



**Daffodil**  
*International*  
**University**

## **Faculty of Engineering**

**Department of Textile Engineering**

### **REPORT ON**

**Identifying a good quality reusable shopping bag among Taffeta,  
Knit and Denim fabrics.**

Courses Title: Capstone Project

Course Code: TE 400

*Submitted By:*

**Rifat – Ul – Inam**

Id: 221-23-1095

**Abdullah Al Noman**

Id: 221-23-1035

*Supervised By:*

**Md. Abdullah Al Mamun**

**Associate Professor**

Daffodil International University

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

**Advance in Apparel Manufacturing Technology**

# DECLARATION

We are sincerely declaring that this report (A study of taffeta fabric shopping bag development compared to knit and denim material) is our own original work. It has been prepared under the guidance and supervision of **Md. Abdullah Al Mamun**. We affirm this report has not been submitted to any institution or organization for any academic or professional purpose.



---

Abdullah Al Noman (221-23-1135)



---

Rifat -Ul-Inam (221-23-1095)

# Approval Sheet

This research, titled ‘A Study on the Suitability of Taffeta Fabric in Shopping Bag Development Compared to Knit and Denim Materials ’was conducted at Daffodil International University in December 2025. The report was prepared and submitted by **Abdullah Al Noman** (ID: 221-23-1135), **Rifat – Ul - Inam** (ID: 221-23-1195) as a partial fulfillment of the requirements for the degree of Bachelor in Science Textile Engineering. The research has been examined and is hereby recommended for approval and acceptance.



Supervisor

---

Md. Abdullah Al Mamun Associate Professor  
Department of Textile Engineering  
Daffodil International University

## **ACKNOWLEDGEMENT**

We sincerely express our gratitude to the Almighty for granting us the strength and perseverance to complete this thesis. Our heartfelt thanks go to our supervisor, Md. Abdullah Al Mamun, for his continuous guidance support and resources that made this work possible. We are also deeply grateful to the department of Textile Engineering at DIU for providing the academic

## **ABSTRACT**

The proposed research seeks to understand the applicability of Taffeta fabric in developing shopping bags through comparative research on knit and Denim fabrics. The research is centered on such key performance indicators as tensile strength, dimensional stability, abrasion resistance, bursting test, seam strength and construction behavior in general. In the course of thorough experimentation and analysis, it has been noticed that Taffeta material has better structural stability, an elegant look that makes it highly suitable where the shopping bag is required to be of high quality. On the contrary, knit fabrics, despite their softness and flexibility, are limited in terms of being low in rigidity and high in stretch tendency that influences shape retention and durability. Instead, denim is extraordinarily robust and sturdy, but lacks the charms of looks and portability, which can be valued in modern bag design. All in all, Taffeta proves to be a practical and multi-purpose option to strike a balance between the functionality and the aesthetics of wearables in the development of the bags.

# **Table of Content**

CHAPTER 1: INTRODUCTION .....	1
1.1 Background of the study .....	2
1.1.1 Problem Statement .....	2
1.2 Research Objectives .....	2
1.3 Scope of the study .....	2
1.4 Limitations: .....	3
CHAPTER 2: LITERATURE REVIEW .....	4
2.1 Literature Review .....	5
2.2 Basic Material Behavior and Fabric Constructions. ....	5
2.2.1 Knit Fabrics .....	5
2.2.2 Taffeta Fabrics .....	5
2.2.3 Denim Fabrics .....	6
2.3 Mechanical Performance Relevant to Quality of Shopping-Bags. ....	6
2.3.1 Tensile and Bursting Strength .....	6
2.3.2 Rubbing Fastness .....	6
2.3.3 Dimensional Stability .....	6
2.4 Literature and Implication Gaps on Thesis Work. ....	6
CHAPTER 3: METHODOLOGY .....	8
3.1 Research Framework .....	9
3.2 Testing Procedures .....	13
3.2.2 Tensile Strength Test .....	13
3.2.3 Dimensional Stability Test .....	13
CHAPTER 4: DEVELOPMENT & TECHNICAL PARAMER .....	16
4.1.1 Development Shopping Bag .....	18
4.2 Bag Development and Technical Specifications .....	19
4.3 Costing Analysis .....	21
CHAPTER 5: TEST AND ITS REPORT ANALYSIS .....	23
5.1 Bursting test of knit fabric .....	24
5.2 Dimensional Stability Test .....	25
5.2.1 Dimensional Stability Test of Taffeta Fabric .....	25
5.2.2 Dimensional Stability Test of Denim Fabric: .....	25
5.2.3 Dimensional Stability Test Of knit Fabric: .....	26

5.2.4 Comparison among Taffeta, Knit and Denim fabric dimensional stability test.....	26
5.3 Seam Strength Test .....	27
5.3.1 Seam Strength Test of Denim Fabric .....	27
5.3.2 Seam Strength Test Result Of Denim fabric.....	28
5.3.3 Description of seam strength test of denim fabric .....	30
5.4 Seam Strength Test of Taffeta fabric .....	31
5.4.1 Seam Strength Test report of taffeta fabric:.....	32
5.4.2 Description of Seam Strength Test Report of Taffeta.....	34
5.4.3 Tensile Strength Test Picture of Denim Fabric:.....	36
5.4.4 Tensile Strength Test report of denim fabric .....	37
5.4.5 Description Of tensile Strength Test of denim fabric .....	39
5.4.7 Tensile Strength Test report .....	42
5.4.8 Tensile Strength Test report of Taffeta fabric.....	44
5.4.7 Comparison Test report Among Denim, Knit and taffeta fabric.....	46
CHAPTER 6: RESULTS AND DISCUSSION.....	47
6.1 Comparative Performance Analysis.....	47
6.2 Efficiency in Production (SMV & Handling .....	48
6.3 Functional Durability vs. Intended Use .....	48
CHAPTER 7: ENVIRONMENTAL, SOCIAL & ECONOMIC IMPACT .....	50
7.1 Environmental Impact:.....	51
7.2 Social Impact: .....	51
7.3 Economic Impact .....	51
CHAPTER 8: CONCLUSION.....	52
8.1 Summary of Findings.....	53
8.2 Recommendation .....	53

## *List of Figure*

Figure 1: Experiment data of Taffeta Fabric.....	10
Figure 2: : Experiment data of Knit Fabric .....	11
Figure 3: : Experiment data of Denim Fabric .....	12
Figure 4: Sketch of our development.....	17
Figure 5: Denim fabric bag .....	18
Figure 6: Taffeta fabric bag .....	18
Figure 7: Knit Fabric Bag .....	18
Figure 8: Bursting test of knit fabric .....	24
Figure 9 : Dimensional Stability Test of Taffeta Fabric .....	25
Figure 10: Dimensional Stability Test Of knit Fabric:.....	26
Figure 11 :Seam Strength Test of Denim Fabric .....	27
Figure 12 :Seam Strength Test Result Of Denim fabric .....	28
Figure 13:Seam Strength Test Result Of Denim fabric graph chart .....	29
Figure 14 :Seam Strength Test of Taffeta fabric:.....	31
Figure 15 :Seam Strength Test repost of taffeta fabric .....	32
Figure 16 ; Seam Strength Test repost of taffeta fabric graph chart .....	33
Figure 17 :Tensile Strength Test Picture of Denim Fabric .....	36
Figure 18 :Tensile Strength Test report of denim fabric.....	37
Figure 19 :Tensile Strength Test report of denim fabric.....	38
Figure 20: Tensile Strength Test picture.....	41
Figure 21: Tensile Strength Test report .....	42
Figure 22 : Tensile Strength Test report graph chart .....	43
Figure 23: Rubbing fastness test of taffeta and denim fabric: .....	45

## *List of Table*

Table 1:Operation Breakdown and SMV	21
Table 2: Comparative Cost Summary	22
Table 3:Comparison among Taffeta, Knit and Denim fabric dimensional stability test	26
Table 4: Warp Direction Results	34
Table 5:Weft Direction Results	34
Table 6 : Warp Direction Results	39
Table 7 :Weft Direction Results	40
Table 8 :Warp Direction Results	44
Table 9 :Weft Direction Results	44
Table 10 :Research Data Comparison: Taffeta vs. Denim	44
Table 11 :Comparison Test report between Denim and taffeta fabric	46

# CHAPTER 1: INTRODUCTION

## **1.1 Background of the study**

The bag business has developed in a significant way since individuals desire to see a bag that is fashionable and one that is practical in their daily living. The current day shopping bags should be durable, lightweight, attractive and convenient. Conventionally, many products are made of Denim and knit fabrics, but both are somewhat restricted when applied to making bags. Denim is tough and heavy, and knit is flexible and not stable enough to the shape of a bag.

Due to these problems Taffeta fabric is getting popular. It is sleek, shiny, is lightweight, resistant to water, and retains its shape, which makes Taffeta a potential solution to the development of good quality shopping bags. This paper attempts to learn how Taffeta is doing in the market in relation to knit and Denim.

### **1.1.1 Problem Statement**

Excellent shopping bags should have excellent strength, stability in the shape, attractive outlook and fair price. Knit material is too stretchy and therefore bag shape is not stable. Denim has good strength but heavy, non-water resistant and dimensional stability is significantly low. Taffeta appears to be better balanced although there are not enough studies that compare it with Knit and Denim.

Therefore, whether taffeta is really appropriate in the production of shopping bags is the key issue.

## **1.2 Research Objectives**

### **Primary Objective:**

To check if Taffeta fabric is suitable for shopping bags when compared with Knit and Denim.

### **Secondary Objective:**

- To compare the physical properties of taffeta, knit and Denim.
- To Study consumption, SMV, and costing for each fabric.
- To analyze performance (Tensile Strength, dimensional stability, seam strength test, rubbing fastness, bursting test of knit)
- To check sustainability impact of the three fabrics.

## **1.3 Scope of the study**

- This study focuses only on Taffeta, Knit and Denim fabric used for shopping bags.
- It includes testing of strength, stability, consumption, SMV, costing, and basic sustainability.
- It does not include large factory testing or commercial market testing.

#### **1.4 Limitations:**

- Only a small number of samples were tested.
- Real factory condition was not available.
- Costing and SMV may vary in industry.
- Sustainability data is partly based on secondary sources.

## **CHAPTER 2: LITERATURE REVIEW**

## **2.1 Literature Review**

### **Introduction**

The reusable shopping bag performance varies as a result of a number of interacting factors such as mechanical strength tensile, bursting, abrasion, and seam strength, dimensional stability, fabric weight, manufacturing feasibility, cost and environmental impact. Since all forms of cloth production knitted, taffeta and denim have their own structural peculiarities, it also has separate advantages and disadvantages when it comes to the application of shopping-bags.

In order to describe the effect of fabric structure on the quality of a bag, and to outline the missing links in the current knowledge on this topic, this review combines the results of textile research and industry best practice.

## **2.2 Basic Material Behavior and Fabric Constructions.**

### **2.2.1 Knit Fabrics**

The interlacing of the yarns to form knit fabrics automatically forms a very stretchable, flexible as well as breathable clothing. This construction enables an elongation of the structure to a great extent under load, thus giving the structure a decreased tensile and bursting strength when compared to taffeta materials created using the same yarns.

The type of stitch, length of loop, twist of yarn as well as fiber composition have a strong impact on their mechanical properties. Although knits can be very comfortable and have great drapability, they are deformed when they are loaded or folded and used in two situations: light duty or foldable shopping bags unless you reinforce them with harder yarns, additional layers, or special webbing.

### **2.2.2 Taffeta Fabrics**

Taffeta is plain-woven clothing, and it is typically composed of nylon or polyester filaments. They are light and smooth and may be covered with the PU, silicone or acrylic to enhance the water, abrasion and surface smoothness.

Bags implications: Taffeta is good to use in lightweight bag that can be packed. Its weaknesses are that it has a low load capacity as compared to denim and it is also prone to sharp-edge abrasion unless it is reinforced.

### **2.2.3 Denim Fabrics**

Denim is a twill-woven cotton that is characterized by the diagonal weave and heavy yarns. These characteristics make denim have a high abrasion, tensile strength and withstand frequent washing. This means that denim bags are durable and presentable as compared to most taffeta fabrics.

But denim normally weighs more, is thicker and more costly to make. Mixed-denim can be used to enhance strength, reduce the rate of shrinkage and performance in general.

## **2.3 Mechanical Performance Relevant to Quality of Shopping-Bags.**

An ideal shopping bag should be able to withstand high levels of strains as long as it is in use. The following are the mechanical properties that are usually emphasized in research and testing standards:

### **2.3.1 Tensile and Bursting Strength**

Denim and taffeta fabrics have a greater tensile strength and a lesser elongation than knitted fabrics. Knit is elastic to a considerable extent and the elasticity is usually not all recoverable resulting in the knit sagging when moving a load that is not dynamic like the groceries.

Bursting strength is especially significant to knitted fabrics because their loop structure makes them expand in different directions when the pressure occurs.

### **2.3.2 Rubbing Fastness**

Denim and taffeta clothes tend to exhibit higher rubbing fastness than knit. The thick twill construction of denim gives the fabric high resistance to loss of color as well as surface damage when under friction. Taffeta is also a good fabric since it has a smooth and compact surface that minimizes the transfer of dyes. Denim and taffeta are better to be placed in reusable bags, which are exposed to handling and friction and have strong rubbing fastness. Since we worked with a gray knit fabric so we have not tested the rubbing fastness of taffeta.

### **2.3.3 Dimensional Stability**

We do dimensional stability of taffeta, knit and denim fabric. In dimensional stability test we determine the stability of the fabric. We test it at wash before and after wash of the fabric.

## **2.4 Literature and Implication Gaps on Thesis Work.**

Most of the existing studies focus on the attributes of fabrics in isolation, but not many are done on the performance of knitted fabrics, taffeta fabrics, and denim fabrics when they are

put together as real shopping bags using the same methods of construction.

Key gaps include:

- i. The lack of Full-Bag Performance Testing.  
Full-bag performance tests could not be done in this study because of limited time and resources. Nevertheless, it would be more realistic to test the entire bag as a whole - its handle strength, seam life and carrying capacity of the bag.
- ii. Only a Limited Testing on All possible Derivatives of Taffeta, Knit and Denim.  
Though Taffeta, Knit and Denim fabrics were tested, there were numerous other important derivatives that could not be done like the various types of weaves, knit structures and coating types. Expanding the testability of a variety of fabric derivatives would assist in determining more accurate material behavior and performance variations. The absence of simulation of long-term use is tabulated at
- iii. Long-term simulations like repeated loading, carrying cycles and multiple wash cycles were not incorporated in the study. Further research in this area should include adding these tests to give a better understanding of durability and life-cycle performance.

## **CHAPTER 3: METHODOLOGY**

### **3.1 Research Framework**

The research framework of this study was designed to systematically estimate the stability of Taffeta fabric for shopping bag development in comparison with Knit fabric and Denim fabric.

This framework follows a structured sequence of activities, ensuring scientific accuracy and reproducibility. The key stage included.

#### **3.1.1 Sample selection & Fabric Categorization**

Three commonly used fabric groups=Taffeta, Knit and Denim were selected based on availability, durability and relevance to bag production. Each fabric type represents a different structural mechanism.

- Taffeta- plain woven, crisp, lightweight, water-resistant
- Knit- loop-based, stretchable, flexible
- Denim- Twill woven, heavy-duty, rigid

#### **1. Prototype Development**

Identical prototype bags were constructed from each fabric to maintain consistency in shape, size, stitching and support. This allowed true compares of performance.

#### **2. Laboratory testing**

Standardized textile tests were conducted following ASTM, ISO and AATC test method. These tests measured physical, mechanical.

#### **3. Data Interpretation & Comparison**

Testing results and survey feedback were analyzed statistically. Comparative charts were prepared to identify the strengths and limitations of each fabric type.

#### **4. Final Evolution**

Based on all results, conclusions were made regarding the overall performance and market suitability for suitable reusable shopping bag development.

### 3.1.2 Sample Materials

We have collected taffeta, knit and woven fabric from our university laboratory.

#### i) Taffeta Fabric

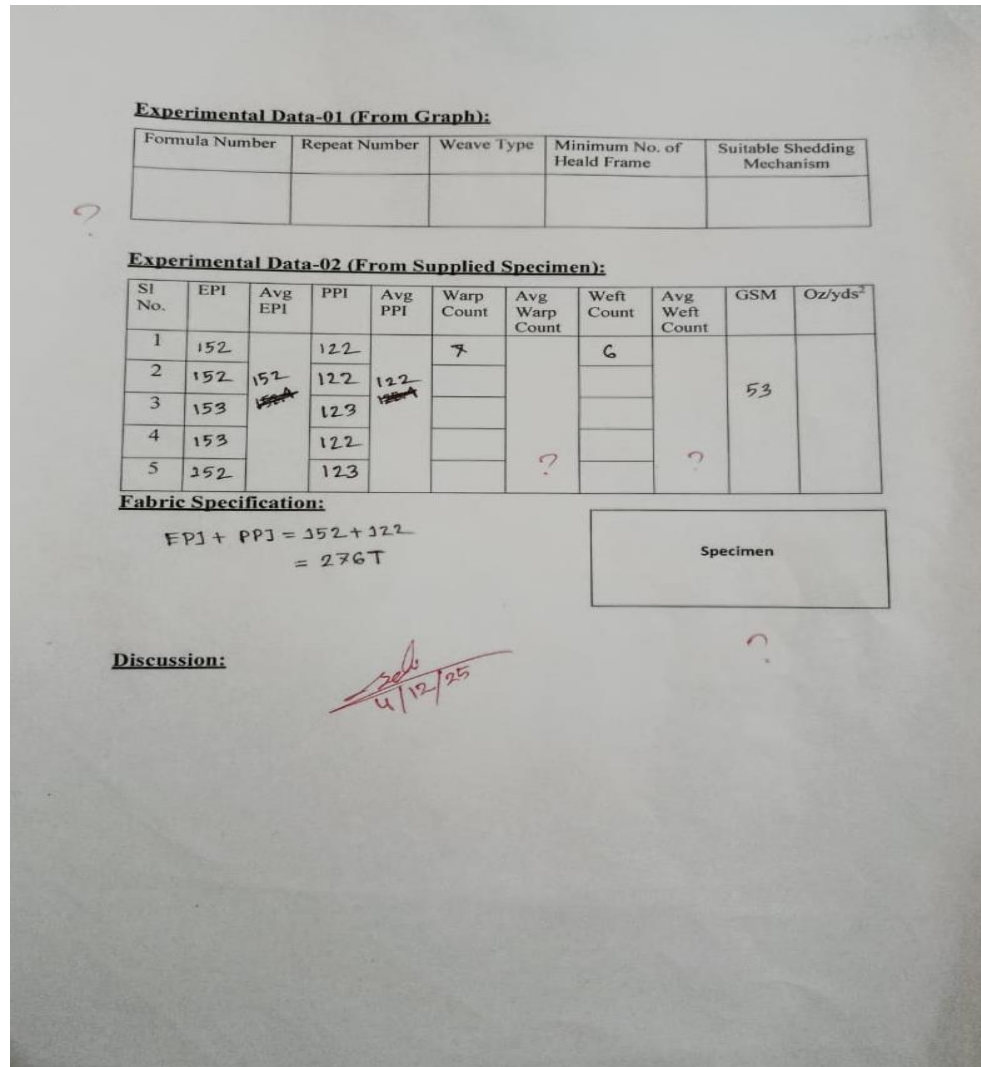


Figure 1: Experiment data of Taffeta Fabric

#### Structure of taffeta fabric: Plain weave

Composition : Polyester  
 GSM : 53  
 EPI : 152  
 PPI : 122  
 EPI+PPI : 276 T

#### Reason for selection:

Taffeta is commonly used for lining and lightweight bags. Its stiffness, dimensional stability tensile make it a good candidate for good quality shopping bag.

ii) Knit fabric

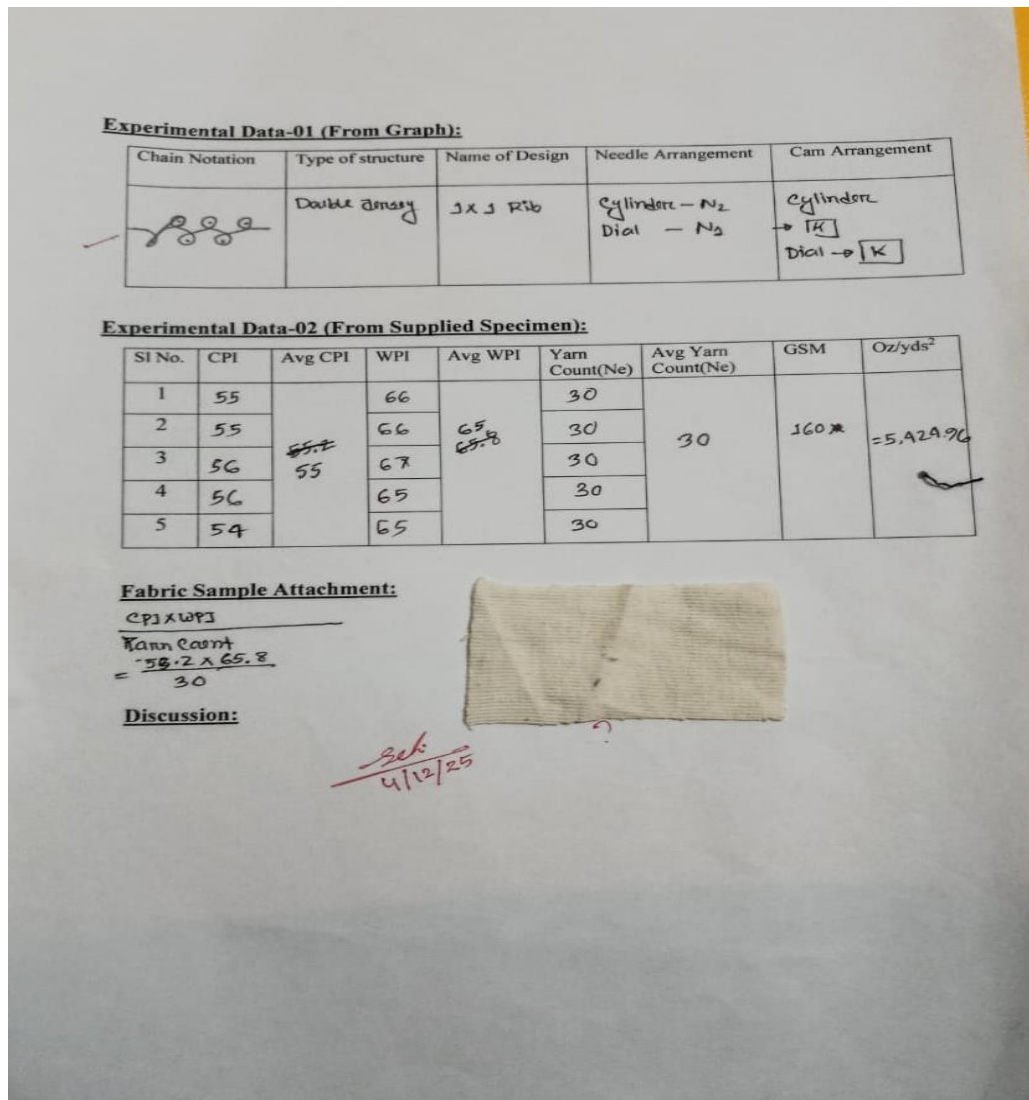


Figure 2: : Experiment data of Knit Fabric

**Structure Of knit fabric :1x1 Rib**

Composition : 100% cotton  
WPI : 66  
CPI : 55  
GSM : 160

**Reason for selection:**

Knit fabrics are rarely used for bags use to their lack of rigidity. They were included to compare performance differences with Taffeta.

iii) Denim fabric

**Experimental Data-01 (From Graph):**

Formula Number	Repeat Number	Weave Type	Minimum No. of Heald Frame	Suitable Shedding Mechanism
<del>3</del> 3 A	4x4	Z-twill	4	Tappete

**Experimental Data-02 (From Supplied Specimen):**

Sl No.	EPI	Avg EPI	PPI	Avg PPI	Warp Count	Avg Warp Count	Weft Count	Avg Weft Count	GSM	Oz/yds <sup>2</sup>
1	48	46	52	52	7	7	C	C	275	93.23
2	48		52		7		C			
3	47		53		7		C			
4	48		52		7		C			
5	49		52		7		C			

**Fabric Specification:**

$$\frac{\text{EPI} \times \text{PPI}}{\text{warp count} \times \text{weft count}} \times \text{Fabric width}$$

$$= \frac{46 \times 52}{7 \times 6} \times 60''$$



**Discussion:**

*Sub. 4/12/25*

Figure 3: : Experiment data of Denim Fabric

**Structure of denim fabric : Z Twill weave**

Composition : Cotton  
 EPI : 48  
 PPI : 52  
 GSM : 275

**Reason for Selection:**

Denim is a common choice for tote bags and casual fashion bags; therefore, it serves as a strong reference fabric for develop a shopping bag.

### 3.1.3 Prototype bag Specifications

All prototype bags were produced using:

- Same dimensions.
- Same stitching type (Single Needle Lock Stitch, Over lock machine).
- Same accessories (Zipper).

This ensured that performance differences come only from fabric type, not construction variations.

## 3.2 Testing Procedures

A series of standardized test were carried out to measure the essential performance characteristics of each fabric. All test followed internationally recognized test methods (ASTM, ISO, AATCC).

### 3.2.1 GSM (Grams per Square Meter) Test.

**Purpose:** For Identify the fabric weight and density.

**Procedure:** cloth cut samples in a constant size. Weight taken on digital GSM cutter. GSM obtained was calculated through the formula  $GSM = \text{Weight(g)} \times 1000 / \text{Area(cm)}^2$ .

**Significance:** An increased GSM normally implies enhanced power and endurance of bags.

### 3.2.2 Tensile Strength Test

**Purpose:** For identify the maximum load capacity of fabric.

**Procedure:** Sample on tensile testing machine. Keep on adding force until the sample tears. Strength was measured in Newton(N).

**Significance:** Tensile strength fabric is important as it gives better bag and strength. Establishes the resisting power of the fabric, when it is needed to handle or make straps.

### 3.2.3 Dimensional Stability Test

**Purpose:** Identify after wash fabric contraction or expansion.

**Procedure:** Sample dried and washed in controlled conditions. Pre-and post-length and width.

**Importance:**

Retains shape and avoids bag distortion.

### 3.2.4 Color Fastness to rubbing Test

**Purpose:** To determine the extent to which the color transfers on the surface of the fabric onto another substance during friction. Significant when bags are exposed to a lot of contact with the clothes and surfaces.

**Procedure:**

- Sample of fabric on crock meter.
  - White standard crocking cloth on rubbing finger.
  - Dry Rubbing: 10 rubs with minimum pressure.
  - Wet Rubbing: Wet pick-up (105% pick-up) wet cloth rubbed 10 times.
- Stain on crocking cloth measured by Gray Scale.

**Importance for bags:**

- Identify whether fabric color will be transferred on food item.
- Check the quality of the product and safety applied.

**3.2.5 Knit fabric Strength burst Test.**

**Purpose:**

To test the capability of knit fabric to resist bursting force of pressure in more than one direction at the same time. This test identifies the overall strength and lifetime of the fabric at the conditions of the multidirectional stress.

**Procedure:**

- Install clamp to machine at first on fabric sample. Rubber diaphragms give pneumatic pressure.
- Apply pressure in the final fabric bursting stage.
- The peak pressure prior to bursting record as bursting test.

**Importance for bag:**

Knit fabric stretch on more than one axis hence bursting strength is a better measure of strength compared to tensile strength.

- Indicate the extent to which the fabric can withstand pressure and swelling under usage.
- Critical in assessment persistence in uses of shopping bag.

**3.2.5 Seam Strength Test**

This is because it is a test that is carried out to determine the amount of force that the stitch seam can withstand before its breakdown. This test will be good to check whether the fabric and seam is good enough to be used as a shopping bag.

**Procedure:**

- Needs to trim sample with stitch seam.
- Fix the sample in tensile testing machine.
- Pulling force is exerted on the seam at either side of the machine.

The process of pulling is continued until the seam tears or the thread slips. Maximum force record in Newton or KGF.

**Importance for bag**

- This test will provide strength during the stretching and use.
- It is also useful in preventing problems such as the opening of seams, popping and thread break.

# **CHAPTER 4: DEVELOPMENT & TECHNICAL PARAMER**

## 4.1 Sketch of our development

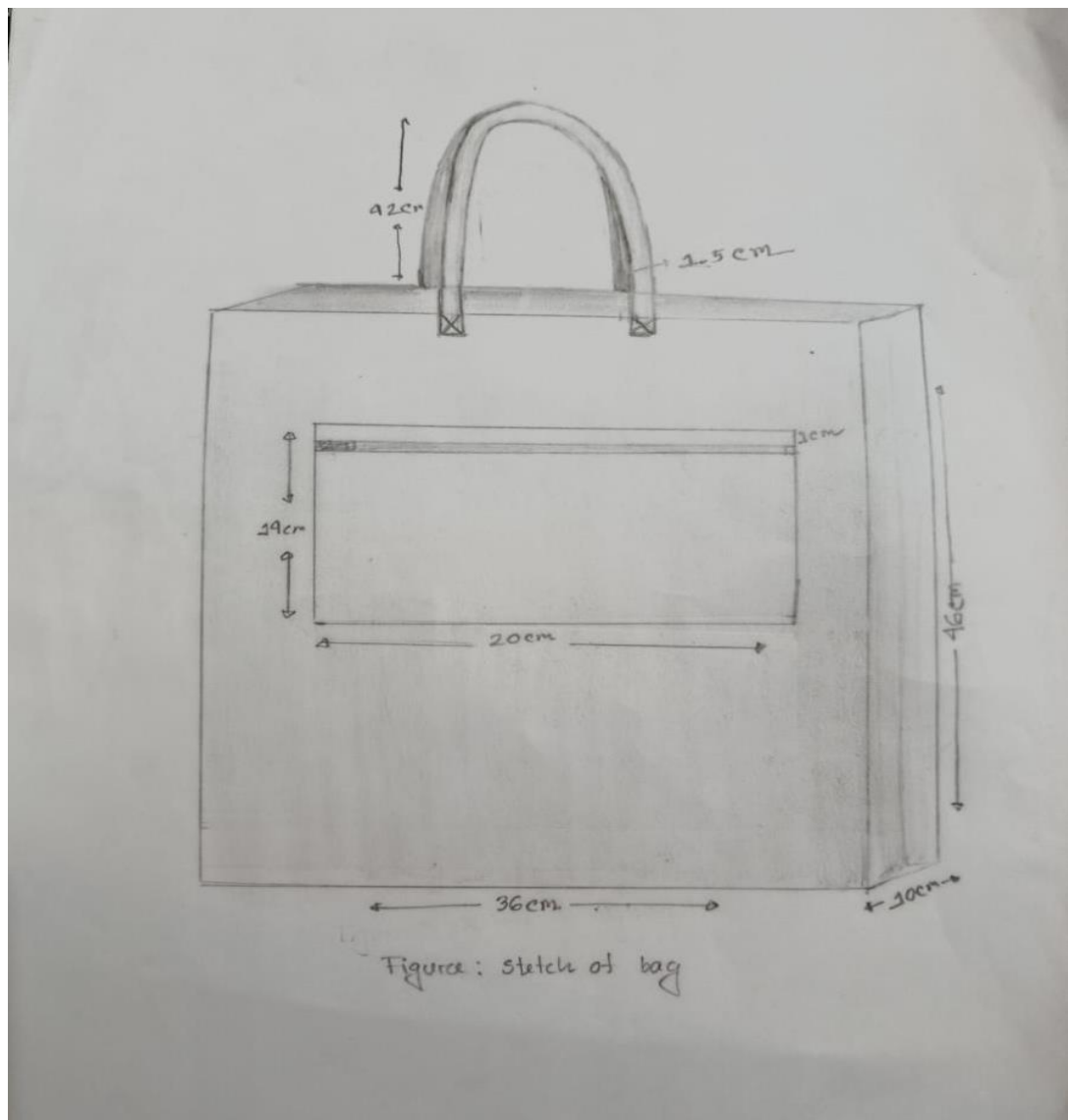


Figure 4: Sketch of our development

**This is our bag development sketch. Based on those measurement we have make our bags. The measurement describes in the below:**

1.	Length	46 cm
2.	Width	36 cm
3.	Gusset length	36 cm
4.	Gusset width	10 cm
5.	Pocket length	14 cm

6.	Pocket width	0 cm
7.	Handle length	48 cm
8.	Handle width	1.5 cm
9.	Pocket chain cover	1 cm

#### 4.1.1 Development Shopping Bag



*Figure 5: Denim fabric bag*



*Figure 7: Taffeta fabric bag*



*Figure 6: Knit Fabric Bag*

## 4.2 Bag Development and Technical Specifications.

The prototype created is an efficient fashion bag that can be used on a daily basis and is balanced between beauty and functionality. The following table presents the technical specifications of the pattern and construction of the samples in all the three types of fabric (Taffeta, Knit and Denim).

Technical Breakdown:

Dimensions of Body Panels: 46 cm (Length) × 36 cm (Width) (Finished dimensions)

Gusset: 36 cm (Width) × 10 cm (Length) ; 3 pcs

Front Pocket: 14 cm (Length) × 20 cm (Wide).

Handles: 42 cm (Length) × 2 cm (2 pieces; unfolded 3 cm width)

Chain Cover: 0.5 cm width

Seam Allowance (SA): 1 cm all over.

Zipper: Nylon zipper.

**The calculation of fabric consumption will be done as below:**

The math calculation was done to determine fabric consumption by applying specific pattern pieces and standard roll of fabric 60 cm (Taffeta and denim), knit fabric in KG. This arithmetic involves a 5 % wastage factor to production safety.

### 4.2.2 The calculation of the area is done step-by-step:

**1. Body Panels (2 pcs)**

Finished: 46 × 36 cm

Cutting (with 1 cm SA each side): 48 × 38 cm

Area = 48 × 38 × 2 = 3648 cm<sup>2</sup>

**2. Gusset (3 pcs)**

Finished: 36 × 10 cm

Cutting: 38 × 12 cm

Area = 38 × 12 × 3 = 1368 cm<sup>2</sup>.

**3. Front Pocket (1 pc)**

Finished: 14 × 20 cm

Cutting: 16 × 22 cm

Area = 16 × 22 = 352 cm<sup>2</sup>

**4. Handles (2 pcs)**

Given cutting: 42 × 3 cm

Area = 42 × 3 × 2 = 252 cm<sup>2</sup>

**5. Chain Cover**

SA = 1 cm all around cm both sides

### 6. Cutting Size:

$$\text{Width} = 0.5 + 2 = 2.5 \text{ cm}$$

$$\text{Length} = 15 + 2 = 17 \text{ cm}$$

$$\text{Area} = 2.5 \times 17 = 42.5 \text{ cm}^2$$

### Total Area

Part	Area (cm <sup>2</sup> )
Body panels	3648
Gussets	1368
Pocket	352
Handles	252
Chain Cover	42.5

$$\begin{aligned} \text{Total Area} &= 5620 + 42.5 \\ &= \mathbf{5662.5 \text{ cm}^2} \end{aligned}$$

Add 5% Wastage

$$\begin{aligned} \text{Wastage} &= 5662.5 \times 0.05 \\ &= \mathbf{283.1 \text{ cm}^2} \end{aligned}$$

$$\begin{aligned} \text{Net Area} &= 5662.5 + 283.1 \\ &= \mathbf{5945.6 \text{ cm}^2} \end{aligned}$$

### Convert to Meter

$$1 \text{ meter} = 10,000 \text{ cm}^2$$

$$\begin{aligned} \text{Fabric consumption} &= 5945.6 \div 10,000 \\ &= \mathbf{0.595 \text{ meters per bag}} \end{aligned}$$

### Final Fabric Consumption (with 5% wastage)

$$= 0.60 \text{ meter per bag (rounded)}$$

The Standard Minute Value (SMV) determines the efficiency of the manufacturing process. The SMV was derived by analyzing the individual process steps required to assemble the bag.

### Table4.1: Operation Breakdown and SMV

Serial	Process Description	Time (sec)	SMV
1	Front part attach with bottom part	7.5	0.125
2	Bottom part attach with back part	7.5	0.125
3	Left side part attach	10	0.166666667
4	Right side part attach	10	0.166666667
5	Hem joining	15	0.25
6	Handle making	10	0.166666667
7	Handle attach	14.5	0.241666667
8	Pocket both parts left attach	7.5	0.125
9	Pocket joining	70	1.166666667
10	Pocket button side part attach	5	0.083333333
11	Pocket attach with body	32	0.533333333
12	Attach zipper	30	0.5
13	Attach zipper cover	30	0.5
<b>Total Manufacturing Time</b>			<b>4.15</b>

*Table 1: Operation Breakdown and SMV*

### 4.3 Costing Analysis

A comparative costing analysis was conducted for Taffeta, Knit, and Denim bags.

**Note:** While the theoretical geometric consumption is approx. 0.85m (Section 4.2), the costing below utilizes an optimized industrial average consumption of 0.48m to reflect mass-production nesting efficiency.

#### Common Cost Factors:

#### Bag Costing with Fabric Type, GSM, Thread & Trims

##### 1. Knit Fabric Bag

Fabric Type: Knit

GSM: 160 g/m<sup>2</sup> (~4.72 oz/yd<sup>2</sup>)

Fabric Consumption: 0.48 m × 1.5 m width → 0.72 m<sup>2</sup> → 0.115 kg

Fabric Cost: 20 Tk (Fabric Rate ≈ 173.6 Tk/kg)

Labor Cost: 8 Tk

Sewing Thread: 2 Tk

Trims (Zipper, Buttons, etc.): 10 Tk

**Total Cost: 40 Tk**

## 2. Taffeta Fabric Bag

Fabric Type: Taffeta

GSM: 53 g/m<sup>2</sup> (~1.56 oz/yd<sup>2</sup>)

Fabric Consumption: 0.48 m × 1.5 m width → 0.72 m<sup>2</sup> → 0.038 kg

Fabric Cost: 25 Tk (Fabric Rate ≈ 47 Tk/yd)

Labour Cost: 10 Tk

Sewing Thread: 2 Tk

Trims (Zipper, Buttons, etc.): 10 Tk

**Total Cost: 47 Tk**

## 3. Denim Fabric Bag

Fabric Type: Denim

GSM: 275 g/m<sup>2</sup> (~8.11 oz/yd<sup>2</sup>)

Fabric Consumption: 0.48 m × 1.4 m width → 0.672 m<sup>2</sup> → 0.185 kg

Fabric Cost: 35 Tk (Fabric Rate ≈ 53 Tk/yd)

Labor Cost: 11 Tk

Sewing Thread: 2 Tk

Trims (Zipper, Buttons, etc.): 10 Tk

**Total Cost: 58 Tk**

**Table : Comparative Cost Summary**

Bag Type	Fabric Cost	Labor	Sewing Thread	Trims	Total	GSM (g/m <sup>2</sup> )	GSM (oz/yd <sup>2</sup> )	Fabric Rate
Knit	20 Tk	8 Tk	2 Tk	10 Tk	<b>40 Tk</b>	160	-	173.6 Tk/kg
Taffeta	25 Tk	10 Tk	2 Tk	10 Tk	<b>47 Tk</b>	-	1.56	47 Tk/yd
Denim	35 Tk	11 Tk	2 Tk	10 Tk	<b>58 Tk</b>	-	8.11	53 Tk/yd

*Table 2: Comparative Cost Summary*

## **CHAPTER 5: TEST AND ITS REPORT ANALYSIS**

## 5.1 Bursting test of knit fabric

Date: Tuesday, November 4, 2025  
Time: 2:34:08 PM

Created: Tuesday, November 4, 2025 2:36:00 PM

### James Heal - TruBurst Results ISO 13938-2 1999 Bursting Properties of Fabrics-Part 2

#### Specimen description here

Temperature: 20 °C  
Relative Humidity: 65%  
Weight: 0  
NTests: 3 / 5  
Diaphragm: 1.0mm  
Test Area: 7.3cm<sup>2</sup> (30.5mm Dia)  
Inflation Rate: 46kPa/s  
Correction Rate: 3kPa/s  
Burst Detect: Normal  
Clamp Pressure: 535 kPa  
Target Pressure: 0kPa  
Target Distension: 0.0mm

Test	kPa	mm	J
1	706.7	12.1	17.7
2	716.7	12.0	19.1
3	721.6	11.1	18.9
Mean	715.0	11.7	18.6
StdDev	7.6	0.6	0.7
Q95	18.9	1.4	1.8
Q95 Max	733.9	13.2	20.4
Q95 Min	696.2	10.3	16.7
CV%	1.1	4.9	4.0

Diaphragm Correction: 75.0kPa  
Instrument Model: 0  
Instrument Serial:  
Software Version: 2.0.3.0  
Hardware Version:

Figure 8: Bursting test of knit fabric

### Description of the bursting strength test report:

This report shows the bursting strength of a fabric tested using James Heal TruBurst machine under ISO 13938-2:1999 standard.

Testing was done at 20-degree, 65% RH, with 3 valid tests out of 5.

#### Key results:

**Bursting pressure (Mean):** 715.0 kPa

**Bursting Distension (Mean):** 11.7 mm

**Energy (Mean):** 18.6 J

Variation is low (CV% around 1-5%) meaning the results are consistent

**Results:** The fabric shows high and consistent bursting strength, indicating good resistance to multi-directional pressure and suitability for applications requiring durability.

## 5.2 Dimensional Stability Test

### 5.2.1 Dimensional Stability Test of Taffeta Fabric

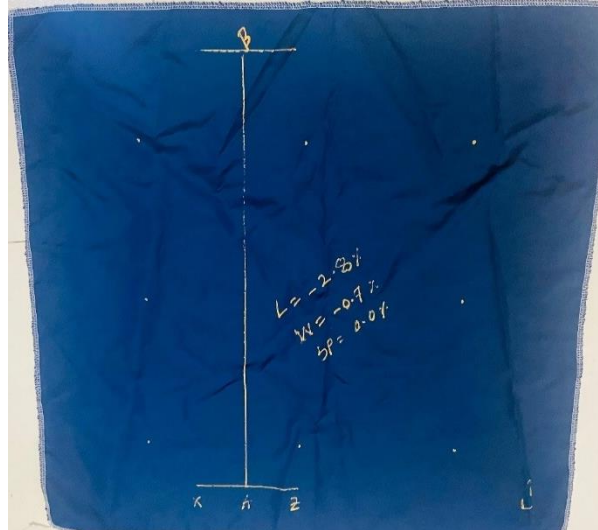


Figure 9 : Dimensional Stability Test of Taffeta Fabric

#### Description of the test:

In the dimensional stability test of taffeta fabric **length wise shrinkage  $-2.8\%$ , width wise shrinkage  $-0.7\%$ , and spirality result is  $0.0\%$**

### 5.2.2 Dimensional Stability Test of Denim Fabric:



Figure 7: Dimensional Stability Test of Denim Fabric

#### Description of the test:

In the dimensional stability test of denim fabric length wise shrinkage is =-9.8%  
Width wise shrinkage is =-14.5% and spirality result is .5%

### 5.2.3 Dimensional Stability Test Of knit Fabric:

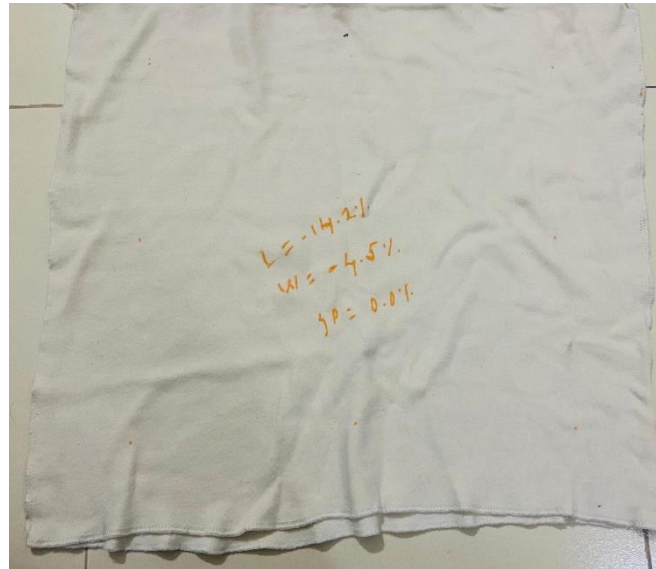


Figure 10: Dimensional Stability Test Of knit Fabric:

#### Description of the test:

In the dimensional stability test of knit fabric length wise shrinkage is =-14.2 %  
Width wise shrinkage is = -4.5% and spirality result is =0.0 %

### 5.2.4 Comparison among Taffeta, Knit and Denim fabric dimensional stability test

Sample	Length Wise direction	Width Wise direction	Spirality Test	Overall Change Trend
Taffeta fabric	-2.80%	-0.70%	0.0%	Least Change / Most Stable
Knit Fabric	-14.20%	-4.50%	0.0%	Highest Lightness Change (Fading)
Denim Fabric	-9.80%	-14.50%	0.50%	Highest Overall shape Change (W)

Table 3: Comparison among Taffeta, Knit and Denim fabric dimensional stability test

In this comparison among taffeta, knit and denim fabric we can see in the length wise test taffeta give a good result, also width wise direction is good spirality is 0.0.%. So, we can say taffeta is better among of them.

## 5.3 Seam Strength Test

### 5.3.1 Seam Strength Test of Denim Fabric



*Figure 11 :Seam Strength Test of Denim Fabric*

## 5.3.2 Seam Strength Test Result Of Denim fabric

### EN ISO 13935-2

Date: 1999

Determination of maximum force to seam rupture using the grab method

#### Test Details

Test Name:	Seam Strength	Print Date:	11/9/2025
Material:	Denim fabric	Jaw Pressure:	100
Specimens:	3	Load Cell:	5000 N
Required Direction(s):	Both	Load Cell SN:	1126095
Test Time:	10:47 PM	Version:	11.0.3.0
Test Date:	11/9/2025	Firmware:	v1.00p36
Jaw Scheme:	T27	Titan SN:	Daffodil International University Administrator
Jaw Separation(s):	100.00	Tested by:	
Force Control Gain:	25		

#### Procedure Settings

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

#### Warp Results

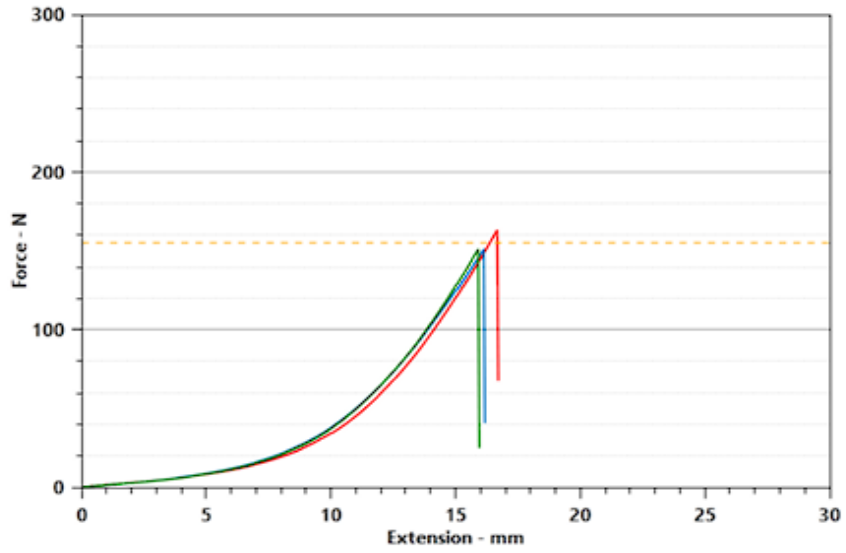
Specimen	Maximum Force (N)	Elongation at Max. Force (mm)
1	163.33	16.66
2	151.29	16.12
3	151.24	15.91
Mean	155.29	16.23
Conf Limits	± 17.31	± 0.962
Coeff Of Var	4.487%	2.386%

#### Weft Results

Specimen	Maximum Force (N)	Elongation at Max. Force (mm)
1	205.13	19.03
2	203.62	19.99
3	216.19	19.87
Mean	208.31	19.63
Conf Limits	± 17.04	± 1.293
Coeff Of Var	3.292%	2.651%

Figure 12 :Seam Strength Test Result Of Denim fabric

Warp Graph



Weft Graph

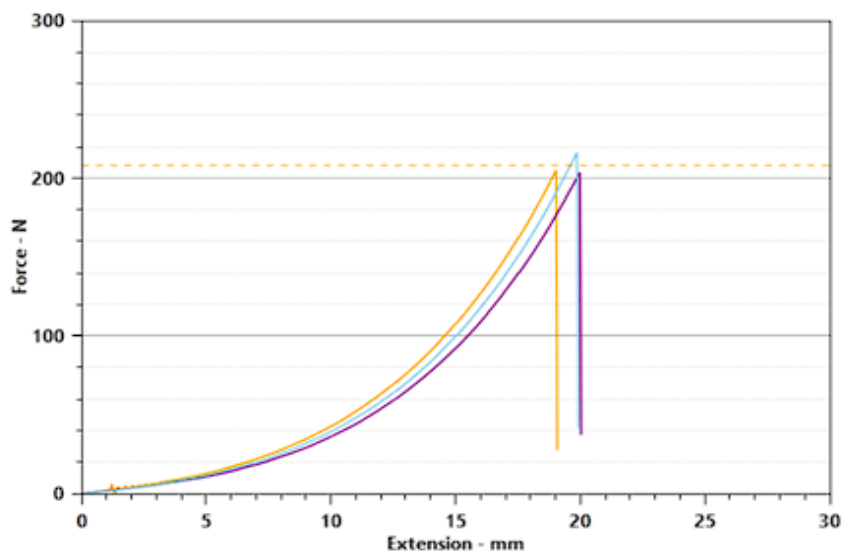


Figure 13: Seam Strength Test Result Of Denim fabric graph chart

### 5.3.3 Description of seam strength test of denim fabric

**Test Overview** The seam strength of the Denim fabric was tested as per the standard of EN ISO 13935-2 (1999) with the standard of grab method to test the maximum force needed to tear up the seam. This experiment was accomplished with a James Heal Titan Universal Strength Tester with a jaw separation of 100 mm and a test speed 50 mm/min

**Warp Direction Results** In the warp direction, the denim fabric exhibited an average maximum seam rupture force of 155.29 N. Mean elongation of the point of maximum force was found to be 16.23 mm. The Coefficient of Variation (CV) was 4.487% which was moderate in consistency of the three tested specimens.

- Maximum Force (Mean): 155.29 N
- Elongation at Break: 16.23 mm

**Weft Direction Results** The resistance to the seam rupture of the weft direction was higher than that of the warp direction. The average force (maximum) was 208.31 N and the elongation was 19.63 mm. Findings in this direction were higher and CV% was lower at 3.292.

- Maximum Force (Mean): 208.31 N
- Elongation at Break: 19.63 mm

**Graphical Analysis** The curves of stress-strain (Figure no:11) show that it is not a linear behavior.

**Warp Graph:** The force gradually increases on a curve then sharply, at about 16mm extension, the failure.

**Weft Graph:** This is a graph that represents a steeper and longer curve meaning that the weft nearest to the applied load and the interaction with the seam offered more resistance to that load than the warp direction did.

#### 5.4 Seam Strength Test of Taffeta fabric



*Figure 14 :Seam Strength Test of Taffeta fabric:*

## 5.4.1 Seam Strength Test repost of taffeta fabric:

### EN ISO 13935-2

Date: 1999

Determination of maximum force to seam rupture using the grab method

#### Test Details

Test Name:	Seam Strength	Print Date:	11/9/2025
Material:	Tafeta Fabric	Jaw Pressure:	100
Specimens:	3	Load Cell:	5000 N
Required Directions:	Both	Load Cell SN:	1126095
Test Time:	10:40 PM	Version:	11.0.3.0
Test Date:	11/9/2025	Firmware:	v1.00p36
Jaw Scheme:	T27	Titan SN:	Daffodil International University Administrator
Jaw Separation(s):	100.00	Tested by:	
Force Control Gain:	25		

#### Procedure Settings

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

#### Warp Results

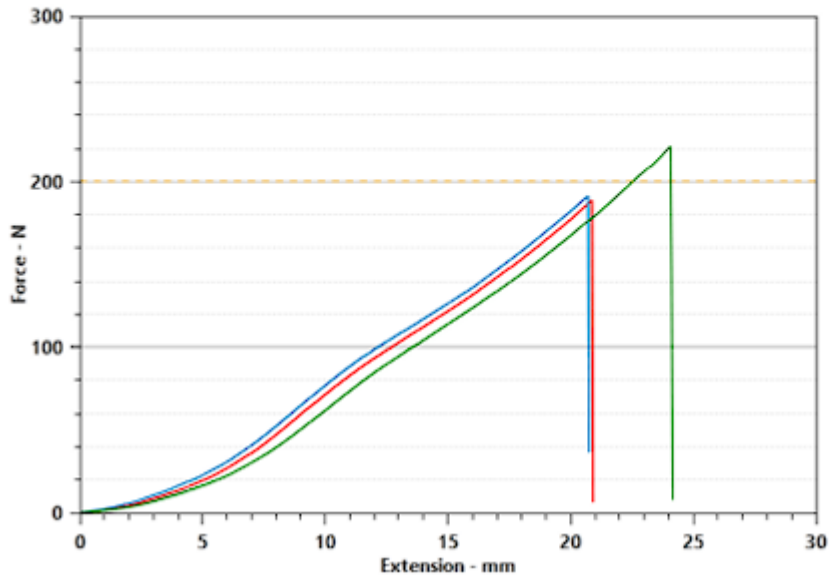
Specimen	Maximum Force (N)	Elongation at Max. Force (mm)
1	188.74	20.87
2	191.36	20.70
3	221.28	24.08
Mean	200.46	21.88
Conf Limits	± 44.91	± 4.726
Coeff Of Var	9.018%	8.694%

#### Weft Results

Specimen	Maximum Force (N)	Elongation at Max. Force (mm)
1	203.32	17.41
2	190.71	15.99
3	174.38	15.12
Mean	189.47	16.17
Conf Limits	± 36.04	± 2.874
Coeff Of Var	7.656%	7.153%

Figure 15 :Seam Strength Test repost of taffeta fabric

Warp Graph



Weft Graph

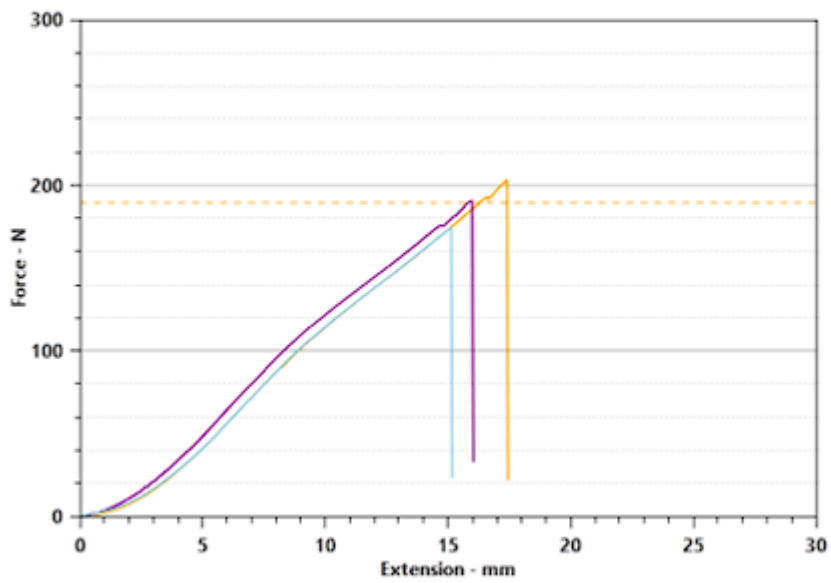


Figure 16 ; Seam Strength Test repost of taffeta fabric graph chart

## 5.4.2 Description of Seam Strength Test Report of Taffeta

### General Test Information

- **Test Standard:** EN ISO 13935-2 (1999)
- **Paint Tested:** Taffeta Fabric.
- **Test Date:** November 9, 2025
- **Equipment:** James Heal Titan (Universal Strength Tester)
- **Test Type:** Seam Strength (Grab Method)

### 2. Procedure Settings

These parameters define how the machine performed the test.

- **Speed:** 50.00 mm/min (The rate at which the fabric was pulled).
- **Jaw Separation:** 100.00 mm (The initial distance between the clamps).
- **Break Detection:** 50% (When the force decreases by half past the peak the test stops).
- **Jaw Pressure:** 100 (Makes sure that the fabric is not slipping).

### 3. Warp Direction Results

The Warp yarns run lengthwise in the fabric. This direction showed slightly higher strength and elongation compared to the weft.

- **Mean Maximum Force (Seam Strength):** 200.46 N.
- **Mean Elongation at Max Force:** 21.88 mm
- **Consistency (CV):** Coefficients of Variation of force is 9.018 which means there is a variation between the three samples under test (Value range: 188.74 N to 221.28 N).

Specimen	Max Force (N)	Elongation (mm)
1	188.74	20.87
2	191.36	20.70
3	221.28	24.08

Table 4: Warp Direction Results

### 4. Weft Direction Results

The Weft yarns run crosswise. The strength is slightly lower than the warp direction.

- **Mean Maximum Force (Seam Strength):** 189.47 N.
- **Mean Elongation Max Force:** 16.17 mm.
- **Consistency (CV%):** the Coefficient of Variation of force is 7.656 that is notation that indicates that the weft direction is a little more consistent than the warp direction.

Specimen	Max Force (N)	Elongation (mm)
1	203.32	17.41
2	190.71	15.99
3	174.38	15.12

Table 5: Weft Direction Results

## 5. Graphical Analysis (Image 2)

The second picture shows the curves of stress-strain of the tests.

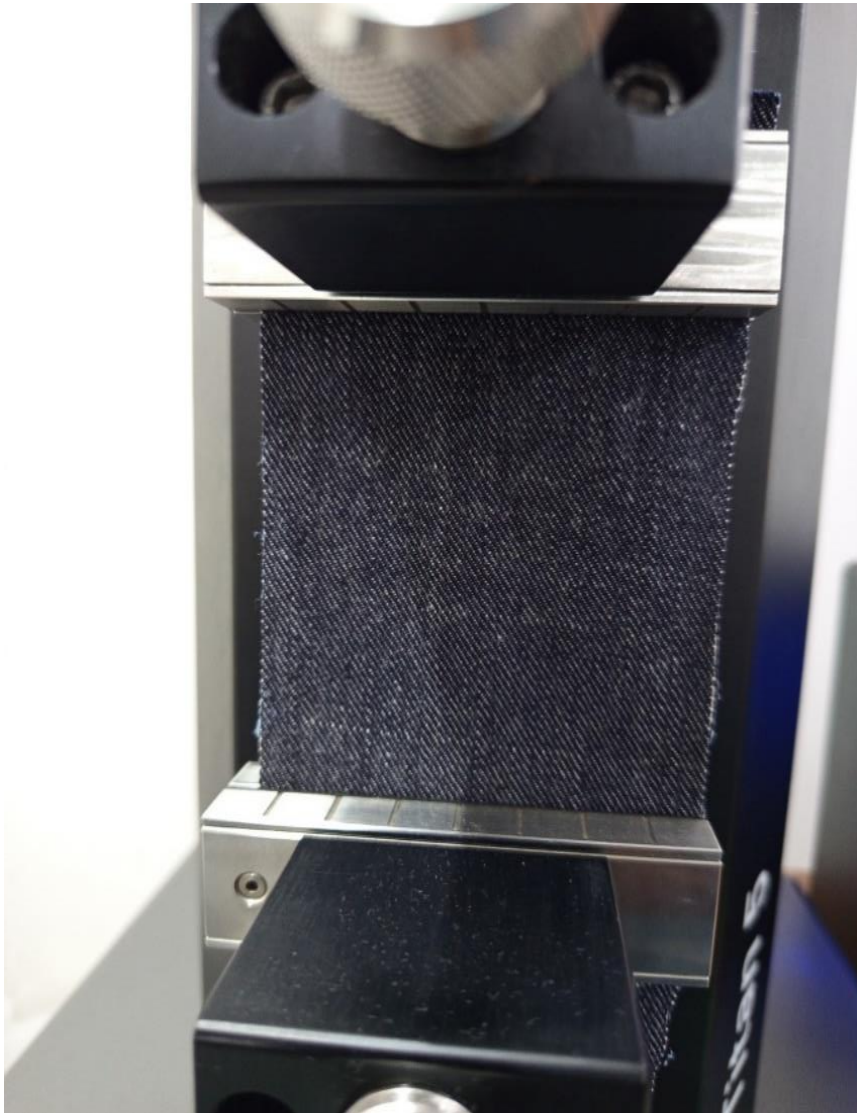
- **Warp Graph:** The curves are very gradual in the extent of force against extension. The lines are clear with the difference as indicated in the CV%. The highest extension is 20mm to 25mm and then suddenly (rupture) the extension decreases sharply.
- **Weft Graph:** These curves are steeper in comparison to the warp curves, which means that the fabric is not so stretchy in the weft direction. The rupture comes at an earlier stage of 15mm to 17mm of extension.

### Summary for Research

For your Taffeta fabric study:

- **Warp Seam Strength:** ~200 N
- **Weft Seam Strength:** ~189 N
- **Results:** The cloth is evenly matched in strength of its seams and the Warp direction is about 5.8% stronger and much more extensible (stretchy) than the Weft direction.

### 5.4.3 Tensile Strength Test Picture of Denim Fabric:



*Figure 17 :Tensile Strength Test Picture of Denim Fabric*

## 5.4.4 Tensile Strength Test report of denim fabric

### EN ISO 13934-2

Date: 2014

Determination of maximum force using the grab method

#### Test Details

Test Name:	Tensile Strength	Print Date:	11/10/2025
Material:	Denim Fabric	Jaw Pressure:	100
Specimens:	3	Load Cell:	5000 N
Required Directions:	Both	Load Cell SN:	1126095
Test Time:	12:27 AM	Version:	11.0.3.0
Test Date:	11/10/2025	Firmware:	v1.00p36
Jaw Scheme:	T27	Titan SN:	Daffodil
			International
			University
			Administrator
Force Control Gain:	25	Tested by:	

#### Procedure Settings

Break Detection:	20 %
Pull To Load Cell Maximum Speed:	50.00 mm/min

#### Warp Results

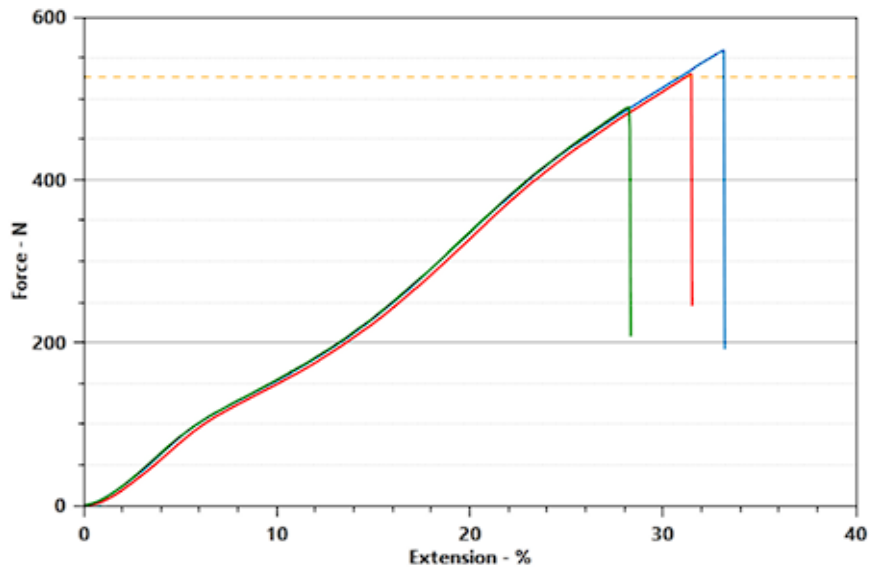
Specimen	Maximum Force (N)	Elongation at Max. Force (%)
1	935.26	27.49
2	842.65	27.95
3	987.36	29.74
Mean	921.76	28.39

#### Weft Results

Specimen	Maximum Force (N)	Elongation at Max. Force (%)
1	515.47	17.12
2	499.18	18.87
3	520.55	18.49
Mean	511.73	18.16

Figure 18 :Tensile Strength Test report of denim fabric

Warp Graph



Weft Graph

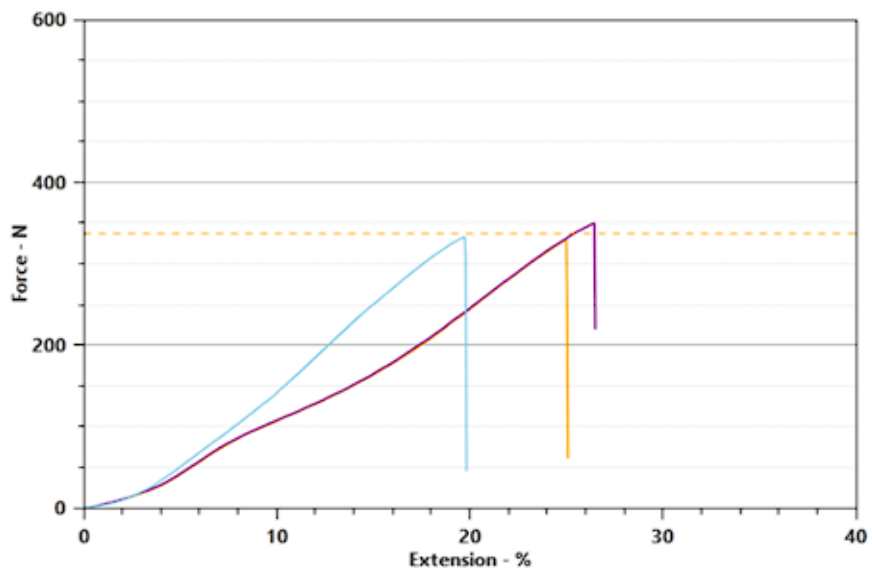


Figure 19 :Tensile Strength Test report of denim fabric

## 5.4.5 Description Of tensile Strength Test of denim fabric

Important Research Note:

This report is of Tensile Strength (Standard EN ISO 13934-2) but the earlier Taffeta report you have sent me was of Seam Strength (Standard EN ISO 13935-2).

- **Tensile Strength:** This is a measure of the strength of the fabric itself before it tears.
- **Seam Strength:** This is a measurement of the strength of stitching/seam before tearing.
- **Implication-** In your comparative study, you are best to compare something like- Tensile vs. Tensile or Seam vs. Seam so that you would get the best results. It would not be a fair comparison to compare the 200 N Seam Strength of Taffeta with the 921 N Tensile Strength of Denim.

### 1. General Test Information

- **Test Standard:** EN ISO 13934-2 (Maximum force by grab method).
- **Material:** Denim Fabric.
- **Test Date:** November 10, 2025.
- **Instruments:** James Heal Titan (Universal Strength Tester).
- **Test Mode:** Tensile Strength (Grab Method).

### 2. Procedure Settings

- **Speed:** 50.00 mm/min.
- **Break Detection:** 20%(Test stops when the force reduces by 20 percent after the peak).
- **Jaw Pressure:** 100.

### 3. Warp Direction Results (Lengthwise)

Warp direction is much more powerful and elastic as compared to Weft which is characteristic of Denim constructions (twill weave).

- **Mean Maximum Force (Tensile Strength):** 921.76 N.
- **Mean Elongation at Max Force:** 28.39 %
- It is strong (almost 1 kN) indicating the heavy-duty characteristic of Denim.

Specimen	Max Force (N)	Elongation (%)
1	935.26	27.49
2	842.65	27.95
3	987.36	29.74

Table 6 : Warp Direction Results

#### 4. Weft Direction Results (Crosswise)

The Warp direction is approximately half as strong as the Weft direction.

- **Mean Maximum Force (Tensile Strength):** 511.73 N.
- **Mean Elongation at Max Force:** 18.16 %

Specimen	Max Force (N)	Elongation (%)
1	515.47	17.12
2	499.18	18.87
3	520.55	18.49

*Table 7 :Weft Direction Results*

#### 5. Graphical Analysis (Image 1)

- **Data Discrepancy:** The graphs in the first image indicate that it has lower peak forces (similar to 550 N in the case of Warp) than the data table in the second image (similar to 921 N in the case of Warp). In your research paper, use the Table (Section 3, and 4 above) because it has the explicit values of the statistical mean.
- **Warp Graph:** Linear increase in the force till the rupture point. The extension is **Warp Graph:** increased (up to approximately 30-35 percent on the graph).
- **Weft Graph:** Reveals a steeper increase yet collapses at a significantly lower force and at a lower extension (approximately 20-25%).

#### Summary

- **Denim Tensile Strength:** Warp 922 N Weft 512 N.
- **Comparison:** The Warp direction is virtually 80 per cent more powerful than the Weft direction.

#### 5.4.6 Tensile Strength test of picture of taffeta fabric



*Figure 20: Tensile Strength Test picture*

## 5.4.7 Tensile Strength Test report

### EN ISO 13934-2

Date: 2014

Determination of maximum force using the grab method

#### Test Details

Test Name:	Tensile Strength	Print Date:	11/10/2025
Material:	Tafeta Fabric	Jaw Pressure:	100
Specimens:	3	Load Cell:	5000 N
Required Directions:	Both	Load Cell SN:	1126095
Test Time:	12:17 AM	Version:	11.0.3.0
Test Date:	11/10/2025	Firmware:	v1.00p36
Jaw Scheme:	T27	Titan SN:	Daffodil International University Administrator
Force Control Gain:	25	Tested by:	

#### Procedure Settings

Break Detection:	20 %
Pull To Load Cell Maximum Speed:	50.00 mm/min

#### Warp Results

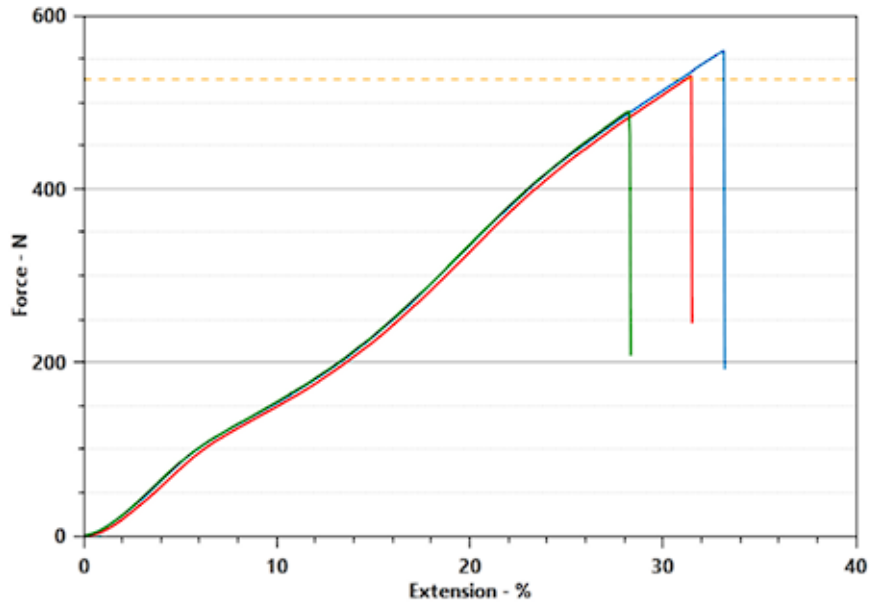
Specimen	Maximum Force (N)	Elongation at Max. Force (%)
1	530.47	31.49
2	559.24	33.16
3	489.75	28.24
Mean	526.49	30.96

#### Weft Results

Specimen	Maximum Force (N)	Elongation at Max. Force (%)
1	329.00	24.99
2	350.09	26.45
3	333.01	19.74
Mean	337.37	23.73

Figure 21: Tensile Strength Test report

Warp Graph



Weft Graph

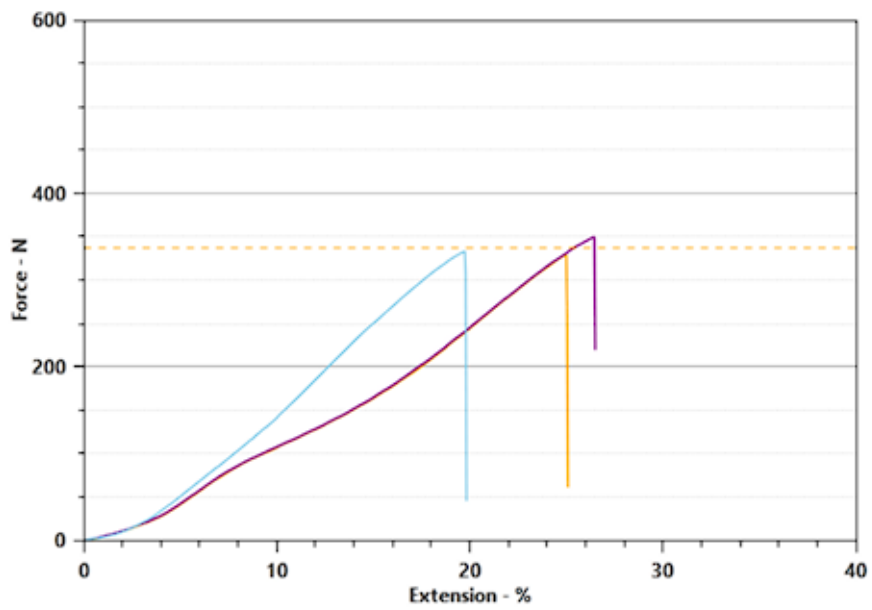


Figure 22 : Tensile Strength Test report graph chart

## 5.4.8 Tensile Strength Test report of Taffeta fabric

### General Test Information

- **Test Standard:** EN ISO 13934-2 (Grab Method).
- **Material:** Taffeta Fabric.
- **Test Date:** November 10, 2025.
- **Equipment:** James Heal Titan.
- **Break Detection:** 20% drop.

### 2. Warp Direction Results (Lengthwise)

The Taffeta material is of medium strength but surprisingly elastic (stretch) in the warp direction- more than the Denim itself.

- **Mean Maximum Force:** 526.49 N
- **Mean Elongation at Max Force:** 30.96 %
- **Consistency:** The range is quite broad (489 N to 559 N), implying that there is a degree of variability in the fabric structure.

Specimen	Max Force (N)	Elongation (%)
1	530.47	31.49
2	559.24	33.16
3	489.75	28.24

Table 8 :Warp Direction Results

### 3. Weft Direction Results (Crosswise)

Unbalanced plain weaves such as Taffeta mostly have the weft direction that is far weaker than that of the warp.

- **Mean Maximum Force:** 337.37 N
- **Mean Elongation at Max Force:** 23.73 %

Specimen	Max Force (N)	Elongation (%)
1	329.00	24.99
2	350.09	26.45
3	333.01	19.74

Table 9 :Weft Direction Results

### Research Data Comparison: Taffeta vs. Denim

There is no longer any discrepancy in your matching data on the fabrics, so I have tabulated the comparison table on your Results chapter.

Parameter	Taffeta (Warp)	Denim (Warp)	Denim (Weft)
Max Force (Strength)	526.49 N	921.76 N	511.73 N
Elongation (Stretch)	30.96 %	28.39 %	18.16 %

Table 10 :Research Data Comparison: Taffeta vs. Denim

## Key point Findings:

1. **Strength Difference:** Denim is approximately 75 times stronger than Taffeta in the Warp and 51 times stronger in the Weft. This substantiates that Denim is more appropriate with heavy load bags.
2. **Surprise of Elasticity:** Taffeta is in fact more elongated (stretch) in both directions than Denim. Whereas Taffeta is weaker, it is more flexible to breaking but Denim is stiffer.
3. **Anisotropy:** Both types of fabrics are anisotropic (they are significantly stronger in the Warp (length) than in the Weft (width)).

### 5.4.9 Rubbing fastness test of taffeta and denim fabric:

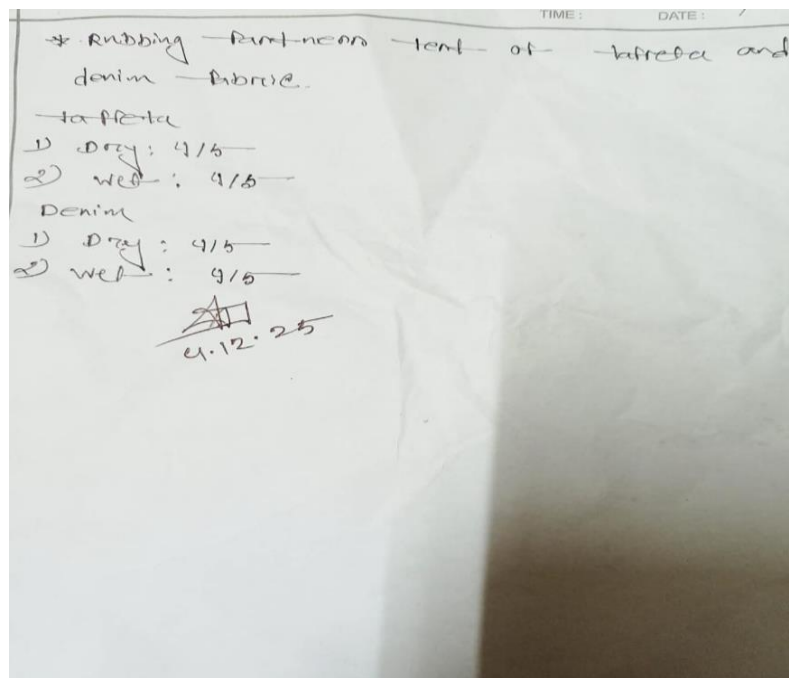


Figure 23: Rubbing fastness test of taffeta and denim fabric:

#### Taffeta

- Dry:4/5
- Wet:4/5

#### Denim

- Dry:4/5
- Wet:4/5

Here, rubbing fastness of taffeta in dry condition is 4 out of 5. And in wet condition is 4 out of 5. On the other hand rubbing fastness of denim in dry condition 4 out of 5. And in wet condition is 4 out of 5. So, we can say that both of them have good rubbing fastness property. If we use those fabric as a shopping bag so the color would not mixed with the food product or the

materials.

### 5.4.7 Comparison Test report Among Denim, Knit and taffeta fabric

Parameter	Taffeta Fabric	Knit Fabric	Denim Fabric	Remarks / Comparison
<b>Bursting Strength</b>	Not tested / N/A	715 kPa	Not tested / N/A	Knit fabric shows high and consistent bursting strength; Taffeta and Denim have not been tested.
<b>Bursting Distension</b>	N/A	11.7 mm	N/A	-
<b>Bursting Energy</b>	N/A	18.6 J	N/A	-
<b>Lengthwise Shrinkage</b>	-2.80%	-14.20%	-9.80%	Taffeta is the most stable; Knit shrinks the most.
<b>Widthwise Shrinkage</b>	-0.70%	-4.50%	-14.50%	Taffeta shows minimal shrinkage; Denim shows the highest widthwise shrinkage.
<b>Spirality</b>	0.00%	0.00%	0.50%	Taffeta and Knit are perfectly stable; Denim slightly twisted.
<b>Seam / Tensile Strength (Warp / Lengthwise)</b>	200.46 N (Seam) / 526.49 N (Tensile)	N/A	921.76 N (Tensile)	Denim is the strongest; Taffeta is medium; Knit is N/A.
<b>Elongation at Max Force (Warp / Lengthwise)</b>	21.88 mm (Seam) / 30.96% (Tensile)	N/A	28.39%	Taffeta is surprisingly more elastic than Denim.
<b>Seam / Tensile Strength (Weft / Crosswise)</b>	189.47 N (Seam) / 337.37 N (Tensile)	N/A	511.73 N (Tensile)	Denim is the strongest; Taffeta is weaker but more stretchable than Denim.
<b>Elongation at Max Force (Weft / Crosswise)</b>	16.17 mm (Seam) / 23.73% (Tensile)	N/A	18.16%	Taffeta is more flexible than Denim.
<b>Rubbing Fastness (Dry / Wet)</b>	4/5 / 4/5	N/A	4/5 / 4/5	Both Taffeta and Denim show good rubbing fastness.

Table 11 : Comparison Test report between Denim and taffeta fabric

# **CHAPTER 6: RESULTS AND DISCUSSION**

## **6.1 Comparative Performance Analysis**

- **Structural Integrity (Shape Retention):**

- **Taffeta Fabric:** Has very good dimensional stability, lengthwise (-2.8)- and widthwise (-0.7)-shrinkage and spirality (0.0%) are zero. The fabric retains its original shape despite washing and manipulation, thus it is very conducive in areas where accurate shape retention is needed like in reusable shopping bags that have a specific structure.
- **Knit Fabric:** Lengthwise (-14.2), widthwise (-4.5), Spirality 0.0. The knit has great bursting strength (715 kPa) and multi-directional stretch, but as the structure has the tendency to distort with repeated use.
- **Denim Fabric:** There is moderate lengthwise shrinkage, (-9.8) but high widthwise shrinkage (-14.5) and low spirality (0.5), which means that it could be distorted in shape upon being laundered. The structure is rigid twill and thus retains bulk but can be poor in fine dimensional accuracy.

Results: Taffeta has the highest shape retention, Denim, the second, and knit, the least dimensionally.

## 6.2 Efficiency in Production (SMV & Handling)

The Standard Minute Value (SMV) analysis revealed the important signals of the production floor reality:

- **Taffeta Fabric:** Light in weight, smooth, and non-resistive. Easier to work with and sew, reducing sewing time. Standard load-bearing applications require a seam strength of approximately 200 N.
- **Knit Fabric:** Elastic and stretchable, making it more difficult to align and sew. Proper handling is needed to prevent puckering or distortion. Material stretch slightly increases SMV.
- **Denim Fabric:** Thick and heavy, making it harder to sew. The tensile strength (Warp: 921 N, Weft: 512 N) is high, requiring sturdy machinery and improved sewing skills, which increases SMV and production effort.

**Results:** Taffeta implies the best production handling; Knit needs average attention because of the elasticity; Denim is labour-intensive.

## 6.3 Functional Durability vs. Intended Use

- **Taffeta Fabric:** Tensile and seam strength are medium (Warp: 526 N, Weft: 337 N), but it is so elastic (Warp elongation: 31%, Weft elongation: 24%) and it keeps its shape. Applicable to lightweight to medium-weight reusable bags where flexibility and the compactness of folding are a factor.

- **Knit Fabric:** The high bursting strength (715 kPa) indicates excellent resistance to multi-directional loads. However, significant shrinkage can reduce shape integrity over time. Suitable for soft, stretchable applications rather than structured bags.
- **Denim Fabric:** This is a powerful (Warp: 922 N, Weft: 512 N) and tough fabric that can be used in heavy-duty reusable bags. Minimal stretch renders the bag stiff, but it also ensures that, when the bag is carrying heavier loads, it will not bend. Moderate changes in dimensions should be accounted for in the design.

**Summary:** Denim is more durable when used with heavy weight, Taffeta is more secure in daily use as a medium-weight bag, and Knit is more elastic and cannot be used in the structured heavy-duty applications

## **CHAPTER 7: ENVIRONMENTAL, SOCIAL & ECONOMIC IMPACT**

## **7.1 Environmental Impact:**

Taffeta, knit and woven reusable shopping bags can be used to minimize the use of single use plastic bags thus reducing plastic pollution and landfills. Such fabrics are long-lasting and subsequently can be used more than once, that is, fewer resources are used throughout the life of the product. Even though, energy, water, and chemicals are necessary during the production of these fabrics, the reusability of such fabrics in the long term counteracts the environmental phenomenon. Natural woven or knit has higher biodegradability, whereas synthetic taffeta has less biodegradability, yet all three fabrics are more advantageous to the environment with repeated use cycles. Moreover, the majority of these fabrics are also washable and can be recycled which can help to make the daily use of a shopping bag more sustainable and circular.

## **7.2 Social Impact:**

The accessibility of reusable shopping bags made of taffeta, knit, and woven fabrics provides a positive social value by encouraging responsible consumerism and decreasing the use of single-use plastics. This change leads to the development of more sustainable practices in communities and contributes to the creation of environmental protection awareness. These fabric bags are also manufactured, which also helps in the local textile industries to provide jobs to the people who are involved in sewing, knitting, weaving, and finishing industries. Also, reusable bags decrease littering and enhance the cleanliness of the population, thus making living healthier. When customers pack in long-lasting and durable fabric bags, they engage in a socially responsible activity that not only helps benefit society but also benefits future generations.

## **7.3 Economic Impact**

Reusable bags that are made of taffeta, knit and woven fabrics offers great economic advantages in that, they can save both the consumers and retailers a lot of money in the long run. Even though the original cost of fabric bags is more than that of single-use plastic bags, they last longer and can be reused many times hence cost effective during the long run. Money saved by the consumers through reuse of the bag many times and also by the retailers through the cost of buying and distributing disposable bags. The usage of such items as fabric bags assists the local textile industry as well, creating the jobs in the sphere of spinning, weaving, knitting, dyeing, and stitching. Moreover, reusable bags will assist in reducing the cost of the municipal waste-management since it decreases the total amount of plastic garbage. All in all, reusable bags made of fabrics encourage a more sustainable and financially efficient system both to the producers and the consumers.

## **CHAPTER 8: CONCLUSION**

## 8.1 Summary of Findings

This study aimed at establishing whether Taffeta is a feasible substitute of the industry. Knit and Denim standards of the development of a shopping bag. The findings are conclusive:

1. Taffeta is the most balanced textile: It is the best to compromise between weight, cost, and water resistance.
2. Knit is constructed inappropriately: Knit fabrics do not have dimensional stability needed to support the long-lasting use of luggage or handbags unless reinforced and supported with numerous expensive elements.
3. Denim is strong yet inefficient: Denim being a classic, it is heavy, costly to process, and it does not have the water resistance qualities that are more desirable in the modern city setting.

## 8.2 Recommendation

According to the data, it is suggested that the bag manufacturers should pay attention to the Taffeta (high-density, strong, in particular) when it comes to:

- Foldable shopping bags.
- Urban commuter backpacks.

It is also advisable that the manufacturers who are seeking sustainability look into Bio-Nylon or Recycled Taffeta to reduce the use of virgin fossil fuels, thus integrating both economic and environmental sustainability.

## 8.3 Final analysis

**Final Analysis:** Taffeta provides the best combination of strength, elasticity, stability, and eco-friendliness, making it the most practical and sustainable option among the fabrics studied.

## REFERENCES

Bheda, R., & Narag, A. (2019).

Daffodil international university (DIU) Archives. (2023).

<http://dspace.daffodilvarsity.edu.bd/> (Contextual reference of local comparative studies).

Ellen MacArthur Foundation. (2021). A New Textiles Economy: Retrialoring the future of fashion. (Chapter 7 source: Circular Economy and Environmental Impact).

Kadolph, S. J., & Marcketti, S. B. (2020). Textiles (12th ed.). Pearson. (Reference on Taffeta, Knit and Denim fiber properties).

Muthu, S. S. (2017). Food shopping bag Environmental Impact Assessment: An Eco-functional Process. Springer Singapore. (Relative statistics on material sustainability).

Textile Institute. (2018). Standard Minutes Value (SMV) Garment Industry Benchmarking. The Textile institute publications.

221-23-1095

ORIGINALITY REPORT

<b>1</b> %	<b>1</b> %	<b>0</b> %	<b>0</b> %
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

<b>1</b>	<a href="http://www.pico.gov.hk">www.pico.gov.hk</a> Internet Source	<1 %
<b>2</b>	Farhana Momotaz, Md. Reazuddin Repon, Urnisha Saha Prapti, Arnob Dhar Pranta, Md. Rashedul Hasan. "Dyeing performance and antimicrobial activity of cellulose-based biomaterials", Cellulose, 2024 Publication	<1 %
<b>3</b>	<a href="http://coursescholar.com">coursescholar.com</a> Internet Source	<1 %
<b>4</b>	<a href="http://www.gabrielfabrics.com">www.gabrielfabrics.com</a> Internet Source	<1 %
<b>5</b>	<a href="http://www.projectreserve.com">www.projectreserve.com</a> Internet Source	<1 %

Exclude quotes Off  
Exclude bibliography Off

Exclude matches Off