Published by :
http://www.ijert.org

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 9 Issue 02, February-2020

The Effect of Torsion on the Mechanical Properties of Reinforced Yarn

Khaidarov Khabibullo Hamidullaevich.
Candidate of Technical Sciences, Associate Professor, Department:
"General Technical Disciplines" Namangan Engineering and Technology Institute,
(Namiti), Republic Uzbekistan Namangan City

Ismailov Nurulla Tuychiboevich
Senior Lecturer, Department:
"Higher Mathematics" Namangan Engineering Technology Institute,
(Namiti), Republic of Uzbekistan. Namangan City

Аннотация
Широкое внедрение предложенной технологии позволит организовать выпуск импорт заменяющих тканей в республике, обеспечить различные отрасли народного хозяйства качественной, дешевой продукцией при одновременном решении проблемы утилизации непрядомых отходов натуральных и химических волокон в текистилное промыщленности.

Abstract. **The widespread introduction of the proposed technology will make it possible to organize the import of substitute fabrics in the republic, to provide various sectors of the national economy with high-quality, cheap products while solving the problem of utilizing indirect waste of natural and chemical fibers in the textile industry.**

Ключевые слова: Сырья, отходами хлопка, натурального шёлка, вискозы, армированной пряжи, линейная плотность, экономического эффективности.

Keywords: Raw materials, waste cotton, natural silk, viscose, reinforced yarn, linear density, economic efficiency ***In the textile industry, shaped yarn, formed by combining several types of threads into a single complex thread, is becoming increasingly widespread.***

At the same time, it is possible to combine the high physical and mechanical properties of chemical threads and the natural properties of natural fibers.
This effect is especially high provided that natural fibers completely encircle the core chemical thread. This is achieved by wrapping the core thread with a continuous screw layer.
For the silk industry, which uses a limited assortment of threads, this direction allows one to obtain twisted threads of fundamentally new structures, taking into account that monofilament barbed threads. Although it is possible to have as a surge yarn a sufficiently liane staple silk fiber. The principle of obtaining a combined thread can be implemented both at the stage of unwinding cocoons and at the torsion stage, and can be used as continuous threads (raw silk), with enhanced consumer properties (nylon, cotton and others).
Such a scheme is implemented both on silk-winding machines and in a spinning rotor machine PR-150-1.
In the first case, the surge thread is natural silk, in the second, discrete staple fibers (Fig. 1).
The question naturally arises: what should be the twist of the reinforced yarn, if the diameter of the core thread is dc and the fibers are db, provided that the core thread is completely covered by fiber layers (Fig. 2).

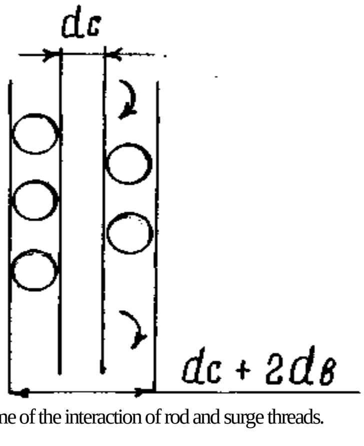

Fig. 1. Scheme of the interaction of rod and surge threads.

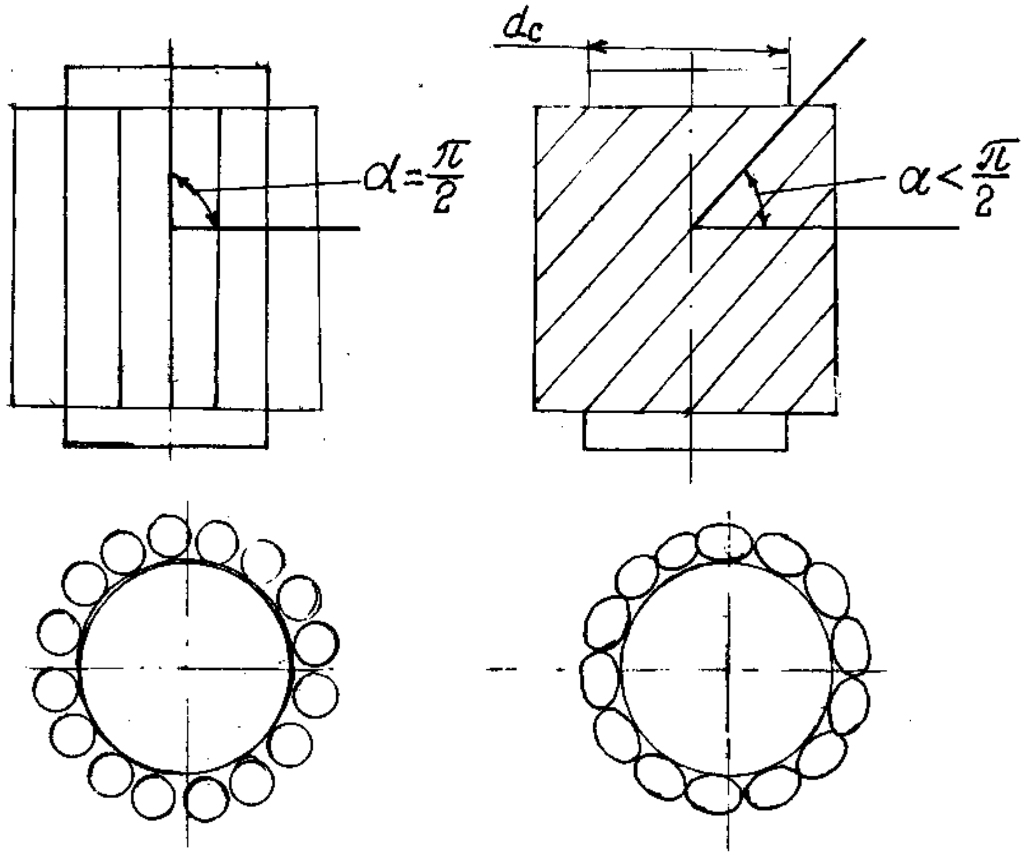

Fig. 2. The design scheme of the parameters of composite yarn.

It can be seen from the diagram that for one revolution of the core thread, the coil is raised by the length Lc, which is determined from two ratios:

$$Lc = \frac{n \cdot d \cdot b}{\cos\alpha} \qquad (1)$$

Or

$$Lc = \Pi(dc+db)tg\alpha = \frac{\Pi(dc+db)\sin\alpha}{\cos\alpha} \qquad (2)$$

We divide the formula (1) by (2) and get the following

$$\frac{\Pi(dc+db)\sin\alpha}{ndb} = 1$$

from here we find Sinα, i.e.

$$\sin\alpha = \frac{ndb}{\Pi(dc+db)} \qquad (3)$$

It is obvious that the maximum number of fibers and threads is determined from the ratio

$$n_1 = \frac{\Pi(dc+db)}{db}, \qquad (4)$$

when the surge thread is parallel to the core (Fig. 2.1), $\alpha = \frac{\pi}{2}$,

α if n <n_1, then the fiber winds at a certain angle

$$\alpha = \frac{\arcsin ndb}{\Pi(dc+db)} \qquad (5)$$

For n> n1, a second layer of filament is formed.

With n = 1, you can calculate the thread with the maximum twist.

Obviously, for this it is necessary to create a twist.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 9 Issue 02, February-2020

$$k = \frac{1}{Z_c} = \frac{\cos\alpha}{ndb} = \frac{\dfrac{\sqrt{1-n^2d^2b^2}}{\pi^2(dc+db)}}{ndb} = \frac{\sqrt{n^2(dc+d^2b)-n^2d^2b}}{\pi ndb} \qquad (6)$$

At the same time, the specific consumption of the overhang in relation to the core is determined by the condition

$$R = \frac{Z\text{наг}}{Zc} = \frac{\Pi(dc+db)}{ndb} \geq 1 \qquad (7)$$

For n1, we have R = 1

Formulas (4), (5), (6) and (7) are the basis for technological calculations in the production of reinforced yarn, with some correction for the non-circular cross-section of the fiber.

Given the ratio between the diameters of the threads and the size of the twist (6).

for any two components, it is possible to choose a ratio of feed rates and twist value that provides complete overlap of the surface of the rod and gives the complex filament the properties of natural fibers

From the obtained formulas it is also obvious that the twist of the shaped yarn depends on the number of surplus threads. When n = 0, the twist will be minimal. When n = 1 - the maximum twist.

The choice of twist or the number of surge threads determines the performance of the machines, on the one hand, and the type and strength of the reinforced thread, on the other.

CONCLUSIONS

1. The theoretical diameter of the reinforced yarn, as well as its dependence on the angle of inclination of the braiding fibers to the core thread, is calculated.
2. Theoretically, the effect of twisting on the strength of reinforced yarn is shown, depending on the composition of the core thread and fiber (through the angle of inclination of the fibers to the axis of the thread).
3. The maximum strength of the thread occurs when this angle is P / 4, the minimum (theoretically) - with the values of the angle zero and P / 2. In the first case, due to the lack of curvature at zero twist, in the second case, due to the arrangement of the fibers perpendicular to the core thread.
4. By calculation, the diameter of the reinforced thread is established as a function of the diameters of the core thread and fibers, as well as the conditions for braiding the core thread with fiber in one and two layers.

LIST OF REFERENCES.

1. Полякова Д.А., Ермилов Г.А., Дроздов Н.А., и др. Роторной способ прядения и армирования М: Легпромбытиздат, 1987.-300с (Курсом ускорения научно-технического прогресса).
2. Полякова Д.А., Дроздов Н.А. и др. Роторный способ прядения и армирования М: Легпромбытиздат, 1987. С 159-160 .
3. Полякова Д.А., Дроздов Н.А. и др. Роторный способ прядения и армирования М: Легпромбытиздат, 1987. С 159-160.
4. Заявка 62-238830 Япония, МКИ D 01 H 7/02. Устройство для изготовления армированной пряжи / Синоко Мацу но. Заявл. 4.04.86, N 60-126598, опубл. 19.10.87.
5. Грекова С.В., Д.А. Полякова., Н.А. Дроздов ЦНИХБИ, Москва, Л.В. Картышева ВНИИТТ, Ярославль. Технология роторного армирования - один из путей экономии натурального волокна. Текстильная промышленность. Москва. 1990,с.40-42.
6. Пат.4899529 США, МКИ D 01 H 13/16, D 01 G 15/00. Способ изготовления армированной пряжи. /Фумио танае. Заявл.12.12.88 283308, опубл. 13.02.90
7. Безин П.В. Оптимизация технологии производства армированной пряжи на кольцевой прядильной машине. Диссертация на соискание ученой степени кандидата технических наук. Санкт-Петербург 1993г.
8. Хайдаров Х.Х., Мелибоев У.Х.,Содиков Р., Парпиев Х. Сравнение способов армирования. Республика Илмий маколалар туплами Тошкент - 1998 г

LIST OF REFERENCES.

[1] Polyakova D.A., Ermilov G.A., Drozdov N.A., et al. Rotary method for spinning and reinforcing M: Legprombytizdat, 1987.-300s (Course for accelerating scientific and technological progress).
[2] Polyakova D.A., Drozdov N.A. and other Rotary method of spinning and reinforcing M: Legprombytizdat, 1987. With 159-160.
[3] Polyakova D.A., Drozdov N.A. and other Rotary method of spinning and reinforcing M: Legprombytizdat, 1987. With 159-160.
[4] Application 62-238830 Japan, MKI D 01 H 7/02. Device for manufacturing reinforced yarn / Shinoko Matsu no. Claim 4.04.86, N 60-126598, publ. 10.19.87.
[5] Grekova S.V., D.A. Polyakova., N.A. Drozdov Central Research Institute of Chemical Biology, Moscow, L.V. Kartisheva VNIITT, Yaroslavl. Rotary reinforcement technology is one of the ways to save natural fiber. Textile industry. Moscow. 1990, pp. 40-42.
[6] Pat. 4899529 USA, MKI D 01 H 13/16, D 01 G 15/00. A method of manufacturing a reinforced yarn. / Fumio Tanay. Declared 12.12.88 283308, publ. 02/13/90
[7] Bezin P.V. Optimization of the technology for the production of reinforced yarn on a ring spinning machine. The dissertation for the degree of candidate of technical sciences. St. Petersburg 1993
[8] Khaidarov Kh.Kh., Meliboev U.Kh., Sodikov R., Parpiev X. Comparison of reinforcement methods. The Republic of Ilmiy Makolalar Tuplyami Toshkent - 1998