UNDERGRADUATE FINAL YEAR PROJECT REPORT

Faculty of Engineering

Department of Textile Engineering

Title of FYDP: Study on Analyzing the Effect of Composition on Seam Slippage in Woven Fabrics.

Submitted By

Name: Md. Arafat Bin Alam Id: 221-23-1206

Name: Tanha Tabassum Anti Id: 221-23-1213

Supervised By

Md. Manik Parvez

Lecturer

This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Textile Engineering

Advances in Apparel Manufacturing Technology

8th Semester – 4th Year

Author's Declaration

We declare that we are the sole authors of this project. It is the actual copy of the project that was accepted by our advisor(s) **Md. Manik Parvez** approved, including any necessary revisions. We also grant Daffodil International University permission to reproduce and distribute electronic or paper copies of this project.

Arafat

....

Name: Md. Arafat Bin Alam

ID: 221-23-1206

Email: alam23-1206@diu.edu.bd

Tanha

....

Name: Tanha Tabassum Anti

ID: 221-23-1213

Email: anti23-1213@diu.edu.bd

©Daffodil International University

Statement of Contributions

In this Final Year Design Project, we (Tanha Tabassum Anti & Md. Arafat Bin Alam) two friends work as a team. The work was shared out equally between us. The preparation of the sample, testing, data collection and report writing was done in concert with literature review. We both had to work together talking to each other and being constantly supervised by our advisor. In order to complete this project, our advisor **Md. Manik Parvez sir** helped us with step and helped to follow the right path within the whole schedule.

©Daffodil International University

Executive Summary

This thesis provides an insight into how the composition of fabric and weave structure influences the seam slippage in woven fabric with reference to six materials chosen and these are Herringbone, Matt, Satin, Zig-zag, Plain and Dogs Teeth weave. One of the most important areas of quality assurance and determination of the stability of a garment is the seam slippage which is the movement of the yarns that are close to a certain stitched seam under the pressure. Fabric Sewing with plain lockstitch to ensure consistency and under standardized conditions (ISO 13936-2 and ASTM D1683). All fabric is sewing with plain lockstitch to ensure under standardized condition. The experiment was intended to make comparisons in seam performance between various weave structures and which compositions offer the best resistance to seam failure. It was found that the Plain weave fabrics had the least seam slip which was attributed to the maximum interlacing points and high friction of the yarns. By comparison the Satin and Matt webs exhibited the greatest seam slip, which was caused by the length of their floats and the decreased friction between yarns. Aesthetic and performance proved to be moderate with Herringbone and Dogs Teeth weaves and functional performance was also moderate with Zig-zag weave, which gave variable results with the tension of the yarns and finishing. The results prove that seam durability is dependent on the weave density and fiber composition simultaneously. Fabrics that are rich in cotton, and are tightly interwoven are always superior over polyester-rich and float-heavy structures. Higher density of the stitches or finishing treatments are the reinforcement strategies proposed to prevent the fabric, which is likely to slip. The study can be of importance to the field of academics and industry by offering a systematic assessment of the seam slippage on different woven fabrics. It underscores the significance of composition-based design in lowering the level of garment rejection, sustainability, and consumer satisfaction.

©Daffodil International University

Acknowledgments

At first, we expressed our heartiest thanks and gratefulness to Almighty Allah for his divine blessing make it possible to complete this project successfully.

Again, we expressed our highest gratitude to **Md. Manik Parvez**, Lecturer, Department of Textile Engineering, Daffodil International University, for his guidelines and priceless advice. His scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, reading many inferior drafts, and correcting them at all stages have made it possible to complete this final-year design project.

©Daffodil International University

Table of Contents

©Daffodil International University

©Daffodil International University

List of Figures

©Daffodil International University

©Daffodil International University

List of Table

©Daffodil International University

List of Abbreviations

DIU	Daffodil International University
FYDP	Final Year Design Project
UTM	Universal Tensile Testing Machine
ISO	International Organization for Standardization
ASTM	American Society for Testing and Materials
SDGs	Sustainable Development Goals
GSM	Grams per Square Meter

©Daffodil International University

List of Equations

Serial	Equation
01	$\text{Seam Strength (N)} = \frac{F}{w}$
02	$\text{Seam Strength} = F_{\max}$
03	$\text{Seam Slippage (mm)} = d_{\text{seam}} - d_{\text{fabric}}$

©Daffodil International University

United Nations Sustainable Development Goals

The Sustainable Development Goals (SDGs) are the roadmap to fulfill a better and more sustainable future for all. They undertake the global problems such as poverty, injustice, inequality, climate change and environmental degradation along with peace and justice. The list of SDGs is 17 in total, as follows. Verify the relevant SDGs for the project.

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

©Daffodil International University

Similarity Index Report

The following students have compiled the final year report on the topic given below for partial fulfillment of the requirement for Bachelor's degree in Textile Engineering.

Project Title: Study on Analyzing the Effect of Composition on Seam Slippage in Woven Fabrics.

Sl. No.	Student Name	ID Number
1	Md. Arafat Bin Alam	221-23-1206
2	Tanha Tabassum Anti	221-23-1213

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

Signature and Date

Md. Manik Parvez
Lecturer
Department of Textile Engineering
Faculty of Engineering, DIU

©Daffodil International University

Plagiarism report

: Study on Analyzing the Effect of Composition on Seam Slippage in Woven Fabrics

ORIGINALITY REPORT

8%	6%	7%	5%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Kaplan University Student Paper	1%
2	link.springer.com Internet Source	1%
3	erl.ucc.edu.gh:8080 Internet Source	1%
4	Submitted to University of Strathclyde Student Paper	1%
5	Virginija Daukantienė, Paulius Pavelas Danilovas, Gerda Mikalauskaitė. "Study of temperature impact on the behaviour of fibre polymer materials′ and their adhesive bonds", The Journal of The Textile Institute, 2020 Publication	1%
6	www.idexlab.com Internet Source	1%
7	Abdullah Sayam, Fogla Rabbi, Mohammad Hossain, Omar Faruque et al. "Influence of Denting Order on Quality and Appearance of Cotton Based Plain Woven Fabric", Journal of Natural Fibers, 2021 Publication	<1%
8	Esra Zeynep Yıldız, Oktay Pamuk. "The parameters affecting seam quality: a	<1%

©Daffodil International University

	comprehensive review", Research Journal of Textile and Apparel, 2021 Publication	
9	Ramunė Klevaitytė, Virginija Sacevičienė, Vitalija Masteikaite, Virginijus Urbelis. "The Influence of the Structure Parameters on the Extensibility of Woven Fabrics", Jaunųjų mokslininkų darbai, 2020 Publication	<1 %
10	Submitted to Fiji National University Student Paper	<1 %
11	Submitted to Liverpool John Moores University Student Paper	<1 %
12	etd.aau.edu.et Internet Source	<1 %
13	etd.lib.metu.edu.tr Internet Source	<1 %
14	www.mecmesin.com Internet Source	<1 %
15	hdl.handle.net Internet Source	<1 %
16	vat.ft.tul.cz Internet Source	<1 %
17	Kaniz Farhana, Md. Syduzzaman, Dilruba Yeasmin. "Comparison of Seam Strength between Dyed and Un-Dyed Gabardine Apparels: A Research on Lapped & Superimposed Seam", Journal of Textile Science and Technology, 2015 Publication	<1 %

©Daffodil International University

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	Off		

©Daffodil International University

Chapter 1: Introduction

1.1 Background and Context:

Seam Slippage is a challenge the woven fabric, especially in apparel and technical textile. It is a phenomenon that is caused on the yarns that are closer to a stitched seam when they start to dislocate due to stress, causing a seam failure, lower durability and lower product quality. Fabric composition, weave structure, yarn properties/ nature and seam construction methods have a strong power in the phenomenon. Among them, the fiber composition and the type of weave determine the final outcome of the frictional resistance between the yarns and the possibility of resist the loads applied to it. Various types of weaves, including Plain, Herringbone, Matt, Satin, Zag-Zag and Dogs Teeth, have different Interlacing positions and yarn positions, which influence directly seam performance. These structural variations are the issues that the textile engineers and manufacturers must understand to maximize fabric design in order to be durable and consumer-satisfying.

1.2 Significance and Motivation:

There are rising demands of quality, durable, and sustainable fabrics in the textile industry. One of the most widespread reasons that garments are rejected in factories is seam failure, which costs the companies money and causes the loss of consumer confidence. This study gives useful information towards:

- Enhancing the performance of garments.
- Lessening waste in production and help in sustainability.
- Advising manufacturers towards choosing the best blends of fabrics and seam structures.

1.3 Aims and Objectives:

Thesis set out is critically assess how the composition and structure of fabric affect seam slippage in woven structures. Objectives are:

©Daffodil International University

- To explore the behavior of seam slippage of six types of woven fabrics (Herringbone, Matt, Satin, Zig-zag, Plain, Dogs Teeth).
- To examine the woven density and interlacing points on seam integrity.
- To create a seam performance of a comparison on various compositions under standardized test conditions.
- To advise on the best fabrics and seam combinations to use in industries.

1.4 Problem Statement (CEP):

Textile engineering has managed to overcome the challenges of textile engineering; however, seam slippage still occurs in a textile, particularly in a fabric that has long floats or less interlacing. Comparison of various types of weaving types on the same seam construction is not given much comparative analysis as per available literature. This gap in the project has been filled by carrying out controlled seam slippage tests on six types of woven fabrics all sewn on a plain stitch to ascertain the effect of the composition and weave structure on the seam life.

©Daffodil International University

Chapter 2: Literature Review

The slippage of the seam is considered to be one of the most serious performance problems of woven fabrics. It is a condition that takes place when stitches are stitched near a seam, the surrounding yarns start shifting with the pressure causing the seam to fail and make it less durable. It has always been pointed out by researchers that seam slippage can be affected by a variety of factors such as fiber structure, yarn density, weave pattern, type of seam, stitch density and properties of sewing thread. Of them, weave design and fabric composition are the most ultimately important in terms of seam integrity. A number of studies have been conducted to investigate the contribution of fiber composition in seam performance. The friction between the yarns tends to be greater and therefore the cotton fabrics have low seam slippage whereas polyester fabrics having the smoother surfaces tend to slip more easily under the load. Blended fabrics can offer a compromise of durability and seam integrity but the prevailing fiber type normally determines performance. As an illustration, cotton/polyester blends are known to have lower opening of the seam than pure polyester fabrics, whereas viscose-rich fabrics tend to have moderate seam strength, and tend to suffer yarn breakage. Density of yarns and seam structure are also considerable. The study conducted on linen and cotton fabrics showed that increased yarn density lowers the openings of the seam whereas seam type and stitch density affect the distribution of stress along the seam. Examples of these seams are lockstitch seams which are more stable than the chainstitch seams. Overall, the influence of needle size, as well as sewing tension has been found to influence seam slippage and puckering and it is important to note that controlled sewing parameters play a vital role in experimental studies. Fabrics that have more interlacing points in them like plain weave are more resistant to seam slippage. Conversely, more susceptible to yarn displacement are satin and mat weaves whose rows of interlacements are longer and consist of fewer rows of floats. Standardized testing procedures have been designed that measure seam slippage in woven fabrics. The ISO 13936-2 (Fixed Load Method) is used to test the opening of seams under defined load whereas ASTM D1683 uses force perpendicular to the seam to test the strength and failure of the seam. These criteria make sure that the results of the various studies are reproducible and comparable, and are therefore necessary in academic research and the industrial world. Although such contributions are made, research gaps are still present. The types of common fabrics studied include cotton, linen and denim, and little comparative analysis has been done on the decorative weaves. Very little studies have been undertaken to test structures such as herringbone, zig-zag and dog teeth

©Daffodil International University

under the same seam constructions. This gap is filled by studying six types of woven fabrics that are sewn using plain stitch and thus isolating the impact of the composition of a weave on the slippage of the seam and gives a very thorough comparison of structural performance.

©Daffodil International University

Chapter 3: Methods / Implementation

Six types of woven fabrics were used in the conduct of the experiment and they included herringbone, matt, satin, zig-zag, plain and dog teeth. The selection of these fabrics was motivated by the fact that they constitute large diversity of weave structures, including tightly interlaced plain weave and float-heavy satin weave, which made it possible to thoroughly compare the behavior of seam slippage. All fabric samples were hemmed to similar standardized sizes and stitched with a plain lockstitch seam so that there would be a consistency between and among all tests. All seams were sewn in polyester and stitched at 8 stitches per centimeter, and seam allowance of 1.5 cm. The equipment used comprised of a universal tensile tester and seam slippage testing equipment, which was modified to ISO 13936-2 (Fixed Load Method) and ASTM D1683 standards.

Seam slippage is a part of sewing defect (seam and construction). This is a seam slippage in woven fabric which we are analyzing now:

3.1 Materials and Equipment:

To analyzing seam slippage in woven fabrics, Materials and Equipment were used:

3.1.1 Fabric Selected:

- **Herringbone weave-** diagonal V-shaped, middle seam resistance.
- **Zig-zag weave**- decoration structure, performance variability of the seam.
- **Plain weave**- highest number of interlacing, highest resistance to slip.
- **Matt weave** – Bundle yarns, less interlacements.
- **Satin weave** – Long floats, smooth surface and slipping
- **Dogs Tooth**: Twill, weave, strong seam.

3.1.2 Seam Construction:

- Stitch: Plain Lockstitch
- Thread Count: 45 Tex
- Thread types: Cotton
- Stitch Length: 12/13 per inch

©Daffodil International University

- Seam allowance: 1.5 cm

3.1.3 Equipment Used:

- Universal Tensile Testing Machine – to impose load and seam opening.
- Seam slippage equipment - certified to ISO 13936-2 and ASTM D1683.
- Sewing machine - to make standard samples of seams.
- Conditioning chamber - to provide normal atmospheric conditions (20 -2 deg C, 65 -2% RH).

3.2 Experimental or Design Methods:

3.2.1 Experimental Flowchart:

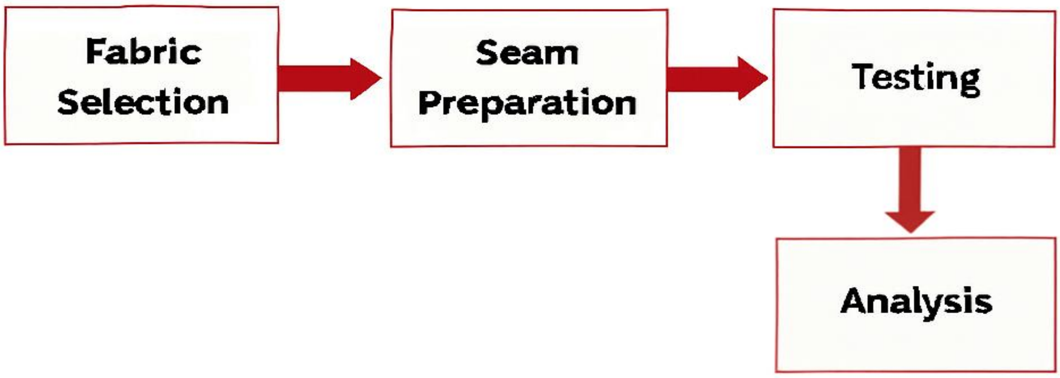


Figure 3.1 Experimental Flow Chart

©Daffodil International University

3.2.2 Fabric Swatch:

Figure 3.2 Herringbone weave

Figure 3.3 Zig-zag weave

©Daffodil International University

Figure 3.4 Plain weave

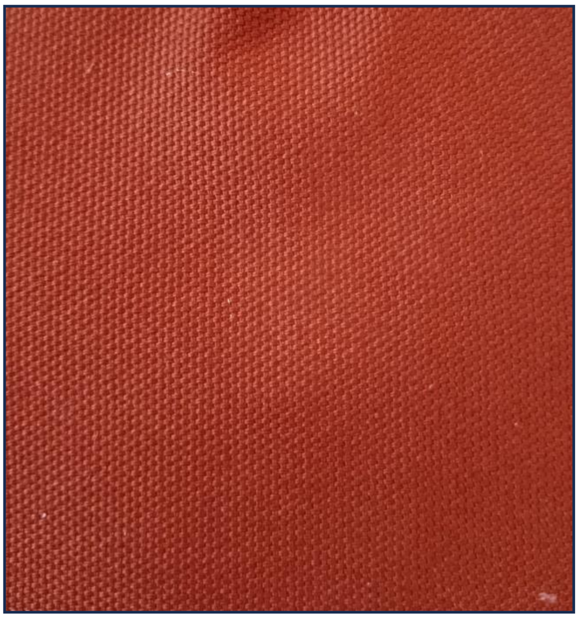


Figure 3.5 Matt weave

©Daffodil International University

Figure 3.6 Satin weave

Figure 3.7 Dogs Tooth

©Daffodil International University

3.2.3 Fabric GSM Swatch:

Figure 3.8 Herringbone GSM

Figure 3.9 Zig-zag GSM

Figure 3.10 Plain GSM

Figure 3.11 Matt GSM

Figure 3.12 Satin GSM

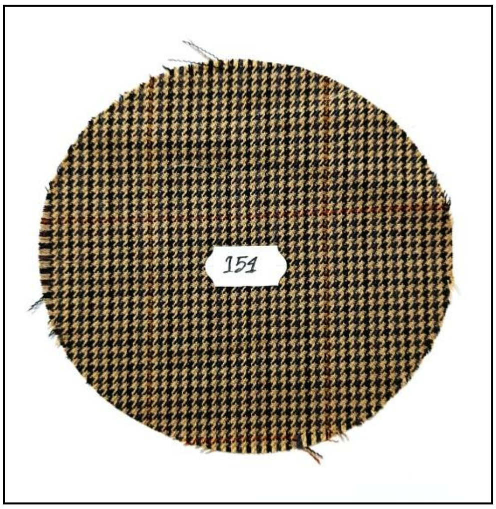


Figure 3.13 Dogs Tooth GSM

©Daffodil International University

3.2.4 Sample Preparation:

- Woven fabric selected: Herringbone, Matt, Satin, Zig – zag, Plain, Dogs Teeth
- Every fabric in the form of standardized test samples (10 cm * 28 cm).
- Seams made of plain lockstitch and polyester thread.
- Stitch Length of 12-13 per inch.
- Seam allowance 1.5 cm
- All the samples were conditioned at normal atmospheric conditions.

3.3.5 Testing Procedure:

- Universal Tensile Testing Machine (UTM) was used to test seam slippage with seam fixtures.
- According to applied load ISO 13936- (Fixed Load Method).
- Measuring the slippage tearing mm at given weight.
- All types of fabrics were tested three times to provide statistical reliability.

3.2.6 Before Tasted Sample:

1. **Herringbone weave**

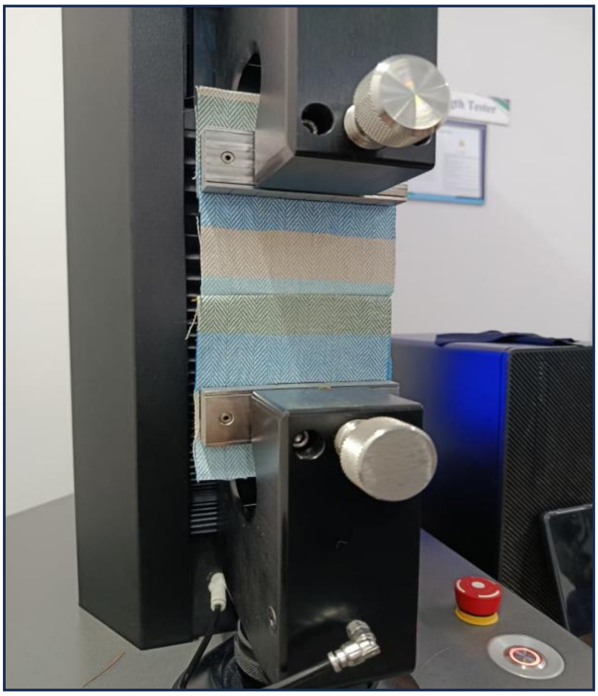


Figure 3.14 Herringbone weave before Tested

©Daffodil International University

2. Zig-zag weave:

Figure 3.15 Zig-zag weave before Tested

3. Plain weave

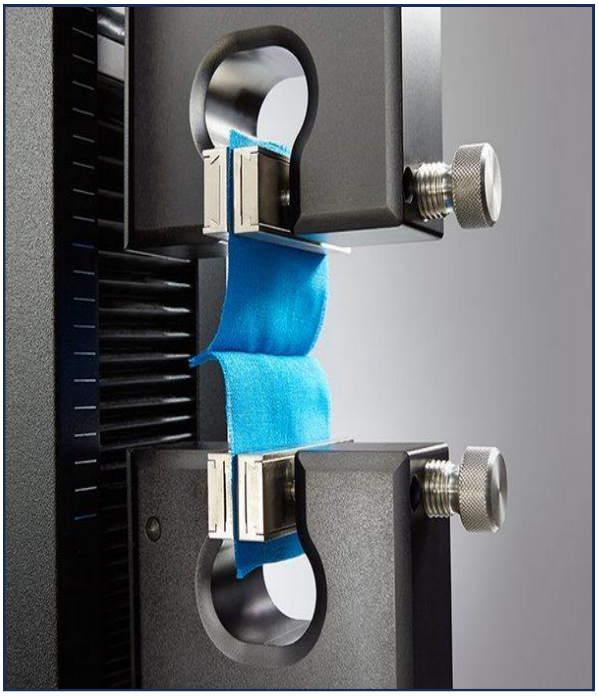


Figure 3.16 Plain weave before tested

©Daffodil International University

4. Matt weave:

Figure 3.17 Matt weave before Tasted

5. Satin weave:

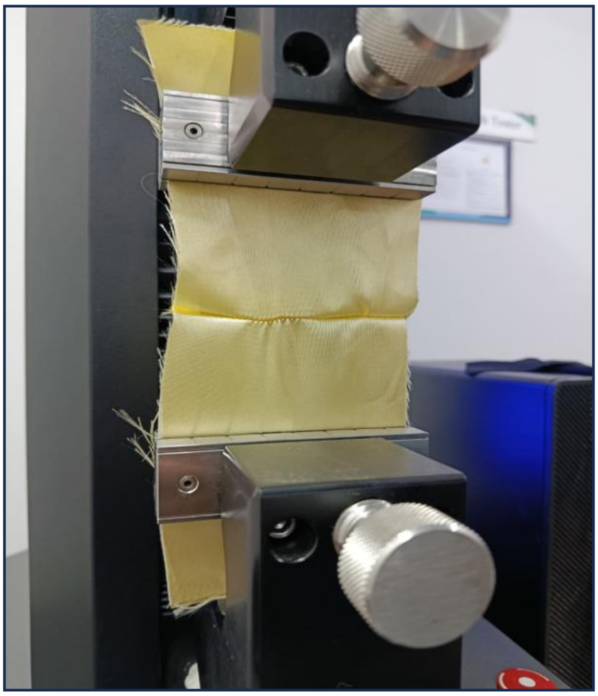


Figure 3.18 Satin weave Before Tested

©Daffodil International University

6. Dogs Tooth:

Figure 3.19 Dogs Tooth Before Tested

©Daffodil International University

3.3 Data Collection and Quality Control:

3.3.1 Data Recording:

- Measures of seam slippage in millimeters were taken after every step of the load.
- Each fabric composition and type of seam were tabulated as results.

3.3.2 Repetition for Reliability:

- The tests were done on each sample thrice.
- To determine consistency, mean values, standard deviations were computed.

3.3.3 Quality Control Measures:

- To prevent the errors in measurements, machines were calibrated in advance prior to every test.
- Testing was done under conditions of environmental control (temperature, humidity).
- Seam allowance was maintained as per sample.

3.3.4 Standards Compliance:

- All tests were made as per IS0 13936-2 (Determination of seam slippage resistance) and ASTM D1683 (Seam strength testing).
- The integrity of the data was kept through ethical reporting.

3.3.5 Observation and Data:

Herringbone weave:

Specimen	Directions	Maximum Force (N)	Elongation at Max. Force (mm)
01	Warp	199.54	16.03
02	Weft	171.41	20.49

Table 3.1 Herringbone weave

©Daffodil International University

Zig-zag weave:

Specimen	Directions	Maximum Force (N)	Elongation at Max. Force (mm)
01	Warp	197.16	19.70
02	Weft	218.23	18.66

Table 3.2 Zig-zag weave

Plain weave:

Specimen	Directions	Maximum Force (N)	Elongation at Max. Force (mm)
01	Warp	182.35	29.28
02	Weft	145.88	18.66

Table 3.3 Plain weave

Matt weave:

Specimen	Directions	Maximum Force (N)	Elongation at Max. Force (mm)
01	Warp	199.54	16.03
02	Weft	171.41	20.49

Table 3.4 Matt Weave

Satin weave:

Specimen	Directions	Maximum Force (N)	Elongation at Max. Force (mm)
01	Warp	113.11	51.16
02	Weft	167.56	12.87

Table 3.5 Satin Weave

Dogs Tooth:

Specimen	Directions	Maximum Force (N)	Elongation at Max. Force (mm)
01	Warp	178.07	36.41
02	Weft	205.32	22.99

Table 3.6 Dogs Tooth

©Daffodil International University

Chapter 4: Results and Discussion

4.1 Presentation of Results:

The seam slippage experiment was performed on six types of woven fabrics, namely, Herringbone, Matt, Satin, Zig-zag, Plain and Dog zigzag with a plain lockstitch seam. According to the ISO standard 13936-2 and ASTM D1683 standards, the displacement of the yarns next to the seam was checked at a constant load of 180 N.

Seam Performance of the fabrics:

- Plain weave was the one with the lowest seam slippage, and the least seam opening since it has the highest number of interlacing points and a great friction of the yarn.
- Herringbone structure exhibited low to moderate seam slip as the diagonal structure dispersed stress and yet gave the yarns some freedom to move.
- Dogs Teeth weave was found to have moderate slippage of the seam, which is based on the twill-based diagonal orientation, which is not as stable, as opposed to plain weave.
- Zig-zag weave has variable outcomes and performance of the seams are greatly reliant on the tension of the yarns deposited, and the finishing treatment.
- Matt we've had a high seam slip, which was explained by grouped yarns and fewer interlacements.
- Satin weave was the most slippery seam as it had long floating and surface smoothness that allowed the migration of the yarn to stress.

©Daffodil International University

4.2 Comparative Table: Seam slippage Result:

Material	Warp Max Force (N)	Warp Elongation (mm)	Weft Max Force (N)	Weft Elongation (mm)
Plain	182.35	29.28	145.88	7.54
Herringbone	152.4	14.53	211.47	37.16
Satin	113.11	51.16	167.56	12.87
Docs Tooth	178.07	36.41	205.32	22.99
Matt	199.54	16.03	171.41	20.49
Zigzag	197.16	19.7	218.23	18.66

Table 4.1 Comparative Table

Key Observations:

- Highest Strength of Warp, Matt (199.54 N) & Zig-zag (197.16 N).
- Highest Strength of Weft, Zig-zag (218 N) & Herringbone (211.47 N).
- Maximum Warp Elongation: Satin (51.16 mm), which is flexible and weaker.
- Maximum Weft Elongation: Herringbone (37.16 mm) which was a combination of strength and stretch.
- Balanced Performance: Docs Tooth demonstrates good values both in the warp (178.07 N) and weft (205.32 N) and middle elongation.

©Daffodil International University

For Herringbone Weave,

EN ISO 13935-2

Date: 2014

Determination of maximum force to seam rupture using the grab method

Test Details

Test Name:	Seam Strengtrh	Print Date:	12/7/2025
Material:	Haringbone	Jaw Pressure:	100
Specimens:	1	Load Cell:	5000 N
Required Directions:	Both	Load Cell SN:	1126095
Test Time:	1:09 PM	Version:	11.0.3.0
Test Date:	12/7/2025	Firmware:	v1.00p36
Jaw Scheme:	T27	Titan SN:	Daffodil International University
Jaw Separation(s):	100.00	Tested by:	Administrator
Force Control Gain:	25		

Procedure Settings

Break Detection:	50 %
Pull To Load Cell Maximum	
Speed:	50.00 mm/min

Warp Results

Specimen	Maximum Force (N)	Elongation at Max. Force (mm)
1	152.40	14.53

Weft Results

Specimen	Maximum Force (N)	Elongation at Max. Force (mm)
1	211.47	37.16

James Heal

Page 1

©Daffodil International University

For Zig-zag Weave,

EN ISO 13935-2

Date: 2014

Determination of maximum force to seam rupture using the grab method

Test Details

Test Name:	Seam Strengtrh	Print Date:	12/7/2025
Material:	zigzag	Jaw Pressure:	100
Specimens:	1	Load Cell:	5000 N
Required Directions:	Both	Load Cell SN:	1126095
Test Time:	1:09 PM	Version:	11.0.3.0
Test Date:	12/7/2025	Firmware:	v1.00p36
Jaw Scheme:	T27	Titan SN:	Daffodil International University
Jaw Separation(s):	100.00	Tested by:	Administrator
Force Control Gain:	25		

Procedure Settings

Break Detection: 50 %

Pull To Load Cell Maximum

Speed: 50.00 mm/min

Warp Results

Specimen	Maximum Force (N)	Elongation at Max. Force (mm)
1	197.16	19.70

Weft Results

Specimen	Maximum Force (N)	Elongation at Max. Force (mm)
1	218.23	18.66

James Heal

Page 1

©Daffodil International University

For Plain Weave,

EN ISO 13935-2

Date: 2014

Determination of maximum force to seam rupture using the grab method

Test Details

Test Name:	Seam Strengtrh	Print Date:	12/7/2025
Material:	Plain	Jaw Pressure:	100
Specimens:	1	Load Cell:	5000 N
Required Directions:	Both	Load Cell SN:	1126095
Test Time:	1:09 PM	Version:	11.0.3.0
Test Date:	12/7/2025	Firmware:	v1.00p36
Jaw Scheme:	T27	Titan SN:	Daffodil International University
Jaw Separation(s):	100.00	Tested by:	Administrator
Force Control Gain:	25		

Procedure Settings

Break Detection: 50 %

Pull To Load Cell Maximum

Speed: 50.00 mm/min

Warp Results

Specimen	Maximum Force (N)	Elongation at Max. Force (mm)
1	182.35	29.28

Weft Results

Specimen	Maximum Force (N)	Elongation at Max. Force (mm)
1	145.88	7.535

James Heal

Page 1

©Daffodil International University

For Matt Weave,

EN ISO 13935-2

Date: 2014

Determination of maximum force to seam rupture using the grab method

---

Test Details

Test Name:	Seam Strengtrh	Print Date:	12/7/2025
Material:	Matt	Jaw Pressure:	100
Specimens:	1	Load Cell:	5000 N
Required Directions:	Both	Load Cell SN:	1126095
Test Time:	1:09 PM	Version:	11.0.3.0
Test Date:	12/7/2025	Firmware:	v1.00p36
Jaw Scheme:	T27	Titan SN:	Daffodil International University
Jaw Separation(s):	100.00	Tested by:	Administrator
Force Control Gain:	25		

Procedure Settings

Break Detection: 50 %

Pull To Load Cell Maximum

Speed: 50.00 mm/min

Warp Results

Specimen	Maximum Force (N)	Elongation at Max. Force (mm)
1	199.54	16.03

Weft Results

Specimen	Maximum Force (N)	Elongation at Max. Force (mm)
1	171.41	20.49

James Heal

Page 1

©Daffodil International University

For Satin Weave,

EN ISO 13935-2

Date: 2014

Determination of maximum force to seam rupture using the grab method

---

Test Details

Test Name:	Seam Strengtrh	Print Date:	12/7/2025
Material:	Satin	Jaw Pressure:	100
Specimens:	1	Load Cell:	5000 N
Required Directions:	Both	Load Cell SN:	1126095
Test Time:	1:09 PM	Version:	11.0.3.0
Test Date:	12/7/2025	Firmware:	v1.00p36
Jaw Scheme:	T27	Titan SN:	Daffodil International University
Jaw Separation(s):	100.00	Tested by:	Administrator
Force Control Gain:	25		

Procedure Settings

Break Detection: 50 %

Pull To Load Cell Maximum

Speed: 50.00 mm/min

Warp Results

Specimen	Maximum Force (N)	Elongation at Max. Force (mm)
1	113.11	51.16

Weft Results

Specimen	Maximum Force (N)	Elongation at Max. Force (mm)
1	167.56	12.87

Page 1

James Heal

©Daffodil International University

For Dogs Tooth Weave,

EN ISO 13935-2

Date: 2014

Determination of maximum force to seam rupture using the grab method

Test Details

Test Name:	Seam Strengtrh	Print Date:	12/7/2025
Material:	Docs Tuth	Jaw Pressure:	100
Specimens:	1	Load Cell:	5000 N
Required Directions:	Both	Load Cell SN:	1126095
Test Time:	1:09 PM	Version:	11.0.3.0
Test Date:	12/7/2025	Firmware:	v1.00p36
Jaw Scheme:	T27	Titan SN:	Daffodil International University
Jaw Separation(s):	100.00	Tested by:	Administrator
Force Control Gain:	25		

Procedure Settings

Break Detection: 50 %

Pull To Load Cell Maximum

Speed: 50.00 mm/min

Warp Results

Specimen	Maximum Force (N)	Elongation at Max. Force (mm)
1	178.07	36.41

Weft Results

Specimen	Maximum Force (N)	Elongation at Max. Force (mm)
1	205.32	22.99

James Heal

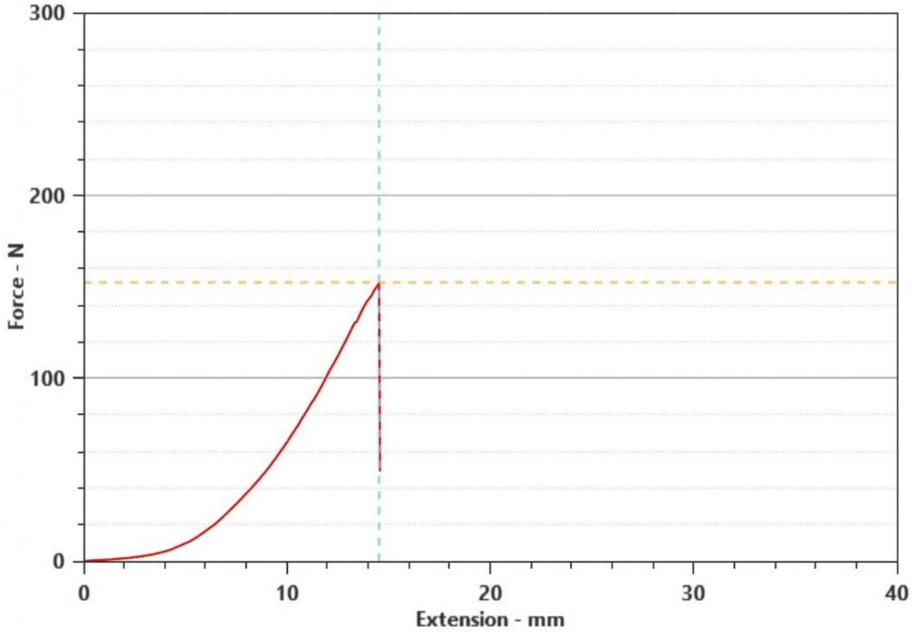
Page 1

©Daffodil International University

4.3 Graph Chart:

For Herringbone Weave,

Warp Graph



Weft Graph

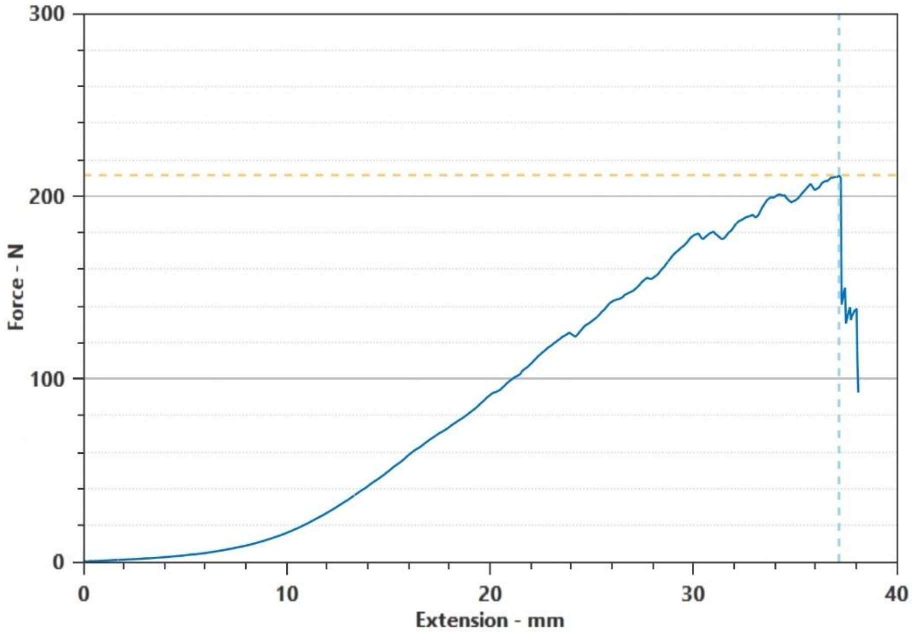
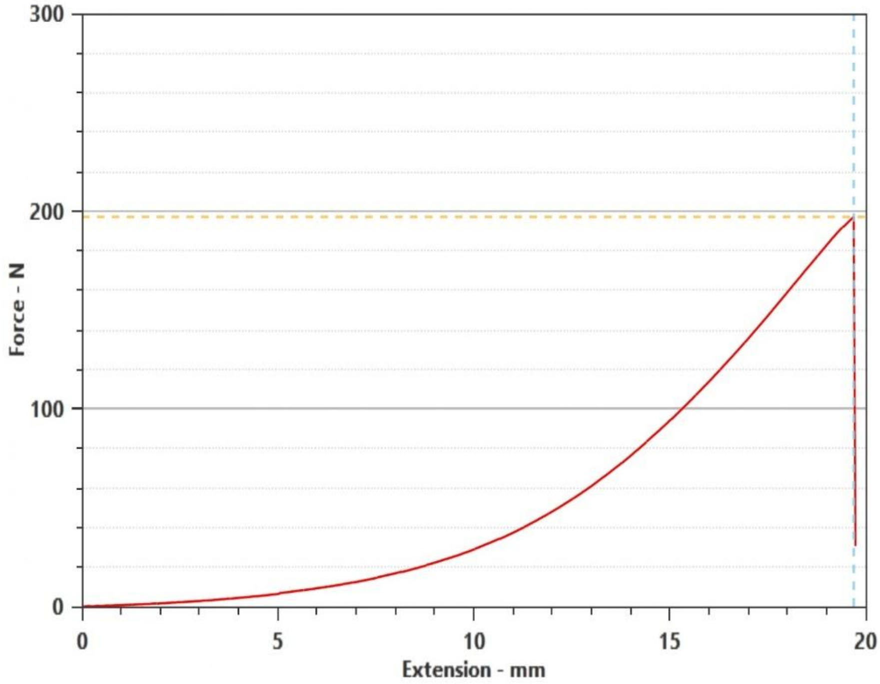


Figure 3.20 Herringbone Weave Graph

©Daffodil International University

For Zig-zag Weave,

Warp Graph



Weft Graph

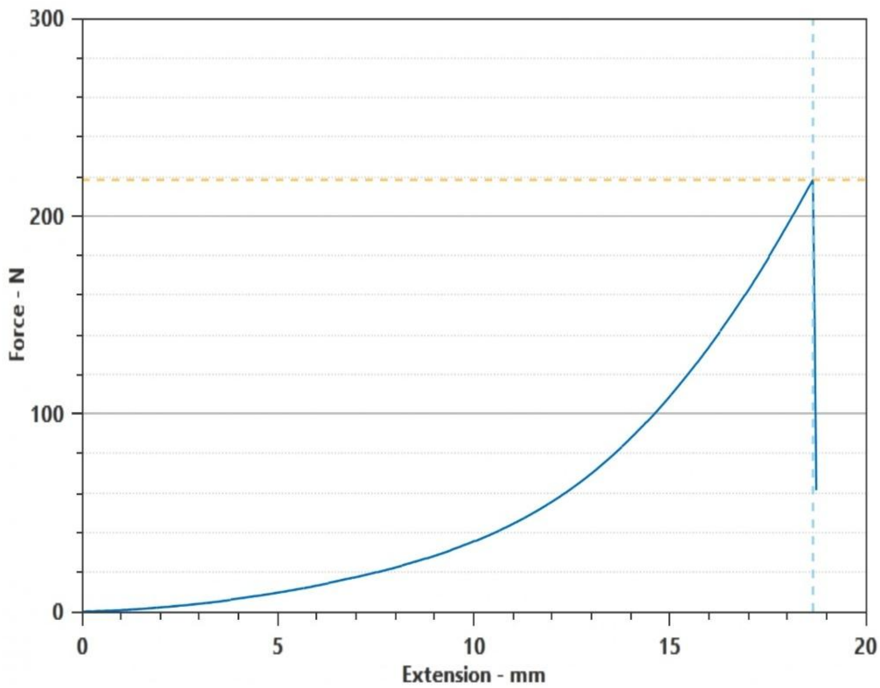
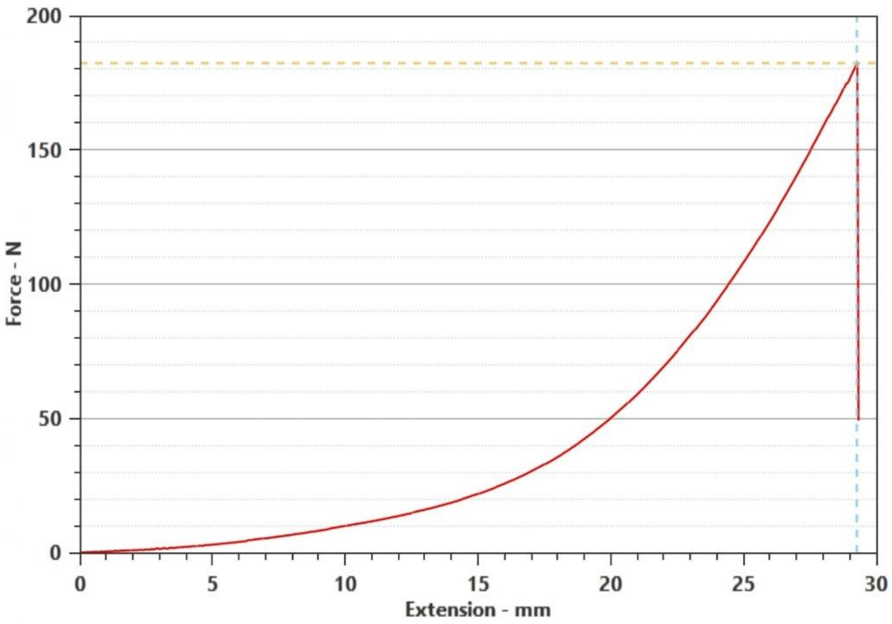


Figure 3.21 Zig-zag Weave Graph

©Daffodil International University

For Plain Weave,

Warp Graph



Weft Graph

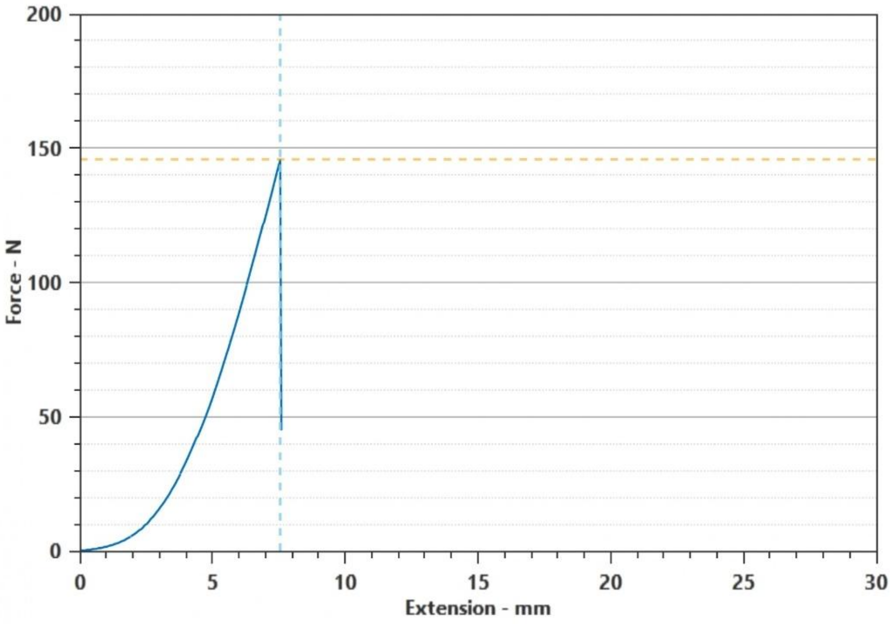
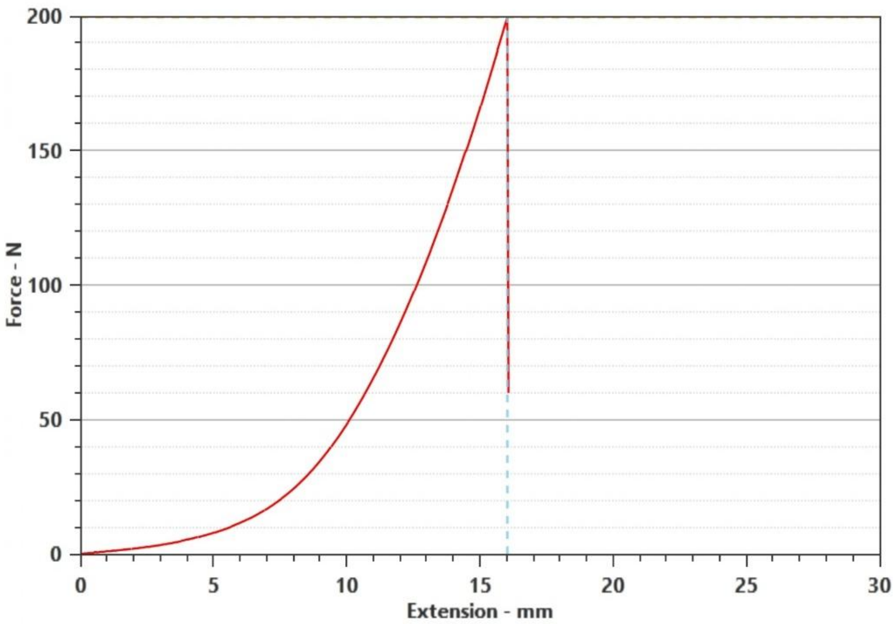


Figure 3.22 Plain Weave Graph

©Daffodil International University

For Matt Weave,

Warp Graph



Weft Graph

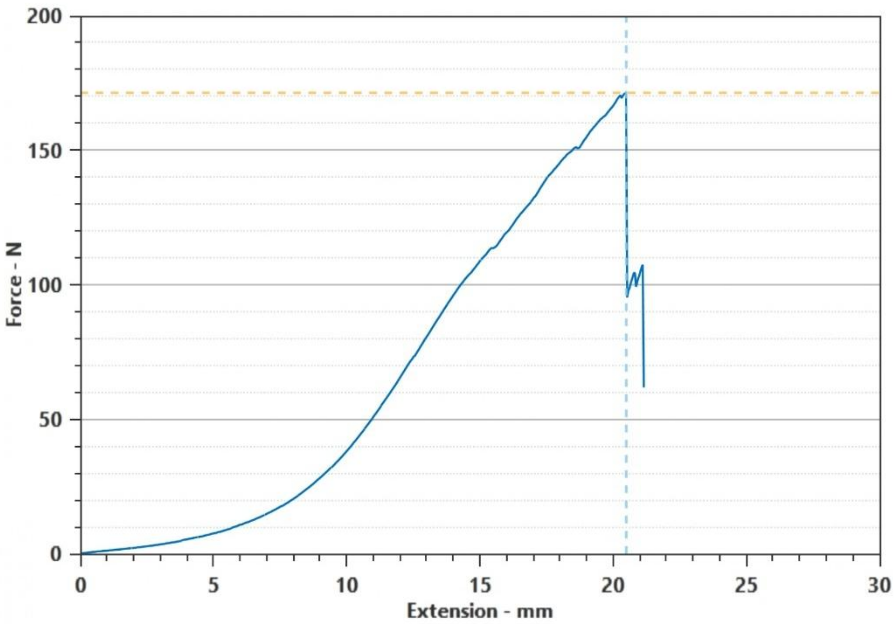
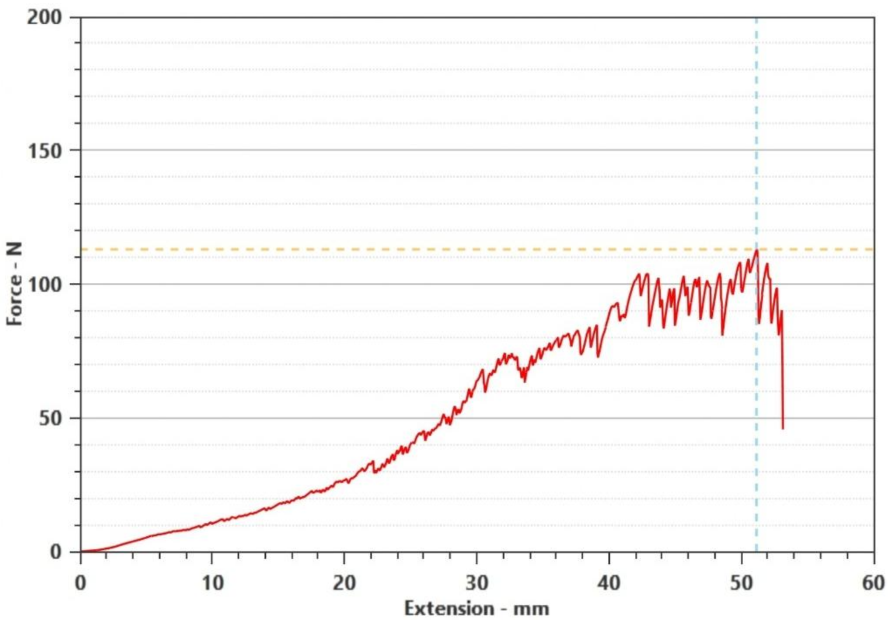


Figure 3.23 Matt Weave Graph

©Daffodil International University

For Satin Weave,

Warp Graph



Weft Graph

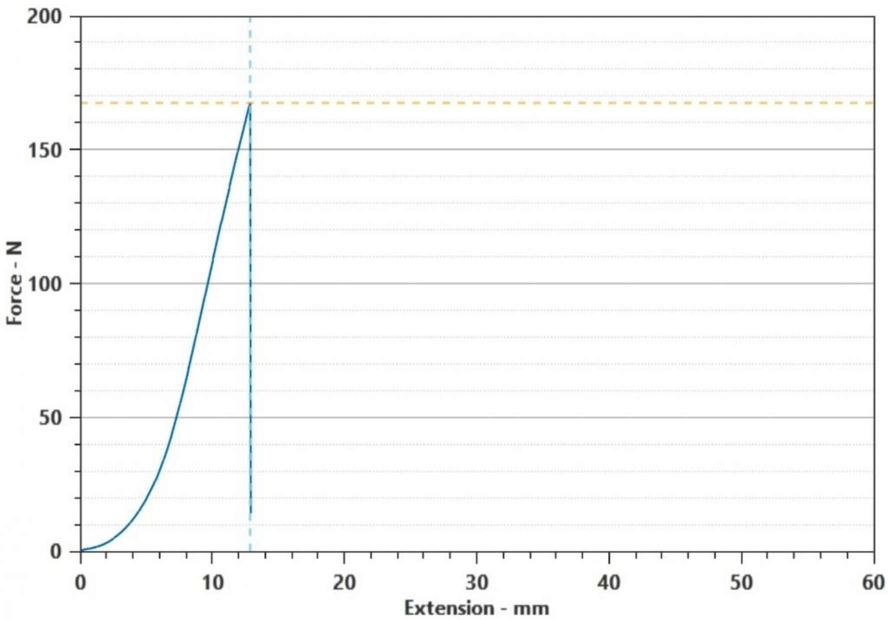
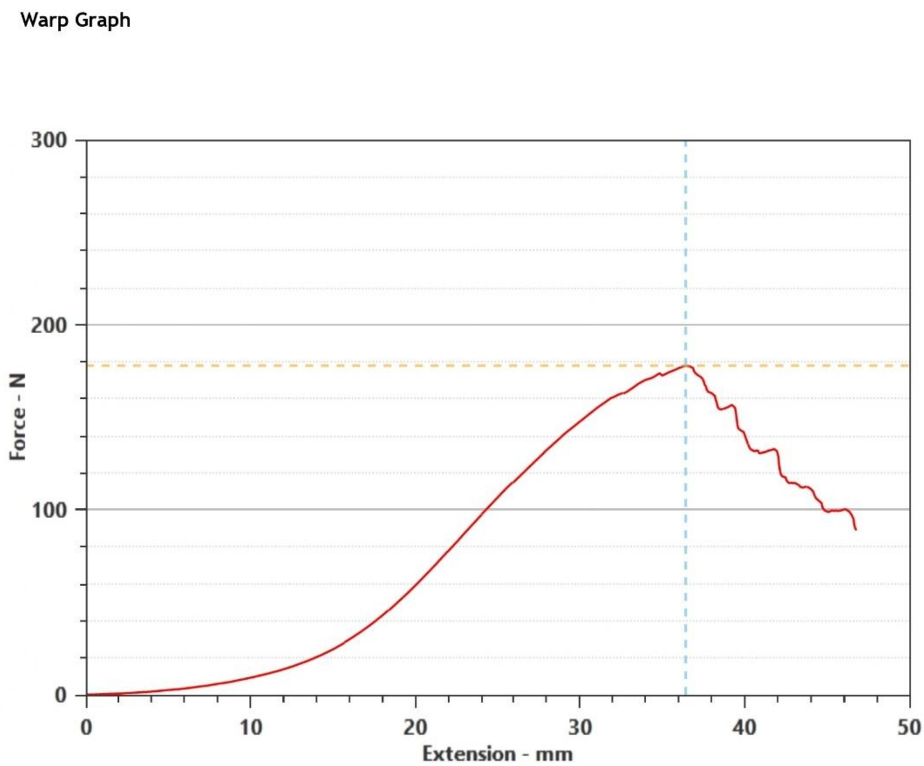


Figure 3.25 Satin Weave Graph

©Daffodil International University

For Dogs Tooth Weave,



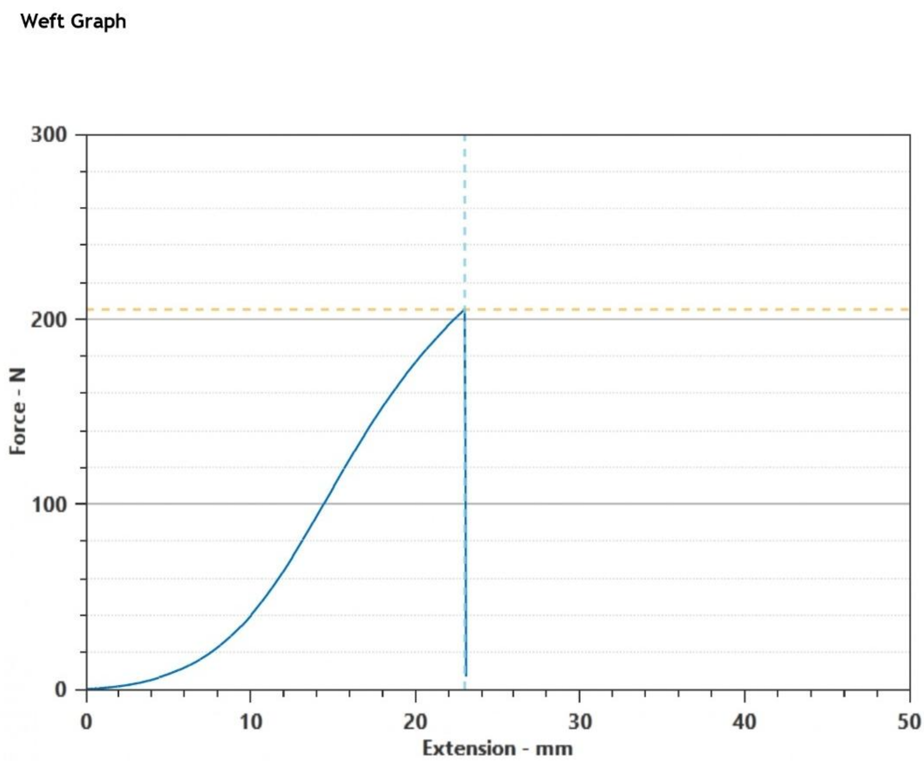


Figure 3.26 Dogs Tooth Weave

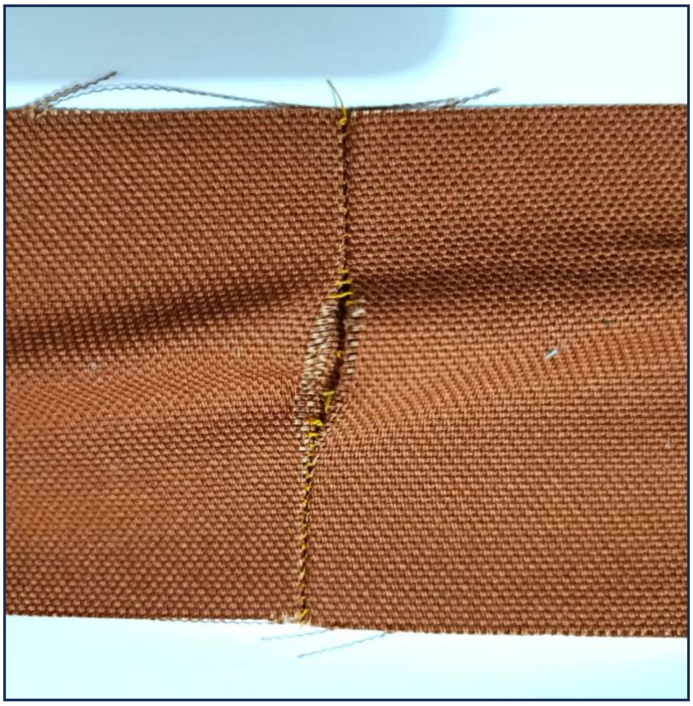
©Daffodil International University

4.4 Experimental Photo:

Herringbone weave

Zig-zag weave

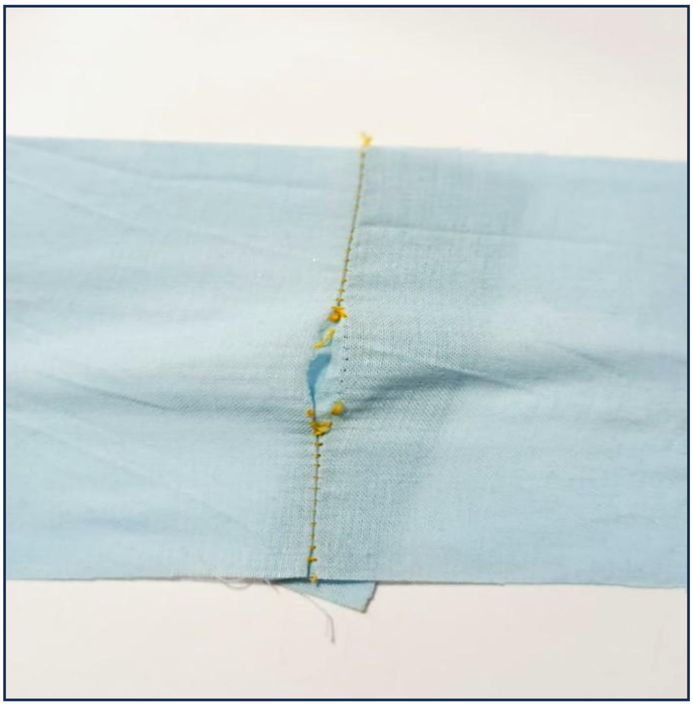
©Daffodil International University



Matt Weave

Satin Weave

©Daffodil International University



Plain weave

Dogs Tooth

©Daffodil International University

4.5 Discussion:

The results validate the fact that weave structure and interlacing density are key issues that determine the seam durability. Fabrics whose structure is well interlaced (plain weave) are more resistant to slipping of seams, whereas fabrics with long floats (satin, matt) are more likely to have their yarns moved. Ornamental weaves like herringbone and dog's teeth are a compromise of beauty and moderate seam strength, and cannot be compared to the dependability of plain weave. The fabrics with cotton content were mostly characterized by lower seam slippage as friction among the yarns was greater and the polyester ones were characterized by a high seam slippage because of their smooth surfaces. This implies that design of weaves and composition of fibers should be combined when designing fabrics to be durable. These results prove the fact that the structure of weave and fiber composition are crucial to the durability of seams. Fabrics that interlace more tightly will not allow opening of seams, whereas float-heavy structures can easily be displaced. Fabrics with more cotton tended to do better than fabrics with more polyester and it can be noted that the composition and the weave design can both influence the reduction of seam failures. Industrially the findings point to the fact that the collection of fabric and the making of seams should be optimized to minimize the percentage of garment rejection and enhance the quality of products. The high seam strength enables sustainability as it enhances the life of the garment and minimizes the waste of the textile.

©Daffodil International University

Chapter 5: Professional Responsibilities

5.1 Codes and Standards:

This work was conducted according to the international standards of textile testing. The assessment of seam slippage was done according to **ISO 13936-2: Textiles Determination of seam slippage resistance** and **ASTM D1683: Standard Test Method for Failure in sewn seams**. These codes allowed consistency, comparability and reliability of the results. Adherence to such standards also brings the project in line with what is happening in the industry, and the findings can be used in a real-life manufacturing environment.

5.2 Ethics and Health & Safety:

The ethical responsibility was upheld by making sure that experimental data were reported in an accurate way and not manipulated. There were transparency and integrity in all testing processes. Laboratory work was conducted with regard to health and safety where sewing machines, tensile testers, and sharp tools were handled safely. Risks of accidents have been minimized by proper training and supervision of the processes and the environmental conditions were under control to achieve reliable testing results.

5.3 Socio-cultural and Environmental Impacts:

The seam durability has a direct impact on the consumer confidence and the cultural views on the quality of the garments. Decorative weaves, including herringbone, zig-zag, dog teeth, etc., are considered to be beautiful, but their moderate seam strength points to the compromise between the beauty and functionality. Durable seams can also be used to conserve the traditional woven textiles and uphold cultural identity in most contexts. Poor seam performance has the environmental consequences of garment rejection, shortened lifespan and textile waste. Fabrics with a high percentage of cotton would work better yet they need sustainable farming and polyester fabrics contain microplastic. In general, the enhancement of seam durability decreases losses in the industry, increases consumer satisfaction, and helps to support the ethical and sustainable production of textiles, in accordance with the requirements of the UN Sustainable Development Goals.

©Daffodil International University

Chapter 6: Project Management and Finance

6.1 Work Breakdown and Timeline:

The timeline of the project was well structured to last between 22 to 35 days, which followed a clear schedule of tasks to accomplish accuracy, quality control and delivery on time. The significant activities and their estimated time are listed below:

Day 1-3: Theories and Pre-planning

- Selection of research topic.
- Identify Research Goal.
- Discussion with supervisor.
- Development of outline of first project.

Day 4-8 Background Study and Literature Review

- Gathering of pertinent research papers, books and testing standards.
- Survey of studies on seam slippage in woven fabrics.
- Work on the elaboration of a complex theoretical base.

Day 9-13: Preparation of Material and Sample

- Fabrics Herringbone, Matt, Satin, Zig - zag, Plain, Dogs Teeth.
- Plain Lockstitch machines: Cutting and sewing of samples.
- Updating of regular specimens with plain stitch seam.

Day 14-20: Laboratory Testing

- Testing Results Seam slippage test, which involves ISO 13936-2 (Fixed Load Method) and ASTM D1683 (Seam Strength Test).
- Application of Universal Tensile Testing Machine (UTM).
- Several repetitions done to achieve accuracy and reliability.

Day 21-25: Data Analysis

- Classifying and categorizing data received.
- Calculation of averages and the comparison of seam performance of the six fabrics that

©Daffodil International University

were woven.

- Drawing of tables and graphs to demonstrate differences.

Day 26-32: Report Writing

- Writing chapters: Introduction, Methodology, Results, Discussion and Professional Responsibilities.
- Figures, tables and formatting based on the format in the university.
- Day 33-35: Checking and Submission of Plagiarism.
- Editing and fixing of typing mistakes.

Day 33-35: Checking and Submission of Plagiarism

- Editing and fixing of typing mistakes.
- Final draft preparation.
- Similarity index check.
- Project submission.

6.2 Budget and Cost–Benefit:

The budget covered expenses on material purchase, thread, machine, and testing in the laboratory. Although first costs were average, the cost benefit analysis revealed that, increasing seam durability will lead to decreased garment rejection rates, greater consumer satisfaction and sustainable production. Therefore, the long-term gains are more than the short-term expenses.

6.3 Risk Management:

The risks that were considered were poor stitching, machine failure and variability of samples. These were addressed by being extremely careful in quality control, calibration of the machines and retest. Resiliency of the project was ensured by backup equipment and standardization procedures. Through open reporting, ethical risks like misrepresentation of data were prevented.

©Daffodil International University

Chapter 7: Conclusions and Recommendations

7.1 Conclusions:

In this paper, the seam slippage of six types of woven fabrics Herringbone, Matt, Satin, Zig-zag, Plain and Dogs teeth were studied with plain lockstitch seams that were tested in ISO 13936-2 and ASTM D1683 standards. The findings proved that the weave structure is a determining factor in seam durability. The highest number of interlacing points in plain weave gave minimum seam slippage whereas the long floats in satin and mat weaves had the highest seam opening. Such ornamental designs as herringbone, zig-zag, and dog's teeth were in between, offering some resistance but not as much as plain weave and somewhere between aesthetics and functional use. Seam performance was also dependent on fiber composition. Fabrics with a high content of cotton tended to resist unfolding of seams than fabrics with high content of polyester because of increased friction between the yarns whereas fabrics composed of polyester tended to give way to stress forces with ease. These observations point to the fact that the design and composition of the fiber should be regarded as a whole when designing fabrics to be durable. In an industrial sense seam failure has continued to be a key contributor to cloth rejection and seam and fabric optimization can reduce wastage, improve product quality and consumer satisfaction. High-quality seams also lead to the sustainability in terms of the longevity of the garments and decreasing the volume of waste of the textile, which aligns with the UN Sustainable Development Goals.

7.2 Recommendations:

According to its findings, some recommendations are possible. When it comes to applications that demand high seam durability, plain weave or cotton-rich should be given preference. The decorative weaves must be applied carefully in the high-stress sections of the garments, and the reinforcement must be made to strike the right balance between the looks and the performance. The decorative weaves must be applied carefully in the high-stress sections of the garments, and the reinforcement must be made to strike the right balance between the looks and the performance. These researches would help to increase the relevance of seam durability study and will yield more information at the academic and industrial levels.

©Daffodil International University

References

1. Daukantienė, V., & Lapinskienė, M. (2012). Influence of the deformation mode on seam slippage in woven fabrics. Fibers and Polymers, 13(8), 1086–1093. https://doi.org/10.1007/s12221-012-1086-8
2. Erayman Yüksel, Y., & Korkmaz, Y. (2019). Investigation of sewing and water repellent performance of outdoor clothing. International Journal of Clothing Science and Technology, 31(5), 693–704. https://doi.org/10.1108/IJCST-09-2018-0119
3. Islam, S., Chowdhury, S., & Akter, S. (2018). The Experiential Analysis of Woven Fabric for Reproduction. Journal of Textile Science and Technology, 04(01), 18–48. https://doi.org/10.4236/jtst.2018.41002
4. Kordoghli, B., Cheikhrouhou, M., & Kacem Saidene, C. (n.d.). MECHANICAL BEHAVIOUR OF SEAMS ON TREATED FABRICS. In AUTEX Research Journal (Vol. 9). http://www.autexrj.org/No3-2009/
5. Koženiauskiene, J., & Daukantiene, V. (2013). Influence of laundering on the quality of sewn cotton and bamboo woven fabrics. Medziagotyra, 19(1), 78–82. https://doi.org/10.5755/j01.ms.19.1.3831
6. Seram, N., & Nandasiri, T. (2015). A Comparison between Bonding and Sewing: Application in Sports Performance Wear. Journal of Academia and Industrial Research (JAIR), 3(8), 343. http://www.twi-
7. Zeynep YILDIZ, E. (n.d.). A STUDY ABOUT THE EFFECTS OF INTERLININGS TO SEWABILITY PROPERTIES OF THE WOVEN FABRICS TELANIN DOKUMA KUMAŞLARIN DİKİLEBİLİRLİK ÖZELLİKLERİNE ETKİSİ ÜZERİNE BİR ÇALIŞMA.

©Daffodil International University