

The Production of cotton yarns with open-end spinning with excellent quality and cost

Assist.Prof.Dr. Hossam Eldeen Elsayed Mohamed

Assistant. Prof of spinning, weaving Dep., Faculty of Applied Arts, Damietta University.

drhossameldeen@yahoo.com

Abstract:

Open end spinning is one of the final spinning techniques used in the production of cotton yarn, and is characterized by increased production and reduced economic cost, and due to the low spread of open-end yarn technology, and limited production despite the low cost and the impact of its use in the production of cotton yarn of different types on the characteristics and performance This study was conducted in order to study the production of different cotton yarns with the system of open-end yarn with better properties in functional performance and economic cost, by producing (12) samples of cotton yarn of different number and composition, with open-end spinning, producing (6) samples of cotton yarn for the same number, with ring spinning, with different yarn number 30/1, 16/1, 20/1, 24/1, 6.5 / 1, 4/1, and conducted Different tests on yarns to illustrate the effect of using the open-end yarn in the production of the yarn under study compared to the technique of ring spinning yarn in their production, the results showed a clear difference in some yarn tests such as tensile strength and coefficient of variation Research in identifying the best types of yarns produced by the system of open-end yarn, reflected on Their performance, after analyzing the results of tests statistically, It is among the results Tensile strength values and RKM values for raw materials 50% cotton : 50% exhausts exhaust higher than the cotton exhaust. (Exhaust cotton and mix cotton with exhaust), Values of naps, thick places, and the thin places of the material 50% cotton : 50% exhausts less than exhausts cotton for all samples of the open end, The irregularity of the material was 50% cotton + 50% exhaust less than the raw material exhaust cotton for all open end samples. The quality coefficients of all the research samples showed that the sample number 12 produced by the open-end system of the material 50% cotton + 50% exhaust and the yarn number 4/1 with a quality factor (94.67%) followed by the second sample number 10 produced by the open-end system of the material 50% Cotton + 50% exhaust and yarn number 6.5 / 1 with a quality coefficient (93.68%), and in the third place came the sample number 18 produced by the ring-spinning system of the material No. 13 Produced by ring spinning system of material cotton and yarn number 30/1 quality factor (31.23%).

Keywords:

Open end spinning – ring spinning – yarns tests

search problem

The low prevalence of open-end spinning technique, and its limited production, despite its low cost and the effect of its use in the production of cotton yarn of different types on their properties and performance, compared to the ring spinning.

Search aim

Studying the production of various cotton yarns with open-end spinning system with better characteristics in performance and economic cost.

search importance

Determine the best types of yarns produced by open-end spinning system, and reflected on the functional performance.

Research Limits

The research is limited to the analysis of the properties of the cotton yarns produced by the open-end yarn system with a different number and the different Cotton constituent material, comparing it with the same number of yarns produced by the ring spinning system and testing the general properties of the produced yarn and studying the results after its statistical analysis to determine the best types of yarns produced by the open-end spinning.

Research methodology:

The research is limited to the analysis of the properties of cotton yarn produced by the system of open-end yarn with tiger (30/1, 16/1, 20/1, 24/1, 6.5/1, 4/1), depending on the quality of the cotton material of the yarn (Exhaust cotton and mix cotton with exhaust) ,12 samples, Comparing it with the same tiger for the yarn produced by the ring spinning system (6 samples), testing the general properties of the produced yarns and studying the results after analyzing them statistically to determine the best types of yarn produced by the system of open end yarn.

Sample No.	Yarn No.	Material	Spinning type	Tensile strength (w.g)	RKM (k.m)	Naps (1000 m)	Thick (1000 m)	Thin (1000 m)	C.V% Irregularity
1	30/1	Cotton exhaust	Open end	224	18.7	233	122	22	16
2	30/1	50%cotton:50% exhaust		296	21.2	187	88	12	13.7
3	24/1	Cotton exhaust		268	19.3	210	115	18	14.4
4	24/1	50%cotton:50% exhaust		315	22	178	81	7	11
5	20/1	Cotton exhaust		295	19.7	223	78	18	14.3
6	20/1	50%cotton:50% exhaust		347	22	152	52	7	11.3
7	16/1	Cotton exhaust		379	18	170	58	8	12.5
8	16/1	50%cotton:50% exhaust		391	23.3	120	35	5	10.7
9	6.5/1	Cotton exhaust		722	25.4	29	38	9	9.4
10	6.5/1	50%cotton:50% exhaust		815	27.3	14	17	0	7

11	4/1	Cotton exhaust	Ring	736	26.2	35	42	11	9
12	4/1	50%cotton:50% exhaust		817	29.7	18	15	0	7.3
13	30/1	Cotton		345	22.3	290	92	52	18.2
14	24/1	Cotton		387	24.8	266	89	48	16
15	20/1	Cotton		932	25.7	215	82	48	16
16	16/1	Cotton		422	26.6	164	69	12	15.5
17	6.5/1	Cotton		872	35.2	85	20	0	10
18	4/1	Cotton		894	35.9	80	20	0	10.2

Research Results:

- Tensile strength values and RKM values for raw materials 50% cotton: 50% exhausts exhaust higher than the cotton exhaust. (Exhaust cotton and mix cotton with exhaust).
- Values of naps, thick places, and the thin places of the material 50% cotton: 50% exhausts less than exhausts cotton for all samples of the open end.
- The irregularity of the material was 50% cotton + 50% exhaust less than the raw material exhaust cotton for all open end samples.
- The quality coefficients of samples produced from open-end yarn showed that the sample number 12 produced from the material 50% cotton: 50% exhaust and yarn number 4/1 with a quality factor (99.40%) is the best, followed in the second sample number 10 produced from the material 50% Cotton: 50% exhaust and yarn number 6.5 / 1 with a quality factor (98.34%), while came in the last sample number 1 produced from the material exhaust cotton and yarn 30/1 with a quality factor (25.41%).
- The quality coefficients of samples produced from ring spinning showed that the sample number 18 produced from the material cotton and the yarn number 4 / 1 with a quality coefficient (98.47%) is the best, followed by the second sample number 17 produced from the material cotton and the yarn number 6.5 / 1 with a quality coefficient (97.79%), while the last place was the sample number 13 produced from the material cotton and the yarn number 30/1 with a quality factor (35.18%).
- The quality coefficients of all the research samples showed that the sample number 12 produced by the open-end system of the material 50% cotton + 50% exhaust and the yarn number 4/1 with a quality factor (94.67%) followed by the second sample number 10 produced by the open-end system of the material 50% Cotton + 50% exhaust and yarn number 6.5 / 1 with a quality coefficient (93.68%), and in the third place came the sample number 18 produced by the ring-spinning system of the material No. 13 Produced by ring spinning system of material cotton and yarn number 30/1 quality factor (31.23%).

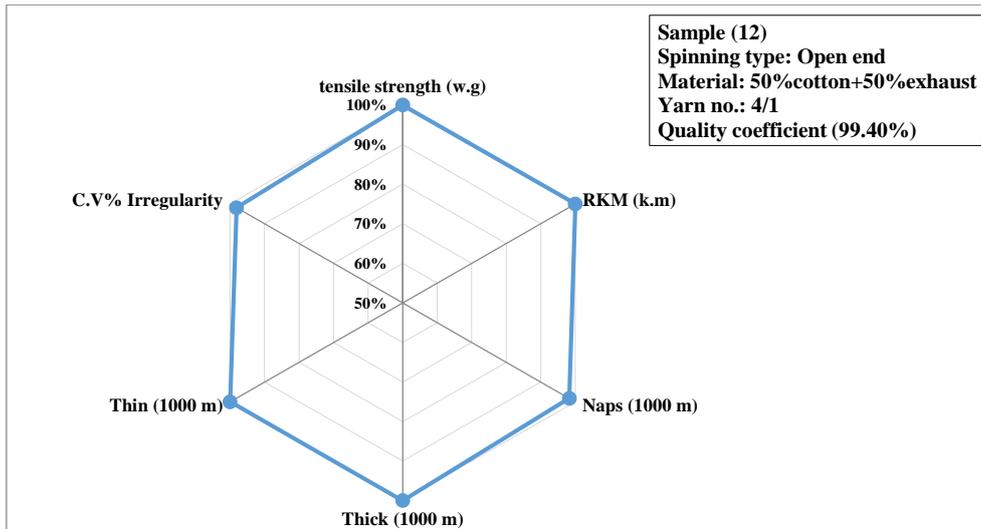


Figure (1) It shows the relative values and quality coefficient of the best sample produced from open end yarn

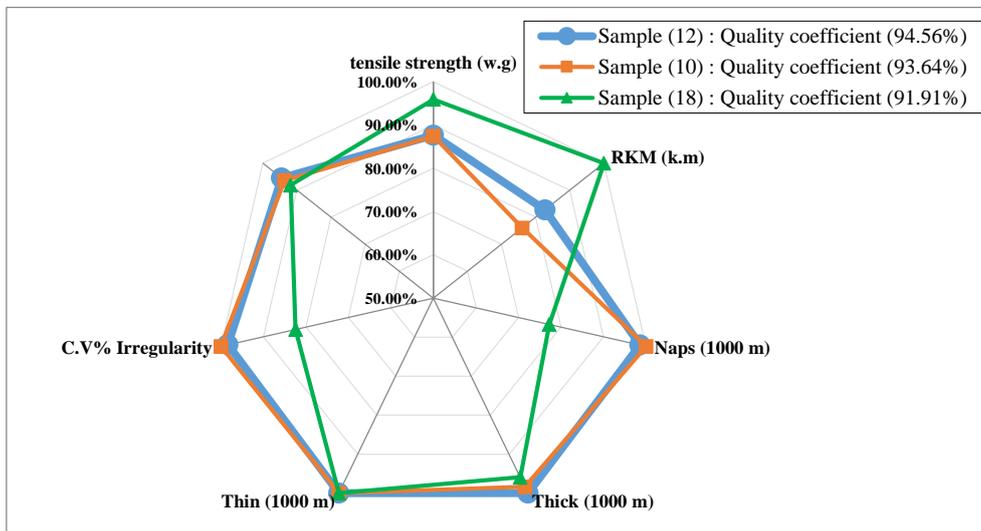


Figure (2) It shows the relative values and quality coefficients of the best research samples.

References

- 1- A. Das, R. Alagirusamy, Advances in Yarn Spinning Technology, Fundamental principles of open end yarn spinning , NCUTE publications on Yarn Manufacturing, Indian Institute of Technology, Delhi, 2010
- 2- Hanan Ghunmi, Adel Ghith, Open end yarn proprieties prediction using HVI fiber properties and process parameters, Autex Journal, Vol 17, March 2017.
- 3- W. Klein, "Technology of Short Staple Spinning", The Textile Institute, Manual of Textile Technology,2015.
- 4- I.A. Elhawary, in Textiles and Fashion, Fibre to Yarn", The Textile Institute,2015
- 5- H.R. Mankodi, in Specialist Yarn and Fabric Structures, Developments in hybrid yarns,2011.
- 6- Carl A. Lawrence , " Fundamentals of Spun Yarn Technology", CRC Publications, 2003.
- 7- P.R. Lord, Hand Book of Yarn Production: Science, Technology and Economics, Tailor and Francis, 2003.