ISSN NO: 2770-4491
Date of Publication:24-11-2021

Universal Sewing Machine Vibration Protection Methods

Kurbanova Iroda Ixtiyorovna,
Doctoral student
Bukhara Engineering-Technological Institute, Bukhara, Uzbekistan.
E-mail: iroda0221@mail.ru

Abstract: This article describes the methods and tools for reducing and protecting vibration encountered in the universial sewing machine.Vibration protection is understood to be carried out by reducing the level of vibration in the object being protected, the vibration emanating from the source.

Key words: Sewing machine, vibration, strut, needle, needle mechanism, thread, tube, deformation, amplitude.

Introduction

Vibration is a mechanical vibration that is observed on a solid and liquid medium.

Vibration is similar to noise by its physical nature. The term" vibration " has a small amplitude, and even then, it is used in low-frequency vibrations not less often.

Vibration is a kinematic energy that is transmitted to a machine or a person, the reasons for its occurrence are the imbalance of the effects of these forces, the sources of occurrence are as follows:
-forward-reverse motion systems. (Crank-rod mechanisms, presses, tramping devices, etc.) [1].
Inconsistency of Rotary moving masses (grinding machines, multiples and electric grinders).

In some cases, vibration-can occur as a result of hitting the details together (threaded joints, camshafts)

The forces are formed as a result of inconsistency, imbalances; the reason for this is the absence of the same density of the composition of the circulating moving body, the result of the fact that the axis of rotation of the body mass does not coincide in one line with the center of rotation. The following are the basic concepts - the theory of vibration:

1. Vibration parameters: vibration-fracture, vibration speed, vibration acceleration;
2. Mechanical vibration;
3. Private frequency;

The vibration that occurs in the technique is close to the-harmonic character, in some cases it is periodic processes, and the harmonic oscillations are similar, that is, the amount of vibration that causes it to change according to the law of sine (cosine) in a state of equilibrium, shaking to a certain environment , for the system of harmonic oscillations moving (vibration- displacement) is:

$$xq\ x_{T=}\sin(\omega t+\varphi) \qquad (1)$$

where: xT - vibration - shear amplitude;
φ-tq0 initial phase in time torque;
wq2nf-circulating frequency; f-oscillation frequency;

Vibration speed (ϑ) and vibration acceleration (a) are the first and second derivatives in terms of shaking – siljshini time and therefore they are expressed through the following formulas:

$$\vartheta q\omega x_T\cdot sos(\omega t+\varphi)=q\vartheta_t\cdot\cos(\omega t+\varphi) \qquad (2)$$

$$aq-\omega^2x_T\cdot\sin(\omega t+\varphi)=qa_T\sin(\omega t+\varphi) \qquad (3)$$

Here: ϑ_T, a_T, - vibration speed of the oscillating point, vibration accelerations correspond to each other, the maximum values; characteristic of vibration, the values of the parameters absallyut vary in large and wide range, therefore in practice, the concept of the degree of parameters is used [2].

The vibration rate ratio (L_a) and vibration acceleration (L_a) are determined by the following formula:

$$L_\vartheta=q20lg\frac{\vartheta}{\vartheta_0}; \qquad (4)$$

$$L_{a=}q20lg\frac{a}{a_0}; \qquad (5)$$

ISSN NO: 2770-4491
Date of Publication:24-11-2021

There are: ϑ and a-vibration speed ($^{m}/_{s}$), and vibration acceleration ($^{m}/_{s^2}$), mutually compatible average square values.
$\vartheta_0 q5 \cdot 10^{-8}$ - base value of vibration speed; $^{m}/_{s}$;
$a_0 q3{,}4 \cdot 10^{-4}$- vibration acceleration base value, ($^{m}/_{s^2}$) ;
By organizational signs: divided into collective and individual types. Depending on the sources of vibration formation " collective protection" is divided into the following techniques:
• method of reducing vibration parameters by affecting the source of vibration formation.
• method of reducing vibration parameters by way of exposure to ways of propagation out of the source of vibration formation.

These are used, as a rule, in the stages of design and preparation of machines and equipment. The means of protection against vibration propagation processes are shown in Figure 1 and can be applied to the projects of machinery and equipment, their exploitation processes.

Vibration absorption is the reduction of the degree of vibration of a protected object : it is carried out by replacing the energy of the mechanical vibration system with another type of energy. The increase in the loss of energy in the system can be achieved through :
application of constructive materials with high internal friction strength;
• soft-the application of a layer of compound-forming materials on working surfaces;
• application of friction surface;
• transfer of mechanical vibration energy to Fuko current energy or magnetic field [3];

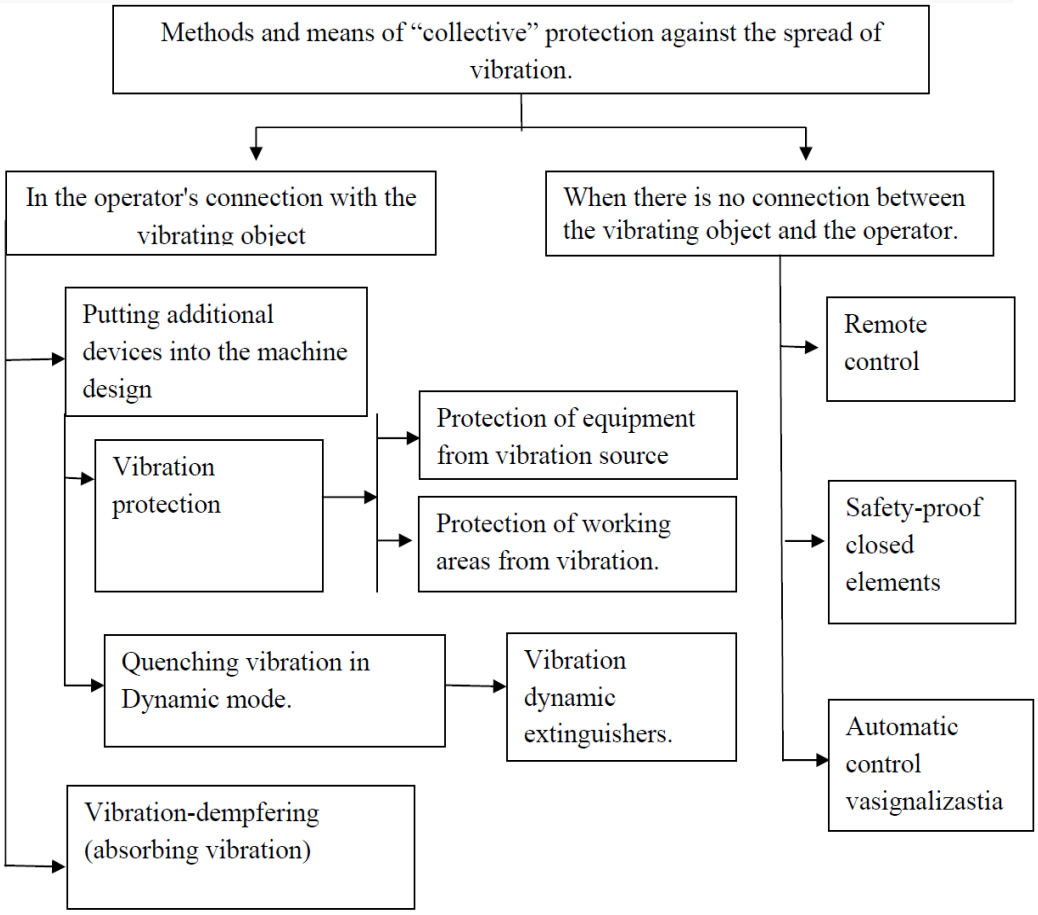

Figure 1. Vibration protection methods and tools.

ISSN NO: 2770-4491
Date of Publication:24-11-2021

From the point of view of vibration, reduction point, it is desirable to choose as constructive materials the following : plastics, wood, rubber, projectiles, etc. In weaving looms, the elements of leather details, tangles, spinning thread stretching mexanizm, etc., reduce vibrationtirishga serve. In low-power machines and equipment, gear wheels are widely used, both from kapron, textolite, and even from hard rubber. As a result, vibrations are reduced on the basis of the machine and on the foundation, which means that even in the working place, a reduction in vibration is formed, the details of many technological machines and equipment are made of hard rubber, plastic details of the bearings, especially in the preparation of modern instruments, the above materials are widely used. Electric sewing machines are used vibration dampers (demfers) [4].

In addition, bearing assemblies made of polymers and plastics allow to significantly increase their service life (in some cases up to 10 years). The effect of the coating used in vibration-absorbing coatings is based on the presence of vibration. In this case, the mechanical vibration energy is converted into heat energy, that is, the surface is deformed. The effective effect of the coating is observed at the resonant frequencies of the elements of the machine and machine structures. The effect of hard coatings occurs at low and moderate frequencies. And the mild effect appears at high frequencies.

Soft – slip materials as hard coatings are included. As soft coatings – plastics, rubber-type materials, penoplasts, polychlorvinyl plastics are used. Good deformation of oil material vibration. For example, concomitant oils it is convenient for bearings, as well as machine oils are used for reducer baths [5].

Vibration suppression – when said is understood to reduce vibration levels by introducing an additional system of reactive impedances to the protected object : vibration suppression is usually carried out by installing machines on an independent foundation. The principle mass is chosen so that the layer under the machine in any case should not exceed 0.1 – 0.2 mm, and in the most important responsible constructions should not exceed the value of 0.005 mm.

Vibration absorption is directly related to the release of vibrations due to the additional reactive impedianklar system. Therefore, the vibration system is also carried out by changing the static of the shear character. Vibration protection is understood to be carried out by reducing the level of vibration in the object being protected, the vibration emanating from the source. Protection of machines and machines from vibration is achieved by installing them on a special anti-slip device (supports) with low hardness. The best protection is achieved in the values of KP $q\ {}^{1}/_{8} - {}^{1}/_{15}$. The transfer coefficient KP can be calculated by the following formula :

$$KPq = \frac{1}{({}^{f}/_{f_0})^2 - 1} \qquad (6)$$

Here: f-the frequency of excitation forces; – the private frequency system in the vibroisolator; f and f0-the value of the optimal ratio 3....It is equal to 4.

For the system of excitation forces along the vertical axis – 3 types of devices with vibration: rubber, coil and combined types are used [6].

Results.

Percussion vibrators have a number of advantages over the type of rubber. They are used to avoid low-and high-frequency vibrations, can maintain their own shear properties for a long time. It is able to withstand high temperatures, good oil effects. However, metal coils are designed for low frequencies, bypassing high-frequency vibrations. The rubber has a low density, well attaches to the details, it is possible to give it a crumbly shape, it is usually applied to machines of small and medium mass (electrodes and so on). In vibrating bases, the rubber works by sliding or compressing.

References

1. Olimov Q.T. Textbook Dynamics of Network Machines. "Science and technology". Tashkent 2006.
2. Pobol, O. N. Noise in the textile industry and methods of its reduction Text. M.: Legprombytizdat, 1987.
3. Poryadkov, V. I. Design of low-noise mechanisms Text. M.: Mechanical Engineering, 1991.-63s.

ISSN NO: 2770-4491
Date of Publication:24-11-2021

4. Androsov, S.P., V. L. Teploukhov. Reducing vibration and noise of sewing machines Text. Clothing industry. 2005, №5
5. Bibutov N.S. - Teaching technology in materials resistance - Bukhara-2013
6. Kurbanova I.I. "Young scientist" scientific journal, No. 14 (148). Features of children's expectation and choice of materials.
7. 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.