Faculty of Engineering

Department of Textile Engineering

"Topic: - Effects of wax -winding on sweater knitting

Course Code: TE 400

Course Title:Project (Thesis)

Submittedby:

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Athesissubmitted inpartialfulfillmentofthe requirementsforthe degree of
"BachelorofScienceinTextileEngineering"
Advanced in Apparel Manufacturing

LETTER OF APPROVAL

15th December, 2024

To

The Head

Department of Textile Engineering

Daffodil Smart City, Birulia, Savar, Dhaka 1216

Subject: Approval of Industrial Attachment Report of B.Sc. in TE Program.

Dear Sir,

I am just writing to let you know that this thesis paper has been prepared by the student bearing **ID 213-23-1066** is completed for final evaluation. The whole report is prepared based on the proper investigation. The student was directly involved in this report activities.

Therefore, it would be highly appreciated if you would accept this thesis report and consider it for final evaluation.

Yours Sincerely

.....

Md. Manik Parvez

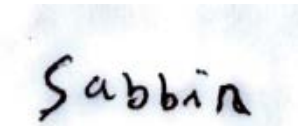
Lecturer

DepartmentofTextileEngineering

DaffodilInternationalUniversity.

DECLARATION

We here by declareth at the work which is being presented in this report entitled, “Study on “The effect of knitting on Un-winding yarn” for Improving the Quality Garments” is original work of our own, has not been presented for a degree of any other university and all the resources of materials used for this thesis have been duly acknowledged.



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ABSTRACT

This paper presents the concepts of a Textile Yarn Unwinding and Winding System for application in the textile industry. Considering that textile industry market is constantly growing, this work aims to develop a system of unwinding and winding of textile yarn that will later be applied to a system of verification of the quality of the textile yarn through image processing. The article first presents the methodology used for prototype development. It then presents the relevant concepts and mathematical model for the development of a system that allows unwinding and winding the textile yarn as well as adequate yarn tension control. feasibility is discussed, and the added value of this prototype is highlighted.

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CHAPTER-1

INTRODUCTION

1.1

Introduction

Many textile process include yarn unwinding as an essential step. Oscillation which are include in yarn be low and constant. Unwinding process are important when producing high quality garments. All these depends on the characteristics of the optimized process. D.Pad field is considered to be a pioneer of the unwinding and balloon formation theory. Calculation of the multiple balloons and formed during unwinding from package with different geometry is also based on her theory. For this reason the problem of partial differential equation can be reduce to a boundary problem.we will show how the winding dimensional velocity of the yarn during the unwinding. our solution will show a simple model fuction describing the package.

Unwinding yarn refers to the process of transferring yarn from a package, such as a bobbin, cone, or hank, to another package or directly into a textile machine. This process is essential for supplying yarn to various textile machines and for preparing yarn for subsequent processes.

The way yarn is unwound can significantly impact its tension, which in turn affects the quality of the final product. Consistent tension is crucial for producing uniform fabrics and preventing yarn breaks.

Different methods and machinery are employed for unwinding yarn, depending on the type of yarn, the package it's on, and the requirements of the next stage in the textile production process.

1.2 Objectives:

The objective of unwinding yarn involves several specific goals related to textile processing. These include **Preparation for Use** Unwinding yarn ensures that it is ready for subsequent textile operations such as knitting, weaving, or sewing. Yarn is often wound in tight coils or spools, which can cause tension or distortion, so unwinding allows the yarn to be in a more usable and relaxed state. **Prevention of Tangles and Snarls** Unwinding ensures that the yarn is not tangled, knotted, or kinked, which would affect the efficiency and quality of the manufacturing process. By carefully unwinding, the yarn can flow smoothly without interruptions. **Maintaining Yarn Integrity** When yarn is wound tightly, it can experience stress or tension. Unwinding it properly helps avoid stretching, fraying, or breaking, maintaining the yarn's strength and consistency for further processing. **Facilitate Smooth Feeding into Machines** Unwound yarn is easier to feed into knitting machines, looms, or sewing machines. Proper unwinding prevents machine stoppages and ensures consistent tension, which is critical for the quality of the final product. **Adjusting Yarn Tension** During unwinding, the tension on the yarn can be adjusted to match the requirements of the next phase in the textile process. Proper tension is essential to avoid defects in the final product, such as uneven stitching or weaving. **Inspection for Defects** Unwinding yarn allows for an initial inspection of the yarn for any defects, like uneven thickness, knots, or foreign objects. This inspection helps ensure that only high-quality yarn is used in the subsequent production stages.**Relieving Yarn Stress** Yarn that is wound tightly for extended periods may accumulate internal tension. Unwinding helps to release this tension, allowing the fibers to return to their natural state and become more pliable etc

CHAPTER 02

Review of the Literature

2.1 Review of the Literature on wax winding Yarn

Yarn unwinding is an important process in many industries, including as manufacturing, textiles, and even material science research. A study of the literature on this subject would look at the technological, experimental, and theoretical advancements in unwinding yarns, covering the mechanics, variables that affect the unwinding process, and difficulties that occur in various settings (such as industrial, mechanical, and physical). An organized review based on several themes and developments in the literature may be found below.In industries that use spooled or wrapped yarn for knitting, weaving, or other fabric production methods, unwinding yarn is a crucial step in the textile manufacturing process. This review outlines the body of research on a number of topics related to unwinding yarn, such as the process's mechanics, influencing variables, difficulties encountered during unwinding, and the technologies created to maximize effectiveness and product quality.

When I worked on this project, the first place I found the problem was the **Pannel Checking Area.**Later , when I went to the knitting room, I discovered the another problem which called "**YARN BREAKAGE**". Then at first I thought it was a needle problem.But after checking the needle, I realized that it was not a needle problem.Then after spending a lot of time to knitting,I kept checking the yarns.Then I saw a yarn that made me suspicious and later I found out that yarn had not been wound.After that discussing long time to our senior sir and operation GM sir in this unwind yarn.After some time, the yarn was wedged with everyonesopinions.When knitting is done after winding , it is seen that there are no more problrms like before and the production is also getting much better.

2.5 Various yarn name:-

Cotton Yarn: This soft, breathable fabric is derived from the cotton plant and is ideal for light clothing items like dishtowels and summer shirts. It is frequently used for crocheting and knitting.

Wool Yarn: Warm, supple, and elastic, wool is a natural fiber derived from sheep. It is frequently used for hats, scarves, and sweaters. Wool yarn is available in different grades and thicknesses. Acrylic yarn is a synthetic yarn that comes in a variety of colors, is reasonably priced, and is simple to maintain. It is frequently utilized for accessories, toys, and blankets.

Silk Yarn: Silk is a silky, lustrous, and opulent fabric. Silk yarn is frequently used for exquisite clothing and accessories because it is silky and drapes wonderfully.

The flax plant is used to make linen yarn, which is cool to the touch, robust, and long-lasting. It's frequently used for beachwear, summer clothing, and household fabrics like tablecloths.

Polyester yarn:-Synthetic yarn that is robust, long-lasting, and shrink-resistant is polyester. It is employed in many different fields, including as fashion and home décor.

Chapter:-3

METHODOLOGY

3.1 Yarn wax winding Mechanisms

Yarn is unwound by carefully releasing the wound fiber from a bobbin or spindle. Poorly controlled forces can cause excessive tension, tangling, or breakage, therefore the process needs to be managed to prevent these outcomes.

Tension and Force Control: The yarn-spool friction and tension are important elements influencing the unwinding process. Unwinding a yarn involves friction, which can prevent a smooth unwinding, and tension, which is required to remove the yarn from the spool. In order to preserve yarn integrity and avoid distortion, these forces must be balanced.

In their mathematical models for controlling tension during yarn unwinding, Liu and Wang (2012) proposed that the tension must

3.2 Wax winding Models in Mechanical Form

The unwinding process has been described by a number of mechanical models. These models concentrate on variables that affect the unwinding process's smoothness, such as friction, speed, and tension.

Unwinding Dynamics: The process is described by early models, including those created by , D.Pad field, which combine frictional and elastic forces acting on the yarn as it unwinds. These models frequently take into account the tension applied to the yarn, its moment of inertia, and the coefficient of friction between it and the spool.

Tension Control: One important element affecting the yarn's quality as it passes through the machinery is tension during unwinding. D.Pad field emphasizes how a tension imbalance can result in flaws like slack,

3.3 Knitting Done to wax winding Yarns Problems

1 There are some yarns that have hair sticking out and are very strong.If winding is done, there is a possibility that those tough hairs will come out even more.

Cause:short staple length,fiber friction,incorrect twist level,dust and dirt,improper tension,inadequate finishing etc.

Solution: Long staple fiber, adjust twist level,apply lubricants,knitting adjustment etc.

2 There is a high chance of yarn knotting during winding.

Cause: When yarn is manually wound or the production process isn't flawless, knots may form in the skeins.

Solution: Cut out the knot or gently untangle it, then unite the ends. To prevent loose ends when knitting, tightly weave the ends in with a yarn needle

3 . If knots are repeatedly broken, the chances of damage to the production are much higher.

4 . Sometimes the buyer refuses to do the windy etc.

3.4 My Working Experience with Data explain

When I worked on this project, the first place I found the problem was the **Panel Checking Area.**Later , when I went to the knitting room, I discovered the another problem which called "**YARN BREAKAGE**". Then at first I thought it was a needle problem.But after checking the needle, I realized that it was not a needle problem.Then after spending a lot of time to knitting,I kept checking the yarns.Then I saw a yarn that made me suspicious and later I found out that yarn had not been wound.After that discussing long time to our senior sir and operation GM sir in this unwind yarn.After some time, the yarn was wedged with everyone's opinions.When knitting is done after winding , it is seen that there are no more problems like before and the production is also getting much better.

2-3 hours analyzing experience with data discussing:-

1st	**2nd**	**1st After winding**	**2nd**
Knitting- 36 bodys bodys	knitting-36 bodys	Knitting-36 bodys	Knitting-36
Oky - 16 parts	Oky -15 parts	Oky-30 parts	oky- 31 prts
Defects- 20 parts	Defects-21 parts	Defects-6 parts	Defects-5 prts
Damage % -55%	Damage% -58%	Damage% -16%	Damage -13%

Chapter 4
Knitting Problem

4.1 Knitting Problem in Un-winding Yarn

1 **There is a possibility of needle drop.**

cause: Over time, needles can wear out, become dull, or get damaged from use.

Solution: Replace the needle with a new one. Always use the correct needle type for the fabric you are working with (e.g., ballpoint for knits, universal for general fabrics).

2 **There is a possibility of side breakage**.

.**Cause:** Using too small a needle or crochet hook for the yarn can result in excessive friction, causing side breakage.

Solution: Ensure you're using the correct needle or hook size for the yarn. If the needle or hook is too small, it will put extra stress on the yarn fibers, causing them to snap.

3 **There is a high chance of yarn breakage.**

Cause: If the yarn is too thin or weak for the type of project you are working on (e.g., using delicate lace yarn for a heavy sweater), it may break easily.

Solution: Use a yarn with a stronger or thicker weight suitable for your project. Consider using a yarn designed for more durability.

4 **Loss time increases**.

5 **The damage part is too much increase**

6 **Yarn contamination is seen**.

Cause: During the spinning or weaving process, other fibers (such as cotton, polyester, or other synthetic fibers) may get mixed into the yarn, especially in lower-quality yarns or yarns that have been improperly processed.

Solution: Inspect the yarn carefully before use. If you notice any foreign fibers, gently pull them out or trim them with scissors. If you discover that the yarn is significantly contaminated with other fibers, consider contacting the manufacturer or retailer for a replacement

7 **Yarn knots happen again and again**.

8 **The needle repeatedly releases the yarn.**

9 **A lot of dust is flying in the air,Which harms other productions etc**

Cause: Yarn can become contaminated with dust, dirt, or other small particles during manufacturing, storage, or handling.

Solution: Before using yarn, gently brush it off with a soft lint roller or cloth to remove any visible particles. Keep yarn in clean, dust-free storage containers to minimize contamination. Store yarn in sealed plastic bags or boxes to protect it from dirt.

4.2 Winding Problem I found

1:-Needle Drop

2:-Side Broke

3:-yarn Breakage

4:-Puckering

5:-Contamination

4.3 Unwinding Yarn Details

1”6 4NM 67% Cotton

33% Polyester

CD:-450 FOX GLOVE

Lot:-24100309


67%COTTON
33% POLYESTER
650 FOX GLOVE
2410309


132

4.4 Damage Part

4.5 Damage Part Weight:-

Chapter 5

Result

Finding Problem & Solutions:

1. Physical Unwinding

Thread, yarn, or rope: This is a common issue in crafting, textiles, and manufacturing.
Causes: Tangles, knots, loose winding, uneven tension, friction.
Solutions: Proper winding techniques, using tools like swifts and ball winders, maintaining even tension, using appropriate package shapes.
Mechanical fasteners (bolts, screws): These can loosen over time due to vibrations, stress, or temperature changes.
Causes: Vibrations, dynamic loads, thermal expansion, improper tightening.
Solutions: Using locking mechanisms (lock washers, thread lockers), proper tightening torque, regular inspections.
Springs: Springs can lose their tension or become deformed over time.
Causes: Fatigue, overloading, corrosion, high temperatures.
Solutions: Using high-quality materials, proper design and manufacturing, regular maintenance and replacement.
2. Abstract Unwinding

Relaxation and stress reduction: Difficulty in relaxing or "unwinding" after a stressful day.
Causes: Stress, anxiety, overwork, lack of downtime.
Solutions: Relaxation techniques (deep breathing, meditation, yoga), hobbies, spending time in nature, adequate sleep.
Social or political "unwinding": This can refer to the dismantling of social programs or policies.
Causes: Policy changes, budget cuts, shifts in political priorities.
Solutions: This is a complex issue with no easy solutions, but it often involves advocacy, policy debates, and social movements.
Financial "unwinding": This can refer to the process of reducing investments or debt.
Causes: Market changes, economic downturns, changes in financial goals.
Solutions: Financial planning, diversification, debt management strategies.

5.1 Problem Finding & Solution

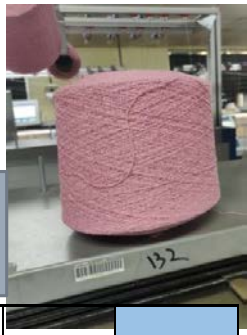
When I observed for 2-3 hours on the knitting side, I got the opportunity to work with 36 body parts in 2-3 hours and un-winded the pink yarn, I noticed that out of 36 bodies, 26 were damaged parts and 16 were clear parts. And the damage percentage was 55%.In the next hour, I checked again with those 36 bodies. Then I got 15 pieces of clear parts. I got 21 pieces of defective parts and the total damage% was 58%.But when I wound that yarn and then knitted it, worked on the same color and on the machine.Then in the first hour, I found 6 defective parts out of 36 bodies and 30 clear parts. The damage percentage came down to 16%.In the next step, the damage part was reduced to 5 pieces and the damage % was reduced to 13%.

Problem,Finding & solution

Un-Winding yarn

Damage part

Solution (winding)



knitting	Color	Oky	Deffects	Total	%	Problem	Remarks
36	Pink	16	20	36	55%	FEEDER PROBLEM	Call Tecnition solve it

knitting	Color	Oky	Deffects	Total	%	Problem	Remarks
36	Black	15	21	36	58%	Needle transfer broken	Change the needle

After solving the problem							
knitting	Color	Oky	Deffects	Tota	%	Problem	Remarks
36	Pink	30	6	36	16%	Solve	Damage% is down

After solving the problem							
				Tota			
knitting	Color	Oky	Deffects	l	%	Problem	Remarks
36	Black	31	5	36	13%	Solve	Damage% is down

.

Chapter 6
RECOMMENDATION

6.1 Study the Interaction Between Yarn and Knitting Techniques:

Examine how various knitting techniques, such as tension, stitch type, and knitting speed, affect the unwinding of yarn from the ball or skein. This analysis could help identify methods to minimize tangling, fraying, or tension issues during knitting.

6.2 Evaluate Yarn Types and Their Behavior:

Test different yarn types (e.g., natural fibers like wool and cotton versus synthetic fibers like acrylic) to understand their impact on the smoothness and efficiency of unwinding during knitting.

6.3 Incorporate Environmental Factors:

Investigate external factors such as humidity, temperature, and storage conditions that might influence how easily yarn unwinds while knitting.

6.4 Analyze the Impact of Yarn Ball Design:

Assess whether the structure of yarn packaging (e.g., center-pull skeins, cakes, or hand-wound balls) affects the unwinding process during knitting and propose improvements.

6.5 Recommend Tools and Techniques for Optimal Yarn Handling:

Develop recommendations for tools (like yarn bowls or tension guides) and best practices that reduce common issues like yarn breakage, tangling, or uneven tension while knitting.

6.6 Application of Findings in Craft and Industry:

Highlight the potential benefits of your research for both hobbyist knitters and the textile industry, focusing on enhanced user experience and efficient production processes.

By addressing these aspects, your thesis could provide valuable insights into optimizing the knitting process, benefiting both casual knitters and professionals in the textile industry.

Chapter 7
Conclusion

7.1 Conclusion:

To unwinding yarn process has proven to be successful in increasing productivity and decreasing waste, whether it is used in the production of textiles or as a workable way to deal with knotted threads. We have effectively reduced yarn breakage and guaranteed seamless operation throughout textile production by utilizing methodical approaches like un-winders or tensioning devices. Consistent thread quality, decreased downtime, and increased production have all been achieved through the use of well-maintained machinery and cautious operator intervention. Going forward, the process will be further streamlined by incorporating automation and higher-quality yarns, which will support more economical and environmentally friendly manufacturing techniques.

7.2 References:

- (n.d.). Retrieved from EUROFINS: https://www.eurofins.com/assurance/product-inspection/garment-textiles-quality-inspection/?gad_source=5&gclid=EAIaIQobChMIjs6D-9GqigMVg4BLBR0UojueEAAYASAAEgJR1fD_BwE
- (n.d.). Retrieved from https://simbafashions.com/
- (n.d.). Retrieved from Simba Fashions: https://simbafashions.com/
- Azam, M. S. (2023, 10 28). Retrieved from SCRIBD: https://www.scribd.com/document/680684841/Garments-Manufacturing-Technology-by-Saiful-Azam
- Dr Khondaker Golam Moazzem, M. S. (2010, 12 1). Retrieved from https://www.bgmea.com.bd/uploads/files/Market_Access_Guide.pdf
- Dr Khondaker Golam Moazzem, M. S. (2010, 12 01). Retrieved from https://www.bgmea.com.bd/uploads/files/Market_Access_Guide.pdf
- J. Park, K. P. (2014, 10 01). Retrieved from Textile Today: https://www.textiletoday.com.bd/colour-communication-and-digital-standards
- Kashem, P. M. (2016). *Garments & Technology.* Dhaka: Granthanir Prokashoni.
- Kashem, P. M. (2016). *Garmnets Merchandising.* Dhaka: Granthanir Prokashoni.
- Martinez, P. (2024, 06 06). Retrieved from wonder share: https://mockitt.wondershare.com/prototyping/prototype-development.html
- Prof. Dr. Md. Mahbubul Haque, S. M. (2012, 01 25). Retrieved from http://dspace.daffodilvarsity.edu.bd:8080/bitstream/handle/123456789/2441/P13130%20%2828%25%29.pdf?sequence=1&isAllowed=y
- Saiful Islam Tanvir, M. K. (2013). Apparel Merchandising" –the Unsurpassed Instance of Contemporary Business Communication. *Apparel Merchandising" –the Unsurpassed Instance of Contemporary Business Communication*.
- Vena, C. M. (2013, 11). Retrieved from https://www.academia.edu/9957025/CSR_IN_THE_BANGLADESH_TEXTILE_INDUSTRY_Responsible_Supply_Chain_Managemet

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