

IMPROVING THE MAINTENANCE OF BELT CONVEYOR ROLLER BEARINGS

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ANNOTATION

In this article as a result of the rollers of the belt conveyors stopping without turning, the conveyor productivity is significantly reduced.

Keywords: Belt conveyors, rubber fabric belts, rollers, bearings, lubrication, scheduled lubrication, conveyor performance.

Belt conveyor roller failure also directly affects conveyor performance. As a result of the rollers stopping without turning, there is a large frictional force against the movement of the belt, which in turn increases the energy demand, in addition, due to friction between the stopped roller and the belt, heating occurs and sometimes causes a fire. 38% due to dust raised during rock loading and delivery, and 37% due to poor lubrication of bearings and untimely maintenance.

The rest of the stoppages caused by rollers are caused by technical reasons, i.e. improper installation of the bearing on the housing or axis and improper maintenance. The change that occurs in the roller when the listed defect is not eliminated in time is shown in figures 1 a and b.



a)



b)

Figure 1. Belt conveyor rollers

It is desirable to overcome these shortcomings by improving the methods of connecting belt conveyor belts, developing solutions that help to reduce the impact of tension and reaction forces on rollers and their supports.

Nowadays, the number one cause of conveyor roller stoppage is due to lack of timely lubrication of bearings and excessive amount of dust ingress. Despite the fact that several protective devices are used to prevent dust from entering roller bearings, small dust particles still enter the bearing balls, 85-90% of the bearings used in the mining industry are guaranteed to last 40,000-44,000 hours. The service life of the bearings installed on the conveyor rollers can be determined by the following expression:

$$T_{pod} = \pi D_p (C_0 / P_e)^3 / 3,6 \mathcal{G}_l, \text{ ч} \quad (1)$$

where T_{pod} - the production time of the bearings, hours;

D_p - roller diameter, mm;

\mathcal{G}_l - belt speed, m/s;

P_e - dynamic equivalent compressive strength of a roller bearing when loaded, H;

C_0 - dynamic load carrying capacity of this type of bearing, H.

If we calculate the service life of roller bearings by expression, we can determine that it will work up to 40,000-44,000 hours mentioned above, but due to the high dustiness in open-pit mines, the period is significantly different from the period due to the average pollution coefficient level caused by the accumulation of harmful substances and dust concentration in transport vehicles. The maximum allowed value for.

A change in the speed of rotation of roller bearings occurs as a result of dusting that exceeds the allowed amount. As a result, the dynamic equivalent load falling on roller bearings is calculated by the following expression

$$P_e = 1,2 K_d F_p, H. \quad (2)$$

where F_p - radial load applied to the bearing, H;

K_d - coefficient of movement of the load.

In order to prevent the above-mentioned shortcomings, first of all, it is necessary to change the types of services provided to the conveyor rollers, that is, to improve the method of lubricating the bearings. Conveyor roller bearings used in the mining industry are currently only lubricated once and run in a non-lubricated mode until failure occurs. The reason for this is that it is not possible to open the inside of the rollers and service them after they are installed on the roller supports. In addition to these, due to the fact that the roller bearings are not lubricated in time, the wet weather also affects the balls. Roller bearing oils are also significantly affected by hot air. As a result, dust and wet air entering between the roller bearings and balls or between the balls causes rusting due to mutual friction. Taking into account the non-stop rotation of roller bearings, due to the ingress of dust and the rusting of the balls, the bearings will stop working and harden in a short time.

As a result of the conducted research, we have found ways to eliminate the defects caused by applying the lubrication method to the bearings through the roller axes. In this case, a tube is passed from the shaft of the roller in a stationary position to the bearing, and oil is sent to the roller bearings when the conveyor stops for scheduled maintenance. The construction for sending oil to the roller bearings is shown in 2 pictures.

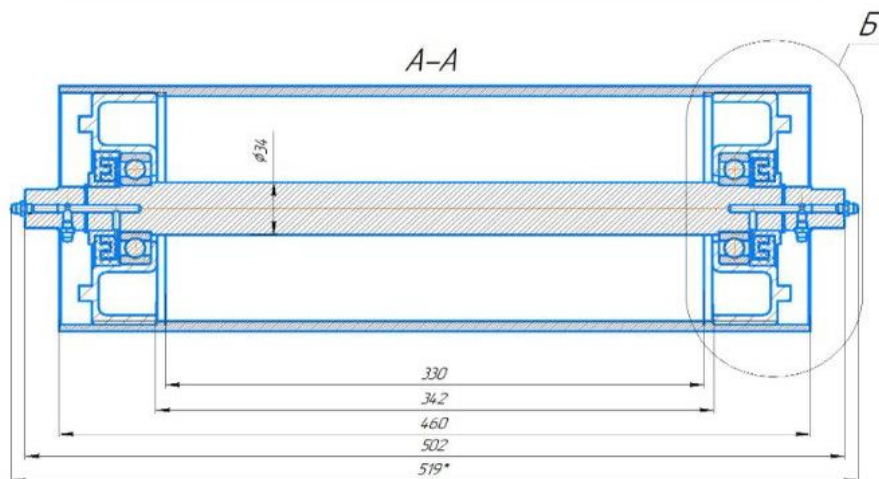
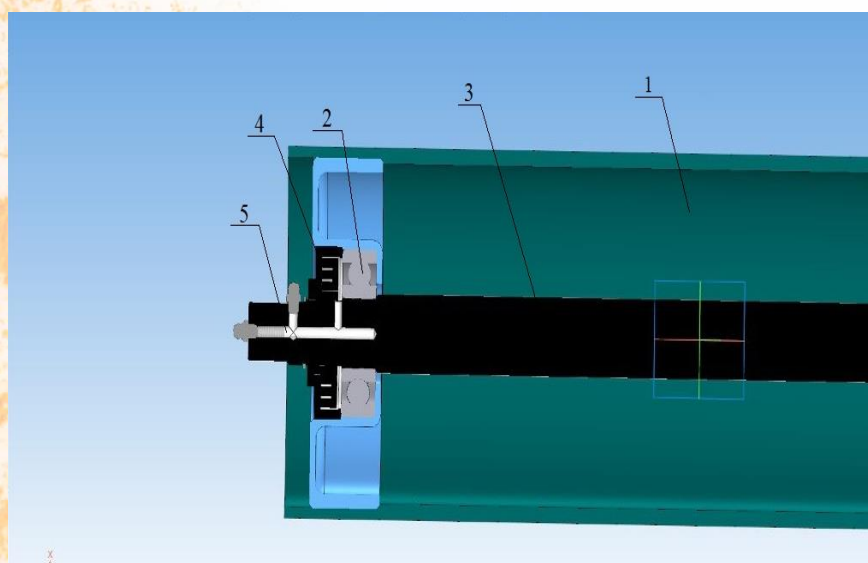


Figure 2. Location diagram of the pipe that sends oil to the roller bearings

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.



3-расм. Конвейер ролиги қирқими

The structure of the conveyor roller made by the proposed method includes a housing (1) to protect the bearing and axle from external mechanical influences, a bearing (2) designed to ensure the rotation of the roller without overloading the conveyor motor, an axle (3) for fixing the roller to its supports and holding the bearing. , consists of a labyrinth seal (4) that protects the bearings from dust and moisture, and a tube (5) for lubricating the bearings. By lubricating belt conveyor roller bearings used in mining enterprises using a tube mounted on the shaft:

- extending the service life of bearings by 17-25%;
- 13-16% reduction in stoppages due to friction between idle rollers and belt;
- due to the non-rotating rollers, we can reduce the load on the electric motors by 5-7%

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