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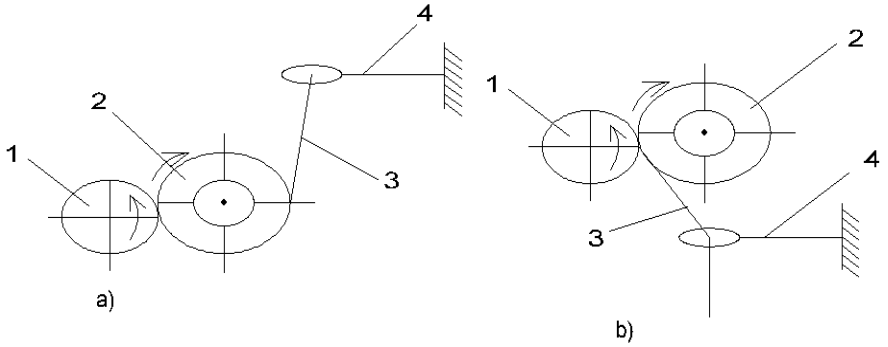
THEORETICAL ANALYSIS OF THE FORCES GENERATED BY THE PRESSURE FORCE OF THE YARN FROM THE TOP OR BOTTOM OF THE YARN WINDING CYLINDER

Homidov Qahramon Abdullajonovich
Independent Researcher, Namangan State Technical University.

Annotation. This in the article textile in the industry the threads wrapping in the process to the surface coming mechanic forces dynamics research Thread hunter to the cylinder of the thread from above and from below orientation as a result harvest to be friction forces two kind hypothesis based on analysis Research during friction power and coverage angle between dependency graphs taken and compared. Results this shows that the thread cylinder high from the part transfer friction strength reduces, this and thread interruptions prevent to take and wrapping density optimization opportunity gives.

Keywords: Textile industry, yarn winding, cylinder, workbench power, coverage angle, mechanical dynamics, hypothesis, tension.

Textile industry main from the joints one these are the threads weaving for preparation process This process is physicist forces, mechanical pressure and threads between relative actions based on done Especially the threads direction, their how forces under movement to do and in the cylinder location important importance has. The thread hunter to the cylinder from above and from below threads when transferred harvest to be forces dynamics seeing we will go out [1].



1. a) Thread the thread onto the thread winding cylinder. from below impact.
b) Thread the thread onto the thread winding cylinder from above impact.
Here: The worker who gives the main rotational movement shaft
2 – A cylindrical object on which a thread is wound.
3 – Thread.
4 – Thread when moving direction integral accordingly provider device.

In Figure 1, we analyze the relationship between the pressure forces generated when the yarns are passed from above and below the yarn-winding cylinder during the winding process and their mechanical effect on the yarn winding. These pressure forces arise during the movement of the yarns and vary depending on the degree of tension between them, the elasticity of the yarn material, and the speed of the yarn winding process. During the winding process, the cylinder begins to be affected by pressure forces from below or above (Figures 1. a and b). In studying this situation, it is mainly necessary to find the friction force. There are two hypotheses for these cases [2].

First hypothesis. The yarn and the cylinder winding the yarn are considered as a kinematic rotating pair, and the pressure of the yarn on the cylinder is equal to the elements of the kinematic pair, that is, the specific pressure is assumed to be a constant quantity. Using the first hypothesis, the yarn is directed towards the cylinder from below For case (1) we find an analytical representation of the friction force (Figure 1. a) [3].

$$F_{ish} = \frac{fQ\alpha_0}{\sin\alpha_0} \qquad (1)$$

Second hypothesis. Since the elasticity of the yarn winding cylinder is very small, it is assumed that it is not deformed. Under the action of the yarn from above, a compressive force is created. This force is selected along the direction of the line of action. The vertical wear of the yarn winding cylinder is a constant value. Using the second hypothesis, we find the analytical form of the friction force (2) for the case where the yarn is directed to the cylinder from above. (Fig. 1. b)[4].

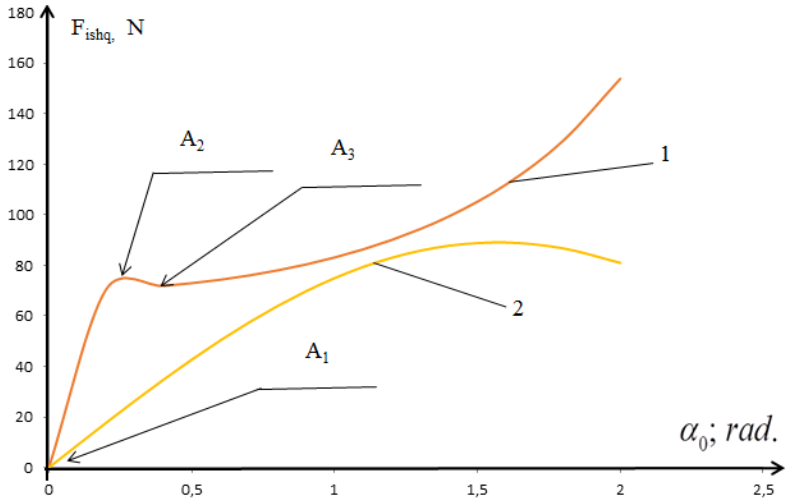
$$F_{ishq} = \frac{4Qf}{\pi}\sin\alpha_0; \qquad (2)$$

Here: -The angle of winding the thread around the cylinder, rad.

Q- Which thread is coming from below or above? pressure power , N.

- Thread and cylinder between friction coefficient

We consider the expressions in formulas (1) and (2) as a function of the angle and the friction force and draw a graph of their relationship. In order to more accurately represent the process under study, values close to practical values of the required quantities were selected.



Friction power and coverage angle between connection graph.

Curve 1 on the graph mechanic from the point of view analysis we do:

A 1 A 2: This in between friction power sharp increase our vision possible. Such process to be main because of peace friction coefficient in motion friction coefficient big to be and of power impact circle increasing is going.

A 2 A 3: In this range thread move starts. Thread move from the beginning after peaceful friction coefficient decrease on account of friction power decreases, thread tension as a result of the thread to the cylinder touching finished surface decreases.

A 3 in the process after coverage angle friction increases strength also increased to go our vision possible.

(2)- from equality using above brought We draw curve (2) on the graph. As can be seen from this graph, as the angle of rotation increases to its chosen value, the friction force also increases.

As can be seen from functions (1) and (2), the friction force generated by the forces acting on the cylinder from above and below depends mainly on the parameters of the yarn, the direction of the yarn, the angle of the cylinder winding, and the coefficient of friction. This directly affects the mechanical movement of the yarn during the winding process. [5]

A general analysis of curves (1) and (2) presented in the graph shows that the friction force arising when the thread is passed through the upper part of the cylinder is smaller than when it is directed through its lower part. This fact indicates a direct dependence of the friction force on the trajectory and direction of the thread movement during the winding process on the bobbin and confirms the study of the mechanical properties of this process. An increase in the friction force is considered a factor that negatively affects the proper functioning of the technological process in the operating mode. In particular, an increase in the friction force generated in the thread leads to an increase in the number of breaks, which leads to an increase in the strength limit of the thread.

At the same time, an excessively dense winding of the thread on the bobbin is observed, which leads to an increase in the thread density above the standard values. As a result, the physical and mechanical properties of the thread, including elasticity, flatness and general quality indicators, decrease. The theoretical formulas studied above substantiated the dependence of the friction force on the direction of yarn movement and showed that, in terms of increasing the efficiency of the technological process, it is advisable to pass the yarn through the upper part of the cylinder.

This recommendation allows reducing yarn breaks, optimizing the density of the yarn, and improving the quality of the finished product.

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