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Comprehensive monitoring of surface deformation in underground mining, prevention of mining damage. Modern technologies and their role in mining

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ABSTRACT: Modern mining scale is the study of geomechanical processes that occur as a result of imbalances in underground deposits and methods of preventing the destruction of deposits as a result of observations. At the current stage of development of the mining industry in the Republic of Uzbekistan, such processes as extraction of components extracted from the massif are often carried out underground. complex observation and analysis of the obtained components (ores) in various processes.

KEYWORDS: Mining pressures and stresses, natural and man-made factors, geomechanical processes, laser scanning, infrared sensors, area tectonics, natural stress state.

I. INTRODUCTION

The information base for the creation of monitoring systems is provided using instrumental and theoretical methods that allow to solve the following tasks:

- obtain reliable preliminary information on the state of natural stress and mechanical properties of the ore body;
- to establish the laws of changes in the state of stress of structural elements during deformation under the influence of natural and man-made factors.

Problem: One of the most pressing problems in mining is the geomechanical processes that lead not only to catastrophic technical and economic consequences (erosion, mining pressures, disturbance of the balance of the mine), but sometimes to human casualties.

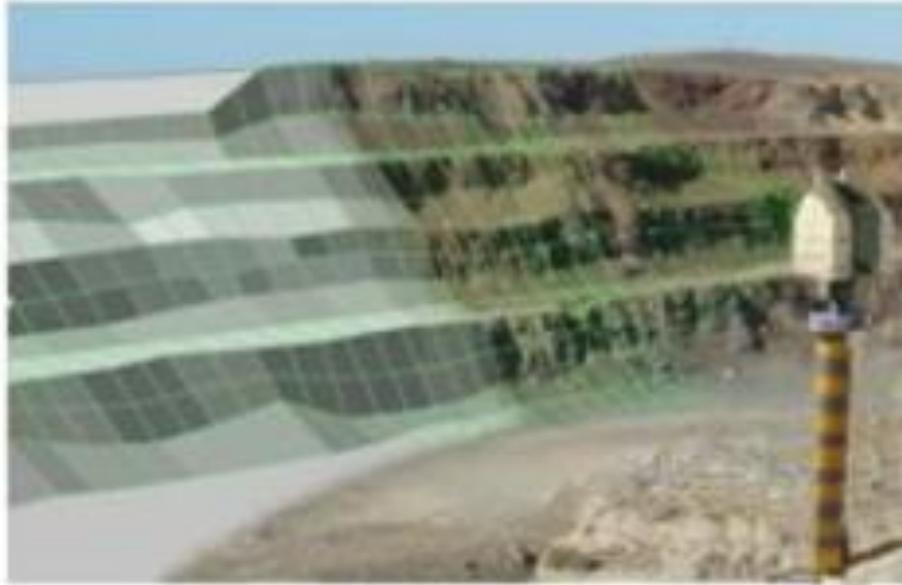
Currently, there are two main problems that can lead to catastrophic consequences in the fields of Uzbekistan:

1. Processes of landslides in underground and open pit mining (mines and open pits).
2. Cases of rock collapse in underground mines.

At present, it is almost impossible to compare, generalize and use the results of monitoring using traditional geodetic methods on the profile lines to observe the processes in the geomechanical state of the rock massif. There are two main ways the mining industry in the world can solve this problem. Today, due to the development of technology, there are a number of modern technical tools in the mining industry. The use of new technologies in the observation of geomechanical processes in geodetic and geological measurements (laser, infrared sensors, GPS technology, etc.) and the ability to predict the measurement data of rocks. which is a mining in the mining industry allows you to manage the geodynamic situation of the extraction work.

- 1) study of geology and tectonics of the area where the deposits are located;
- 2) study of the strength properties of massive rocks in the lower horizons and the stresses in the deposit;
- 3) study of the state of cracking and stress-strain of the rocks around the rock massif and mining sludge;
- 4) interpretation of results and choice of methods of geo-process management.

Modern technologies such as electronic tacheometers and levels are used to monitor the geomechanical processes of underground and surface work in the fields of Uzbekistan.



Monitoring of open pits

1. Nowadays, 3D scanners have created a number of conveniences in the practice of surveying and geodesy. By processing the scan results in the software part (MaptekSiteStudio), the elements of porosity are analyzed by calculating the values of the dimensions of the bed azimuth, the angle of inclination and the size of the rock blocks. As a result, we will be able to get information about the status of the object in a short time and see all the possible changes. The rate of laser scanning is very high. It is very convenient, fast and easy to capture objects that are 500 km long and 1000 sq. Km per day, and the main advantage is that you can work even in the dark.



2. The use of drones to photograph open deposits - the coordinates of the danger zone, the size of which can be determined. creation of three-dimensional digital models and calculation of volumes (quarries, ditches, etc.); high



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quality cartographic materials. The results of monitoring of underground deposits show that subsidence occurs as a result of underground mining. Therefore, it is necessary to intensify the work on underground control of deformation and deformation of such parts of the rock massif. The modern method of underground monitoring is to create the size using electronic tachometry and laser scanner.

1. Nowadays, modern types of tachometers create a lot of conditions not only for open pit mining, but also for underground mining, and for accurate imaging and low labor consumption.
2. The use of 3D scanners to create a real-time three-dimensional model of the object and a detailed digital model of the quarry, the ability to remotely image the gaps; 3D imaging of underground mining by scanning, direct volumetric observation of these excavations; provides mining pressure management capabilities. In addition, safety regulations in mining require periodic inspections of capital underground mines, including their dimensions, railways, and laid communications. Sometimes this work takes a long time and the surveyors do not have enough time for this work.

II. CONCLUSION

Underground and surface mining provide a number of benefits to mining companies in terms of tectonic shifts, earthquake relief, and human safety. Productivity increases.

- determination of physical and mechanical properties and classification of mining areas, their modeling, integrity;
- Development of monitoring systems allows to monitor and predict the geomechanical condition of underground deposits formed as a result of mining operations.

Keeping the mining mass in equilibrium creates a number of advantages in excavation. Identifies the danger zone and keeps workers safe. Ensures the continuity of mining operations.

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