METHODS OF NOISE AND VIBRATION CONTROL IN MODERN SEWING MACHINES

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Abstract: This article presents the problems with noise and vibration of light industry and methods of control. When studying the phenomena of noise and vibration, it is important not only to measure their values, but also to determine the source of their occurrence and the nature of their propagation, since by introducing vibration isolation of one system, it is possible to amplify the vibration of another.

Key words: Noise, vibration, vibration isolator, reduction, vibration absorbing, load, main shaft, frequency, inertia forces, shock absorber.

Introduction

The levels of vibration activity and sound emission are one of the indicators of the competitiveness of both existing and projected industrial equipment.

High-speed sewing machines are a fairly powerful source of noise and vibration. Sewing production is characterized by monotony of operations, their frequent repetition, which contributes to operator fatigue. At the same time, working on sewing machines requires increased attention. Numerous studies of hygienists have shown that vibration and noise worsen the conditions and quality of work, have an extremely adverse effect on a person - increase the overall morbidity, lead to occupational diseases. The adopted noise standards at the workplace, equal to 80.95 dB, currently no longer meet modern sanitary and hygienic requirements and need to be revised downward. Thus, the production has put forward the task of minimizing the intensity of vibration and noise [1]. Experience shows that the effectiveness of measures to reduce the mechanical noise of existing equipment is very limited and is due to the possibility of structural changes in its components, therefore, reducing the mechanical noise of machines should be achieved mainly at the design stage. At the same time, without creating appropriate dynamic and mathematical models, mathematical and software that allows analyzing the design being developed, achieving the goal is not possible. For comparison, we will give the indicators of sound pressure levels of different sound sources at a distance of one meter from the observer, taking the audibility threshold to zero: Increasing the speed parameters of modern sewing machines, their power and complexity of mechanisms forces us to look for new methods to combat noise and vibration [2]. With an increase, for example, in the speed of rotation of the main shaft of the machine, the probability of resonant phenomena increases, and with an increase in inertia forces, their impact not only on the machine itself, its table, but also on the interstory floors, especially when installing a large number of simultaneously operating machines. Vibration of machines can lead to the unraveling of mechanisms, premature wear and destruction of parts, to a decrease in the reliability of machines and, in some cases, to disruption of the technological process. The problem of combating noise and vibration in light industry is complicated by the presence of a large number of working machines in the workshops, it includes a whole range of measures [3]. Among such measures are the development of methods for measuring noise and vibration parameters in factory workshops, the definition of methods for reducing noise and vibration characteristics, the use of active means to combat vibration and noise, etc. When studying the phenomena of noise and vibration, it is important not only to measure their values, but also to determine the source of their occurrence and the nature of their propagation, since by introducing vibration isolation of one system, it is possible to amplify the vibration of another. For example, in order to reduce the vibration of the head of a household sewing machine, improved soft rubber shock absorbers operating on the principle of suction cups were introduced into the stand. The machine began to work quieter, but its vibration increased. It turned out that with more rigid shock absorbers, part of the vibration was transmitted to the machine table, and the head itself worked in better vibration

conditions [4]. With softer shock absorbers serving as vibration isolators, smaller vibrations began to act on the table, but the head itself began to close them inside its system, so the frequency of its own vibrations increased. Noise and vibration are measured by high-precision acoustic and vibration measuring devices. The fight against noise and vibration is conducted, starting from the selection of materials for mating parts when creating new machines and ending with the installation of noise- and vibration-absorbing and insulating devices. Due to this, noise and vibration levels in the sewing workshops of knitting, sewing and shoe enterprises do not exceed permissible standards. The creation of new and improvement of existing sewing machines is associated with an inevitable increase in the intensity of work of their parts, which significantly affects their performance and leads to a decrease in the reliability and durability of machines, and to a greater extent, the higher their speed mode. Therefore, the issues of rational lubrication of mating pairs of mechanisms and assemblies of sewing machines, and especially industrial machines, are of great importance. This includes the issues of the correct choice of systems, methods and modes of lubrication, as well as the type of oil in the design, timely and rational frequency of lubrication during operation, control over the operation of lubricating devices and oil quality, etc. The lubricant reduces the wear of parts, removes heat generated on the friction surface, protects parts from corrosion, seals gaps, and also serves as a buffer that dampens shock loads. Interestingly, friction energy losses in mechanical engineering account for up to 80-87% of all energy consumed. Therefore, reducing friction is one of the most important tasks in modern technology.

Results. The main reason that causes failures in operation, backlash, breakage of machine parts over time is their wear and tear. Wear is a change in the size of machine parts during their operation, caused by the friction of the mating surfaces and leading to an increase in the gaps between the pairwise working parts. For each part, the maximum permissible wear is provided, in which the necessary accuracy of the part is still maintained and the correct operation of the machine is not disrupted. With further wear, there comes a time when it is necessary to replace unusable parts in order to restore the machine's operability.

Literature:

1. Androsov, S. P. Reduction of vibration and noise of sewing machines Text. / S. P. Androsov, V. L. Teploukhov // Sewing industry. 2005, No. 5— - P. 19.
2. Shvetsov, A.V. Ways to reduce noise and local vibration in sewing machines of the series 31. Text./ A.V. Shvetsov // Sewing industry. 1993, -No. 1, p. 21.
3. Androsov, S. P. Reduction of vibration and noise of sewing machines Text. / S. P. Androsov, V. L. Teploukhov // Sewing industry. 2005, No. 5, - p. 19
4. Kurbanova I.I. Proceedings of the 4th Internatinal Scientific and Practical Conference. Global and regional aspects of sustainable development. Copenhagen. №65. The most widely used types of bearings in the light industry today.