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Methods of Determining Geotechnological Risks of Underground Excavation Works in Mining Enterprises

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Abstract: Underground excavation processes in mining enterprises are a very dangerous environment and process. Geological and is one of the factors affecting the excavation condition in geotechnological condition. Mines during the mining process a methodological approach and a well-planned risk response. This article will be discussed in mining enterprises in geotechnological methods that approach to identify and understand the hazard that occurs underground the classification of excavation processes is given. Geotechnical risk must be recognized before, during and after excavation. The author explained with examples how to use drilling data, seismic data and ground motion indicator to identify geotechnological hazard. From the drilling data, the drill core is determined using the Geological Strength Index. In mining enterprises combined with several studies as a test to determine the place and condition of the geological and geotechnological location of the mine before excavation. Seismic the device indicates the location of the mine from the processes of excavation blasting or mining. Tunnel transformation is monitored using a ground motion indicator device to determine geotechnical and remedial measures are considered after excavation. Finally, geotechnical data analysis is performed to reduce the risk and plans are made to ensure economic or safe operation, as well as time to meet the impending geotechnical hazard, ensuring the safe operation of the process during that time.

Keywords: Underground mining processes, mine design, geotechnological risk, geological and geotechnological conditions of the mine, block mining in mines.

INTRODUCTION

The underground mining industry involves working in a confined and uncertain environment. Such projects often operate on a very tight net present value that increases the risk of economic loss. Over time, strict planning procedures emerged and mining industry, where the project is extensively analyzed for its economic sensitivity. For this project sustainability is ensured, as mining projects can last for decades or more. However, accidents in an underground mine can cause great loss of life and property and seriously affects the profitability of the mine. Any uncertain geotechnical environment mine operation is one of the main causes of geotechnical accidents. In the form of such accidents roof collapse, collapse, uncontrolled caving, etc., can cause loss of people and machinery. In the mine significant ore loss and loss of productivity are observed. In several areas, the practice of risk assessment has played an important role in foresight and measures are taken to control accidents. Industries such as oil and nuclear power, aviation were adopted and in order to ensure a safe system of work, a comprehensive evaluation exercise will be necessary in its design and operation. Mining accidents can be as devastating as those in oil and aviation. Thus, incorporating risk assessment practices in the underground mining industry from the stages of feasibility study and mine design can help anticipate potential threats in the operation. Such approach can be called a risk-based mine design approach, in which a mine is designed and planned, the qualification of the employee should be sufficient to eliminate or prevent potential geotechnological hazards in the mine. Below is a geotechnical risk assessment for underground mining are mentioned in the geotechnical risk assessment criteria. It helps in risk-based contingency planning in the mining economy, evaluation and control costs are explored. This paper discusses the geotechnological risk pathways and assessment

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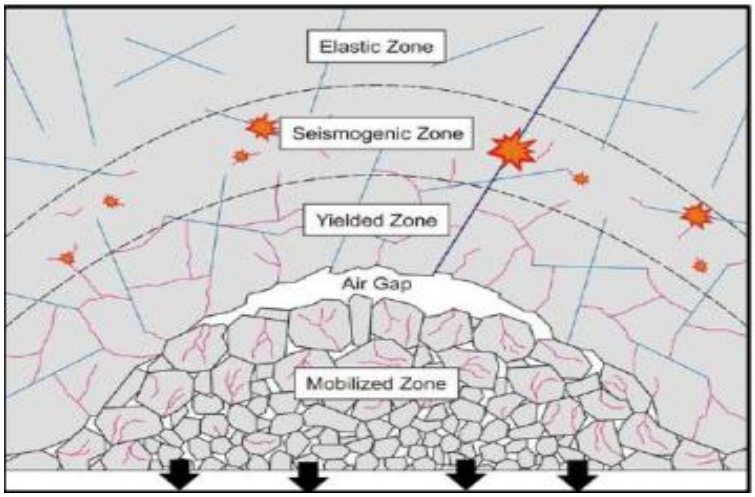
should be planned and organized. It redefines risk assessment elements accordingly and offers guidance on scoping mining and geotechnical risk assessments. Process management in underground mines requires an adequate understanding of the factors and conditions, all processes that control risk in tunneling are considered. The geological and geotechnical location is considered by the mining engineer, in mines it will be necessary to study all the processes affecting the excavation condition. Cave monitoring provides data and makes safe decisions, focused on managing all operations and geotechnical risks in a block mining field underground excavation works are carried out. Geotechnical monitoring data collection problems require sufficient resources, tool selection, location, installation, damage probability and analysis data will need to be collected. Mine processes a monitoring program should begin with a framework that governs what data is needed and what is and decisions must be made using the data. This article discusses the geotechnical methodology identified and approached and understand the risks involved in underground mine excavations and discuss geological issues method of understanding geotechnical risk is presented.

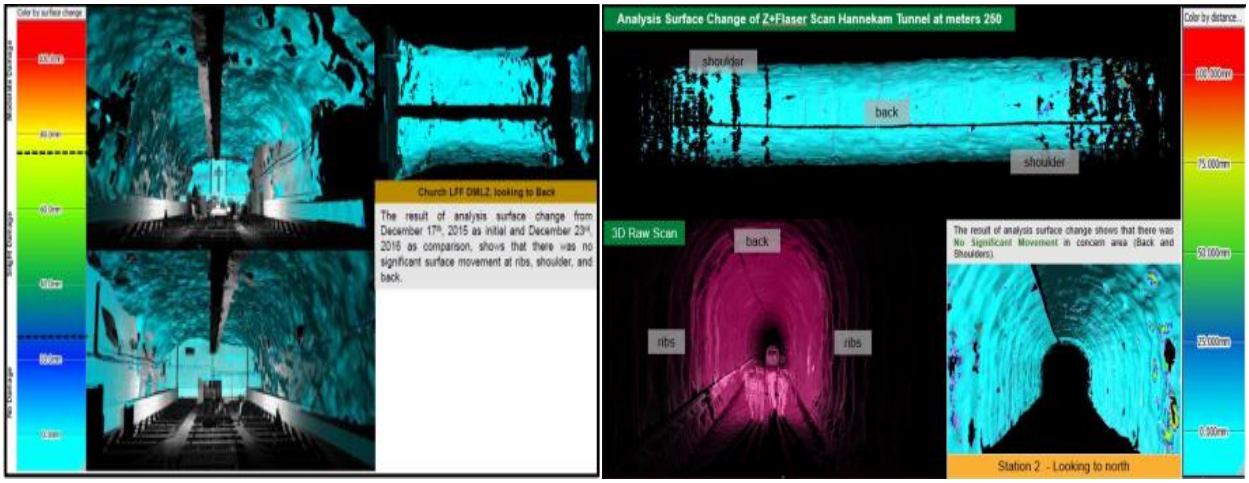
Construction of the conceptual model of the mining layer

In mining operations, the excavation process involves cutting the lower part of the ore body through the solidity of a series of parallel tunnels and drilling and blasting of the columns between them in retreat along the ore body execution mechanism is created. Mining layer from the excavation level point below the production level in the case of bottom cutting or drilling and blasting drilling up hole and loops and in advanced case the bottom cut drift is located in the layer from itself the sub-location layers are shown. When the bottom hydraulic radius reaches a critical size, it is self-contained when broken and bulk ore is mined, mining processes develop in the mine. This is the most important part of the geotechnical risk assessment, where the probability and the identified consequences are evaluated to determine them qualitatively/quantitatively and values will need to be determined. These values in turn lead to a risk calculation. In a risk-based design approach, detailed and a comprehensive evaluation leads to the rejection or selection of a particular design/methodology and therefore each identified risk must be assessed. This can be evaluated probability and assessment of consequences. Probability assessment in geotechnological risk is based on the following approaches, the following three categories: Deterministic approach involves direct measurement of risk, draw conclusions about the symptoms and the likelihood of their occurrence. This method includes the impact of comprehensive geotechnical tools, mechanisms on the site. It may be specific to the hazard or may be part of it regular geotechnical data collection ensures the safety of this process. An example would be risk-based instruments violation of roof convergence monitoring. Large-scale roof convergence can lead to roof collapse. that is why regular on-site measurements can be made for convergence speed. This can be achieved the use of extensometers or the use of advanced tools and mechanisms by regularly checking the level of the roof. This the collected data can then be converted into a numerical model to simulate the rate of convergence. This is the site a particular model can then be used as a benchmark to assign a low/high probability to a roof event and can prevent collapsing processes at the mining site.



Picture 1. Location of layers during mining processes in mines

The probabilistic approach takes into account the underlying variability and eliminates the uncertainty of geotechnical data in an underground mine. The effect of variability and uncertainty in hazard probability is introduced using statistical analysis of geotechnical parameters it is necessary to consider all causes and events affecting the risk. It focuses more on the causes of geotechnical hazards, defines the limit of direct risk measurement. If the risk in question is the collapse of the roof, the main thing this may be due to weak layers, seismic event, stresses from the mine, large discontinuities. For a probabilistic approach, all measurable causes behind the hazard are identified and the data is at the mine boundary. These parameters are used to account for data variability and to appropriate distribution functions to obtain the statistical distribution of these parameters in layers the shape of the probability density function, the distribution function, and other parameters are taken into account. The probability of failure is calculated from such graphs. Mine Process Laser Scanner (3D I-site) is a high-precision survey device that helps us identify. It helps to eliminate risks in mining enterprises. 3D View of Underground Excavation This device displays a detailed 3D shape that expands our resolution, but it requires in-office processing and coverage of the condition with the last scan, which the process not only requires a well-trained operator but also takes more time to define the boundary area and movement or layer thickness is visible Earth movement provides a live indicator device, shows real-time ground conditions. This device provides a sudden action and warning system and effectively reducing analysis time, on the other hand, this system required a large infrastructure and the server will be well maintained.



Picture 2. Measurement limit and field view of laser scanning technology in tunnel.

Conclusion

Understanding how risk is monitored throughout mining operations is critical to identification and understanding. Our main goal is to timely eliminate the risks that arise in underground excavation works. By performing all tools such as drilling data, geological conditions, seismic data and ground motion indicators that we have, we were able to identify geotechnical hazards earlier and underground excavation through water potential areas, gas potential areas and vacant or similar areas it is possible to track broken zones. Identification of geotechnological hazards during and after underground excavation using seismic data It is necessary to constantly monitor the processes carried out in high voltage zones or loading areas and high response blasting areas. From all the information obtained from geotechnical risk monitoring, we can analyze the situations where it can help. Dangers in mines we need to prepare important steps for reduction and underground excavation processes. Otelbayev Azizbek (azikalisherovich2001@gmail.com, https://orcid.org/0000-0003-2091-7978) a student of the Nukus Mining Institute under the Navoi State University of Mining and Technologies, has conducted many researches and scientific works on the activities of mining enterprises. Azizbek's interest in activities in mining enterprises is high, he is mainly interested in processes based on metallurgy, chemical technologies in mines, the scheme of metal melting furnaces, processes in mines.

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