

Проведенный анализ причин выхода из строя расточной головки позволил учесть выявленные недостатки и разработать новую конструкцию расточной головки, которая позволит обеспечить обработку отверстия в трубной заготовке с более высокой надежностью, чем ранее использованная.

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BORING HEAD FOR PIPES

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Keywords: cutting treatment, boring holes, cutting tool, a boring head.

Abstract. The article deals with the cutting treatment of long pipes, cutting conditions, forces that arise in the cutting treatment. The phenomena that occurring during processing is examined. Based on the conducted research the list of possible causes of unsatisfactory work of boring heads is created and the new boring head is designed.

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THE QUESTION OF BREAKING INTERNAL WIRES OF THE STEEL ROPE

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Keywords: lifting installations, steel ropes, tension, rope lapping, analysis, control, sensor, safety.

Abstract. The article addresses the issue of breaking the internal wires of a steel rope. A method of conducting study on the diagnosis of steel ropes of mine (elevator) lifting installations is given. Diagnostics of steel ropes mine (elevator) lifting installations is a complex of programs, plans and measures aimed at the safety of the operation of mine (elevator) lifting installations.

Diagnostics of steel ropes in the course of their operation is the basis for the prevention of emergencies at the mine (lift) rise. The operating conditions of the lifting installation involves three main stages - acceleration, uniform movements, braking of the lifting vessel (cage, skip, elevator car). However, in the course of the lifting unit

operation, various emergency conditions are possible - this is the formation of a rope overlap when a lifting vessel was stuck in the shaft, a rope overloaded when a moving vessel is jammed up the trunk.

The prevention of dangerous conditions for the lifting of a steel rope at the mine lifting installation (MLI) largely depends on the operation of monitoring devices and protecting the lifting system from accidents.

Uniform safety rules provide for equipping the MLI with systems for monitoring and protecting against accidents (§455 of the EPB in the development of ore, non-metallic and loose mineral deposits in underground way. Moreover, item “b” provides protection against sagging strings and rope inlet) [1]. Therefore, at present, MLI are equipped with Signal - 16, Signal - 20, AZNK - 1, AKNK, APIC - 2, and others. [4]

Known systems provide control of the rope inlet to a certain depth, but does not control its overload when the vessel is seized in the trunk of shaft.

Control and protection of the lifting installation from accidents remains one of the urgent tasks of preventing accidents at the MLI.

Existing systems do not solve the main task - increasing the safety of operation of mine hoisting facilities.

According to statistics, a steel cable break is often not in the intended location, fibers of the internal cavity of the rope damaged by corrosion, and the ends of break are heated. A sharp decrease in the amplitude of transverse oscillations at certain frequencies during the aging of steel wires requires an explanation. When squeezing the strands of a steel rope, the crystal structure changes and heterogeneous inclusions appear - aging nuclei, which develop into corrosion. They are hidden, internal defects of the wires, and therefore could not be visually detected. In the normal state, the surface of the steel ropes remains smooth, without signs of any physical, mechanical changes on the surface. That is, metal aging is one of the main reasons for not only the occurrence of corrosion, but also the cause of the steel cable rupture [2]. Efforts in the ropes, especially in a multi-rope climb, require additional control of the tension of each carrying rope, which can lead to an emergency associated with the rope sliding along the pulley.

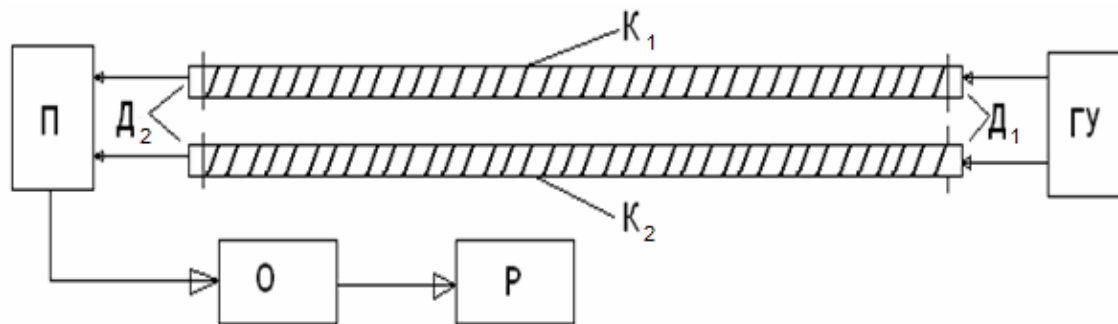
Steel ropes are aged due to violations of the crystal lattice, which is programmed at the initial stage of the design and manufacture of the rope. And it depends, first of all, on the alloy and features of the technology for its production. [3]

Corrosion in iron forms the nuclei of aged in the crystal lattice itself, i.e. a non-uniform steel fiber is formed. When the steel ropes break, the clipping itself occurs away from those points where the rope is bent on the drum or pulley.

Steel ropes are tightly attached to each other strands, in other words, come into contact along the length. There are no surface tension forces along the line of contact. As the metal from one strand penetrates the other. The contact strip pulls this pair of strands together, ensuring the transition of heterogeneities from one strand to another.

To determine the tension of the rope using various methods and means. The most common are sensors of different models, now as well as devices for protection against rope overlap [2].

We propose a stand for studying the possibility of using ultrasound to assess the state (tension, gusts of wires, corrosion, etc.) of a steel cable during its operation.



K1 - the reference sample of the rope; K2 - tested rope sample; PG - generator of ultrasonic signals; P - Receiver of signals; O - Oscilloscope; P - The recorder of signals from the oscilloscope

Fig. 1. Block diagram of the stand for the study of the state steel rope

The stand (Fig. 1) is a base on the supports, which segments of steel rope fixed, with one rope being the reference K1 and the other with the test K2.

As a generator, a standard low-frequency generator "GU" is used, the output of which is connected to piezoceramic sensors "D1" installed at the ends of the rope segments. Sensors "D2" receive a signal from the generator "GU" converted (amplified) and through a two-beam oscilloscope "O" recorded on a digital camera for subsequent analysis of measurement results.

The methodology for conducting experimental research suggests the following.

1. The choice of steel ropes, the most common on drum-type lifting installations and with friction pulleys (elevators).
2. Preparation the ends of the rope segments for fastening piezo sensors on the stand.
3. Setting up the piezoelectric sensor, signal generator, oscilloscope and recorder for research.
4. Conducting experimental studies to determine the amplitude, frequency and phase of the signal during the passage of ultrasound on steel ropes.
5. Processing and analysis of research results. Figure 2 shows a general view of an experimental test bench.



a)



b)

Fig. 2. Stand for the diagnosis of steel ropes: a) view of stand, b) Fastening piezosensor of steel rope

The developed stand allows experimental studies to assess changes in the steel cable section during operation, identify defects at the attachment of the steel cable to the trailer device, and develop a device for continuous monitoring of the operating mode and structural integrity of steel cables on drum-type lifting units and elevators with friction pulleys.

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К ВОПРОСУ ОБ ОБРЫВЕ ВНУТРЕННИХ ПРОВОЛОЧЕК СТАЛЬНОГО КАНАТА

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Ключевые слова: подъемные установки, стальные канаты, натяжение, напуск каната, анализ, контроль, датчик, безопасность.

Аннотация. В статье рассматривается вопрос об обрыве внутренних проволок стального каната. Дана методика проведения исследования по диагностике стальных канатов шахтных (лифтовых) подъемных установок, которая представляет собой комплекс программ, планов и мероприятий направленный на безопасность работы шахтных (лифтовых) подъемных установок.

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