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ALGORITHM FOR DETERMINING THE INFLUENCE OF DESIGN PARAMETERS ON THE STRENGTH OF THE TECHNOLOGICAL PROCESS

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The work [1] is devoted to the determination of the thread tension when interacting with various guides of the loom feed system. This study does not take into account the actual physical and mechanical properties of the threads, namely its bending rigidity, the nonlinear dependence of the friction forces on the normal pressure, the actual angle of wrapping of the thread by the guide, and the angle of radial wrapping of the thread by the guide surface. The influence of the loom settings on the value of the input thread tension is considered in [2, 6]. However, the authors do not disclose the mechanism of influence on the stepwise increase in the tension of the conditions for the interaction of the thread with the guides of the thread supply system of the loom. In [3], the influence of the thread tension in front of the working area on the structural parameters of fabrics for protective clothing is established, but the reasons for the increase in tension compared to the input tension and the mechanism for their change are not disclosed. Of interest is the work [4], which considers the effect of the tension of three systems of longitudinal threads on the conditions for the formation of multilayer technical fabrics. They form three independent thread feeding systems on the loom, each containing a different number of guides.

The recommendations received are of a narrow nature and do not allow predicting the intensity of the formation of multilayer tissues when their structure changes. Similar results are given in [5] when studying the processing of cotton threads. The influence of the physical and mechanical properties of cotton threads on the conditions for the formation of the fabric structure is given in [6]. However, there is no information in the work about the influence of the design parameters of both the thread supply system and specific guides on the amount of tension in front of the working area. In [4], when determining the thread tension after the guide, the authors take into account the bending stiffness of the thread, however, when determining the wrapping angle, its decrease due to the influence of this parameter is not taken into account, which does not allow accurately determining the tension after the guide. The issue of determining the thread tension in the presence of radial coverage of the thread by the surface of the guide is considered in sufficient detail in [2-3]. The authors limit themselves to considering the issue of determining the tension for various feeder guides of a knitting machine. However, the work does not take into account the bending stiffness of the thread when determining the actual wrapping angles. Similar

results were obtained in [2] for knitting machines with guides in the form of a feeder. When determining the tension, the actual conditions of interaction in the contact zone are not taken into account, taking into account the bending stiffness of the thread.

The need to take into account the relative displacement of the thread and the guide rubbing on the surface is noted in [3], which is very important in the presence of anisotropy of frictional properties. The use of strain gauge allows you to determine the tension with a sufficient degree of accuracy. However, this setting cannot be used to determine the influence of the design parameters of complex-shaped guides, in addition, the range of change in the angles of wrapping the guide with a thread is very limited. When experimentally determining the thread tension, there is reason to assert the prospective development of methods of redundant measurements for different types of transformation functions (linear and nonlinear) in the field of increasing accuracy by processing the results of intermediate measurements. The independence of the results of experimental measurements of the thread tension on the parameters of the conversion function of tensometric devices is confirmed in [1].

Thus, the experimental determination of the tension in front of the fabric and knitwear formation zone causes great difficulties. This does not allow, even at the initial stage of designing the technological process of obtaining specific fabrics and knitwear from a particular type of thread, to determine the amount of tension and, as a result, to improve the shape of the threading line, to select the design parameters of the guide elements at the break points of the threading line.

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