

PREVENTING THE FAILURE OF CONVEYOR ROLLERS

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Abstract: In the dynamic mining industry, the efficiency and reliability of conveyor systems are critical to the smooth transport of raw materials. Among the most important components driving this technology, ball bearings play a key role. However, the harsh conditions of the mining industry pose enormous challenges to the durability and performance of ball bearings in conveyor systems. From abrasive materials to extreme temperatures, each factor contributes to the complex equation that determines bearing health and system performance. In this article, we delve into the complex world of ball bearings in mining conveyor systems, exploring the inherent challenges they face and the formulas-both literally and figuratively-that can be applied to ensure they perform optimally.

Key words: Conveyor systems, ball bearings mining operations, bearing contamination, misalignment impact

Introduction

In open-pit mining enterprises, energy consumption is benefitted from trunk and plot conveyor transports, which make up about 15-20%. Reducing the resistance forces exerted on the load-bearing conveyor belt current is the most effective way to save energy. As a result of static friction between the tape and the rock of the mountain, changes in the distance between the rollers, the interaction of the tape and the rollers, friction of the roller bearings along the conveyor belt and deformations of the tape, a force of resistance to the movement of the traction body is created

Failure of belt conveyor rollers also directly affects conveyor performance. As a result of the fact that the rollers stop rotating, a large resistance to the banding behavior is created by friction force, which in turn increases the demand for energy, in addition to the fact that due to the friction between the standing roller and the banding, overheating occurs on the surface and also causes burning at certain times. At the same

time, friction also damages the tape, which is the most expensive element of the conveyor, which we can see in Figures 1.

Figure 1. Conveyor belt tear



Studying literature

The rest of the interruptions that occur at the expense of the rollers are organized by technical reasons, namely the fact that the bearing is not properly mounted on the body or shaft, and improper service. The change that comes to the surface on the roller when the listed defect time is not eliminated is induced in figure 2.

Figure 2. Belt conveyor rollers



To eliminate these disadvantages, it is advisable to melt the belt conveyor belts by improving the connection methods, developing solutions that help reduce the stress falling on the rollers and their supports, as well as the impact of reaction forces.

Currently, the first factor in the non-rotating stop of conveyor rollers is due to the fact that the bearings are not lubricated in time and the excess amount of dust penetrates. Despite the fact that a number of protective equipment has been applied to the roller bearings to prevent dust from entering, small dust particles are still penetrating into the bearing bearings. Bearings used in the mining industry are considered to be guaranteed to externalize 85-90% of the working hours of 40000-44000 hours. The life of bearings installed on conveyor rollers can be determined by the following expression:

$$T_{pod} = \pi D_p (C_0/P_e)^3 / 3,6 \vartheta_l, \text{ ч}$$

D_p - roller diameter, mm;

ϑ - the rate of decay of the tape, m / s;

P_e - dynamic equivalent pressure force of the roller bearing at Load Time, N;

C_0 - dynamic load-bearing coefficient of this type of bearing, N.

To avoid these disadvantages listed above, it is necessary first of all to change the types of services provided to conveyor rollers, that is, to improve the method of lubricating bearings. Bearings of conveyor rollers, which are used in mining industry, are currently working in another non-lubricating mode until the fakat is anointed once and comes into a state of failure. The reason for this is the fact that after installation on the roller supports, it is not possible to open the inside of the rollers and indicate the service, which we will be able to see in the 4 -images, which are presented below.

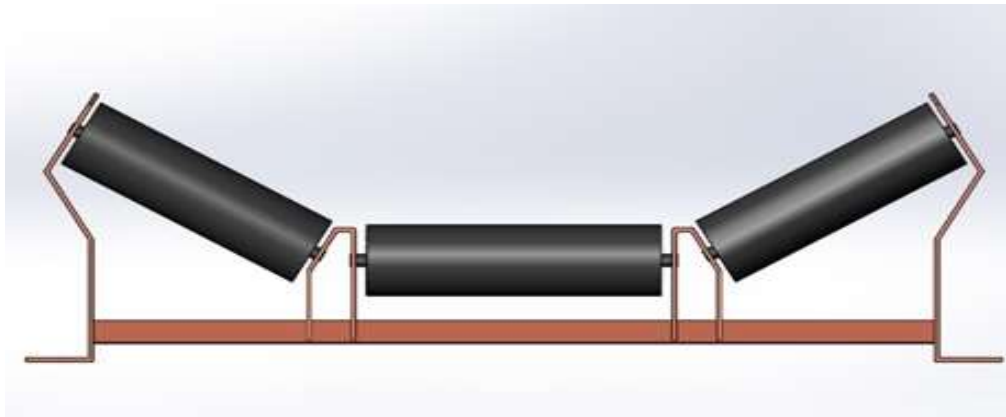


Figure 3. Conveyor roller

The main part

As shown, there is no way to lubricate the roller supports by opening its bearings, after which the bearings are loaded into the axle, and after installation on the inside of the roller, the Caps are hardened using welding equipment. In fact, the main cause of solidification in this method is carried out so that dust and wet air does not enter the stream, but as a result of the very high amount of pollution and the fact that it occurs undamaged, the roller bearings still enter the flow of moist air along with dust. In addition to these, the effect of wet weather on partners is also observed as a result of the fact that your roller bearings do not lubricate in time. Hot air Ham significantly affects the oils of the roller bearing. As a result, dust that enters between the roller bearing ring and the ball bearings or ball bearings, as well as wet air, occurs due to rusting resulting in mutual friction. When considering the continuous rotation of the roller bearings, dust ingress and rust of the bearings will cause the bearings to solidify in a short time without going out of business and turning.

Therefore, it is considered necessary to carry out lubrication of bearings at certain intervals, while improving the methods used to prevent dust from entering the conveyor rollers with straps.

As a result of the research carried out, the rollers were able to scrape ways to

eliminate the shortcomings caused by the use of lubrication on bearings through arrows. In this, a tube is passed at a distance from the shaft of the roller, which is in a stationary position, to the bearing, oil is sent to the roller bearings at the time when the conveyor stops for scheduled repairs. The design for the shipment of oil to the roller bearings is presented in Figure 4.

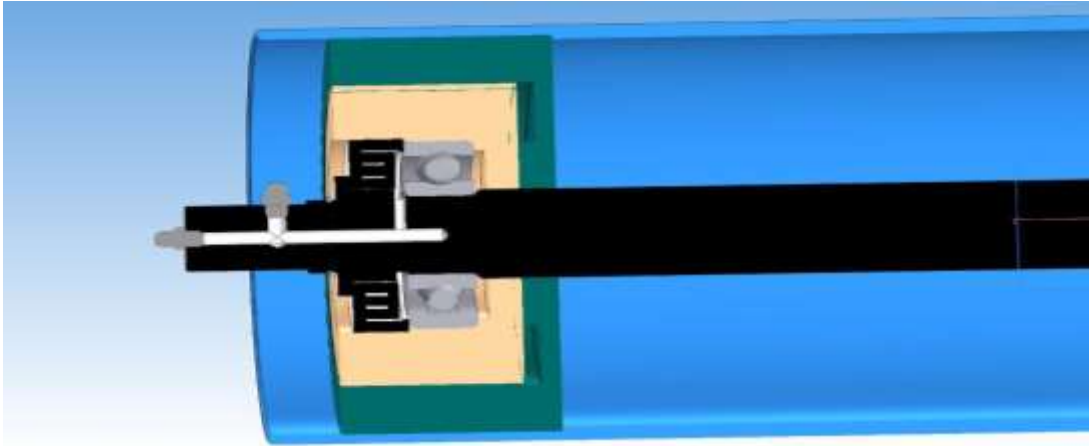


Figure 4. The proposed version of the roller.

When sending oil to roller bearings, first of all, low-viscosity oil is taken into the syringe used in lubrication work, the tube has a reversible cap that touches the wall of the tube when the syringe is inserted, and then oil is sent along the tube. The oil sent along the tube channel falls to the location point of the bearing balls.

In order to verify the information mentioned above, conveyor roller bearings have been lubricated in 3 different ways, after a certain period of time, they have been lubricated according to schedule and they have been dusted more than the norm. We use 3 types of oils with different viscosities in order to obtain accurate results and to choose the right type of oil for bearing lubrication.

Results

As a result of the conducted researches, it will be possible to increase the service life of the roller bearings, which are lubricated at the time of installation, compared to other non-lubricated roller bearings, reduce the load on the conveyor electric motors due to non-rotation or partial rotation, and reduce the friction between the conveyor belt and the non-rotating rollers.

In conclusion, belt conveyor roller bearings used in mining enterprises can be lubricated by means of a tube mounted on an axle:

- extend the service life of bearings by 17-25%;
- 13-16% reduction in stoppages caused by friction between rollers and belt;

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