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Improving Technology on Manufacturing Sewing Threads from Raw Silk

J.A.Akhmedov , U.N.Azamatov ,Kh.Kh.Umurzakova ,Sh.A.Usmanova ,Sh.Tolibaeva

Doctor of technical sciences, associate professor, Tashkent Institute of Textile and Light Industry,
Uzbekistan

Researcher, Tashkent Institute of Textile and Light Industry, Uzbekistan

Researcher, Tashkent Institute of Textile and Light Industry, Uzbekistan

Researcher, Tashkent Institute of Textile and Light Industry, Uzbekistan

Student, Tashkent Institute of Textile and Light Industry, Uzbekistan

ABSTRACT: Article is devoted to development of sewing threads from raw silk with improved consumer properties. There were set values for parameters of produced twisted sewing thread on a new method: as linear density, number of additions, relative explosive loading and explosive lengthening.

KEY WORDS: Slik thread, Raw silk, Twisting, Sewing thread, Linear density, Sericin, Parameter, Tex, Boiling, Rewinding, Method.

I.INTRODUCTION

For production of finished products sewing threads there widely used of various origin, structure, twist and linear density.

It is known that manufacturing the twisted sewing threads with a linear density of 22-200 tex by use of complex polyester threads giving them 200 – tw/m on the left direction, and then on an opposite direction giving 1,6-2,0 times more than primary twist [1]. The twisting giving more than 1,6-2,0 times than primary twist in opposite direction doesn't manage to be fixed. If additional twist isn't fixed, then won't be complete. Therefore when using on sewing production, threads are broken due to formation of confusion and a twisting and is a lack of this method.

It is possible to develop sewing threads from raw silk with a linear density of 2,33 and 3,23 tex: Then threads of raw silk are rewound, addition and twisting 80 –tw/m, then the first twisting 400 –tw/m, the second addition twisting 80 - tw/m, the second twisting 400 - tw/m. Then the second turning and twisting are given an opposite direction, than the first, boiling and coloring [2].

II.ANALYSIS OF EXISTING FILTERING MATERIALS AND RESEARCH RESULTS

A method of receipt of sewing threads reduced by 4 processes of raw silk, developed by us, provides technological results and to increase in characteristics of stability of twist leading to improvement of sewing properties.

Method of development of sewing threads with a linear density of 18-19 tex are made on the following: raw silk with a linear density of 2,33 and 3,23 tex are rewound, respectively 6-20 and 3-14 threads in addition, and it is at the same time given 700 and 600 –tw/m twists on the left the direction. Then the last 2 threads again added, and also given 700 and 600 –tw/m twists in the left direction, later they are boiled for removal of a sericin and also for stabilization of a twist and are colored.

A new method reduces the first and second turning and due to increase in a twist respectively on 220 and 180 –tw/m. and raises relative explosive load of sewing threads of 25-30% and explosive lengthening of 22-35% (tab. 1). Simultaneous addition and twisting the threads can be made by modern doubling-and-twisting machines, having at the silk entities. By preparation for raw silk rewind use of vacuum and steam handling of hanks also reduces process by two transitions. Technological scheme of manufacturing the silk sewing threads are given in fig. 1.

III. LITERATURE SURVEY

After handling the corresponding transitions (twisting, texturing, addition, boiling, coloring and drying) linear density of thread is determined by the following formula [2]:

$$T = \frac{nT_o}{\left(1 - \frac{\alpha}{100}\right)} \left(1 - \frac{\beta}{100}\right) K_3 \quad (1)$$

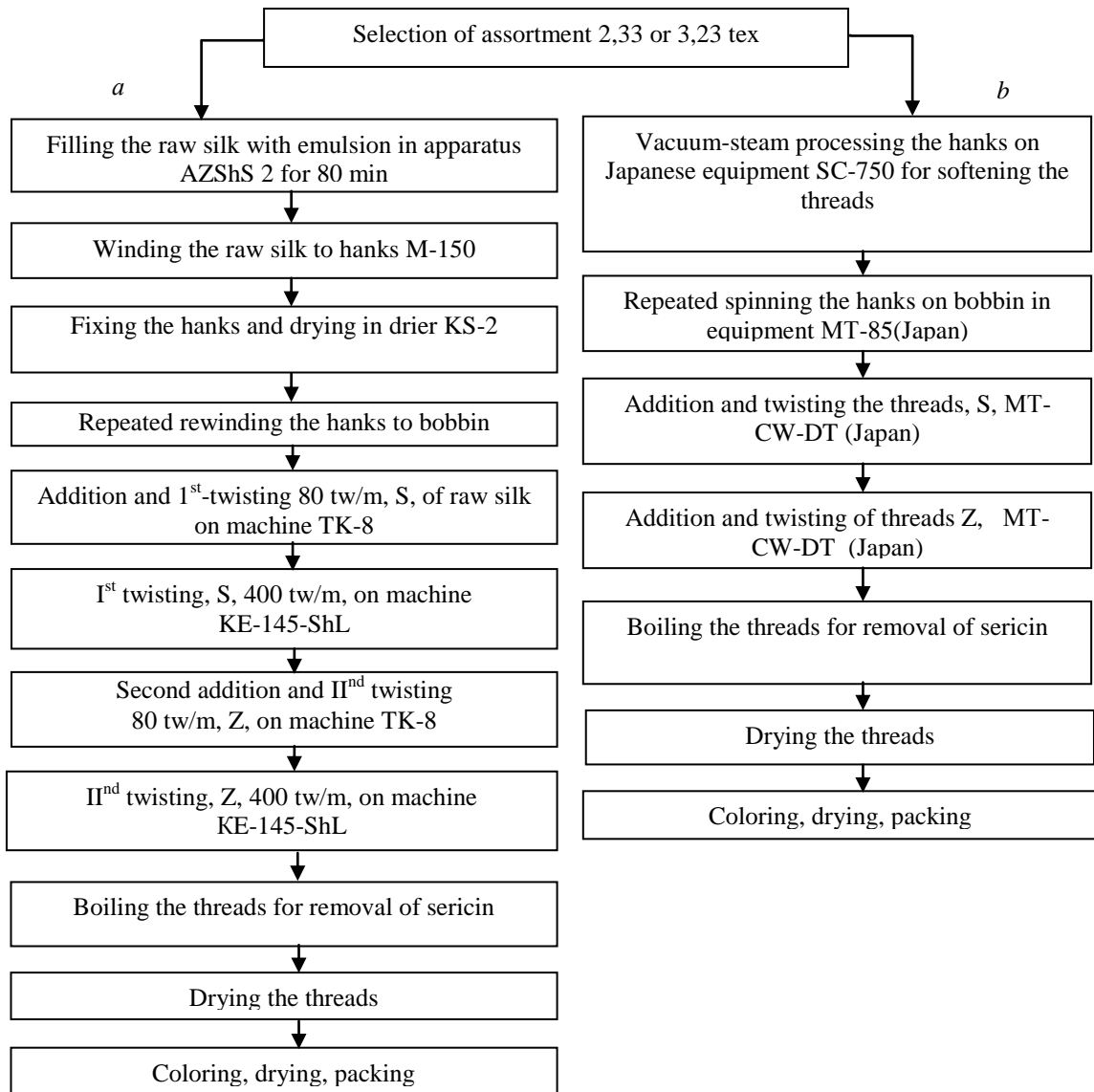
here, n – is a number of additions;

T_o – linear density of being manufactured threads, t;

α – twist take up, %;

β – Decreasing linear density on the account of boiling the raw silk (solution of sericin), %;

K_3 – rate of texturing .



a) Existing [2]; b) new technology.

Fig.1. Technological scheme for manufacturing the silk sewing threads

Discontinuous characteristics of sewing threads received by a new method (from raw silk 2,33 and 3,23 tex) are provided in tab.-1 and Fig.-2.

Table 1. Discontinuous characteristics of sewing threads, manufactured on new method from raw silk 2,33 and 3,23 tex

conditional number (in sales)	Related discontinuous load on method, cN/tex		Discontinuous elongation on method, %	
	existing	new	existing	new
9	31,5±7,0	41,1 ± 3,7	18	22,4 ± 1,15
13	31,5±4,5	39,7 ± 3,1	18	23,6 ± 1,2
18	31,5±3,7	41,3 ± 2,5	18	22,0 ± 1,15
33	30,5±4,1	42,0 ± 2,3	16	20,5 ± 1,12
65	30,5±5,2	40,5 ± 1,85	16	21,6 ± 1,0

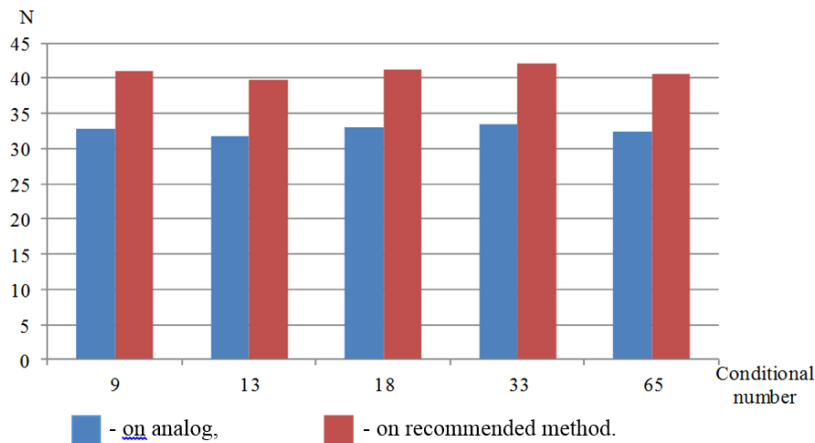


Fig. 2. Histogram of discontinuous loading of sewing threads

According to a law, in texturing there is used a rate of texturing (K3).

Manufacture of sewing threads from raw silk doesn't require texturing. Therefore for calculation of linear density of twisted sewing threads we recommend the following formula:

$$T = \frac{nT_o}{\left(1 - \frac{\alpha}{100}\right)} \left(1 - \frac{\beta}{100}\right) \tag{2}$$

On results of industrial approbation, we have established that, changes in linear density of sewing threads are settled and actually matching. Technological formula and limits of linear density of sewing threads from raw silk are given in tab. 2.

Table 2. Technologies formula and Limits for linear density of new silk sewing threads

Conditional number (in sales)	Technologies formula for silk sewing threads	Limits for linear density of sewing threads, tex
9	3,23 tex x 14 Z 600 x 2 S 600 2,33 tex x 20 Z 700 x 2 S 700	80 – 90
13	3,23 tex x 9 Z 600 x 2 S 600 2,33 tex x 14 Z 700 x 2 S 700	55 – 60
18	3,23 tex x 8 Z 600 x 2 S 600 2,33 tex x 10 Z 700 x 2 S 700	45 – 55
33	3,23 tex x 6 Z 600 x 2 S 600 2,33 tex x 8 Z 700 x 2 S 700	33 – 42
65	3,23 tex x 3 Z 600 x 2 S 600 2,33 tex x 4 Z 700 x 2 S 600	18 – 20

V. EXPERIMENTAL RESULTS

On the basis of pilot studies when sewing (tailoring) products from fabrics various area density, we have established the rational relation between linear density of silk sewing threads, numbers of needles in sewing machines. (tab.-3)

Table 3. Rational relation of parameters for machine needles, fabrics and silk sewing threads

Conditional number (in sales)	Linear density		Surface density of fabrics, gr/sq.m	Number of needles
	raw silk and addition, tex	Sewing threads, tex		
9	3,23x28 2,33x40	86,4 ± 3,3	280 - 350	130
13	3,23x18 2,33x28	53,5 ± 3,5	150 - 280	120
18	3,23x16 2,33x20	48,0 ± 2,0	50 - 110	90, 100

VI. CONCLUSION AND FUTURE WORK

It is established that, in products from fabrics with area density of 50-350 g/m² for providing increased strong seams it is established and recommended a use of silk sewing threads with conditional number 18, 13 and 9. due to reducing engineering procedures and increase number of twists developed technological developments of sewing threads with raised discontinuous characteristics. In case of development of a new assortment classification of sewing threads is expanded. There is recommended a rational ratio of parameters of numbers of machine needles, fabrics and silk sewing threads.

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AUTHOR'S BIOGRAPHY

He is working as a Head of department, Tashkent Institute of Textile and Light Industry, Uzbekistan. He has published eight articles in international journals.