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Analysis of the Results of an Experiment to Determine the Torque on the Shaft of a Gin Saw Cylinder

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ABSTRACT: The article presents the results of experimental studies on the measurement of torques on the shaft of a gin saw cylinder using rubber bearings. Oscillograms and graphical dependences of the change in torque on the change in performance and torsional stiffness of the rubber bearings of the shaft of the saw cylinder are presented, the necessary parameter values are substantiated.

KEYWORDS: Saw gin, cylinder, rubber, bearing, support, torque, performance, strain gauge, vibration, rigidity.

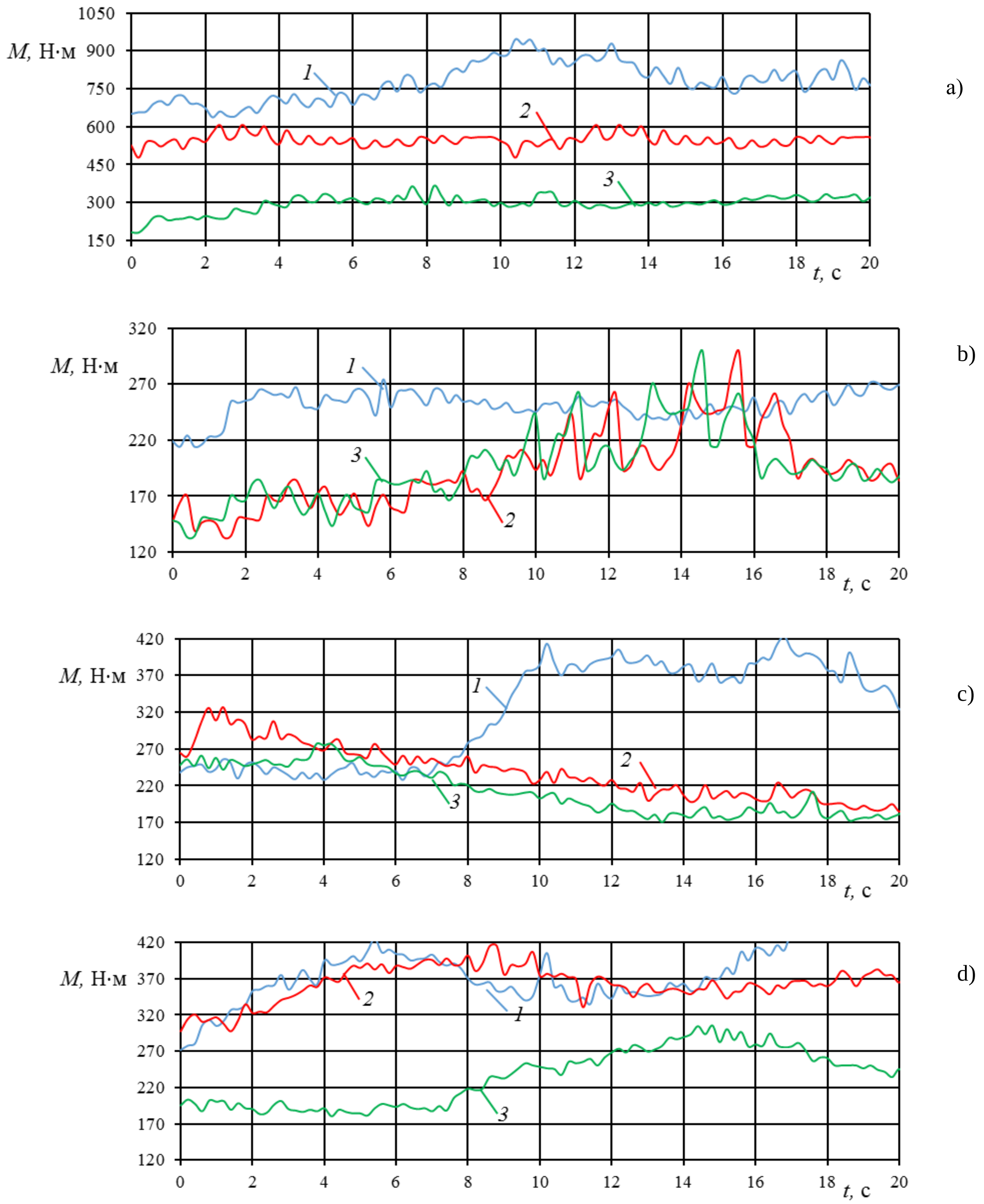
I. INTRODUCTION

The installation of a saw cylinder on an elastic bearing support allows for significantly reduced peak values of torque fluctuations. This leads to uniform rotation of the saw cylinder, an improvement in the fiber separation process, and also to a reduction in noise [1,2]. To determine the torque on the shaft of the gin saw cylinder, the method of strain gauging on a special installation was used [3,4].

Oscillograms are presented characterizing the change in the torques in the shaft of the saw cylinder at a productivity of 3.5 t / h, 4.0 t / h and 4.5 t / h, both in the existing shaft (a) and in the shafts of the saw cylinder with bearing support with three different grades of rubber. In an existing machine with a capacity of 3.5 t / h, the shaft torque averaged 300 Nm, and with a capacity of 4.5 t / h - up to 720-750 Nm. When installing the recommended bearings with elastic rubber bearings, the torque is significantly reduced.

When used in supports made of rubber grade 6308-ТМКЩиС with a capacity of 4.5 t / h, the torque varies within (370 - 420) Nm, and when using rubber 7317, the torque is in the range (250-270) Nm.
Based on the processing of the obtained oscillograms in Fig. 1, graphical dependences of changes in the values of torque, amplitude and amplitude of oscillations from changes in the productivity of gin and various rubber grades used for elastic bearing support were constructed (see Fig. 2, Fig. 3 and Fig. 4).

In fig. Figure 2 shows the dependence of the change in torque on the shaft of the saw cylinder on the change in the performance of the gin. An analysis of the obtained graphical dependencies shows that with an increase in productivity from $3.51 \cdot 10^2$ nm to $6.23 \cdot 10^2$ nm when using the brand of rubber 7317 as an elastic bearing, the torque on the shaft of the saw cylinder increases from $3.82 \cdot 10^2$ Nm to 4.1 102 Nm, and when using the rubber grade 6308-TMKSCHIS, the torque reaches $1.22 \cdot 10^2$ nm. This means that in order to reduce the load on the shaft of the saw cylinder, it is considered advisable to use a rubber grade with lower torsional stiffness, the most acceptable is an elastic bearing support from a rubber grade 10-220.



1,2 and 3 - with a productivity of 3.5 t / h; 4.0 t / h; 4.5 t / h; a) for the existing option: and when using the following grades of rubber; b) 7317 c) 10-220; d) 6308-TMKSCHIS

Fig. 1. Oscillograms characterizing the patterns describing the law of change of torque on the shaft of the saw cylinder

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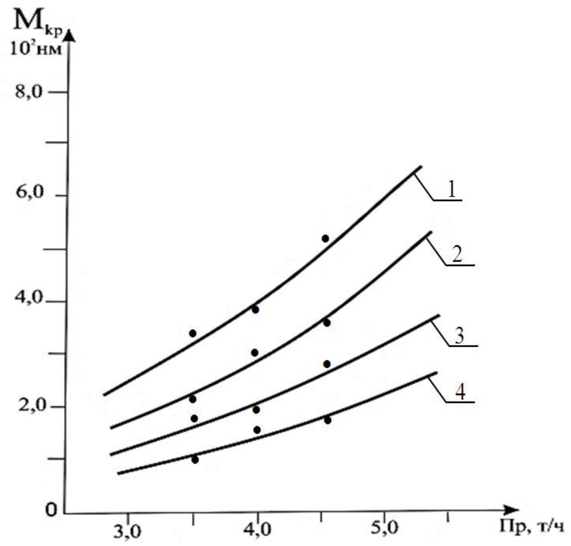
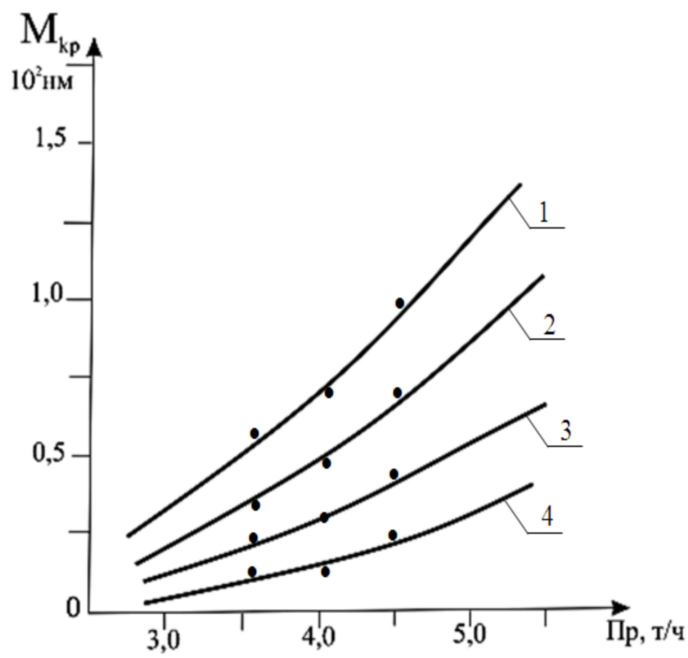


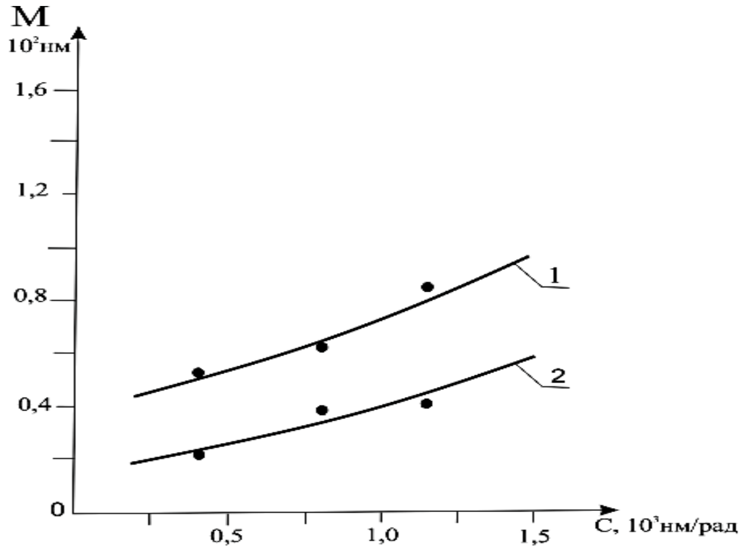
where, 1-serial version of the bearing support of the saw cylinder; 2-when using an elastic bearing support from the rubber brand-7317; 3-when using an elastic bearing support from the rubber brand-10-220; 4-when using an elastic bearing support from the rubber brand-6308-TMKSCiS;

Fig. 2. The dependence of the change in torque on the shaft of the saw cylinder on the change in the performance of the genie



where, 1-serial version of the bearing support of the saw cylinder; 2-when using an elastic bearing support from the rubber brand-7317; 3-when using an elastic bearing support from the rubber brand-10-220; 4-when using an elastic bearing support from the rubber brand-6308-TMKSCiS;

Fig. 3. Dependences of the change in the range of fluctuations in the torque on the shaft of the saw cylinder on the change in gin productivity



where, 1-Pr = 4.5 t / h, 2-Pr = 3.0 t / h.

Fig. 4. Dependences of the change in the range of fluctuations in the torque on the shaft of the saw cylinder with an elastic bearing support on the coefficient of circular stiffness of the support.

In fig. Figure 3 shows the dependence of the variation in the amplitude of the fluctuations in the torque on the shaft of the gin saw cylinder on the variation in gin performance. Analysis of the graphs shows that an increase in gin productivity leads to an increase in the range of torque fluctuations on the shaft of the saw cylinder with a nonlinear regularity. So, with an increase in productivity from 3.5 t / h to 4.5 tp, ΔM for serial production of the bearing support increases from 0.305· 10^2 Nm to 0.982·102 Nm. The use of rubber from the brand 6308-TMKSCHIS as an elastic bearing, it leads to a slight increase in ΔM from 0.018 10^{-2} to 0.12· 10 m. In addition, rubber of the brand 10-220 is also recommended.

It is important to study the effect of torsional stiffness of an elastic rubber support on a decrease in ΔM (see Fig. 4). An increase in the torsional stiffness of the elastic support from 0.43 103 Nm / rad to 1.173 103 nm / rad leads to an increase in the range of fluctuations in the torque on the shaft of the bearing support from 0.6 102 Nm to 1.18·10^2 Nm [4,5]. The most acceptable values of the coefficient of torsional stiffness of the elastic support are considered (0.68÷0.92) 103 nm / rad, at which the amplitude of the momentum does not exceed (0.6 ÷0.75)) 102 Nm.

II. CONCLUSION

Using the method of tensometry, regularities of the change in the torque on the shaft of the gin saw cylinder are obtained. Graphical dependences of the change in the torque on the shaft of the saw cylinder on the change in the productivity of the gin, as well as on the change in the coefficient of circular stiffness of the elastic bearing are constructed. The most acceptable values of the coefficient of torsional stiffness of the elastic support are considered (0.68÷0.92) 103 nm / rad, at which the amplitude of the momentum does not exceed (0.6÷ 0.75)) 102 Nm.

REFERENCES

1. Джураев А.Д. Юнусов С., Мирзаумидов А. Разработка эффективных конструкцийи совершенствование научных основ расчета параметров рабочих органов и механизмов пильных джинов // Изд. «Фан ва технология», Монография Ташкент, 2018 г., с. 217.
2. Джураев А.Д. Юнусов С. Динамика машинных агрегатов с механизмами рабочих органов пильного джина // Монография, Изд.“Фан ва технология” Ташкент, 2013 г. ISBN 978-9943-10-887-5 с.144. 3.
3. Anvar Djuraev, Ozod Rajabov Analysis of the Interaction of Fibrous Material with a Multifaceted Grid of the Cleaner // International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8, Issue-1, May 2019.
4. A. Djuraev, M. T. Khojiev, O. Murodov, A. Rakhimov Development of Design and Substantiation of The Parameters of the Separator for Fibrous Materials // International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8 Issue-2, July 2019, P. 5806-5811.
5. А.Джураев, Ш.Худойкулов Экспериментальное определение крутяшего момента и изгиба вала пильного цилиндра джине // Журнал. Известие ФерПИ, 2019 г. №3, с.112-117.