



TO STUDY THE EFFECT OF FILLING PARAMETERS ON THE EFFICIENCY OF THE COTTON YARN SPINNING PROCESS.

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Article history:	Abstract:
Received: March 20 th 2021	Currently, the problem of import substitution poses a number of challenges for the textile industry with the production of high-quality fabrics that compete with foreign counterparts in terms of consumption and price.
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The solution to these problems is to improve the quality of textile products through the use of modern high-efficiency equipment installation methods and the creation of efficient technological regimes.

The textile enterprises of Bukhara region face similar tasks, they are currently re-equipping the fleet of spinning and weaving equipment with a technopark with the installation of machines of foreign companies.

At the DELUXE FABRIC LLC, new selection and weighing machines of the German company Zukker Müller and looms of the Picanol company were purchased. Purchased equipment increases labor productivity as well as product quality.

It is known that one of the most important processes that ensures the high quality of the fabric is the technological process of weaving the yarn.

The purpose of this process is to increase the resistance of the yarn to friction and polycyclic loads when passing on the weaving machine and to create the wrapping required for the weaving process.

The weaving process consists of two operations: chemical (preparation of the yarn) and mechanical (soaking the yarn with yarn, squeezing, drying and wrapping the dried tan yarns on a weaving spool).

The name and quantitative ratio of the ingredients included in the ohor for a given volume of the finished ohor is called the ohor recipe.

Ohor recipes are determined by the baking of the fibrous material, the linear density of the ohor yarn, as well as the weaving of the fabric being produced and its density.

The composition of ohor can vary depending on the type and quality of ohor materials.

Ahor must meet the following requirements:

- the tan must have an adhesive and a certain viscosity to cover the surface of the yarn and partially penetrate deep into the yarn;

- Abrasion resistance in yarns, creating an elastic shell that does not break the elasticity of the yarn, does not make the yarn brittle and stiff, as well as does not spill the amount of yarn on the surface of the yarn, both during the weaving process and on the loom;

- have a good resemblance to fiber, do not break the threads and do not change the color of the threads when weighing colored bases, easy to remove and do not affect the color and finish of fabrics, do not change their properties during storage and use, do not form foam in the glue valve;

- not to worsen the condition of the technological equipment of the loom, to ensure that the threads do not stick to the drying drums;

- to have a low price.

The weighting process is influenced by many technological parameters: the depth of immersion of the tanda yarn, the concentration and temperature of the solution in the adhesive bath, the vapor pressure in the drying drums, the elongation of the tanda yarn and the moisture content of the tanda yarn.

In addition, the factors affecting the quality of the technological process, the technical condition of the control equipment, the quality of the yarn, the temperature and humidity conditions in the shop.

Thus, the sizing process is a multifactorial technological process, characterized by a complex relationship between factors, as well as the presence of random external disturbances.

Optimal adjustment and maintenance of loading parameters ensures that high-quality loading bases obtain substrates.

The weighting parameters are selected depending on the type of fiber, the linear density and structure of the yarns, the structure and purpose of the fabric, the composition of the yarn and the type of loom.

At present, DELUXE FABRIC LLC is equipped with a new drum baler Zukker Mueller from the German company Zukker Mueller, which processes 27 linen cotton yarn. A brief description of the cotton yarn is given in Table 1.

Table 1. Brief characteristics of cotton yarn.

Indicator name	Value
Linear density of threads, tex	27
Interruption elongation load, sN / tex	11,9
Coefficient of variation on breaking load,%	13,8

At present, the task of determining the optimal filling parameters of the weighing process for a newly installed weighing machine is relevant for the enterprise.

Table 2 shows a brief technical description of the Zukker Müller weighting machine.

Table 2.

Indicator name	Value
Digging speed, m / min	100
working width, mm	3100
number of reels	10
flange diameter, mm	1000
a pair of compression shafts	1
Compression force of the compression shaft (max), N	12000
the gravitational force of the rope (max), N	5000
number of drying drums	7
diameter of the drying drum, mm	800
steam pressure in the drying drum, (max) bar	5

In this study, the relationship between the amount of breakage of the yarns in the weave Y of the filling parameters of the warping process was established:

- L-is the sinking depth of the tanda thread;
- K-is the average steam pressure in the drying drum;
- Ч-is the length of the thread in the body,%;
- W-is the moisture content of the tanda yarn in the tanda spool;
- E-temperature, ° C;
- V-loading speed, m/min.

The variability of the selected filling parameters of the weighting process in the Zucker Müller machine is given in Table 3.

Range of variability of filling parameters of Ohor technological process.

Table 3

process parameters	symptoms	min	max
the depth at which the tanda rope sinks into the anchor	L	100	140
Chorus concentration,%	K	2	10
steam pressure in the drying drum, atm	P	1	3,5
length of body thread,%;	Ч	1,5	3,5
Moisture of the tan yarn in the tan roll,%	W	4	7
chord temperature, ° C;	T	80	95

V-loading speed, m / min.	V	80	100
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Average values of filling parameters: Table 4

process parameters	symptoms	values
depth of sinking of the tanda thread into the chord, mm	L	120
Chorus concentration,%	K	6
steam pressure in the drying drum, atm	P	2,5
length of body thread,%;	Ч	2,5
Moisture of the tan yarn in the tan roll,%	W	5,5
chord temperature, ° C;	T	90
V-loading speed, m / min.	V	80

A passive experiment was used as the research method, resulting in average values of the parameters completed in Table 4.

During the experiment, the results of the study of the actual adhesion of cotton yarns for 10 weaving spools were obtained.

Subsequently, the studied weaving rods were mounted on STB-190 looms, which produced chit fabric.

The degree of breakage of the yarns was studied according to the standard technique on the prepared looms.

The experimental results were processed in a MathCad programming environment on a computer.

The result is a secondary mathematical model describing the effect of factors L, K, R, Ч, W, T, V on the selected optimization parameter (breakage of the affected strands) and having the following form:

$$Y = 14,69 + 0,022 L + 0,325 K - 1,01 Ч - 1,13 W - 0,104 V$$

In the resulting equation, the value of the coefficient in the argument describes the force of this parameter, and the coefficient sign determines the effect.

Analysis of the obtained mathematical model showed that the greatest effect on the breakage of the tanda yarn is under the influence of moisture in the tanning shaft, the elongation of the tanda yarn and the concentration in the tanning bath. the concentration in the solution increases with the depth of immersion of the solution and the elongation of the tan yarn increases, the moisture content of the yarns in the tanning shaft and the rate of glue aggregation decreases.

Based on the obtained mathematical model, using the method of canonical modification of the model, the optimal filling parameters of the weaving technological process, which provides minimal breakage of yarns in weaving, were developed. Thus, when producing chit fabric on the STB-190 loom, it is necessary to set the following filling parameters on the weighing machine:

- Depth of body rope to the saddle, -110 mm;
- oxor concentration, 7.2%;
- average steam pressure in the drying drum, 2.5 atm
- long length of the body,%; 1.25%;
- Moisture content of the yarn in the body roll, 5.3%
- oxor temperature, ° C; 90 ° C;
- decrease rate, m / min. 80 m / min.

Setting the above parameters on the Zukker Müller spinning machine reduces the breakage of the yarn during the weaving process for 1 meter of fabric in the range of 0.20-0.25 breaks.

CONCLUSIONS ON THE CASE:

- 1) Analysis of the park of technological equipment installed in the loading section of the textile production, installed in "DELUXE FABRIC" LLC.
- 2) As a result of experiments to optimize the technological process of spinning 32 tex cotton yarn on the machine of Zukker Müller firm, a mathematical model was obtained that establishes the relationship between the filling parameters of the spinning machine and the breaking of yarns in weaving.
- 3) On the basis of the mathematical model obtained using the method of canonical modification of the model for 1 meter of fabric, the optimal filling parameters of the ohor technological process were developed, providing minimal breakage of yarns in weaving in the range of 0.20-0.25 breaks.

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