Achieving the most appropriate scientific standards for using compact spinning technique and its effect on the properties of the yarns produce

Dr. Ayman El said Ibrahim

Lecturer at Department of Spinning and Weaving and Knitting - Faculty of Applied Arts - Helwan University

aymanelsayd2664@yahoo.com

Introduction: -

The spinning and weaving industry occupies the forefront among the consumer industries, and the spinning industry is witnessing continuous development processes in the technology of raw materials operation and raising the degree of benefit from them while improving processes of operating methods control in order to keep pace with technological developments to take advantage of our cotton quality and maximize its value to raise the efficiency and quality of the product taking into account reducing the cost so that we can compete globally.

Modern spinning systems are now entering into serious competition to try to reserve a suitable place for them, **and operations in the spinning stage can be divided into three basic processes:**

1- The drawing process "reducing the weight of the longitudinal unit" to produce the required tigress.

2- The twisting process to find a way for the consistency and bonding of the bristles and the durability of the thread according to the final use.

3- The resulting yarn winding process in the form of a suitable sized Popping.

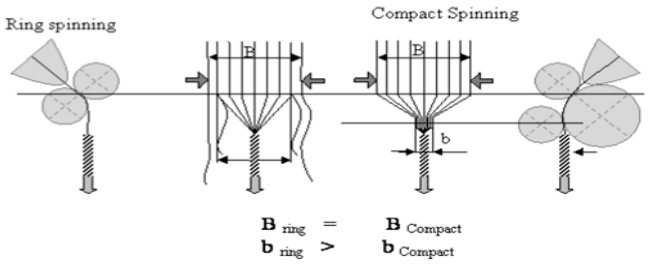

Figure No. (1)

Research problem: -

Ring spinning is considered one of the most important and best methods used to manufacture cotton yarn so far compared to other methods. Therefore, the companies that produced this type of yarn tended to develop their products and improve their quality, and since most of the spinning factories in the Arab Republic of Egypt operate with the traditional annular spinning system, therefore it is necessary to highlight and do research studies. On the nature and features of the integrated yarn system and its suitability for Egyptian cottons and the most important characteristics that this system provides for the yarns production, as well as discovering the possible defects of the combined yarn and how to treat them.

DOI:10.21608 /mjaf.2020.21851.1460

The research importance: -

The importance of the research is due to the fierce competition faced by the Egyptian textile products, which favor the superiority of the high-quality product and the appropriate price, whether for local production or export. Therefore, successive developments in the yarns production systems, including the integrated spinning machine and the extent of their suitability to Egyptian cottons, must be followed by achieving the most appropriate scientific standards for using this method of Yarn and its effect on the properties of the produced yarns.

Research aims: -

The research aims to achieve the following points: -

1- Obtaining good properties of yarns (durability - elongation - irregularity – hairy) using the built-in spinning technique.

2-Achieving the most appropriate scientific standards by studying the effect of the type of material, tigers, and exponents on the properties of the produced yarns.

2- Production of yarns with different properties on the traditional annular yarn and compact yarn machine, comparing the resulting properties and finding the significant differences for these properties.

The research hypotheses: -

1-There is a statistically significant relationship among the average staple length of the cottons used in the research with different diameters and the properties of the yarns produced (durability - elongation - irregularity - hairiness).

2-There is a statistically significant relationship among the exponent used in the research with different diameters and the properties of the produced yarns.

3-There is a statistically significant relationship among the ring spinning system (conventional - compact) and the properties of the produced yarns.

The search limits: -

1-The research samples were produced at the Cotton Research Institute at the Agricultural Research Center using the traditional ring yarn machine and the built-in annular yarn machine Marzoi Model 2004.

2-Three types of Egyptian cotton were chosen. Giza 70 is a super-long type, Giza 86 is long and staple, and a medium length 80 Giza.

The research Methodology: -

The research uses the experimental and analytical methods.

The search procedures: -

Three types of Egyptian cottons were chosen, Giza 70 super long Giza 86 long staple Giza 80 medium length, which are the types that represent the three different levels of length for the Egyptian cotton, and then those cottons were spun on a traditional and compact ring spinning machine with three different diameters for each cotton type (40/1, 50/1, 60/1), for each diameter, three types of twines were selected with a bass twist (3.2, 3.6, 4), thus 54 filament samples were produced.

Analysis of the results: -

First / the effect of research variables on the strength of the produced yarns: -

A - Yarn produced from cotton (G 70) gave the best durability followed by (G 86) and then (G 80), and thus there is a direct relationship and significant differences between the length of the bristles and the durability of the yarns produced from them, due to the increase in the joint areas between the long-stapled bristles, which increase the coefficient of friction among them, thus increasing the cutting resistance.

B - Yarns produced from 1/40 diameter gave the best durability, followed by a yarn of 50/1 and then a thread of 60/1, because thicker threads are more thick in the number of filaments, which directly affects the thread's ability to withstand stress when cutting.

C- The yarns produced by twisting exponent coefficient (4) were more durable than twisting exponent 3.6, and then the lowest result was at twisting exponent 3.2, due to the fact that the extra twines resulted in the difficulty of the capillaries sliding from each other during the stress testing and thus increasing the resistance of the fibers to cutting.

D - The yarn produced on the built-in spinning machine was more durable with significant differences due to the tight control of the fibers leaving the drawing device and directing them towards the axis of the tuft and pressure by joining the fibers with each other by exposing them to the air suction process, which led to the participation of all the hairs to bear the stress during cutting.

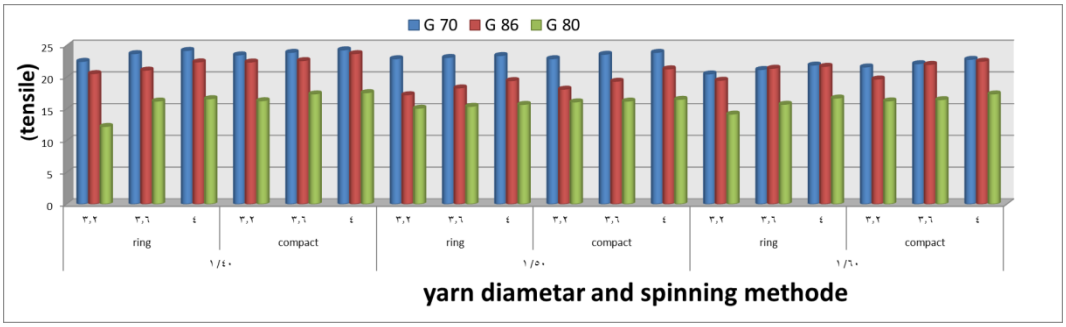

Figure No. (2)

Second / the effect of the research variables on the percentage of elongation of the produced threads: -

A - Yarn produced from cotton 70 gave the lowest elongation ratio followed by 86 then 80, but with insignificant differences due to the convergence of the elongation properties of the filaments used in the production of yarns

B - Yarns produced from 1/40 diameter gave the lowest elongation percentage, followed by a 50/1 thread, then a 60/1 yarn, even if the differences were also insignificant.

C- The yarn produced from the Berm 4 coefficient were less in the elongation ratio than the Berm coefficient 3.6, and then the most elongation of the Berm coefficient of 3.2 came due to the fact that the extra twines lead to the difficulty of the capillaries sliding from each other during the elongation ratio test.

D - The yarns produced on the traditional annular yarn machine were more elongated but with no significant differences, due to the fact that the elongation of the bristles in the production of the thread and the number of twists in the unit of measurement have the largest role in changing the elongation ratio during the test

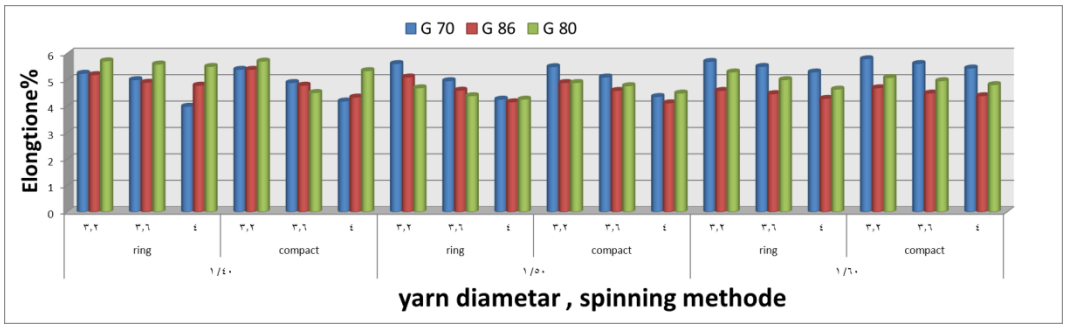

Figure No. (3)

Third / the effect of the search variables on the produced yarn hairiness: -

A - Yarn produced from cotton 70 gave the least hairs followed by 86 and then 80 and thus there is a direct relationship between the length of the hairs and the feature of the hairiness of the threads produced from them due to the increase in the lengths of the hairs, which reduces the phenomenon of straying of the hairs during the spinning process, as the lesser hairs have a greater chance of going out from the axis of the yarns in the area of the spinning triangle.

B - Yarns produced from 1/40 diameter gave hairier threads followed by a thread of 50/1 and then a thread of 60/1, because thicker threads are more thick in the number of hairs, which leads to an increase in the probability of some of the hairs leaving the axis of the thread when produced.

C- The strands produced from the Burm 4 coefficient were less hairy than the Burm coefficient 3.6, and the most brilliant was the Burm coefficient 3.2, due to the fact that the extra twines lead to an increase in the merging of the bristles, which reduces the chances of the filaments leaving outside the axis of the productive thread.

D - The yarn produced on the compact spinning machine was less hairy due to the tight control of the fibers leaving the drawing device and directing them towards the tuft axis and pressure by joining the fibers together by exposing them to air suction, which led to complete control of most of the hairs resulting from the machine.

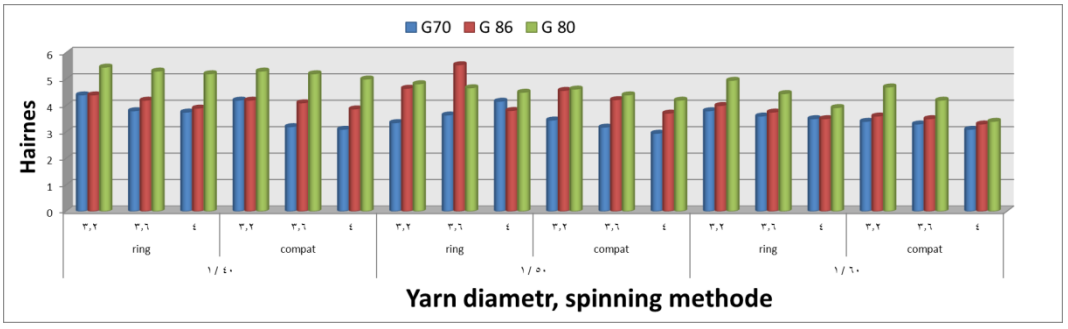

Figure No. (4)

Recommendations: -

1-The researcher recommends using the compact ring spinning system because it has direct effects on the quality of the yarns produced in terms of uniformity and durability and reduces the degree of parleying of the yarns which increases the quality of the fabrics produced from them.

2-The researcher recommends the use of fewer twists in the unit of measurement when using the compact yarn, which directly affects the increase in the production of machines without prejudice to the quality of the resulting yarns.

3- The researcher recommends using a thickened tiger with a yarn to produce the yarn due to the control of the movement of hairs inside the drawing devices with the compact spinning machines, which allows the ability to increase the clouds values, which lead to a cycle to increase the productivity of the twisting preparatory stages.

4- The researcher recommends studying the addition of a suction device in the drawing area to the traditional ring-spinning machine, a technical and economic study to obtain the properties of the compact yarn on the conventional machines instead of changing the machines.

References

1.Alhamla alkawmya llnhod balsnaat alnasgya , brnamg tanmya alkwa albashrya – algwza alawal 2004.

2.Alhwary Ebrahem abdo , abd erahman salah saber : teknlwjya gzl alkotn- 2004

3.Eseman samya Ebrahem lofty – maeswa elmlabs - gameat aleskandrya – 1997

4.Sandwk daam senat elgazl walnaseg ketab teknwlojya algazle – 2005.

5.Swltan Mohamed ahmed wa akhron : mekaneka alat hazel elkotn mansheat elmaref – alaskandarya – 1987.

6.Nashret sandek daam senate elgazel wa alnaseg ; emkanet tahseen kafat algazel almodmag 2012.

7.Tantawi , Samir ahmad , sydealaaalsyd "tknwlwjya 'intaj alkhywt", alshinhabi liltibaeat wa alnaser ,2011

8.Mebed sayd hosen – emkanyt tashgel alkotn alborkeny bmsanee algazl almesrya wa taseroh ala khwas alkhyot almontaga,magalet alemara waalfenon waalelom alensanya aladd 17

Foreign references:

9- Successful compact spinning process, A. Rush, 1/2002.

10- Compact spinning-a true-innovation in staple fiber spinning, Dr. Peter Artzt, 5/1998.

11-Kyaw, A. Takahashi, M. and Nakajima M., "Structure and Properties of MVS yams in Comparison with Ring yarns and Open-End Rotor Spun yarns", Textile Res. J., September, 2004, Vol. 14, No.9. p (819-826).

12-Joseph Introductory Textile. Science. Third Edition, p. 406-407