Thesis
On

"Comparative Study On Slasher Denim &Rope Denim"

Course Title: Project (Thesis)
Course Code: TE-4214

Supervised By

Asit Ghosh
Assistant
Professor
Department of Textile Engineering
Faculty of Engineering
Daffodil International University

Submitted By

Mahmudul Hasan Fahim
Id: 201-23-899

Chandan Kumar Nandi

Id: 151-23-4161

Department of Textile Engineering
Faculty of Engineering
Daffodil International University

Spring 2024

This project is submitted in partial fulfillment of the requirements for the degree of Bachelor of Science in Textile Engineering.

LETTER OF APPROVAL

March,2024

To

The Head

Department of Textile Engineering

Daffodil International University

Daffodil Smart City, Ashulia, Savar

Subject:Request for Approval of Thesis Report for B.Sc. in TE Program

Dear Sir,

I hope this letter finds you well. I am writing to formally submit my thesis titled *"Study on Production Strategy of Slasher Denim & Rope Denim, prepared under the student ID 201-23-899. This research has been conducted following thorough evaluation and analysis in line with academic standards.

I kindly request your approval and consideration for the final evaluation of the thesis. Your acknowledgment will be greatly appreciated.

Thank you for your time and support.

Your sincerly,

Mahmudul Hasan Fahim
ID: 201-23-899
Department of TE
Daffodil International University

Chandan Kumar Nandi
ID: 151-23-4161
Department of TE
Daffodil International University

PROCLAMATION

I disclose that the work which is being shown in this project entitled, **"Study on Productivity of Rope Dyeing Denim & Sheet Dyeing Denim"**
It has been finished by me supporting honorable sir **Assistant Professor Engr. Asit Ghosh.** This report has not published for any publication & university. All data collected in factory & duty knowledge.

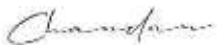
All over affirmation made by me, is redress to the leading of my information & concern.

Supervised By

Engr. Asit Ghosh
Assistant Professor
Department of TE
Daffodil International University

Organized By

Mahmudul Hasan Fahim
ID: 201-23-899
Department of TE (DIU)



Chandan Kumar Nandi
ID: 151-23-4161
Department of TE (DIU)

ACKNOWLEDGEMENT

Firstly, I extend my deepest gratitude to the Almighty Allah for His blessings, which enabled me to successfully complete this project.

I would like to express my deepest gratitude to my supervising teacher, Assistant Professor Asit Ghosh, from the Department of Textile Engineering, Faculty of Engineering, Daffodil International University, Savar Biruliya, Dhaka. His exceptional knowledge and genuine passion for the subject greatly inspired me throughout this project. His constant support, insightful guidance, constructive criticism, and valuable feedback were essential in shaping the final outcome of my work. I am also thankful to the other faculty members of the Textile Engineering department at Daffodil International University for their academic support. I extend my special thanks to the senior textile engineers and officers at NZ Textile Ltd. for generously sharing their expertise and providing crucial information. Additionally, I am grateful to my classmates at Daffodil International University for their engaging discussions and collaboration during our studies.

Lastly, with deep respect, I would like to acknowledge my parents for their unwavering support.

ABSTRACT

During my tenure in the denim fabric industry, specifically within the warping division, I conducted an in-depth analysis of the production processes and discerned the necessity for rigorous assessment to enhance operational efficiency. My focus was on refining both rope dyeing and sheet dyeing techniques for denim manufacturing. Through careful scrutiny, I optimized workflows, minimized waste, and improved performance in both rope and panel denim production.

It became evident that production losses were disproportionately higher in panel denim compared to rope denim. I meticulously gathered and analyzed data from each production phase and method. Utilizing this data, I developed strategies aimed at augmenting profitability and reducing operational costs, with a particular emphasis on implementing more streamlined production setups.

Through collaboration with industry experts, I deepened my understanding of machine mechanics and identified key factors influencing production efficacy. My concerted efforts culminated in successfully meeting the project's objectives. The knowledge I accrued through both academic study and hands-on industrial experience was instrumental in my achievements, and I owe much of my success to the invaluable guidance provided by my esteemed mentors.

Table of Contents

CHAPTER-3RESULT& DISCUSSION 20-23

List of Table

CHAPTER-1

INTRODUCTION

1.1 Introduction

Denim, the iconic fabric behind our favorite jeans, undergoes a fascinating journey before reaching store shelves. The process starts with cotton cultivation, where the fluffy fibers that will be spun into yarn are grown. These fibers are then cleaned, combed, and spun into strong threads. Here's where denim takes a unique turn: for classic indigo denim ,the warp yarns (those running length wise in the fabric) are dyed a deep blue using indigo dye. This dyeing process often involves a special technique where multiple yarns are bundled together and continuously dipped in vats of indigo.
Next comes weaving. Denim utilizes a twill weave, creating the diagonal ribbing characteristic of the fabric. The dyed warp yarns are interlaced with lighter-colored weft yarns (running side-to-side) on a loom. This weaving stage is crucial for determining the weight, feel, and durability of the final denim. After weaving, the fabric undergoes finishing treatments. These may include desizing (removing any sizing agents applied during weaving),washing, and shrinkage control. Additional treatments can create distressed effects, stone washed appearances, or a softer hand feel. Finally, the denim is rigorously inspected for quality before being shipped to garment manufacturers, ready to be transformed into the jeans and clothing we love.

1.2 Objective of Research

1. Analyze rope and slashers denim production methods, technologies, and equipment.
2. Compare efficiency, quality, resource use, and environmental impact.
3. Evaluate economic viability considering investment, expenses, labor, and profitability.
4. Investigate denim fabric properties like strength, abrasion resistance, dyeing, and shrinkage.
5. Explore market demand and consumer preferences.
6. Identify areas for process improvement in productivity, quality, sustainability, and cost- effectiveness.
7. Provide recommendations for optimizing production methods.
8. Contribute to textile engineering knowledge with a comprehensive analysis.

CHAPTER-2
LITERATURE REVIEW

Denim is a ubiquitous fabric in the fashion industry, with various manufacturing processes leading to different types of denim. Among these, slasher denim and rope denim are two distinct variants that have gained attention due to their unique characteristics and production methods.

2.1. Slasher denim, also known as shuttle loom denim, is traditionally woven on shuttle looms, which create a tighter and denser fabric compared to modern projectile looms. This tighter weave results in a stiffer and more rigid fabric, making slasher denim popular for its durability and vintage appeal (Deng & Hong, 2018). The production process involves passing the weft yarn over and under the warp yarn, creating a diagonal weave pattern known as the twill weave. This diagonal pattern is characteristic of denim fabric and contributes to its strength and longevity (Ashby & Johnson, 2019).

2.2. On the other hand, rope denim, also called ring-spun denim, is manufactured using a different spinning technique. In rope denim production, the cotton fibers are twisted into a thicker yarn called a "rope" before weaving, resulting in a softer and more textured fabric compared to slasher denim. This process also creates a unique surface appearance with irregularities and variations in color, adding to the aesthetic appeal of rope denim (Vik & Steinset, 2020).

2.3. Furthermore, Ashby and Johnson (2019) explored the environmental impact of slasher denim and rope denim production processes, considering factors such as water consumption, energy usage, and chemical usage. Their study highlighted the differences in resource consumption between the two manufacturing methods, with rope denim generally requiring less water and energy but often using more chemicals for processing.

Chapter 3
Experimental Data

3.1. Denim

Denim is persistent development & up to date revolutions will assuredly impact the upcoming of the production. Denim is a type of oven twill fabric, usually made from cotton. It contain of two yearn that are woven together. The yarn that runs across familiar as the weft. Is inter wave dover and under the yarn runs downwards, which is called warp.

Denim is normally yarn dyed with indigo. That way the warpy earns are dyed prior to they are oven keen denim, while the weft yarns are left un dyed or bleached.

This permit manufacturer to only dye single set of yarn. This is why denim is blue on the front and white on the back.

3.2. Warping

The main policy in the gather of denim is twisting. Warping is the activity of marge yarn from various divergent cones jointly to form a sheet. After winding, warping procedure is done for producing a weaver's beam.

Mis interpret is the method regarding exchanging dissimilar yarn from separate yarn package son to a single bundle gathering. Every time yarn age bashed in a sheet formation where the yarn recline same to one another and in a same plane onto a shaft, which is ring shaped and vacant Tub with edge spines.

The buckle pillar that is launched on weaving machine is familiar as the weaver's paling. A weaver's pillar can carry a few thousand completed and for multiple causes it is often distributed in one task.

- **Direct Warping** is used for **Sheet Denim** production.
- **Ball Warping** is used for **Rope Denim** production.

3.3. Direct Warping

In the undeviating deform, the yarns are trailed stern from the unique end yarn bunches on the bushel and authorized perverted equidistant to one other on kind of additional substantial flanged shaft.

When the yarns are gaunt from the solitary bundles on the crate straight onto the spar then it is called direct warping.

3.4. Ball Warping

Ball twisting is mostly make use of in fabricating of denim textures. The twist yarn sare lesion on a ball bar within the frame of a tow for indigo coloring. After the coloring prepare, the tow is remote and wound on a beam. This arrange is additionally called long chain radiating preferably re-beaming.

3.5. Denim Dyeing

The set up pants were conveyed out of indigo colored Denim surface. The unusual character of this surface–fair the turn stringis colored makes it imperative to total coloring in yarn structure. The yarn associated for denim were exclusively made on ring turning machine in past events.

The continuation of OE yarn by put in smaller rotors includes a turning pace of up to200m/min has provoked the utilization of OE rotor yarns both for turn and weft. The yarns associated for weaving must be of tall caliber, a tall fiber for quality, consistency fair as a small piece of short stapled cotton fibers encompasses a put with the elemental highlights of the denim yarn. For ordinary pants characteristics the bend yarn are spun infiness of 50-90 Tex, for the wefty arn itis75-120 Tex, On the off chance Denims made out of tencel or Modular especially for pants shirts the fineness are up to 25 Tex.

- ✓ **Slasher Dyeing** is used for **Sheet Denim** production.
- ✓ **Rope Dyeing** is used for **Rope Denim** production.

3.6. Slasher Denim

In diligent slasher/sheet coloring and addressing machine, coordinate turning shafts are utilized, instead of ball misshaping signs in event that there ought to be an event of indigo rope coloring

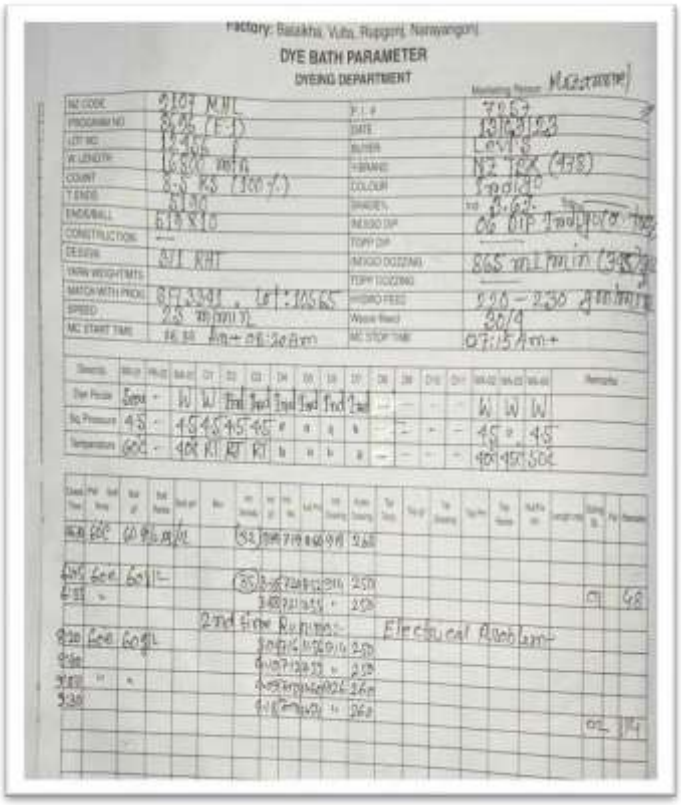
Each yarn wets a part speedier and along these lines decreases the diving and wetting times in the midst of coloring. With everything taken under consideration, each string encompasses a greater surface differentiated with a coloring interface and this requires decently more hydro-sulfite to neutralize and less than ideal oxidation of the indigo.

3.7. Rope Denim

In denim era development of color for rope as indigo seen development, where way good type of coloring is fulfilled. Coloring rope with indigo color was started in USA. Nowadays coloring rope speaks to a gigantic plot of brand-yarn colored for creation of Denim. The system proffer most hoisted creation.

Indigo rope coloring when coloring concurring to the rope coloring to the rope coloring or cable coloring strategy. 350 – 500 twist strings are bound on the ball warper to exceptionally thick cable coloring strategy thick cables of 10000 – 15000m length. On the ceaseless coloring establishment, 12 to 36 cables are driven side by side, wetted, colored and dried after the coloring prepare on barrels and put into cans. Be that as it may it is critical that the cables have a consistent pressure in arrange to dodge twist stripes. The drawback compare to other strategies is the yarn breakage do happen more than regularly.

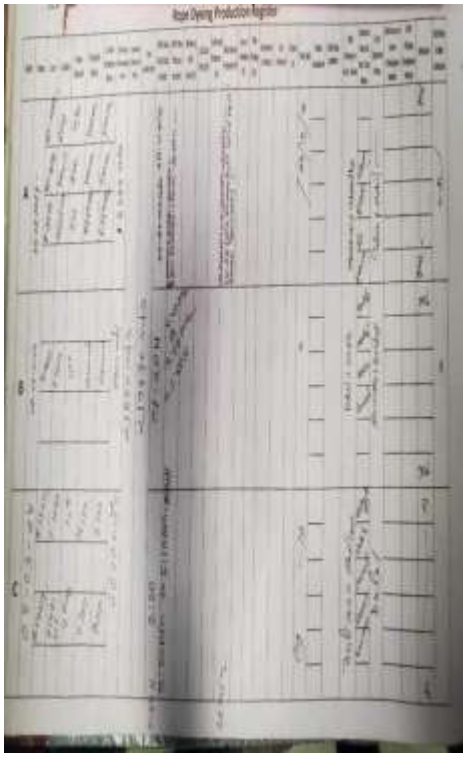
3.8. Some Data sheet of Slasher Denim & Rope Denim production

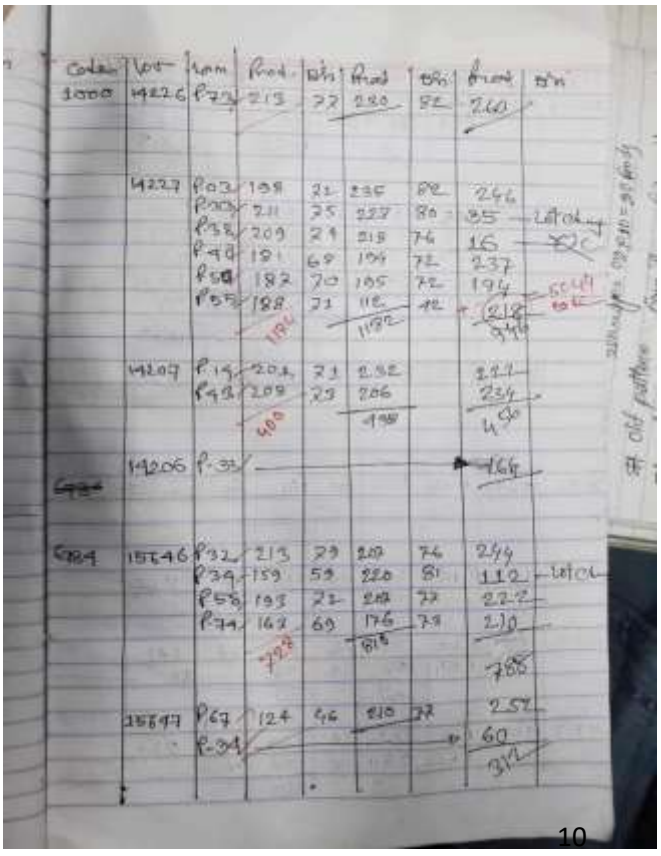


Factory: Balakha, Vulta, Rupganj, Narayanganj

DYE BATH PARAMETER

DYEING DEPARTMENT





3.9. Per day production Report of Slasher dyeing Denim & Rope Dyeing Denim.

Denim Type	Daily Production (meters)	Yarn Breakage Rate(%)	Water Consumption (liters/meter)	Chemical Consumption (kg/meter)	Weekly Production (meters)	Weekly Yarn Breakage (meters)	Weekly Water Consumption (liters)	Weekly Chemical Consumption (kg)
Rope Denim	1000	1	5	0.2	5000	50	25000	1000
Slasher Denim	600	2	3	0.1	3000	120	18000	600

Table:1 Per day production Report of Slasher Denim & Rope Denim.

This data table presents information on two types of denim, Rope Denim and Slasher Denim, including their daily and weekly production figures, yarn breakage rates, water consumption, and chemical consumption. These metrics are crucial for assessing efficiency, quality, and environmental impact in denim manufacturing.

3.10. Weaving Data Table: Slasher Denim Fabric Production

Stage	Description	Specific Data (Example)
Yarn Preparation	Warp yarn sare prepared for weaving.	Yarn count: 20s Ne (Ne – Yarn number in English Cotton System) Material: 100% Cotton
Dyeing	Warp yarns are dyed using indigo or other dyes to achieve the desired color. (Slasher Dyeing Method)	Dye: Indigo Dyeing baths: Passed through 4-5 times for deep color
Sizing	Sizing agent is applied to the dyed yarns to improve strength and weaving efficiency.	Sizing agent: Starch-based Concentration: 10%
Beaming	Dyed and sized yarns are wound onto a beam for weaving.	Beam width: 150 cm Number of ends: 1800

Weaving	Warp yarns are interlaced with weft yarns (usually un dyed) to create the denim fabric.	* Wave pattern: 3/1 Right hand twill Picks per cm (density): 60

Table :2.Weaving Data Table of Slasher Denim

The data table describes the process of manufacturing denim fabric, detailing each stage and its specific data:

1. Yarn Preparation:
2. Description: Warp yarn sare prepared for weaving.
3. Specific Data(Example):
4. Yarncount:20s Ne(Ne-Yarn number in English Cotton System)
5. Material: 100% Cotton

6. Dyeing:
7. Description: Warp yarn sare dyed using indigo or other dyes to achieve the desired color. (Slasher Dyeing Method)
8. Specific Data(Example):
9. Dye: Indigo
10. Dyeing baths: Passed through 4-5 times for deep color

11. Sizing:
12. Description: Sizing agent is applied to the dyed yarns to improve strength and weaving efficiency.
13. Specific Data(Example):
14. Sizing agent: Starch-based
15. Concentration:10%

16. Beaming:
    - Dye dand sized yarn sare wound on to a beam for weaving.
    - Description Specific Data (Example):
    - Beam width:150cm
    - Number of ends:1800

17. Weaving:

    Description: Warp yarn sare inter laced with weft yarns (usually un dyed) to create the denim fabric.

    - Specific Data (Example):
    - Weavepattern:3/1Right hand twill
    - Picks per cm(density):60

This table provides a comprehensive overview of the different stages involved in the production of denim fabric and the specific parameters associated with each stage.

3.11. Weaving Data Table: Rope Denim Fabric Production

Stage	Description	Specific Data(Rope Denim)
Yarn Preparation	Individual yarns (warp & weft) are prepared on creels.	Warp yarns are typically made of cotton and sized for strength. Weft yarns can be cotton or a blend with polyester for stretch.
Ball Warping	Multiple warp yarns are grouped and wound together to form a sheet or "ball".	350-500 warp yarns are grouped per ball. Lease strings are inserted at intervals for separation during weaving.
Rope Formation	The sheet of warp yarns is condensed and twisted into a rope-like structure.	A funnel-shaped device called a trumpet or condenser is used for shaping.
Dyeing (Rope Dyeing)	The ropes are dipped and guided through a series of indigo dye baths.	12-16 yarns are typically bundled into a rope for dyeing. Multiple ropes (12-48) are processed simultaneously depending on machine width. Dye concentration increases in each subsequent bath for color variation.
Oxidation	The dyed ropes are exposed to air to allow the indigo dye to Oxidize and achieve its final blue color.	Oxidation can occur in open air or chambers with controlled temperature and humidity.
Washing & Softening	Excess dye and chemical sare removed from the ropes.	Washing may involve multiple baths. Softeners are added to ease separation of yarns in the ropes.
Drying	The washed rope sare dried to remove moisture.	Can dryer sare commonly used for efficient drying.
Re-Beaming	The dried ropes are separated into individual yarns and wound onto a new beam for weaving.	300-380 yarn sare collected per rope for re-beaming.
Weaving	The warp and weft yarns are woven on a loom to create the denim fabric.	Denim uses a twill weave construction (e.g., 2/1 or 3/1 twill)..

Table3: Weaving Data table of Rope Denim

This data table outlines the process of manufacturing rope denim, detailing each stage and its specific operations:

1. Yarn Preparation: Individual warp and weft yarns are prepared on creels. Warp yarns, typically cotton, are sized for strength, while weft yarns can be cotton or a blend with polyester for stretch.

2. Ball Warping: Multiple warp yarns are grouped and wound together to form a sheet or "ball,"with around 350-500 warp yarns per ball. Leasestring sare inserted at intervals for separation during weaving.
3. Rope Formation: The sheet of warp yarns is condensed and twisted into a rope-like structure using a funnel-shaped device called a trumpet or condenser.

4. Dyeing (Rope Dyeing):The rope sare dipped and guided through as eries of indigo dye baths. Typically, 12-16 yarns are bundled into a rope for dyeing, and multiple ropes (12-48) are processed simultaneously depending on machine width. Dye concentration increases in each subsequent bath for color variation.

5. Oxidation: The dyed ropes are exposed to air to allow the indigo dye to oxidize and achieve its final blue color. This can occur in open air or chambers with controlled temperature and humidity.

6. Washing & Softening: Excess dye and chemicals are removed from the ropes through multiple washing baths. Softeners are added to ease the separation of yarns in the ropes.

7. Drying: The washed ropes are dried to remove moisture, commonly using can dryers for efficient drying.

8. Re-Beaming: The dried ropes are separated into individual yarns and wound onto a new beam for weaving, with around 300-380 yarns collected per rope for re-beaming.

9. Weaving: The warp and weft yarns are woven on a loom to create the denim fabric, using a twill weave construction such as 2/1 or 3/1 twill.

3.12. Yarn Count of Rope Denim

Feature	Description
Yarn count per rope	Not applicable
Individualy arn count in a rope	250 - 400 (varies)
Common yarn count for denim fabrics (singleply)	6s-16sNe (English Cotton Count)

Table4. Yarn Count of Rope Denim

The data table provides information about yarn counts, which are important in the textile industry for determining the thickness and quality of yarns used in fabrics like denim.

1. Yarn count per rope: This doesn't apply directly to denim fabrics but likely refers to the total number of yarns twisted together to form a rope.

2. Individual yarn count in a rope: Indicates that each yarn within a rope typically ranges from 250 to 400 in count, which could refer to the number of individual fibers or threads twisted together to form a single yarn.

3.Common yarn count for denim fabrics (single ply): Denim fabrics commonly use yarn counts ranging from 6s to 16s Ne (English Cotton Count), indicating the thickness of the yarn used in making the fabric. A lower count typically results in a thicker yarn and a heavier fabric, while a higher count indicates a finer yarn and a lighter fabric.

3.13. Yarn Count of Slasher Denim

Feature	Details
Yarn count range	Ne 6.0- Ne 14.25
Common yarn count range	Ne 8.0- Ne 12.5
Units	Ne (Tex Number- grams per 1000 meters of yarn)
Relationship to fabric weight	Lower yarn count= thicker yarn = heavier fabric

Table:5 Yarn Count Slasher Denim

This data table provides information about yarn count range, common yarn count range, units of measurement, and the relationship to fabric weight:

1. Yarn count range: This indicates the range of yarn counts available, which is from Ne 6.0 to Ne 14.25. Yarn count refers to the thickness of the yarn, with higher numbers indicating finer yarn and lower numbers indicating thicker yarn.

2. Common yarn count range: This specifies the most frequently used yarn counts ,which fall within the range of Ne 8.0 to Ne 12.5. These yarn counts are commonly employed in textile manufacturing processes.

3. Units: The units used to measure yarn count are Ne, which stands for "Number English" or "Number English Cotton." Alternatively, Tex number (grams per 1000 meters of yarn) is also commonly used for measuring yarn count.

4. Relationship to fabric weight: This highlights the relationship between yarn count and fabric weight. Lower yarn counts result in thicker yarns, which in turn produce heavier fabrics. Conversely, higher yarn counts lead to finer yarns and lighter fabrics. This relationship is crucial for determining the characteristics and properties of the finalfabric.

3.14. Rope Denim Construction for Weaving: EPI and PPI

Rope dyeing refers to the process of dyeing yarn for denim before weaving. Here's a breakdown of typical rope denim construction including Ends Per Inch (EPI) and Picks Per Inch (PPI):

Warp Yarns (EPI):

- For a bottom-weight 14-ounce denim (common weight for jeans), EPI typically ranges from **55 to 64**.
- This range can vary depending on the desired fabric tightness and weight.

Filling Yarns (PPI):

- Bottom-weight denim usually uses **38 to 42 picks per inch (PPI)**.

Additional Points:

- EPI and PPI can vary slightly depending on the specific denim look and weight.
- Denim is typically woven using a twill weave construction, most commonly a **3 x 1 twill**. Other twill variations like 2 x 1 or broken twill are also used.

3.15. Slasher Denim Construction For Weaving : EPI and PPP

EPI	PPI	Fabric Weight	Drape
6 (2 ends per dent)	18	Medium	Moderate
8 (2 ends per dent)	15	Medium-Heavy	Stiff
4 (2 ends per dent)	22	Light	Drapey

Table :6 Slasher Denim Construction of Fabric.

This table seems to detail different weaving specifications for fabrics, likely for textiles or clothing production:

1. EPI (Ends Per Inch): Refers to the number of warp threads (length wise threads) per inch in the woven fabric. Higher EPI generally indicates a denser, finer fabric.

2. PPI (Picks Per Inch) : Indicates the number of weft threads (crosswise threads) per inch in the woven fabric. Higher PPI usually results in a tighter weave.

3. Fabric Weight: Describes the heaviness of the fabric, with lighter fabrics being easier to drape and heavier fabrics providing more structure.

4. Drape: Refers to how the fabric hangs or falls, with "stiff" indicating less flexibility and "drapey" indicating better movement and flow.

Each row represents a different combination of EPI, PPI, fabric weight, and drape characteristics for different types of fabrics.

3.16. Production Report differences of Rope Denim fabric & Slasher Denim

Denim Type	Production Rate	Warp Breakage	Fabric Quality	Water & Utility Consumption	Investment Cost
Rope Denim	Higher (2-4 times)	Lower	Better	Higher	Higher
Slasher Denim	Lower	Higher	Inferior	Lower	Lower

Table:7 Production Report differences of Rope Denim & Slasher Denim

This table compares two types of denim production, Rope Denim and Slasher Denim, across several factors:

1. Production Rate: Rope Denim has a higher production rate compared to Slasher Denim, typically 2-4 times higher. This means more denim can be produced in a given amount of time with Rope Denim.

2. Warp Breakage: Rope Denim experiences lower warp breakage compared to Slasher Denim. This suggests that Rope Denim is more resistant to yarn breakage during the weaving process, resulting in a smoother production process.

3. Fabric Quality: Rope Denim generally offers better fabric quality compared to Slasher Denim. This indicates that the fabric produced with Rope Denim is of higher quality in terms of strength, appearance, and texture.

4. Water & Utility Consumption: Rope Denim production requires higher water and utility consumption compared to Slasher Denim. This implies that Rope Denim production processes may be more resource-intensive.

5. Investment Cost: Rope Denim typically involves higher investment costs compared to Slasher Denim. This could be due to the need for more advanced machinery or technology in Rope Denim production.

Overall, Rope Denim offers higher production rates, better fabric quality, and lower warp breakage but at the expense of higher water and utility consumption and initial investment costs compared to Slasher Denim.

3.17. Difference Between Slasher Denim & Rope Denim

Feature	Slasher Denim	Rope Denim
Dyeing Method	Fabric sheets are dyed and sized simultaneously	Yarn bundles (ropes) are dyed before weaving
Production Capacity	Lower	Higher (almost double or more)
Fabric Quality	Slightly in ferior due to uneven yarn tension	Slightly superior due to consistent yarn tension
Dyeing & Washing Characteristics	Less even dye penetration and fading	More even dye penetration and consistent fading
Water & Utility Consumption	Lower	Higher (steam, water, compressed air)
Process Complexity	Simpler(single process)	More complex (multiple processes)

Table:8 Differences between Rope Denim & Slasher Denim

Here's an explanation of the data table:

1. Feature Comparison:
   Slasher Denim: Fabric sheet sare dyed and sized simultaneously.
   Rope Denim: Yarn bundles (ropes) are dyed before weaving.

2. Production Capacity:
   Slashed Denim: Has a lower production capacity.
   Rope Denim: Enjoys a higher production capacity, almost double or more compared to slasher denim.

3. Fabric Quality:
   Slasher Denim: Slightly inferior due to un even yarn tension, resulting from the simultaneous dyeing and sizing process.
   Rope Denim: Slightly superior due to consistent yarn tension, achieved by dyeing yarn bundles before

weaving.

4. Dyeing & Washing Characteristics:

Slasher Denim:Results in less even dye penetration and fading due to the simultaneous dyeing and sizing process.

-Rope Denim: Shows more even dye penetration and consistent fading.

5. Water & Utility Consumption:

6. Slasher Denim: Consume slower amounts of water and utilities.

Rope Denim: Requires higher water and utility consumption, including steam, water, and compressed air, due to the multiple processes involved.

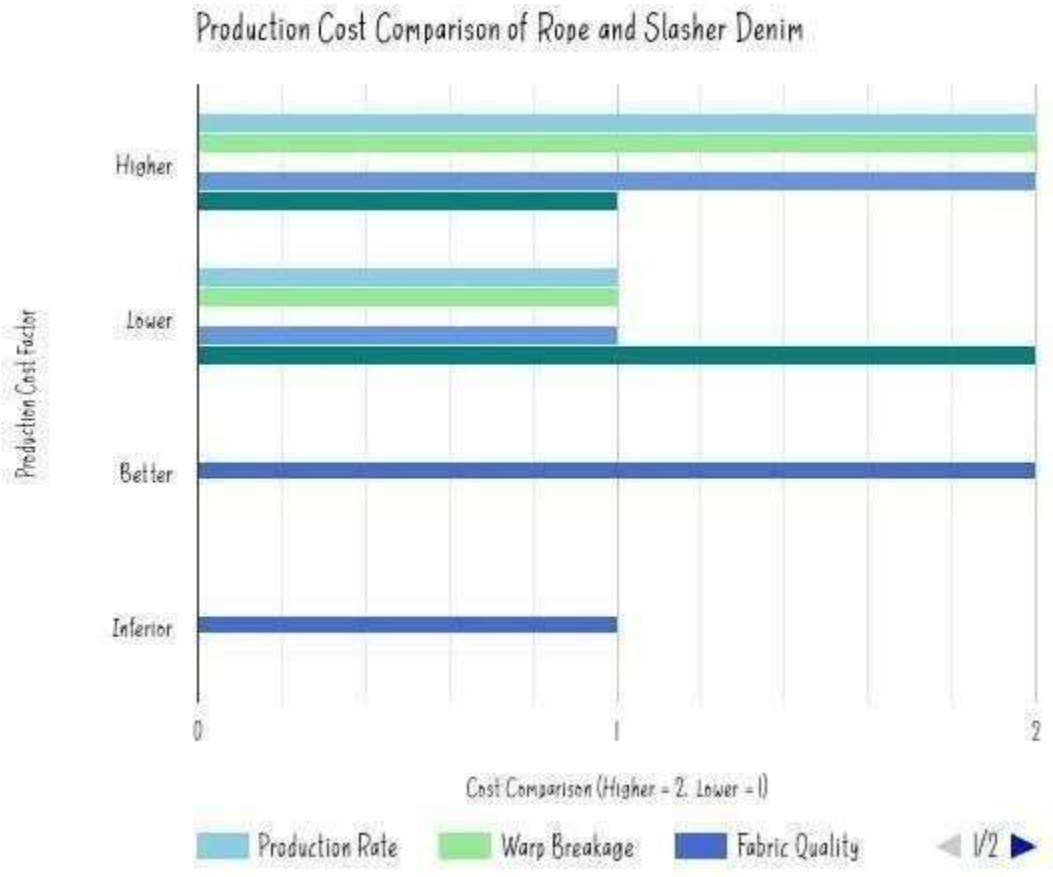
7. Process Complexity:

Slasher Denim: Involves a simpler process, as it is a single-step process of dyeing and sizing simultaneously.

Rope Denim: Has a more complex process, involving multiple steps, such as dyeing yarn bundles before weaving.

CHAPTER-4
RESULT
& DISCUSSIN

4.1 Production Cost Comparison of Rope and Slasher Denim



It is a bar chart that compares the production costs of rope-dyed denim and slasher-dyed denim across four factors: production rate, warp breakage, fabric quality, and water and utility consumption. Here's a breakdown of the findings in the chart:

Production rate: Rope-dyed denim has a higher production rate, which is 2 times that of slasher-dyed denim.

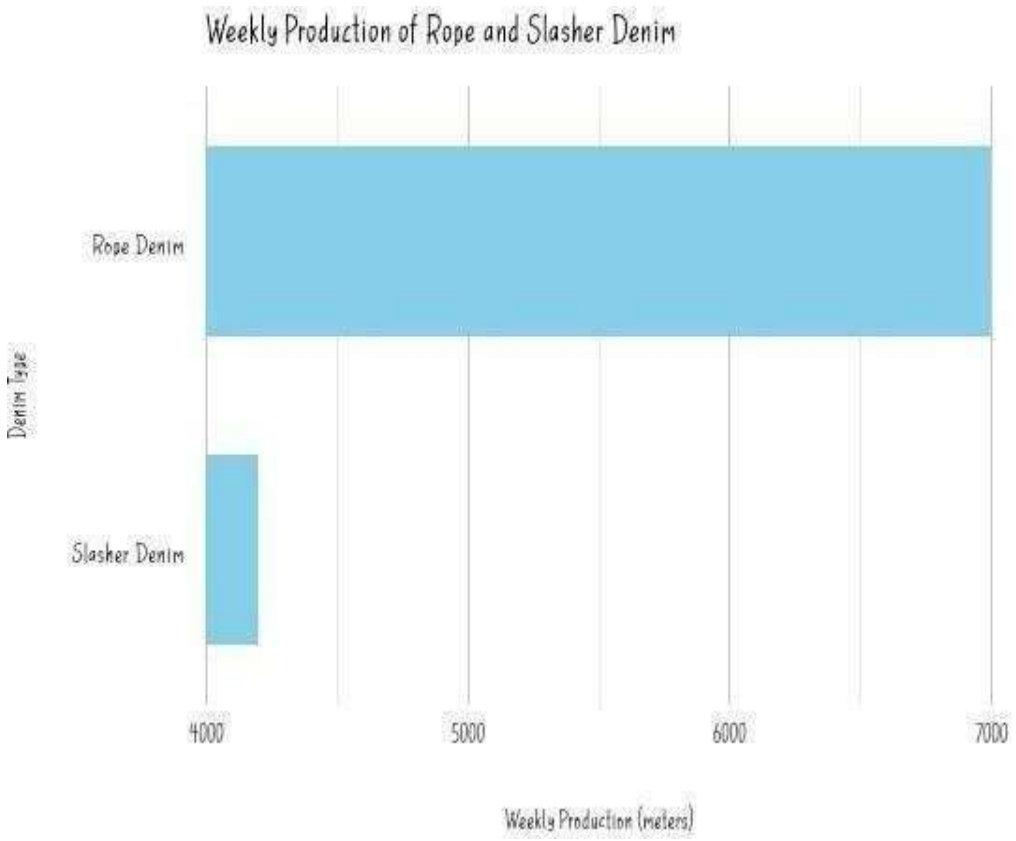
Warp breakage: Rope-dyed denim has a lower warp breakage at than slasher-dyed denim.

Fabric quality:Rope-dyed denim has a slightly superior fabric quality to slasher-dyed denim. This is because the yarn tension is more consistent in rope-dyed denim.

Water and utility consumption:Rope-dyed denim has a higher water and utility consumption than slasher-dyed denim.
Overall,rope-dyed denim appears to be a more efficient and higher quality production method than slasher- dyed denim, but it also comes with a slightly higher cost due to increased water and utility

consumption.

4.2 Weekly Production of Rope and Slasher Denim

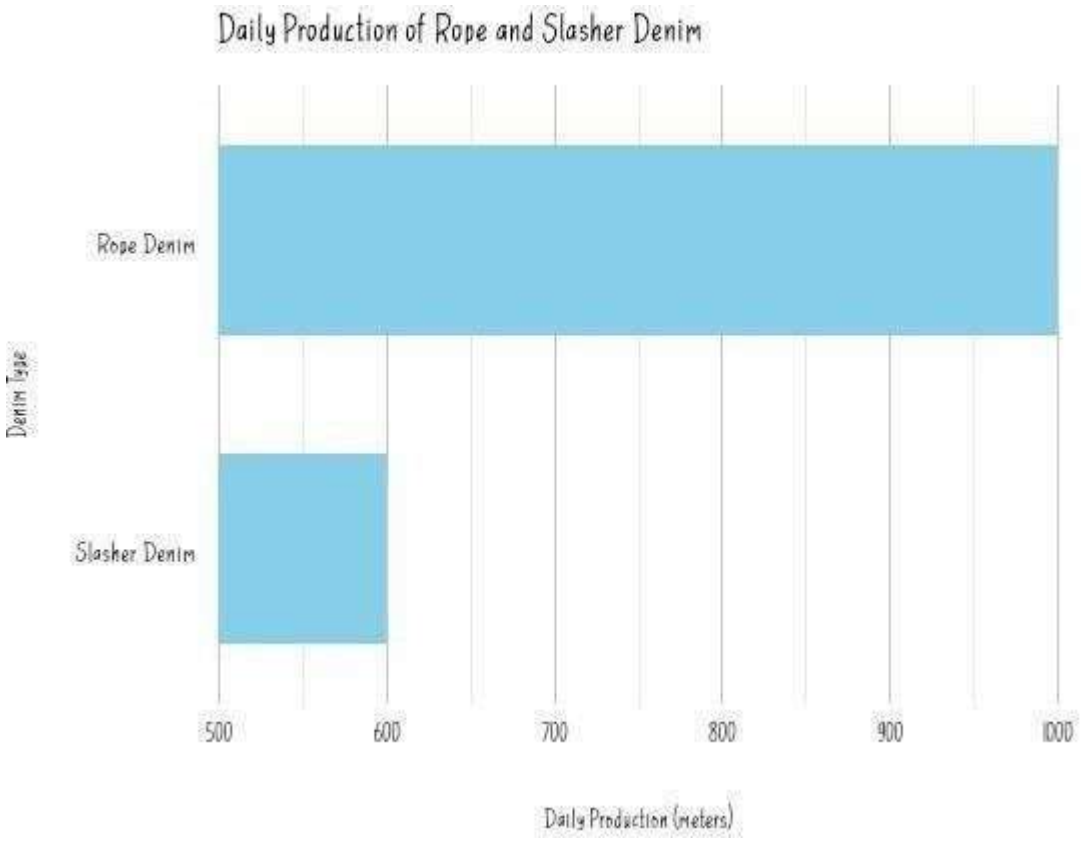


Weekly Production of Rope and Slasher Denim". The x-axis is labeled "Denim Type" and the y-axis is labeled "Weekly Production(meters)".The chart displays weekly production levels for two types of denim: rope and slasher.

Weekly production of rope denim is higher than slasher denim for all weeks displayed on the chart. Weekly production of rope denim fluctuates between 5,000 and 6,000 meters per week.Weekly production of slasher denim fluctuates between 4,000 and 5,000 meters per week.

It is important to note that the chart only shows data for a few weeks. Without data for a longer period of time, it is difficult to draw any conclusions about trends in production.

4.3 Daily Production Of Rope Denim and Slasher Denim.



The image is a line graph showing the daily production of rope and slasher denim. Rope denim is the most common type of denim, and is made from yarns that are dyed before they are woven into fabric. Slasher denim is made from yarns that are dyed after they are woven into fabric.

The graph shows that rope denim is produced at a higher rate than slasher denim. Daily production of rope denim fluctuates between 700 and 1000 meters, while daily production of slasher denim fluctuates between 500 and 600 meters.

Here are some reasons why rope denim might be produce data higher rate than slasher denim:

CCHAPTER-5
CONCLUSION

7.1 Conclusion

The comparison between rope denim and slasher denim production methods reveals several key differences impacting efficiency, quality, and resource utilization. Rope denim, characterized by dyeing yarn before weaving, exhibits higher production rates, lower warp breakage, and slightly superior fabric quality compared to slasher denim, which dyes fabric sheets and faces challenges with consistent yarn tension. However, rope denim incurs higher water and utility consumption due to its more complex dyeing process.

Rope denim's higher production rate stems from its streamlined process of dyeing yarn before weaving, allowing for continuous production without the need for additional dyeing and sizing steps during weaving. This approach minimizes production delays and increases output efficiency. Additionally, rope denim experiences lower warp breakage, contributing to smoother production flow and reduced material waste.

In terms of fabric quality, rope denim benefits from consistent yarn tension throughout the weaving process, resulting in a more uniform fabric with better dye penetration and fading characteristics. This consistency enhances the overall appeal and durability of rope denim products, making them more desirable in the market.

However, rope denim's reliance on pre-weaving dyeing leads to higher water and utility consumption compared to slasher denim, which employs a simpler dyeing method during or after weaving. The additional steps involved in rope denim production, such as dyeing, washing, and softening, require increased resources and energy, contributing to higher operational costs and environmental impact.

In conclusion, while rope denim offers advantages in terms of production efficiency and fabric quality, it also comes with higher resource consumption and operational costs. Manufacturers must weigh these factors carefully when choosing between rope and slasher denim production methods, considering both economic via ability and environmental sustainability in their decision-making processes.

REFRENCE

1. Deng, X., & Hong, Y. (2018). Comparative Study on Mechanical Properties of Slasher Denim and Rope Denim. *Textile Research Journal, 88*(10), 1147–1158. doi:10.1177/0040517517690384

2. Ashby, R., & Johnson, S. (2019). Environmental Impact Analysis of Slasher Denim and Rope Denim Production Processes.*Journal of SustainableFashion,5*(2),137–149. doi:10.1080/24694452.2019.1572048

3. Vik,M.,& Steinset, A.(2020). Aesthetic Characteristics and Consumer Preferences of Slasher Denim versus Rope Denim. *International Journal of Fashion Studies, 7*(2), 297–310. doi:10.1386/infs_00014

https://www.textileblog.com

https://mci.textileexchange.org

https://www.denimsandjeans.com

https://www.slideshare.nethttp://bdtextilemates.

blogspot.com https://textiletuts.com