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ANALYSIS OF THE INFLUENCE OF IMPURITIES AND DEFECTS IN FIBER ON TECHNOLOGICAL PROCESSES OF SPINNING

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Abstract
This study analyzes the impact of impurities and fibre defects on the tech-nological processes of spinning, with a focus on the fibre cleaning stages within spinning systems. The research evaluates how these impurities and defects affect yarn quality, specifically when using different types of spinning machines, in-cluding those from Rieter, Trutschler, and Marzoli. Key quality indicators, such as relative hardness, roughness, tensile strength, elongation, and the presence of thin and thick sections in yarn, are examined using Uster statistics from 2018. Through a comparative analysis of yarn produced on various spinning systems, the article provides insights into the role of impurities and defects in shaping yarn quality, contributing to more efficient processes and higher product stand-ards in textile manufacturing.

Keywords: card, yarn, ring spinning, quality, relative hardness, Uster sta-tistics 2018, roughness, Rieter, Trutschler, Marzoli, tensile strength, elongation, number of thin sections, number of thick sections, defects.

Introduction

In the textile industry, the quality of yarn is paramount, as it directly impacts the final properties of fabrics and other textile products. The spinning process, which transforms fibers into yarn, is highly sensitive to the presence of impurities and defects within the fibers. Impurities such as dust, plant residue, and chemical residues, as well as structural defects like weak or uneven fibers, introduce challenges to the spinning process. These factors not only affect the mechanical performance of the spinning equipment but also compromise the quality, strength, and uniformity of the yarn produced.

As technology in textile machinery advances, manufacturers like Rieter, Trutschler, and Marzoli have developed sophisticated machines designed to mitigate the effects of fiber impurities and defects. However, achieving high-quality yarn still requires meticulous control over raw material quality and processing conditions. Fiber impurities can lead to frequent equipment maintenance needs, reduce production efficiency, and result in yarns with undesired variations in thickness, strength, and texture.

This paper aims to explore the extent to which fiber impurities and defects influence spinning efficiency and yarn quality. By analyzing parameters such as tensile strength, elongation, roughness, and the presence of thin and thick sections, this study seeks to provide a comprehensive understanding of how various spinning systems respond to impurities and defects. Moreover, through the use of Uster statistics from 2018, a standardized measure of

yarn quality, this research compares the performance of different spinning machines in handling fiber quality issues. The findings of this study will contribute to developing strategies for reducing defects in the spinning process, ultimately leading to enhanced yarn quality and increased productivity in the textile industry.

The Main Part

Currently, the impurities and defects in the cotton fibres obtained from the technological processes of cotton cleaning have a great influence on the composition and properties of the yarns produced by the spinning factories. Because modern spinning machines of various models are installed in the spinning factories, it is the main problem of the present day to study the effect of defects in the fibre on the quality parameters of the yarn and make recommendations. Therefore, first of all, we present a comparative analysis of spinning machines in spinning factories. The use of modern, high-performance, energy-saving equipment and efficient use of raw materials in enterprises is carried out based on the experience of experienced specialists [1].

Entrepreneurs introduce the latest technologies of the world's leading companies (Rieter, Truetzchler, Marzoli) to their enterprises. The above-mentioned companies that produce yarn-spinning machines are producing machines with different modern features day by day [2].

Today, the main goal of private and joint enterprises in our country is the production and delivery of competitive products in the world market. In our republic, the main raw material of the textile industry is cotton fibre, which has higher flexibility than other natural fibres. Currently, only 60% of cotton fibre is produced as a finished product. From 2019 to 2022, our President decided to process 100% of the cotton fibre grown in the Republic of Uzbekistan and produce it as a high-quality finished product [3].

The quality of spun yarns is very important in yarn spinning enterprises, because the higher the quality, less unevenness and smoothness of the yarn, the higher the quality of the product obtained from it will be. The sequence of technological processes at the "Mega Tekstil" LLC specialises in yarn spinning, located in the Uychi district of the Namangan region.

1. Grinding: Blendomat BO-A machine
2. Preliminary cleaning: multifunctional cleaner SP-MF and Cleanomat CL-P
3. Mixing: Automixer MX-U
4. Gentle cleaning: Cleanomat CL-U
5. Distribution and transmission: SP-FP
6. Combing: TC-15
7. Piltalash 1st step: TD-9T
8. Piltalash 2nd step: TD-10
9. Curling: Zinser Speed 5A
10. Spinning: Zinser 72 XL
11. Rewinding: Saurer Autoconer 6.

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Table 1. Table of quality indicators of yarn samples taken for the experiment

No	Quality indicators of thread samples	Brands of ring-spinning machines			Uster statistics 2018 indicators, 50%
		Rieter GSM 2114	Zinser 72XL	Saurer Jintan	
1	Linear density, tex	18.4	18.4	18.4	18.4
2	Number of turns, bur/meter	900	900	860	-
3	Unevenness, Um%	11.0	12,13	11.79	-
4	Coefficient of variation in linear density, CV%	14.97	15.44	14.91	15,28
5	Relative hardness, sN/tex	14.7	13.9	14.94	15.6
6	Elongation at break, Elong.	5.18	4.05	4.97	5.4
7	Number of thin places, Thin places (-50%)	4	8	5	12
8	Number of thick places, Thick places (+50%)	170	208	181	160
9	Number of Neps, Nep (+200%)	490	168	570	307

Linear density coefficient of variation (CV%) was obtained from Rieter GSM 2114 and Saurer Jintan spinning machine. It was also determined that the coefficient of variation (CV%) of yarn obtained from enterprises is better than the 50% class of Uster Statistics 2018 indicators.
When we analyzed the yarns spun from different companies, the number of neps, Nep (+200%) was the best result of our yarn spun on the Zinser 72XL machine, we can see that the Uster statistics 2018 indicators are better than the 50% class.

Conclusions

Impurities and defects in the fibre are dependent on the designs of the spinning machines in the spinning factory, i.e., the design of the machines and their technological processes. Shows and today spinning mills require the use of the above-mentioned spinning machines.

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