DEVELOPMENT OF A METHOD FOR DETERMINING AND CALCULATING LOADS APPEARING ON BELT CONVEYOR GUIDE ROLLER MECHANISMS

Jumaev Akbarjon Sayfullaevich
Almalyk State Technical Institute, Almalyk, Uzbekistan
Doctor of Philosophy (PhD) in Technical Sciences, Associate Professor
ORCID: 0009-0009-3026-8052; E-mail: akbarjumayev011@gmail.com

Abdurakhmanova Muattar Musurmakulovna
Almalyk State Technical Institute, Almalyk, Uzbekistan
Assistant
E-mail: muattarabdurahmonova984@gmail.com

Esenbaev Irzaxmet Xojaxmet uli
Almalyk State Technical Institute, Almalyk, Uzbekistan
Student of the 7d-25 ME group, Mechanical Engineering
E-mail: irzaesenbaev@gmail.com

Annotation. This article discusses the development of a method for determining and calculating loads arising in guide and support roller mechanisms of a belt conveyor. The transportation of gold ore in mining enterprises is analyzed considering the inclined motion of the belt and its operational movement modes. The influence of loads on the speed range, amplitude, and vibration characteristics of the system is scientifically substantiated. The distribution of static and dynamic loads within the roller mechanism elements is determined. The proposed calculation method is aimed at improving the reliability and operational efficiency of belt conveyor systems.

Keywords: belt conveyor, support roller mechanism, load, inclined motion, transportation, gold ore, speed range, motion.

Annotatsiya. Mazkur maqolada tasmali konveyer yo‘naltiruvchi va tayanch rolikli mexanizmlarida yuzaga keladigan yuklanishlarni aniqlash hamda ularni hisoblash uslubini ishlab chiqish masalalari ko‘rib chiqiladi. Tog‘-kon sanoatida, xususan oltin rudasi transportirovkasi jarayonida konveyer tasmasining og‘ma harakati va umumiy harakat rejimlari tahlil etiladi. Yuklanishlarning tezliklar qamrovi, amplituda va tebranish ko‘rsatkichlariga ta’siri ilmiy jihatdan asoslab beriladi. Dinamik va statik yuklanishlarning rolikli mexanizm elementlariga taqsimlanishi aniqlanadi.

Taklif etilgan hisoblash uslubi tasmali konveyerlarning ishonchliligini oshirish va samarali ekspluatatsiyasini ta’minlashga xizmat qiladi.

Tayanch so‘zlar: tasmali konveyer, tayanch rolikli mexanizm, yuklanish, og‘ma harakat, transportirovka, oltin rudasi, tezliklar qamrovi, harakat.

Аннотация. В статье рассматриваются вопросы разработки метода определения и расчёта нагрузок, возникающих в направляющих и опорных роликовых механизмах ленточного конвейера. Проанализированы процессы транспортировки золотой руды в горнодобывающей промышленности с учётом наклонного движения ленты и режимов её работы. Обосновано влияние нагрузок на диапазон скоростей, амплитуду и вибрационные характеристики системы. Определено распределение статических и динамических нагрузок в элементах роликового механизма. Предложенная методика расчёта направлена на повышение надёжности и эффективности эксплуатации ленточных конвейеров.

Ключевые слова: ленточный конвейер, опорный роликовый механизм, нагрузка, наклонное движение, транспортировка, золотая руда, диапазон скоростей, движение.

One of the main goals and tasks of mining enterprises today is to increase the production of metal processing, metalworking products, as well as to constantly monitor the quality of engineering products. Machine-building plants occupy an important place in mining enterprises. Because the role of “Machine-building plants” in the manufacture or repair of parts and elements of machinery used in industry is very large.

Navoi Mining and Metallurgical Combine State Enterprise "Navoi Machine-Building Plant" Production Association, automated and semi-automated machine tools play an important role in the manufacture of machine parts necessary for mining enterprises. Today, the reliability and durability of the spare parts produced are of primary importance, and their control is significantly increasing.

This indicates that the products made from metal and non-metal raw materials are in high demand. Of course, this serves as a large-scale program for the development of technical progress in our society and the improvement of our social well-being. One of

the important factors determining the reliability and durability of each machine mechanism in the production of its parts depends on the quality of its parts.

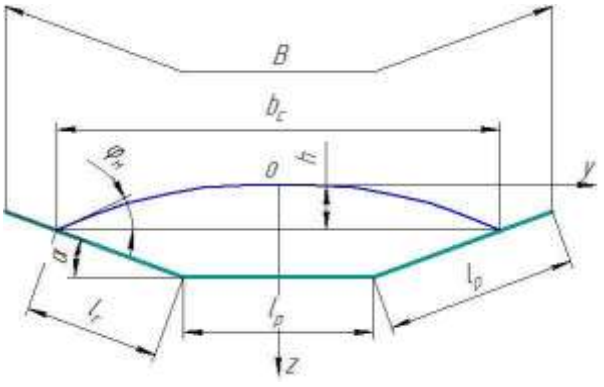
Incorrect assembly of the parts of the integrated guide roller mechanism is one of the factors affecting the operation and durability of the mechanism. The loads on the belt conveyor, along with the loads on the belt and rollers, also have an impact on the parts of the roller mechanism in particular. Basically, the load on the rolling bearings, which provide a smooth rotational motion in the mechanism, depends on the physical and mechanical parameters of the load, the nature of the load distribution on the belt, and other factors [1,2].

The load pressure on the horizontal section of the belt conveyor can be considered hydrostatic, the normal force acting on this section is the same as that of the sheep [3-5].

$$N = 0{,}5 \cdot l_{on} \cdot l_P \cdot \rho \left[2 \cdot l_{r.} \cdot \sin\alpha + \left(b_c - \frac{l_P^2}{12 \cdot b_c} \right) \cdot tg\varphi_H \right]$$

where l_{on} – is the distance between the supports of the guide roller mechanism;

φ_H – is the angle of lifting the load or the angle of stopping when the belt moves.



Structural design of a cross-section of cargo on a belt conveyor

One of the main structural elements of a conveyor that determines the efficiency of a conveyor belt, and especially the service life of the belt, is the guide roller mechanism. The durability and reliability of the guide roller mechanism of a belt

conveyor are influenced by factors such as the nature of the load (impact or non-impact); physical and mechanical properties of the load; design of the new design of the guide roller mechanism parts; and conditions of their use.

Depending on the operating conditions, several types of belt conveyors have been developed, designed in various forms and structures, and they are divided according to the following characteristics [6, 7]:

– by the conveyor installation slope;

– by the type of belt (width and length);

– by the number of guide roller mechanisms;

– by the location of the roller mechanism (angle and spacing);

– by the type of load;

– by the location of the belt's load-bearing web;

– by the cross-sectional shape of the belt's load-bearing web.

As you can see here; the physicochemical properties of the product being transported vary, including particle size, density, moisture, and other factors. To calculate this, it is necessary to select the highest values and generalize them. One of the factors affecting the external load value is the bulk density or bulk density r (t/m^3), for which the selection of its highest value is determined, of course, by taking samples from the tables.

CONCLUSION

The results of the study show that a systematic method for determining and calculating loads on the guide and support roller mechanisms of a belt conveyor serves to increase the efficiency of the system. The effect of loads on such parameters as deflection, speed range, amplitude and vibration has been scientifically determined. The results obtained allow us to assess the dynamic loading of roller mechanisms during the transportation of gold ore. The proposed calculation method helps to increase the

reliability of conveyor systems and reduce operating costs. At the same time, this study creates a theoretical and practical basis for further improving belt conveyor mechanisms and their effective use in modern mining enterprises.

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