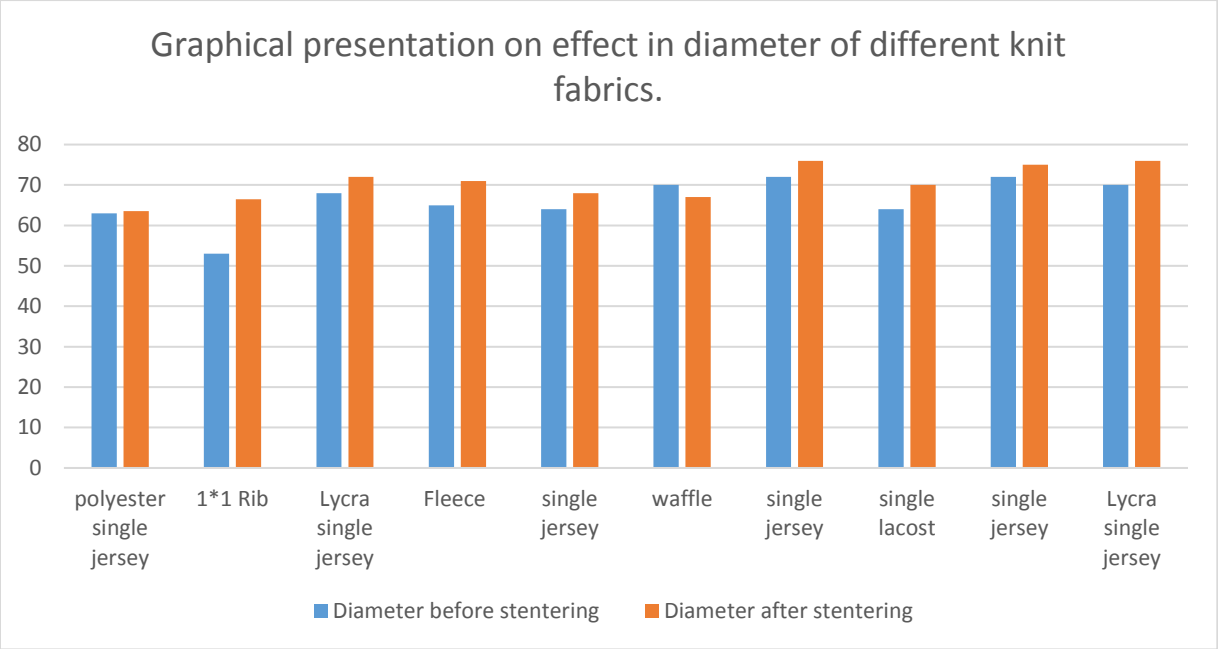


Figure. 4.5 changes of diameter in different knit fabrics after stentering

From this graphical diagram we can see that the diameter changes of different knit fabrics after stentering process. Here we takes ten kinds of different knit fabrics before stentering process and after stentering process to understand the changes of diameter. We takes ten different knit fabrics samples along to X-axis and takes their diameter along to Y-axis. From this graph we can see that polyester single jersey fabrics diameter is increased 0.79%, (1*1) Rib increase 25.47%, Lycra single jersey increase 5.88%, Fleece terry increase 9.23%, single jersey increase 6.25%, waffle decrease 4.48%, single jersey increase 5.5%, single lacost decrease 9.37%, single jersey increase 4.16%, Lycra single jersey increase 8.57% after stentering process, because diameter of fabrics is maintained according to buyer requirement by stretching fabrics. When fabrics is remain unfinished situation generally remain squeeze position for this fabric diameter is remain less but when fabrics is stretching by stenter machine fabrics diameter is increased.

4.6 Effects of stentering on shrinkage% of different knit fabrics.

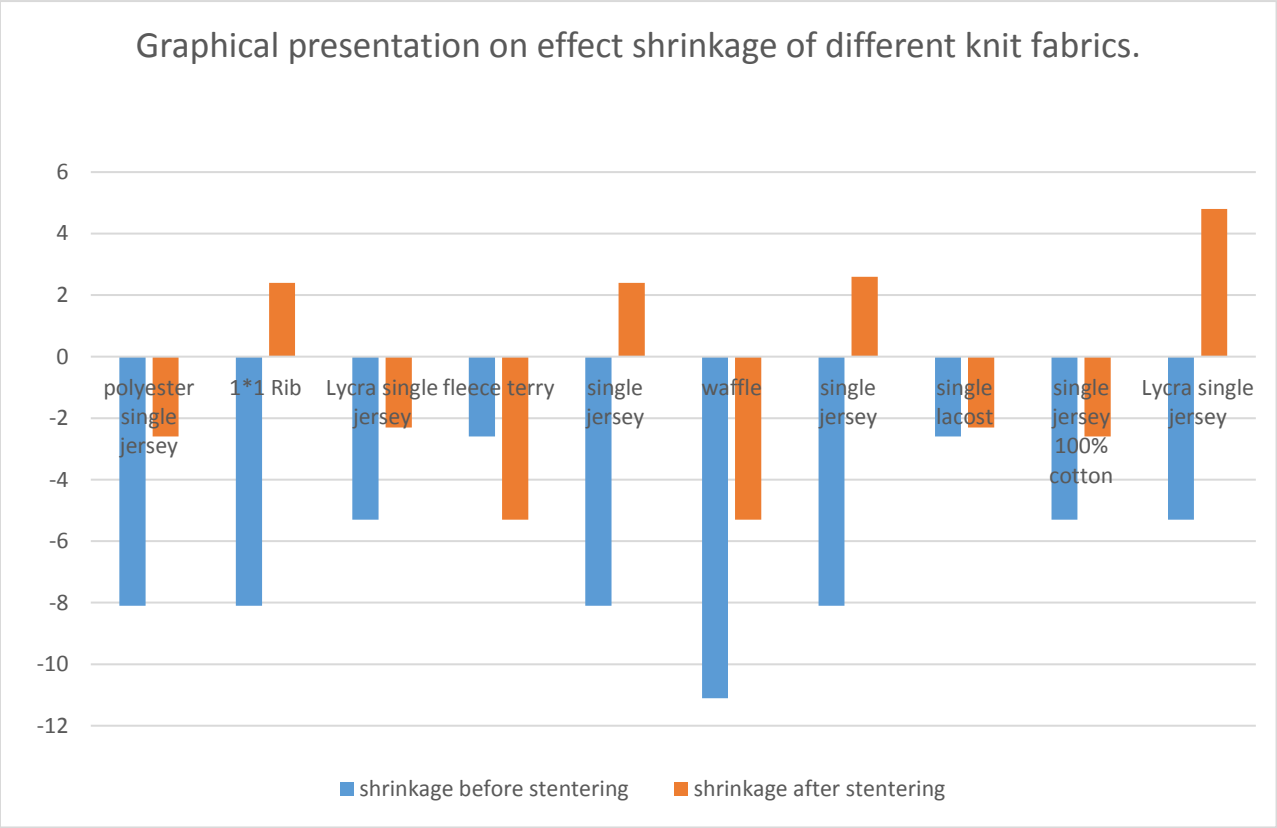


Figure. 4.6 Changes of shrinkage in different knit fabrics after stentering process

This column diagram is drawn for changes fabrics shrinkage before stentering and after stentering process. Here we takes ten kinds of knit fabrics samples before stenter and after stenter to understand changes of diameter. Here we takes ten knit fabrics sample along to X-axis and shrinkage before stenter and after stenter is taken along to Y-axis, minus value is taken along to –Y-axis. From this diagram we can see that maximum fabrics are shrinkages after wash because when fabrics is washed the fibers release tension that was created during knit fabrics manufactured. The release of tension deforms fabrics after wash. Some fabrics show extension because after wash fabrics decrease the strength and extension is occurred.

CHAPTER-5

CONCLUSION

CHAPTER-05

CONCLUSION

After completing the thesis (project) work, we have come to know the effect of stentering process on different kinds of knit fabric. Before doing this thesis (project) we did not know about the actual information the effect of stentering process on different knit fabrics. Now we can say that after stentering process fabric GSM, CPI, WPI, SL, Diameter, and Shrinkage is increased or decreased according to fabric construction.

- We see that after stentering stage most of knit fabrics GSM decreased because before stentering fabrics GSM is high. During compete stentering process fabrics stretching is occured for this reason after stentering sample GSM is low than before stentering, and some fabrics GSM increased for more over feed %.
- We see that after stentring process most of the knit fabrics CPI decreased because of stretching the fabrics and some fabrics CPI is increased for more over feed fabric.
- We see that after stentering process most of the knit fabrics WPI decreased because of stretching the fabrics and some fabrics WPI is increased for more over feed percentage.
- We see that after stentering process most of the fabrics SL is decreased because before stentering sample there have no over feed with temperature, and finishing agents on the fabric for this fabric SL is higher than after stentering process. Some fabrics SL is increased for fabric stretching.
- We see that after stentering process most of fabrics Diameter is increased because of fabric stretching. Before stentring process fabric remain squeeze position for this fabrics diameter is less than after stentering but when fabric set on stenter machine fabric is stretched by stenter for this reason fabric diameter increased.
- We see that after stentering process most of the fabrics shrinkages is occurred because when fabric is washed the tension of fabric is release for this fabric is deform. Some fabrics extend after washed because fiber loss their strength.

REFERENCE

[1] http://dspace.daffodilvarsity.edu.bd:8080/bitstream/handle/20.500.11948/1381/P04799.pdf?sequence=1&isAllowed=y (15.11.18; 10.03 am)

[2] http://dspace.daffodilvarsity.edu.bd:8080/bitstream/handle/20.500.11948/1381/P04799.pdf?sequence=1&isAllowed=y (18.11.18; 12.35 am)

[3] http://textilelearner.blogspot.com/2012/03/textile-softening-fabric-softening.html (19.11.18; 10.05 pm)

[4] Takes help from previous semester thesis paper. (20.11.18; 8.46 pm)

[5] Take help from textile learn page (22.11.18; 10.00 pm)

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[8] Take help from one article that was published by DIU student (23.11.2018; 10.00 pm)

[9] http://dspace.daffodilvarcity.edu.bd:8080 (24.11.2018; 11.12 am)

[10] Takes help from previous semester project report on stenter (24.11.2018; 8.00 pm)

APPENDIX

Table A.1: Effects of stentering on GSM (gram per square meter) of different knit fabrics.

SL NO.	Sample name	GSM Before stentering	GSM After stentering	Change of GSM	% of changing GSM
1	Polyester single jersey	165	152	-13	7.87
2	(1*1) Rib	303	270	-33	10.89
3	Lycra single jersey	192	165	-27	14.06
4	Fleece terry	240	256	+16	6.67
5	Single jersey	165	160	-5	3.03
6	Waffle	182	240	+62	34.06
7	Single jersey	170	142	-32	18.82
8	Single lacost	180	194	+14	7.77
9	Single jersey	135	155	+20	14.81
10	Lycra single jersey	290	177	-113	38.96

Table A.2: Effects of stentering on CPI (course per inch) of different knit fabrics.

SL NO.	Types of fabrics	CPI before stentering	CPI after stentering	Change of CPI	% Of CPI change
1	Polyester single jersey	71	65	-6	8.45
2	(1*1) Rib	56	49	-7	12.5
3	Lycra single jersey	65	54	-11	16.92
4	Fleece terry	55	58	+3	5.26
5	Single jersey	57	54	-3	5.26
6	Waffle	47	52	+5	10.63
7	Single jersey	57	46	-11	19.29
8	Single lacost	54	59	+5	9.25
9	Single jersey	52	61	+9	17.30
10	Lycra single jersey	73	46	-27	36.98

Table A3: Effects of stentering on WPI (wales per inch) of different knit fabrics.

SL NO.	Fabric types	WPI before stentering	WPI after stentering	Change of WPI	% of change
1	Polyester single	38	35	-3	7.89
2	(1*1) Rib	41	32	-9	21.95
3	Lycra single jersey	43	37	-6	13.95
4	Fleece terry	34	36	+2	5.88
5	Single jersey	40	33	-7	17.5
6	Waffle	29	32	+3	10.34
7	Single jersey	39	31	-8	20.51
8	Single lacost	32	35	+3	9.37
9	Single jersey	39	43	+4	10.25
10	Lycra single jersey	58	35	-23	39.65

Table A4: Effects of stentering on SL (stitch length) of different knit fabrics.

SL NO.	Fabric types	SL before stentering	SL after stentering	Change of SL	% of change
1	Polyester single jersey	2.5	2.3	-0.2	8
2	(1*1) Rib	2.62	2.38	-0.24	9.16
3	Lycra single jersey	2.31	1.98	-0.33	14.28
4	Fleece terry	2.5	2.64	0.14	5.56
5	Single jersey	1.7	1.64	-0.06	3.53
6	Waffle	2.66	2.94	0.28	10.52
7	Single jersey	1.25	1.04	-0.21	16.8
8	Single lacost	1.67	1.8	+0.19	11.37
9	Single jersey	2.8	3.2	+0.4	14.28
10	Lycra single jersey	2.73	1.67	-1.06	38.82

Table A5: Effects of stentering on diameter of different knit fabrics.

SL NO.	Fabric types	Diameter before stentering	Diameter after stentering	Change of diameter	% of change
1	Polyester single jersey	63	63.5	0.5	0.79
2	(1*1) Rib	53	66.5	13.5	25.47
3	Lycra single jersey	68	72	4	5.88
4	Fleece terry	65	71	6	9.23
5	Single jersey	64	68	4	6.25
6	Waffle	70	67	-3	4.48
7	Single jersey	72	76	4	5.55
8	Single lacost	64	70	-6	9.37
9	Single jersey	72	75	3	4.16
10	Lycra single jersey	70	76	6	8.57

Table A6: Effects of stentering on shrinkage% of different knit fabrics.

SL NO.	Fabric types	Shrinkage before stentering	Shrinkage after stentering	Change of shrinkage
1	Polyester sigle jersey	-8.1	-2.6	5.5
2	(1*1) Rib	-8.1	+2.4	5.7
3	Lycra single jersey	-5.3	-2.3	3
4	Fleece terry	-2.6	-5.3	2.7
5	Single jersey	-8.1	+2.4	5.7
6	Waffle	-11.11	-5.3	5.81
7	Single jersey	-8.1	+2.6	5.5
8	Single lacost	-2.6	-2.3	0.3
9	Single jersey	-5.3	-2.6	2.7
10	Lycra single jersey	-5.3	+4.8	0.5