Faculty of Engineering

Department of Textile Engineering

Report on

Design and Development of Upcycled Denim-Based Tote Bags through Sewing Techniques

Course Code: Capstone Project

Course Title: TE 400

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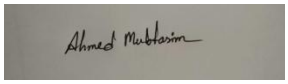
This Report is Presented in Partial Fulfillment of the Requirements for the Degree of

Bachelor of Science in Textile Engineering

[Advance in Apparel Manufacturing Technology]

AUTHOR'S DECLARATION

We certify that we are the sole authors of this report. The materials in this report have never before been submitted for evaluation in a structured educational program, with the exception of the instances in which we have provided fully documented references to the work of others. The supervisor has the right to cancel our report at any time if we do anything that would violate the first declaration.



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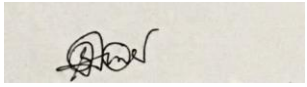
LETTER OF APPROVAL

This is a certification that Ahmed Mubtasim bearing ID: 221-23-1211 and Umme Habiba Mousi bearing ID: 221-23-1223 are students in the Department of Textile Engineering at Daffodil International University, have successfully completed the capstone project they were assigned under my supervision.

The capstone project submission by Ahmed Mubtasim and Umme Habiba Mousi seems like authentic work and up to the work.

I have gone through the final drafts of the report recommended its submission for the degree of B.sc in Textile Engineering.



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ACKNOWLEDGEMENT

First of all, we wish to express our deep gratitude to almighty Allah for enabling us to successfully complete this report. We are especially thankful to our esteemed supervisor Mr. Subrata Majumder, Lecturer at the Department of Textile Engineering, Daffodil International University. His expert guidance and insightful suggestions have been pivotal in driving this project to completion with excellence.

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DEDICATION

This report is dedicated to our **Parents**, whose unwavering support and encouragement have afforded us the opportunity to pursue our career in Textile Engineering. They have been instrumental in our career as a result of their commitment.

ABSTRACT

In this project, the sustainable design and development of tote bags using upcycled denim with the help of certain sewing techniques. The main goal is to re-use used denim clothing into useful, stylish, and long-lasting tote bags, and hence will create awareness in the environment and lessen use of textiles. The project will include the process of material selection, cutting, stitching and finishing of materials. There were other sewing techniques like seam construction and edge finishing which helped to improve the structural strength and outlook of the end products. The finished tote bags were tested in terms of durability, usability, cost-effectiveness, and appeal to the consumer. The project illustrates that denim re-use does not only reduces the effects of waste but also gives a chance to be creative in the design of accessories. In general, in all the work there is a glimpse of the possibilities of sustainable fashion practices due to the successful reuse of textile materials.

Chapter 1: Introduction

1.1 Background of the study:

Denim has always been one of those materials that carries memories. We live in our jeans walk in them, work in them, and travel in them. They fade and soften with time, almost like they grow up with us. The idea of upcycling began to feel meaningful almost necessary. Tote bags, on the other hand, have quietly become part of everyday life. People carry them everywhere: to the market, to classes, to work, even just casually hanging out. They're simple, but useful. And there's something charming about turning old denim into a tote bag it feels practical, creative. The more I thought about it, the more it made sense, denim is strong enough to hold weight, stylish enough to look good, and unique enough to make each bag a little different.Sewing, for me, became the bridge between the old denim to new tote bag. The process of cutting, shaping, and stitching denim felt very easy and impactful. Every stitch gives the material another chance to be something new and valuable in our life. It's not just a designer bag or practicing sewing techniques. It's a learning to see potentiality in things we often waste. It's about the understanding that sustainability doesn't always need to be complicated, sometimes it starts with a small idea and a willingness to try. Through the process of upcycling denim into tote bags, I'm hoping to show that simple creative decisions can make a difference. These old clothes don't always belong to the trash section. Handmade items still matter. And that sustainable fashion can create with simple way and with materials we already have in hand.

1.2 Objective of the Study:

- To explore how waste denim garments can be reused for Tote bag
- To apply different appropriate sewing techniques for durability
- To evaluate the final Tote bags durability and sustainability
- To raise awareness of upcycled fashion

1.3 Importance of Study:

To begin with, the research brings out the extent to which potentiality is in denim that we tend to have neglected. Old denim has not gone away, is smooth and cool. This project demonstrates how worn out garments may be used again useful and beautiful by converting them into tote bags. This helps in minimizing waste, besides promoting a novel approach of producing stylish tote bags through old denim.

Secondly the paper indicates the increased trend to sustainable fashion. Small steps such as upcycling can be used to alleviate environmental pressure in a world where fast fashion is leading to the generation of huge volumes of textile waste. By showing people the reuse of denim, people can be motivated to think differently about their own clothes and their length of wear.

Thirdly the project has practical importance for students, artisans, and small entrepreneurs. The project shows how to upcycle a denim into tote bag which can open doors to low-cost business

ideas, creative hobbies. It proves that we don’t need expensive materials or equipment to create something meaningful and marketable.

Lastly this study helps preserving the value of handmade craft.

Overall, the importance of this study lies in its ability to mix creativity, sustainability, and practical knowledge showing that responsible fashion can start with something as simple as an old pair of jeans.

1.4 Limitations of the study:

- Basic sewing techniques
- Limited testing conditions
- Focus only on Tote bags
- Low time

Chapter 2: Literature Review

2.1 Denim as a Sturdy and Multi-purpose Textile Material:

Denim is regarded as one of the most legendary and hardest clothes in the apparel industry. It is normally woven in a cotton warp -frayed twill pattern that provides it with those diagonal ribs that keeps it strong and withstands day to day wear. Jeans usually just fade or become slightly worn-out on the surface but the internal structure usually remains the same even after a couple of years of use. It implies that denim can be used again or re-used rather than being discarded. A number of researches on textiles indicate that denim possesses high tensile strength, tear resistance and abrasion resistance among many other wovens. Those attributes allow denim to endure recurrent tension and that is the reason why it performs well in multipurpose goods such as bags that require the ability to carry weight on a weekly or monthly basis. Even after consumer denim, when selected properly and inspected, has its mechanical properties remaining such that it can still be used to form secondary products without becoming less efficient. Besides being strong physically, the denim is very appealing in its appearance. It has its natural fading patterns, whiskering, seams, pocket detailing, and other special textures that are not possible to replicate with fabrics that are newly made. These literatures propose that such dilapidated characteristics render up-cycled denim items more appealing and are such that they offer personalization and personal worth to the items and, as a result, assist users to connect to the product and retain them longer.

2.2 Textile Waste and Sustainable Alternatives Necessity:

One of the largest causes of environmental pollution is the global fashion industry, and the issue of textile waste is huge. The volume of clothing discarded due to the current trends in fast-fashion, brief garment cycles, and the ever-changing tastes and preferences of consumers per annum is staggering. Denim, specifically, has contributed to this waste stream significantly because of its mass production and wide usage. Studies indicate that the production of denim is resource-consuming - it attracts bulk of water, energy, colorants, and chemicals. One of the negative effects on the environment that the manufacture of a single pair of jeans includes is excessive water consumption and the use of chemicals. Due to this, the alternative options the sustainable methods of reuse, recycling and upcycling are being considered as the more effective choices to reduce the environmental impact of the textile production. The fact that up-cycling does not require the fiber-breakdown step that occurs in recycling is particularly attractive to upcycling since it conserves energy and maintains the quality of the material at a high level. Upcycling as a means to prolong the life of the textiles, decrease the amount of waste in landfills, and decrease the need of virgin raw materials is heavily supported by the literature.

2.3 Idea and Philosophy of Upcycling in Fashion.

It is simply recycling of the discarded or wasted stuff into something more useful, better or of higher quality. It contrasts with recycling which only tends to degrade the material; upcycling preserves or even enhances the properties of the starting material. In the fashion and textile industry it has turned into this hip, green movement that combines environmental sustainability

and design creativity. According to scholars, upcycling helps designers and consumers reevaluate waste in a new perspective such as viewing it as a resource. In the case of denim, such as, upcycling would allow designers to redesign worn-out components of a garment, such as seams, pockets, waistbands, panels, and so on, into new items. This is not only wastage reduction, but also reduction of additional trims and accessories. Social and learning elements of upcycling are also mentioned in the literature. It promotes innovation, competencies and more savings on sustainable operational practices. Upcycled fashion projects tend to be presented as available, inexpensive projects that can be fully adopted by students, craftspeople and other small entrepreneurs.

2.4 Tote Bags: Evolution, Functionality and Design Requirement.

Tote bags are in, and extremely easy, yet practical. They are open-tops, and their bottom is flat and has two handles. Previously, they were used to carry heavy things but today they are ordinary shopping, class, work or even hangout totes. Functionally speaking, tote bags must be sturdier: they must be able to carry a lot, have well-built seams and be durable, and have to be comfortable. Research indicates that the content is everything. You would tend to find canvas or denim to these bags due to their toughness, thickness and resistance to pressure. Totes are easy to make construction and hence good in upcycling projects. The simple design allows one to stitch together old garments scraps without going to waste. Research has shown that upcycled totes are useful and can also promote eco-friendly behaviors since they can be used instead of single-use plastic bags.

2.5 Denim Tote Bags in Contemporary Sustainable Fashion

Tote bags of denim have gained more popularity in sustainable fashion trends because of their durability, aesthetic value and environmental friendliness. According to researchers, denim tote bags are the best way to achieve the balance between functionality and environmentally friendly design. The roughness of denim increases the strength of the bag and casualness of the bag makes it acceptable among a broad group of users. Upcycled denim tote bags are usually viewed as high quality or crafty products as each product is one of a kind. Color, fading, stitches and thickness of the fabric are varied to give individuality, and it is greatly appreciated in the contemporary fashion markets. It is also written that consumers believe that upcycled denim products are authentic, crafted, and responsible. Moreover, denim tote bags are very compatible with the principles of slow fashion because they can be used long-term, repaired, and attached to one. All these factors decrease the frequency and the environmental influence of consumption.

2.6 Sewing Techniques in Denim Upcycling.

I have been researching how sewing methods actually influence the final product whenever you are upcycling denim. This cloth is quite dense, and if simple mistakes are made with the needle, it can be very easy to have a seam that collapses, or the cloth can be torn into shreds or only result in a truly unpleasant experience of putting on. In what I have read during classes and in

some studies related to the apparel manufacturing, it is important to choose the right type of seams, the density of the stitches, the right needle size, and the thread with the ability to withstand the pressure. But that is all when you have to work with denim. Popular methods applied on denim products include; using overlock stitching on the edge finishing- simply to prevent fraying, reinforced seams where a heavy load is likely to occur, and the double stitching to provide greater strength. The correct construction of those seams assists in the distribution of tension throughout the fabric that implies that the fabric will not tear or the seam will not open.It has also been found out that ornamental stitching can be more than just mere looks, it can even be supportive of the structure. In upcycled products, sewing methods must be utilitarian and aesthetic, therefore they contribute quite a significant amount to the success of the overall design.

2.7 Performance appraisal of Recycled Clothing items.

The way we have read in the papers, it is evident that we should test the upcycled stuff otherwise we cannot be assured that it can really work in the real life scenario. Tensile strength, rubbing fastness, and GSM are the topics of every conversation people make when it comes to usability and durability. In the literature I have read it is true that upcycled denim can survive those strength tests almost as well as new denim provided we are choosing the appropriate fabric and sewing it correctly. Denim fastness is a big business; bleed the color and the people are irritated. The GSM test informs us whether the material has the right weight to support an object that requires weight such as a tote bag. Measuring all those indicators assists the researchers in demonstrating that the upcycled gear is a reliable one, and it increases its acceptance both in academia and on the market segment.

2.8 Environmental and social advantages of Denim upcycling.

This is because I have learned in my sustainability module that denim upcycling is indeed an environmentally friendly solution. Recycles of old jeans would reduce the amount of water, energy, and chemicals that are usually apparent in new textile manufacturing. It also prevents tons of fabric into landfills, which is a vast victory over our ever-increasing waste issues. In addition to the benefits of recycling to the environment, it also has a social advantage. It gives a boost to local production and promotes the hand-made crafts, opening the doors to the small-scale entrepreneurship. One of the latest things I watched was that upcycled projects can provide students and artisans with skill-based income at the least startup and this is very encouraging.

2.9 Research Gap and Relevance of the Present Study.

I think we have a lot of literature on sustainable fashion, and denim recycling, but I have found a gap, there are not a lot of works that test the upcycled denim tote bags made through structured sewing with actual performance statistics. The majority of papers remain at the theoretical outskirts, with emphasis being made on design instead of practical testing and product analysis. The relevance of this study is that it combines ideas about reusing materials, specialized sewing techniques, testing of durability, and cost-effectiveness within a framework of the academic

research. The focus on tote bags as practical items allows the research to offer practical knowledge that can be translated into university projects, locally produced goods, and other sustainable fashion projects.

2.10 Overall Summary of Literature Review

In general, the analysis of the literature shows that the topic of the relationship between the country of origin and the target country captures significant interest among many researchers. General Outline of the Literature Review. The literature review has clearly demonstrated how denim can be recycled due to its high level of durability and recyclability, which makes it the best fabric to be recycled. Tote bags are the right choice when it comes to sustainability and it is important to sew using a method that is key to performance. The upcycling of denim can be beneficial in terms of the environment, economy, and creativity, yet we require additional work to be applied to connect the theory and practice. This work is based on the existing knowledge, as it demonstrates that it is possible to transform old denim into durable and sustainable tote bags.

Chapter 3: Methodology

3.1 Materials Used:

The materials that were used in this project were chosen based on the durability, availability and sustainability. Old denim jeans were selected to be used as the main raw material because it is strong and reusable. There was the use of polyester sewing threads that ensured a higher strength of the seams and provision of straps to boost the carrying capacity and usability of the tote bags.

The primary materials used for this project was:

- Old denim Jeans
- Threads
- Straps

3.2 Tools and Equipment:

Different sewing tools/equipments were employed to ensure that the tote bags were constructed and finished adequately. Plain stitch and overlock sewing machine were used to ensure the strength of the seams as well as the fraying of the fabric. Proper measurement, cutting and finishing was facilitated by the assistance of tools.

- Sewing Machines
- Scissors
- Measuring tape
- Iron and ironing board

3.3 Sewing and Assembly:

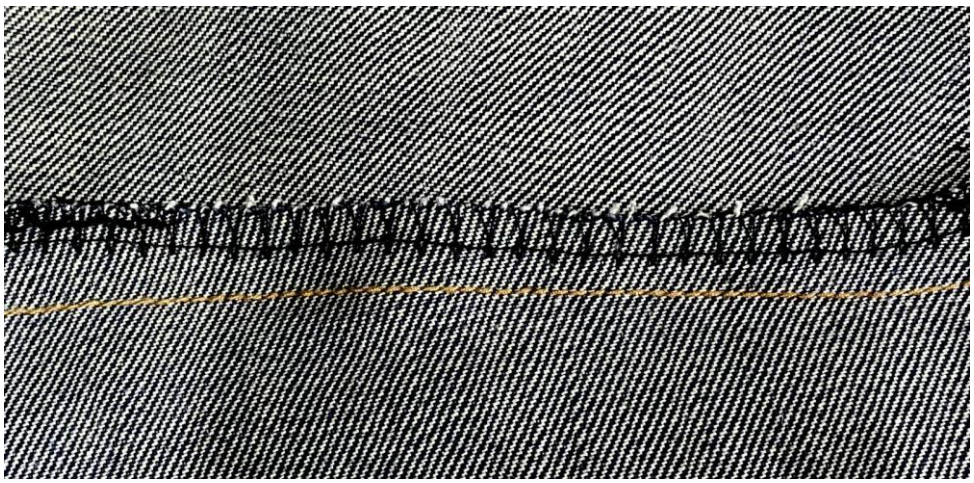
The steps used in the sewing and assembly of the tote bags were systematic to allow them to be long-lasting and in the right shape. Fabric panels were then cut to the specifications required. Raw edges should be stitched overlock to avert fraying and plain stitching was used when attaching handles and joining the panels. This was reinforced stitching at the places of stress to enhance the load-bearing.

- Main parts were stitched by overlock sewing machine and other parts are stitched by Plain Stitch Sewing machine
- Decorative parts were added

3.3.1 Fig : Plain Stitch Sewing Machine

3.3.2 Fig : Overlock Sewing Machine

3.3.3 Fig : Plain Stitch



3.3.4 Fig : Over lock Stitch

3.4 Data Collection:

We have collected some data through tests which are essential before making a tote bag.

Tensile Strength Test:

Test 1:

EN ISO 13934-2

Date: 2014

Determination of maximum force using the grab method

Test Details

Test Name:	Tensile Strength	Print Date:	11/26/2025
Material:	Used Denim 51	Jaw Pressure:	100
Specimens:	3	Load Cell:	5000 N
Required Directions:	Both	Load Cell SN:	1126095
Test Time:	10:11 PM	Version:	11.0.3.0
Test Date:	11/26/2025	Firmware:	v1.00p36
Jaw Scheme:	T27	Titan SN:	Daffodil International University
Jaw Separation:	100.00 mm	Tested by:	Administrator
Force Control Gain:	25		

Procedure Settings

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

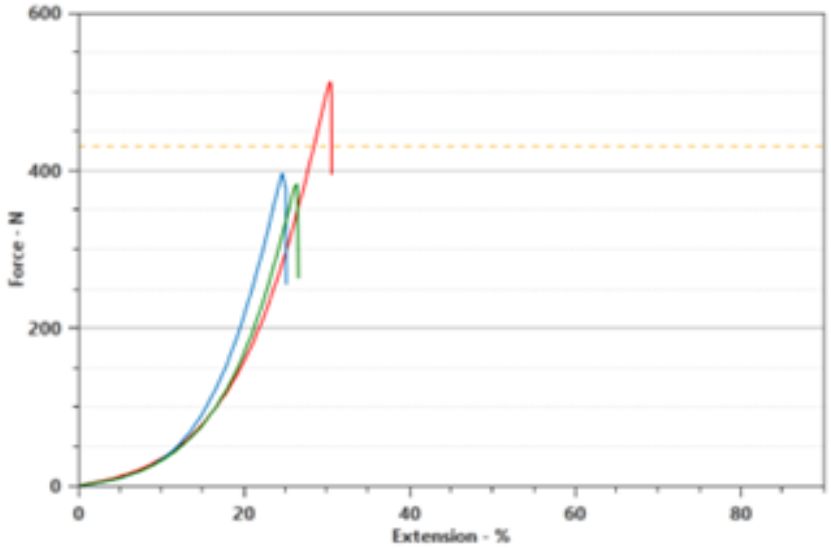
Warp Results

Specimen	Maximum Force (N)	Elongation at Max. Force (%)
1	512.81	30.37
2	396.41	24.62
3	383.85	26.41
Mean	431.02	27.13

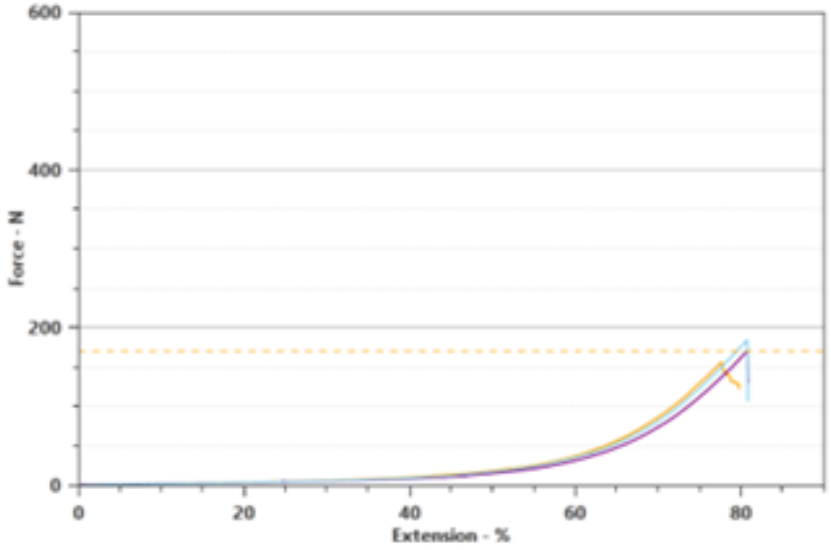
Weft Results

Specimen	Maximum Force (N)	Elongation at Max. Force (%)
1	156.57	77.70
2	169.98	80.79
3	184.15	80.78
Mean	170.23	79.76

Warp Graph



Weft Graph



Test 2:

EN ISO 13934-2

Date: 2014

Determination of maximum force using the grab method

Test Details

Test Name:	Tensile Strength	Print Date:	11/26/2025
Material:	Used Denim S2	Jaw Pressure:	100
Specimens:	3	Load Cell:	5000 N
Required Directions:	Both	Load Cell SN:	1126095
Test Time:	10:11 PM	Version:	11.0.3.0
Test Date:	11/26/2025	Firmware:	v1.00p36
Jaw Scheme:	T27	Titan SN:	Daffodil International University
Force Control Gain:	25	Tested by:	Administrator

Procedure Settings

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

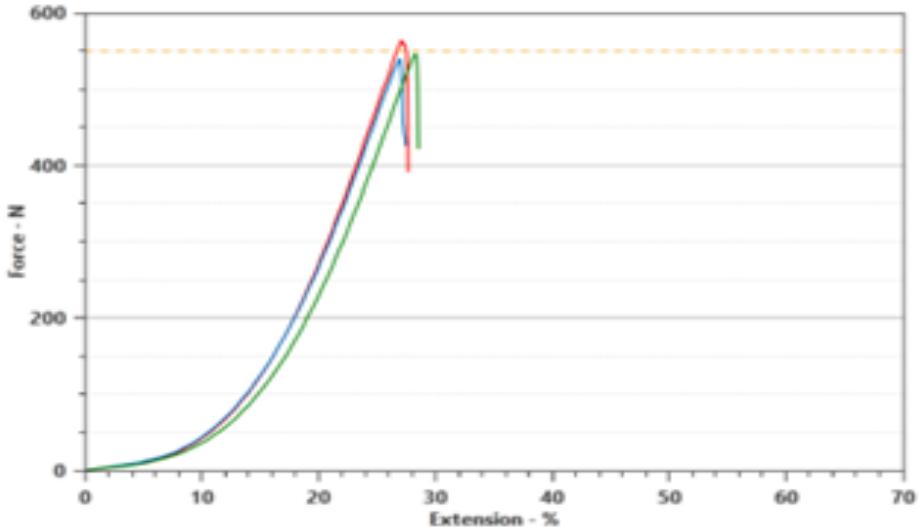
Warp Results

Specimen	Maximum Force (N)	Elongation at Max. Force (%)
1	564.65	27.07
2	540.13	26.95
3	546.12	28.16
Mean	550.30	27.39

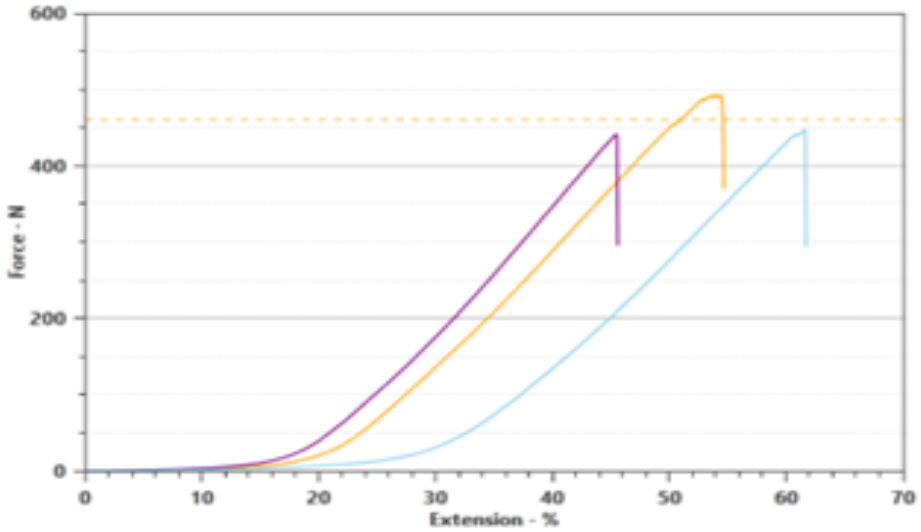
Weft Results

Specimen	Maximum Force (N)	Elongation at Max. Force (%)
1	493.14	54.03
2	441.97	45.45
3	447.74	61.62
Mean	460.95	53.70

Warp Graph



Weft Graph



Summary:

Tests	Rubbing Fastness	GSM
Test 1	**Dry: 4/5** **Wet: 4/5**	**256 GSM**
Test 2	**Dry: 4/5** **Wet: 4**	**337 GSM**

3.5 Costing of Product

Material Cost:

- Waste Denim Collected from friends
- Thread: 50tk
- Needle: 30tk
- Accessories Collected from Seniors

Chapter 4: Result and Discussion

4.1 Result:

A Total 2 pcs of old denim jeans were collected from our old collection. We used the fabric from jeans for our bags.

Prototype Tote Bag:

1. **Prototype Bag A**

   Prototype Bag A was targeted at the strength and carrying capacity. It is simply designed with a single compartment and hence it is useful in transporting heavier goods.

   - Single Main Compartment
   - Simple Strap
   - Designed for heavy weight loads
   - Absorbs water easily
   - Not ideal for rainy condition

4.1.1 Fig : Prototype Bag A

2. **Prototype Bag B**

The prototype bag B was created with the emphasis on the casual image and ornamental design. It has a functional usefulness, and Prototype Bag B is more oriented at the everyday use, aesthetics and the decorative look. It has practical usability with a better visual gratification to the daily use.The prototype bag B was created with the emphasis on the casual image and ornamental design. It has a functional usefulness, and Prototype Bag B is more oriented at the everyday use, aesthetics and the decorative look. It has practical usability with a better visual gratification to the daily use.

- Single main compartment
- Simple strap
- Decorative accessories
- For Casual Appearance
- Proper washing is required to avoid shrinkage

4.1.2 Fig : Prototype Bag B

4.2 Discussion:

The result shows that unused old denim jeans can be converted into a usable, fashionable and trendy product. Denim has a strong durability that's why it can be reused for this type of work. From this project we can say upcycling a old fabric not only reduce fabric waste but also create a significant role in textile fashion.

Chapter 5: Conclusion

5.1 Conclusion:

The study on the Design and Development of Upcycled Denim-Based Tote Bags through Sewing Techniques successfully shows that old denim garments can be transformed into a new trendy, appealable product by using careful sewing. The project does not only demonstrate a novel amount of value in what would otherwise result in textile waste but also demonstrates the possibility of upcycling as a sustainable design strategy. It has developed that various sewing methods affect the usability, durability and the strength of the final product.
All in all, the sample and study indicate that sewing textile waste into denim is a visible and influential strategy of reducing textile waste. Out of this we receive a handmade product that is of high quality with proper design and sewing skills.

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