Faculty of Engineering

Department Of Textile Engineering

PROJECT (THESIS) REPORT ON

Comparison of the physical characteristics of sweater knitted fabrics produced of acrylic and acrylic-cotton ply yarn

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Submitted By

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This Report presented in partial fulfillment of the Requirement for the Degree of

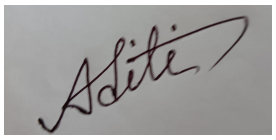
Bachelor of Science in Textile Engineering.

Advanced in Fabric Manufacturing Technology

13th june 2023.

Declaration:

We hereby declare that, this thesis paper has been done under the supervision of **Md. Farhad Hossain**, Lecturer, Department of Textile Engineering, Faculty of Engineering, Daffodil International University. We further declare that no portion of this thesis or any other portion of this paper has ever been submitted elsewhere for the purpose of receiving a degree or diploma.



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LETTER OF APPROVAL

The Project titles **"Comparison of the physical characteristics of sweater knitted fabrics produced of acrylic and acrylic-cotton ply yarn "** has been submitted to the Board of Examiners of the Faculty of Engineering by the following students on June 2023 in partial completion of the prerequisites for the degree of Bachelor of Textile Engineering and has been approved as satisfactory.

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ACKNOWLEDGEMENT

I'm begin by expressing our sincere gratitude and thanks to the Supreme Being for His divine favors, which have enabled me to successfully complete this project.

We are appreciative and owe a debt of gratitude to our supervisor, Md. Farhad Hossain, Lecturer, Department of Textile Engineering, Faculty of Engineering, Daffodil International University, for encouraging me to complete this project successfully with his extensive knowledge and keen interest in the field of enhancing knitted fabrics' physical properties. This project was finally finished thanks to his never-ending patience, astute direction, consistent encouragement, energetic supervision, constructive criticism, and invaluable advice. He also reviewed numerous subpar versions and corrected them at every stage.

Also, we would like to thank Md. Mominur Rahman Sir, Assistant Professor and Department Head (In-Charge) of textile engineering at Daffodil International University, for his ongoing assistance in the preparation of this project report.

Dedication

We want to start by thanking God for this Industrial Training report.

This report is also dedicated to **Md. Farhad Hossain**, Lecturer, Daffodil International University who greatly assisted us in finishing our industrial training report.

Finally, we want to thank our parents for being our biggest supporters and motivators as we dedicate this industrial report to them.

Statement of Contributions

I am worked very hard to complete this report. At First , I'm produced the fabrics in the University knitting lab with V-bed Knitting Machine and measured the GSM of the fabrics practically. I also determined the WPI of the fabrics and measured the CPI and SL of the fabrics. I am measured the abrasion and bursting strength of the fabrics in the university lab.

Our supervisor, **Md. Farhad Hossain** always instructed us about this thesis. Lab Assistant, **Md. Alamin Hossain** instructed us to operate the machines of the lab. With everyone's effort, we completed this thesis.

Abstract:

Good fabric appearance and clothing comfort are important criteria for consumer. At the future new natural healthy and ecological textile products gain importance.

The final usage of knitted fabric is significantly influenced by its physical characteristics, such as bursting strength, gram per square meter (GSM), stitch density, etc. The goal of this study is to examine the physical characteristics of sweater knit fabrics made from Different types of fiber and Material. It has been demonstrated that different SL and fiber types, such as cotton and acrylic have an impact on the fabric's physical characteristics, including bursting strength, pilling, GSM, and stitch density. Every experiment for this study is run on a . The findings showed that physical properties of knitted fabric varies due to variation of stitch length.

For 7.6 SL, acrylic 2 ply fabric has GSM 487, bursting strength 412.90 N, WPI 9, CPI 19, pilling Grade 2 And acrylic 1 ply cotton 2 ply fabric has GSM 326, bursting strength 433.85 N, WPI 8, CPI 14, pilling grade 1-2.

For 6.6 SL , acrylic 2 ply fabric GSM 516, bursting strength 468.05 N, WPI 9, CPI 20, pilling Grade 2 And acrylic 1 ply cotton 2 ply fabric GSM 426, bursting strength 588.67 N, WPI 10, CPI 20 , pilling grade 1-2.

For 9 SL, acrylic 2 ply fabric GSM 381, bursting strength 338.64 N, WPI 8, CPI 13, pilling Grade 2 And acrylic 1 ply cotton 2 ply fabric GSM 588, bursting strength 662.57 N, WPI 9, CPI 19, pilling grade 1-2.

We Know SL will be more fabric loose & light weight & GSM will be less and SL will be less fabric tight & heavy weight & GSM will be more. That's why 9 is the highest SL among 7.6, 6.6 & 9 SL that's why acrylic-cotton has highest GSM (588) and its bursting strength is the best because the fabric strength is better. 6.6 Both acrylic & acrylic fabric of SL has 20 CPI.

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Chapter 1: Introduction

1.1 Introduction

Knitted products are very popular all over the world. Maintaining the physical properties of knitted fabrics such as abrasion and bursting strength is one of the most important challenges. For producing garments, the knit fabrics should be resistant to abrasion as much as possible. Parachutes are made with knitted fabrics. So, while producing knit fabrics, the bursting strength property should be maintained carefully.

1.2 Objectives

- The main objective in this work to determine the effect of Sweater knit fabric structures
- on physical properties of knit fabrics with three different Stitch Length .
- Find out how fibers effect on physical properties of knitted fabrics.
- Find out the best fabric having the best physical properties.

1.3 Outcomes

- Fabrics GSM has a great impact on bursting strength.
- Acrylic-cotton fabric with 9 SL shows the better Strength to Bursting .
- Fabrics SL, WPI, CPI has great impacts on fabrics physical properties.

1.4 Limitations

- In this research, we could manage to get only Seven test specimens of Acrylic 2 Ply , Acrylic 1 Ply Cotton 2 Ply fiber. More specimen would help to get more accurate results.
- Another limitations , I have only acrylic yarn other yarns of fiber can be used .

Chapter 2 : Literature Review

2.1 Knitting Tecnology

Knitted fabric is produced by a knitting process of intersecting loops of yarn in a horizontal (weft) direction or in a vertical (warp) direction. Therefore, all knitted fabrics can be divided into two primary classes—weft knits , and warp knits . Generally, warp knit fabrics tend to be stretchier in the width, while weft knit fabrics tend to have more spring back in both width and length. (2,6)

A row of knitted loops is called a course. A column of loops is known as a wale. The number of courses and wales per inch or unit length, and the total number of loops per unit area are directly related to the fabric quality. The higher the number in each group, the better the fabric.

Depending on the fabric type, weft knitting includes:

- ❖ Plain or single jersey knitting
- ❖ Rib knitting
- ❖ Interlock knitting
- ❖ Purl knitting.

Single Jersey fabrics and their derivatives are generally made in S/J Circular Knitting Machines. On the other hand, Double Jersey fabrics derivatives such as Rib and Interlock fabrics are made in D/J Circular Knitting Machines.

2.2 Characteristics of knitted fabric :

Knit fabrics come with several advanced and exclusive characteristics. Let's explore some of the characteristics of knit fabrics in detail :

a. Durable and Breathable

B. Stretchy and flexible

C. Crease & Tear resistance

D. Versatile fabric

E. Easy to maintain

F. Air permeability:

G. Extensibility:

H. Softness.

2.3 Importance of yarn for Knitting

One of the most common methods for producing cloth is knitting. Yarns are blended together in this method to create a thick, elastic fabric that is still flexible. In order to knit the highest-quality fabric or defect-free fabric, we must select the best yarn or ideal yarn. So, we must be careful to choose yarn with the right characteristics.

As an ideal yarn, yarns should have the following characteristics:

1. The yarn is consistent in length and has a circular cross section.
2. Yarn is made up of radial layers that are concentric.
3. Each fiber maintains a consistent distance from the yarn axis by rotating uniformly around one of the concentric cylinders.
4. A fiber near the center will travel along the axis in a straight line.
5. The yarn-based axis of the coir sides of circular cylinders.
6. The density of packing, or the number of filaments or fibers across the unit area, is constant. The yarn's fibers remain the same throughout the model.
7. The yarn will have the same amount of twist per unit length for each filament.
8. There are a huge number of filaments in the yarn.

Any yarn should not be permitted to be used in knitting to create fabric if any of the aforementioned yarn qualities are missing. Although maintaining the yarn's parameter is necessary for excellent knitting, it cannot provide that for you.

Acrylic fibers are an important category of man-made fibers based on polyacrylonitrile produced by addition polymerization of acrylonitrile (vinyl cyanide).

2.4 Acrylic Fiber

Acrylic fibers are blended with polyester, cotton, and others also used to produce knitted goods, sweaters, and, blankets. Besides, it is used to make sportswear, pile fabrics, carpet, and many more.

2.4.1 Physical Properties of Acrylic :

Acrylic fiber has some physical properties. The following are the physical properties of acrylic. They are-

1. Tenacity: 2 – 4.2 gm/den
2. Density: 1.16 gm/c.c
3. Elongation at break: 20 to 55%
4. Elasticity: Good
5. Moisture Regain (MR%): 1 – 2.5%
6. Resiliency: Good
7. Melting point: 2300C
8. Ability to protest friction: Good

9. Color: White or Grey white

10. Light reflection ability: Good

11. Ability to protest heat: It can protest up to 1500C temperature.

12. Luster: Bright to light

2.4.2 Chemical Properties of Acrylic:

The following are the chemical properties of acrylic fibers. They are-

1. Acids: Acrylic has enough ability against acidic action.

2. Basic: Strong alkali damages the fiber.

3. Effect of bleaching: It is safe to bleach acrylic fiber.

4. Organic solvent: Organic solvents do not cause harm to the acrylic fiber.

5. Protection ability against mildew: Excellent

6. Protection ability against insects: Insect does not affect acrylic fiber.

7. Dyes: Acid dyes and Basic dyes are suitable to dye acrylic fiber.

2.5 Cotton Fiber

Cotton ,as a natural cellulose fiber, has a lot of Characteristics of Cotton Fibers such as :

1. Comfortable to wear Natural, cellulosic fiber , Made from the cotton boll
2. Absorbs water and “breathes”
3. Slow to dry
4. Resists static electricity build-up
5. Wrinkles easily
6. Can withstand heat, detergents, and bleach
7. About 20% stronger when wet than dry
8. Will shrink unless treated

2.6 Knit Fabric GSM:

GSM is short for grams per square meter. GSM is a unit of fabric weight. It has no restrictions but does influence several fabric qualities. In order to prevent financial loss throughout the manufacturing process, fabric weight must be regulated. For instance, ordering heavier fabric than is required for the product being created. GSM is a significant knitted fabric metric that is crucial for a textile engineer to comprehend and produce fabric. Engineers must manage fabric GSM in order to meet consumer quality expectations. The

yarn count is a highly important component for GSM variation. This allows us to examine which textiles are heavier and lighter per unit area.

GSM= (CPI×WPI×0.9158)/Ne

2.7 Stitch Length

Stitch length or loop length is the amount of yarn needed to create a finished knitted loop. A stitch length is the length of yarn that includes the needle loop and each side's half of the sinker loop.

2.8 WPI (Wales Per Inch)

Wales are the rows of loops that run the length of the cloth. The term "wales per inch" refers to the number of wales in each inch of knit fabric (WPI).

2.9 CPI (Course Per Inch)

The term "Course Per Inch" refers to the number of stitches in each inch of knit fabric (CPI).

2.10 Pilling Test Fabric:

A fabric's capacity to withstand surface wear brought on by flat rubbing contact with another material is known as abrasion resistance. Wyzenbeek and Martindale are two separate test procedures frequently used by the textile industry to evaluate abrasion resistance. Due to the fact that both of these test procedures are only capable of assessing a textile's flat abrasion resistance, they are unable to account for edge abrasion or other types of surface wear that might be present in actual upholstered applications.

2.11 Bursting Strength of Knit Fabric

When a fabric is compressed, it immediately starts to expand simultaneously in every direction. When the pressure is gradually increased, the cloth eventually reaches a pressure limit and bursts. Burst strength refers to the upper limit of pressure. As a result, we may state that "the bursting strength of the fabric is defined as the pressure necessary to rupture the fabric surface." Ball Bursting is a special type of bursting test. Ball Bursting is the required amount of force (N) to break the fabric. The most crucial feature for parachute cloth is its bursting strength. The bursting strength of the fabric is significantly influenced by the type of yarn and material used, the count, and the construction of the fabric.

Chapter 3: Methodology

3.1 Materiials :

3.1.1 Yarns :

- 100% Acrylic Yarn
- 28 Ne Cotton
- 14/1 Nm Acrylic Yarn

Figure 1 (3.1.) : Acrylic Yarn

Figure 2 (3.1) : Cotton

3.1.2 Fabrics :

- Six Rib Fabric with three different Stitch Length (SL)
    1. Three Rib Fabric with Acrylic 2 ply
    2. Three Rib Fabric With Acrylic 1 ply and cotton 2 ply .

3.2 Machine Description

3.2.1 Knitting Machine

3.2.1.1 V-Bed Knitting Machine

A knitting machine known as a "V-bed" or "flat bed" has two flat needle beds placed in an upside-down "V" shape. These needle beds have a maximum width of 2.5 meters (8 feet 2 inches). These needle beds are traversed by a carriage, often referred to as a Cam box or Head, that goes backwards and forwards while manipulating the needles to selectively knit, tuck, or transfer stitches. A flat knitting machine offers a great deal of flexibility, enabling intricate stitch patterns, curved knitting, and exact width control. To be fair, it moves more slowly than a circular machine. Knitting at 0.5 meters per second (1.6 feet per second) or below is regarded as being at a low speed in flat knitting, which is often done on hand flat machines.

3.2.1.2 Main Parts

- Yarn package
- Yarn guide
- Tension spring
- Cymbal tension
- Yarn take-up
- Fabric comb
- Yarn carrier
- Back needle bed
- Front needle bed
- Needle spring
- Fabric
- Dead weighting system
- Latch needle

Figure 3 (3.2.1.1) : V-bed Knitting Machine

Brand : China

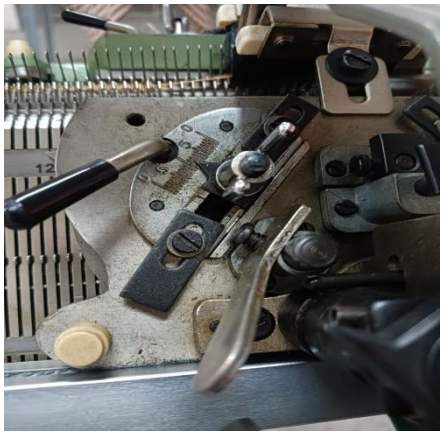
Machine Width : 42 Inch

GAUGE : 7 G

Needles : 294 .

3.3 Construction of Fabrics :

By changing 3 types of stitch length on V-bed knitting machine, 6 fabrics are made through 3 acrylic & 3 acrylic-cotton ply yarn

SL No	Yarn Type	SL Setup	Sample Fabric
01	Acrylic		
02	Acrylic- Cotton		
03	Acrylic		
04	Acrylic - Cotton		

05	Acrylic		
06	Acrylic - Cotton		

Table 1 (3.3) : Sample Fabric Table

3.4 Stitch Length (SL) Calculation :

3.4.1 For (1-2 sample) Acrylic & Acrylic-cotton

Total Course Length 12.8 feet

We know , 1 feet = 12 inch

= (12*12.8)

= 153.6 inch

= (153.6* 2.5) cm

= 384 cm

= (384* 10) mm

= 3840 mm

= 3840/250 [1 course = 250 wales]

= 15.36 /2 mm

= 7.6 mm

Here , SL is 7.6 mm .

3.4.2 For(3-4 sample) Acrylic & Acrylic - cotton

Total Course Length = 11.1 feet

We know , 1 feet = 12 inch

So , 11.1 feet = (12* 11.1) inch

= 133.2 inch

= (133.2 * 2.5) cm

= 333 cm

= (333* 10) mm

= 3330 / 250 mm [1 course = 250 wales]

= 13.22 /2

= 6.66 mm

Here SL is 6.66 mm .

3.4.2 For (5-6 sample) Acrylic & Acrylic-cotton

Total Course Length 15 feet

We know , 1 feet = 12 inch

= (12*15)

= 180 inch

= (180 * 2.5) cm

= 450 cm

= (450* 10) mm

= 4500 mm

= 4500/250 [1 course = 250 wales]

= 18/2 mm

= 9 mm

Here , SL is 9 mm .

3.5 Test Methods and Testing Machines:

3.5.1 Fabric weight (GSM):

The mass per unit length and per unit area of a fabric may be determined in more than one way.

Machine name: GSM Cutter.

Standard: ISO-3801

This International Standard specifies methods for the determination of the mass per unit length, and the mass per unit area.

Standard atmosphere for conditioning and testing

The atmosphere for conditioning and testing textiles is that defined in ISO 139. This atmosphere has a relative humidity of 65 ± 2% and a temperature of 20 ± 20 C.

Method- When the piece or sample length can be condition in the standard testing environment, the length and mass of the fabric are calculated, or the length, width, and mass of the fabric are determined and calculated. as appropriate, the computed mass per unit area

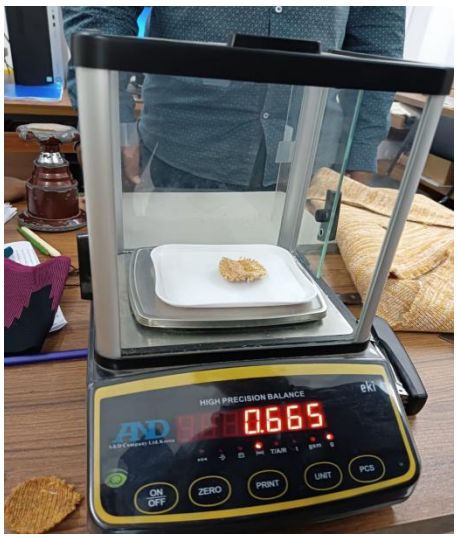


Figure 4 : GSM Cutter & Weight Balance Machine

3.5.2 Stitch Length, WPI & CPI :

Stitch length, WPI & CPI is determined with the help of Counting Glass, Scale and Needle.

Method of determining Stitch Length: At first 100 Wales from same yarn are marked. Then then the yarn is untied from the fabric. Then the marked 100 Wales length are measured into the scale. Then the measured length is divided by 100.

Method of determining WPI: The Counting glass is put over the fabric and then the number of vertical lines present inside the counting glass is determined. The vertical lines are wales & in 1inch the lines are determined through counting glass.

Method of determining CPI: The fabric is marked 1inch horizontally through the counting glass. Then the yarns are untied. Then number of yarns are counted inside the marked 1inch fabric. The number of yarns in that marked portion is the number of courses.

Figure 5 : Thread Counting Glass

3.5.3 Abrasion Test :

Abrasion Machine: This device is used to test the ability of socks, gloves, carpet, non woven materials, leather, and high pressure laminated and printed surfaces to pill and abrasion.

Machine name- Martin dale

Standard: ISO-12947-2

Testing Method: A cork-lined box is filled with specimens that are mounted on polyurethane tubes and rotated at a consistent speed. After a predetermined amount of yarn breakage, weight loss, fuzzing and pilling are evaluated visually.

Evaluation: Yarn Breakage is determined visually and weight loss percent is determined by the help of digital balance

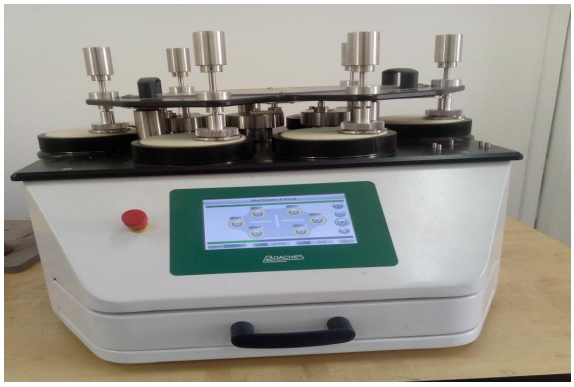


Figure 6 : Martin dale Machine

3.5.4 Bursting Strength Test :

For knit fabric, non woven, plastic bags, tissue paper, and medicinal items, the bursting test is crucial. This test has been completed for both dry and wet fabric. To determine the bursting strength, we have taken dry fabrics.

Machine name: James Heal (Universal Strength Tester)

Standards: ISO 3303-1

Method: There are two versions of the software "Test wise for Truburst" available, however we have only used the Test wise Lite version, which is included by default. We began by setting the specimen on the jaw and continued once the ball was placed over the fabric. We took the reading after the fabric burst.

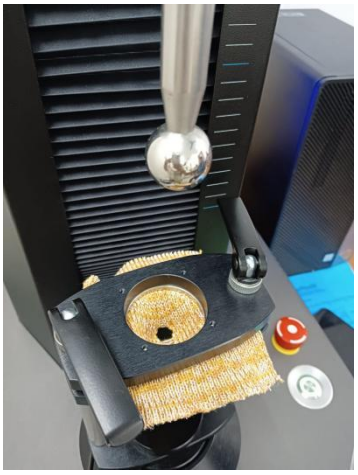


Figure 7 : Universal Strength Tester

3.5.5 Thickness Test

Fabric thickness is defined as perpendicular distance through the fabric, which determines the dimension between the upper and lower side of the fabric.

Determination of thickness of fabric samples in laboratory is usually carried out with the help of a precision thickness gauge.

In Fabric Thickness Gauge, the fabric whose thickness is to be determined is kept on a flat anvil and a circular pressure foot is pressed on to it from the top under a standard fixed load. Then the Dial Indicator directly gives the thickness in mm.

Specifications of Fabric Thickness Gauge:

Range of measurement : 0 - 10 mm

Least count of dial gauge : 0.01 mm

Diameter of anvil : 60 mm

Diameter of pressure foot : 10 mm & 25 mm

Working Procedure of Fabric Thickness Gauge:

1. The fabric sample that is to be measured is kept on an anvil.

2. The press foot is gently lowered on to the specimen.

3. The reading is taken to get the thickness of the specimen.

4. The flat circular indented of the micrometer exerts the specified pressure on the fabric sample.

5. The above procedure is repeated to obtain the values of thickness at least at 3 different locations.

6. The mean value of all the readings of thickness determined to the nearest 0.01m is calculated and the result is the average thickness of the sample under test

Chapter 04 : Result and Discussion

The test results are shown here following the completion of testing (GSM, SL, WPI, CPI, Abrasion and Bursting) & Yarn Quality in accordance with the previously discussed standards.

4.1 Test Results :

4.1.1 GSM

SL NO	Stitch Length	Fabric Types	GSM
01	7.6	Acrylic Rib	487
02		Acrylic-cotton rib	326
03	6.6.	Acrylic Rib	516
04		Acrylic-cotton rib	426
05	9	Acrylic Rib	381
06		Acrylic-cotton rib	588

Table 2 : GSM Results

4.1.2 SL , WPI & CPI :

SL no	Fabric Types	SL	WPI	CPI
01	Acrylic Rib	7.6	9	19
02	Acrylic-cotton rib		8	14
03	Acrylic Rib	6.6	9	20
04	Acrylic-cotton rib		10	20
05	Acrylic Rib	9	8	13
06	Acrylic-cotton rib		9	19

Table 3 : SL, WPI &CPI Results

4.1.3 Brusting Strength test :

Sl no	Stitch Length	Fabric Types	Rupturing Force(N)
01	7.6	Acrylic Rib	412.90
02		Acrylic-cotton rib	433.85
03	6.6	Acrylic Rib	468.05
04		Acrylic-cotton rib	588.67
05	9	Acrylic Rib	338.64
06		Acrylic-cotton rib	662.57

Table 4 : Brusting results

4.1.4 Pilling Test :

Sl no	Stitch Length	Fabric Types	Pilling
01	7.6	Acrylic Rib	Grade 2
02		Acrylic-cotton rib	Grade 1-2
03	6.6	Acrylic Rib	Grade 2
04		Acrylic-cotton rib	Grade 1-2
05	9	Acrylic Rib	Grade 2
06		Acrylic-cotton rib	Grade 1-2

Table 5 : pilling results

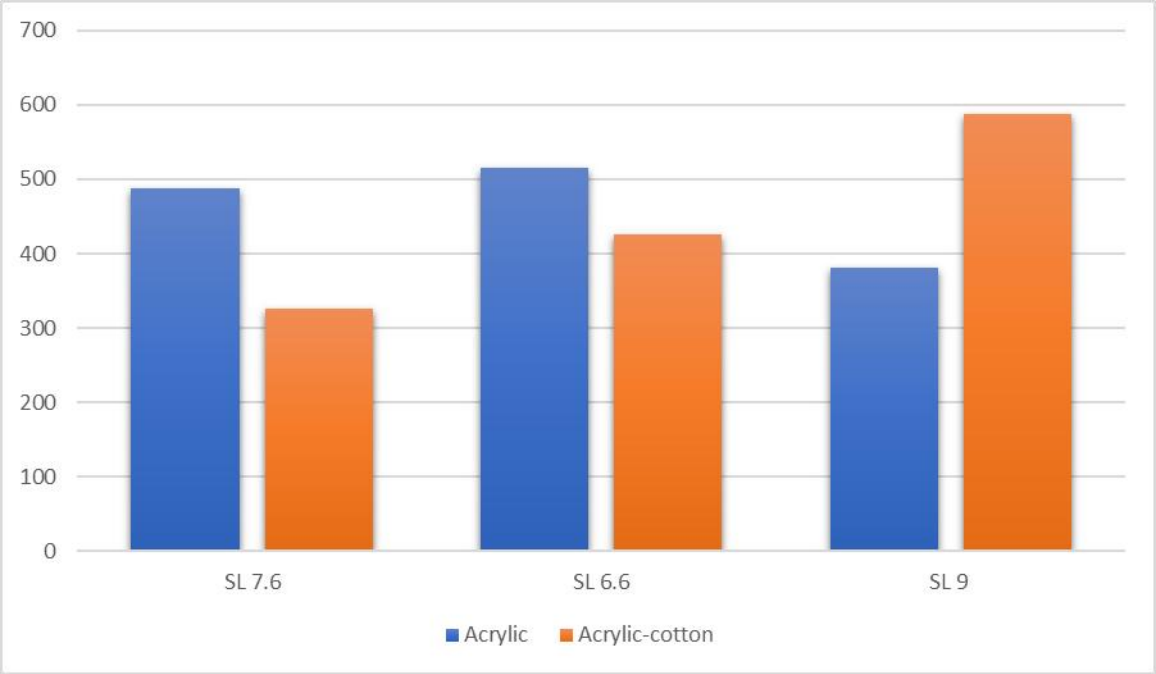
4.1.5 Thickness Test

SL no	Stitch Length	Fabric Type	Thickness
01	7.6	Acrylic Rib	2.08
02		Acrylic-cotton rib	1.55
03	6.6	Acrylic Rib	2.22
04		Acrylic-cotton rib	1.75
05	9	Acrylic Rib	2.25
06		Acrylic-cotton rib	2.33

Table 6 : Thickness Results

4.2 Discussion Based on Test Results

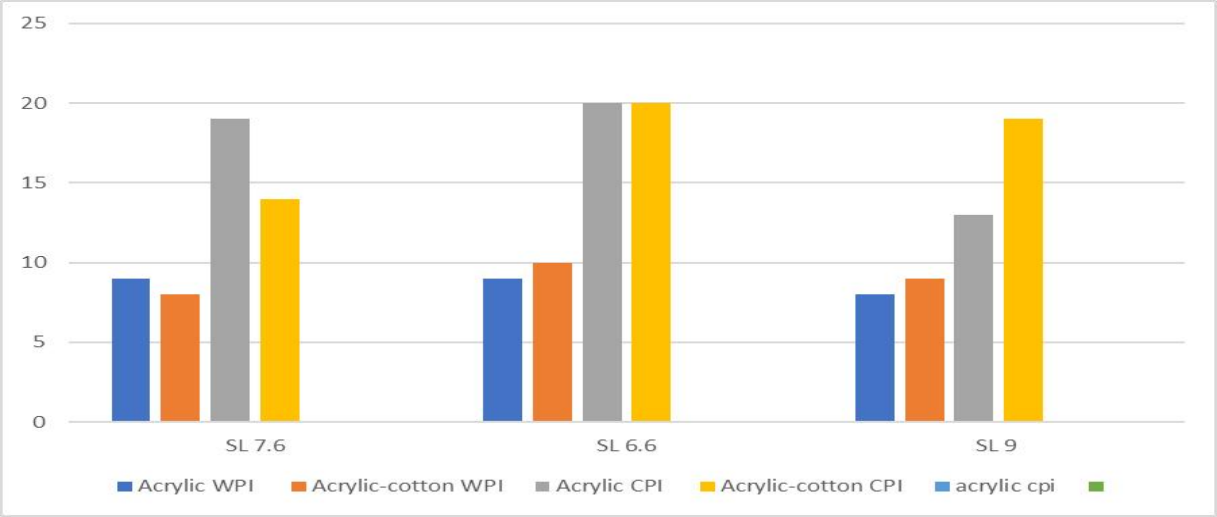
4.2.1 GSM



Discussion on GSM: According to the graph above,

Acrylic -cotton fabrics of 9 SL has the most GSM that is 588. Acrylic fabric of 6.6 SL is just behind it and its GSM is 516. On the other hand, same SL which is 7.6 Acrylic & Acrylic -cotton fabric has 487 GSM & 326 is the lowest GSM. 6.6 SL of Acrylic-cotton fabric has 426 GSM. Lastly, GSM 381 of acrylic fabric of 9 SL.

4.2.2 WPI & CPI



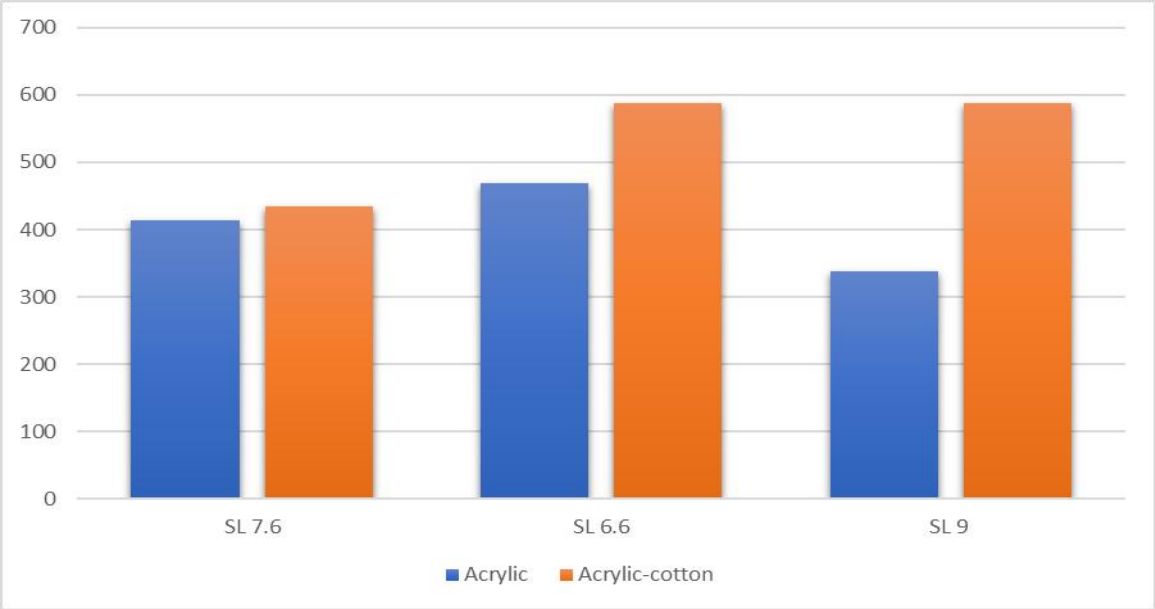
Discussion on WPI & CPI: According to the graph above,

The WPI of the fabric lies between 8-10.

Acrylic-cotton fabric of 6.6 SL has the highest WPI that is 10. Both 7.6 & 6.6 SL of acrylic fabric have the same WPI that is 9. The others are, 7.6 SL of acrylic-cotton & 9 SL of acrylic fabric both have 8 WPI which is the lowest WPI.

On the other hand, The CPI of the fabric lies between 13 to 20. Both acrylic & acrylic-cotton fabric of 6.6 SL has the highest CPI that is 20. 9 Acrylic & Acrylic fabric of SL has 13 & 19 CPI accordingly. 7.6 SL has 19 & 14 CPI which is acrylic & acrylic-cotton Fabric.

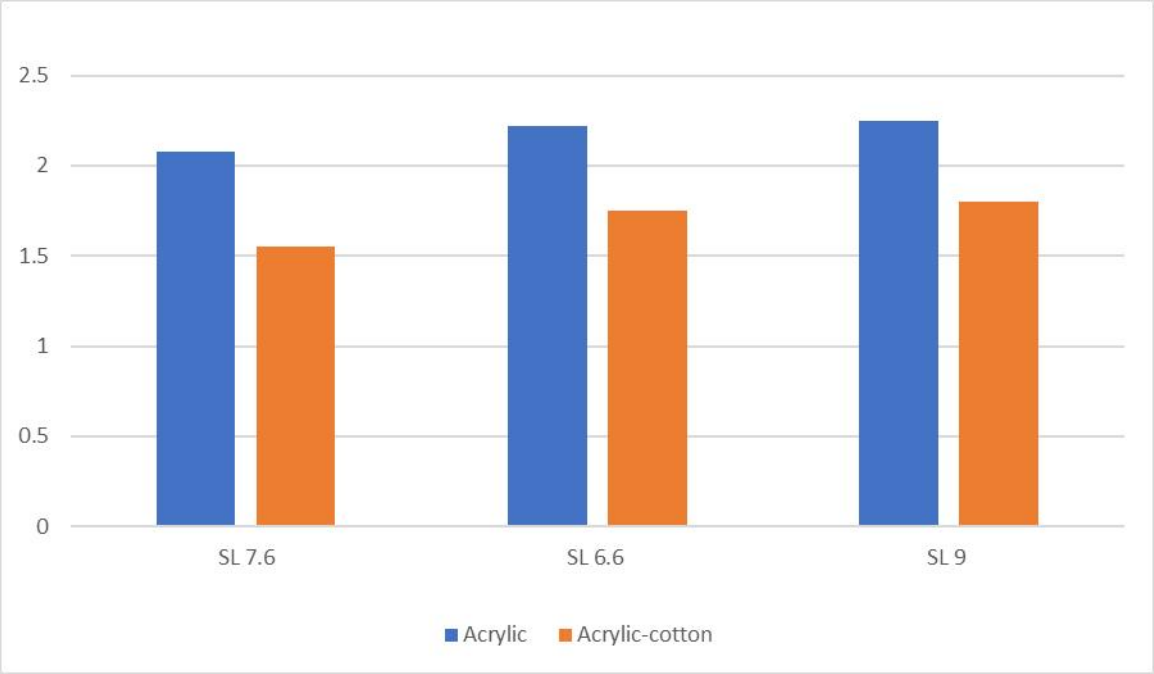
4.2.3 Brusting Strength



Discussion on Ball Bursting: According to the graph above,

For SL 7.6, Acrylic & acrylic cotton needs 412.90 N & 433.85 N force to break. On the other hand, for SL 6.6, Acrylic & acrylic cotton needs 468.05 N & 588.67 N force to break. Last one which SL is 9, acrylic & acrylic cotton needs 338.64 N & 662.57 N force to break. if we compare, acrylic-cotton fabric of 9 SL has the strongest bursting property and acrylic fabric has the weakest bursting property. Acrylic and acrylic-cotton have good bursting strength which is 6.6 SL . Acrylic and acrylic-cotton fabric are comparatively weak fabrics Which is 7.6 SL .

4.2.4 Thickness



Discussion on Ball Bursting: According to the graph above,

In this graph we found that, For 6.6 SL, acrylic & acrylic-cotton fabric thickness is 2.08 and 1.55. On the other hand, for 6.6 SL, acrylic & acrylic-cotton thickness is 2.22 and 1.75. Last one, for 9 SL, acrylic & acrylic-cotton thickness is 2.25 and 2.33. If we compare acrylic & cotton, we can see that the thickness of acrylic is more than acrylic-cotton even if the fabric is made with the same stitch length.

Slub yarn is thick in some parts and thin in some parts, due to which the thickness changes. we used slub acrylic for this reason acrylic thickness is more than cotton

Chapter 5: Conclusion

We have done the thesis successfully. In this study the effect of knitted structure with different yarns on the physical properties of knitted fabrics were investigated. From the investigation , It was found that, GSM, WPI, CPI, bursting strength, pilling test, Thicker physical properties of 6 fabrics were compared with acrylic and acrylic-cotton yarn through 3 Different SL.

For 7.6 SL, acrylic 2 ply fabric has GSM 487, bursting strength 412.90 N, WPI 9, CPI 19, pilling Grade 2 And acrylic 1 ply cotton 2 ply fabric has GSM 326, bursting strength 433.85 N, WPI 8, CPI 14, pilling grade 1-2.

For 6.6 SL , acrylic 2 ply fabric GSM 516, bursting strength 468.05 N, WPI 9, CPI 20, pilling Grade 2 And acrylic 1 ply cotton 2 ply fabric GSM 426, bursting strength 588.67 N, WPI 10, CPI 20 , pilling grade 1-2.

For 9 SL, acrylic 2 ply fabric GSM 381, bursting strength 338.64 N, WPI 8, CPI 13, pilling Grade 2 And acrylic 1 ply cotton 2 ply fabric GSM 588, bursting strength 662.57 N, WPI 9, CPI 19, pilling grade 1-2.

We Know SL will be more fabric loose & light weight & GSM will be less and SL will be less fabric tight & heavy weight & GSM will be more. That's why 9 is the highest SL among 7.6, 6.6 & 9 SL that's why acrylic-cotton has highest GSM (588) and its bursting strength is the best because the fabric strength is better. 6.6 Both acrylic & acrylic fabric of SL has 20 CPI.

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