"The Extent of the Impact of Yarn Cleaning Phase in Winding Process on the Properties of the Final Performance"

Dr. Mohamed Saied Dorgham
A. Professor of Textile, Textile Dept., Faculty of Applied Arts, Helwan Univ., Egypt

Abstract:
The process of spinning yarn is a chain of processes starting from opening process to spinning, the yarn cone is considered as a final product but that state is not suitable for operation in weaving process because they contain a high degree of hairness as they are has lengths are not suitable with the required lengths of the next stage.
The research measure the change in the physical properties of yarns, also concern the cleaning operations determining the quality and optimal cleaning efficiency ratios required, taking into account the vulnerability of the threaded surfaces to the cleaning operations and the consequent need for appropriate cleaning equipment, and their association with the nature of the materials used.

Research problem:
Despite the necessity of having to make yarn rewinding processes on the yarn get from the stages of spinning and conducting cleaning them, but this process may has an adverse significant effect on the physical and appearance properties of yarns, which led to try to examine these factors and try to reach good solutions to maintain the yarn properties in order to complete the next weaving process.

Research Significance:
The research presents a feasibility study trying to reach the impact of yarn rewinding and re-cleaning processes for some materials (cotton- spun polyester- linen) with different count on the physical properties (tensile strength and elongation), in addition to the effect of the cleaning process with mechanical yarn knives the most common in the textile factories in the proportions of assessments to research.

Research hypothesis:
1 - Increasing the proportion of yarn cleaning required increases the amount of friction between them and the knives influential on their physical properties.
2 - Depending on the type of yarn materials used and the nature of the surface is the extent of effect on the properties change after the cleaning process.
3 - Cannot be generalized one way to clean up all textile yarn.

Objectives:
The study aims to reach the best systems and equipments used for rewind and clean the textile yarns before processing by weaving stages taking into account the nature of these materials and the required final properties that access to choose the optimum system for yarn cleaning.

Experimental Work
Three yarns tested of different materials (cotton - spun polyester – linen) with three different count of all been neutralized in English count which (6Ne-10Ne-16Ne) for cotton and polyester and (16 - 25- 40) for linen with numbering linen.
Samples have been produced using yarn rewinding machine produced by Alfa Tex Co. (Spanish) with groups of mechanical cleaning knives.
The efficiency of the cleaning process determined and followed on three degrees of quality 100 % - 75% - 50%, based on the number and shape of defects allowed to pass with the thread.

Results and discussion:
Test results were measured tensile strength and elongation properties of the yarns under study were as follows:

Tensile Strength
the powerful indications that observed can be used as a basis for comparing the relationship between the tensile strength and the cleaning efficiency in the sense, that in the case of a request of a strong, influential and high efficiency cleaning it should be taken into account the

extent of adverse impact of which on efficient operation of these strands in successive stages in addition to not having to access low rates of as cleaning using the cleaning efficiency of 50 % , which may affect on the appearance of floss and quality , while he can reach a good cleaning rate while maintaining the limits of good tensile strength filament continuity of work in the following stages.

In the end, it all due primarily to the required levels of quality of the production process with the preservation of the physical properties of yarns without damage.

Elongation

A highly vulnerability in the elongation of the natural materials according to the change of the cleaning efficiency was concluded comparing to the synthetic origin materials as polyester. Therefore, a much care needed in this case for the elongation of yarn with the clarity of the desired goal of cleaning operations precisely to increase the area affected during rewinding threaded that will have a profound impact on using yarn in the rest of the following stages.

Hairness

In general, it appears how much the influence uniformly almost for all the materials of all tested thickness and cleaning efficiency ratios located, which leads to the conclusion that this process (cleaning) have a crucial role and influential of all shapes on the nature of the surface of the yarn, cotton yarn was the deeply influenced by this process due to the properties of cotton yarn from the presence of capillaries surrounding the surface of the thread in the natural state, but increased significantly after the cleaning process

Conclusion

Foregoing it is clear how much the importance of the process of rewinding yarns in textile factories and the active role that played by the stage of cleaning yarns and their relationship to the material under use, in addition to the devices attached to the machine which holds the cleaning process and which have had the impact of the effect on the physical properties of the yarns as well as the properties of appearance of the final product and then conclude some of the following points:

1 - Increasing the efficiency of the cleaning process and reduce defects located on the surface of the thread is highly affect the tensile strength values

2 – A linked yarn elongation to the cleaning operations and stress along the yarn during the cleaning process, especially for natural ones.

3 - Do not neglect adjust the spaces between the blades of the mechanical cleaning in accordance with the schedules and the required values.

4 - The importance of identifying the role required of cleaning operations and the efficiency of the cleaning process required to the extent appropriate so as not accompanied by a negative effect on the properties of the yarns without the need for it

5 - In cases of yarn with the surface properties of high sensitivity to friction clean operations can be turned to the use of modern equipment for electronic cleaning.

References

1 - Hassan Sayed Darwish - Abdul Latif Ali Qassem, - "preparations" - Support Fund spinning and textile industry - Egypt - 2004

2- Adanur, S.,"Handbook of Weaving,"Technomic Publishing Co., Inc., Lancaster, Pennsylvania, USA (2001).

3-J., E., Booth, B.Sc.F.T.I, A.M.C.S.T."Textile Mathematics", Vol.3, the Journal of Textile Institute, Manchester, 1977.

4-X.Shao, Y.Qiu and Y.Wang, "Theoretical Modeling of The Tensile Behavior of Low-twist Staple Yarns: Part 1-Theoretical model ", The Journal of Textile Institute, Vol.96, No.2, 2005.

5- J.Wang and J.Jin, "Study on areducing-hairiness Nozzle Attached on The Winding Machine", The Journal of the Textile Institute, Vol.100, No.7, October, 2009.

6- Zhigang Xia and Otheres,"Experimental Investigation on The Effect Of Singeing on Cotton Yarn Properties", Textile Research Journal, Vol.79, Issue 17, November, 2009.