

## RESEARCH ARTICLE

# Application of Mine Survey in Safety Production of Metal Mine

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**Abstract:** Mine survey plays an important role in safety production. In recent years, more attention has been paid to mine survey to improve safety and reliability. This paper analyzes the problems in mine survey and the application in safety production, hoping to help the development of the industry

**Keywords:** Mine survey; Metal mine; Positive significance

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## 1. Introduction

Mine survey itself is a highly complex and practical work. Improving the efficiency of mine survey is of vital practical significance for realizing safe production in metal mines and maintaining the safety of life and property of production personnel. Therefore, China's mining industry needs to pay more attention to mine survey, and make clear the common problems in the survey process, so as to realize its better application in the safety production of metal mines.

The positive significance of mine survey in safety production of metal mines.

From a macroscopic point of view, mine survey is the premise and foundation of safe production in metal mines, and it plays an important role in the whole mining process. Strengthening mine survey can provide perfect data reference for later mine work plan compilation, construction drawing drawing and safe production, and to a great extent, it is also beneficial to shorten the construction period and reduce hidden dangers in the mining process. The detailed analysis is as follows.

## 2. Analysis

### 2.1 Provide Guidance for Roadway Drivage

The primary significance of doing a good job in mine survey is to provide guidance for roadway excavation, thereby improving the efficiency of roadway excavation

and mining more valuable minerals. First of all, through the mine survey work, it can provide effective data support for the roadway excavation work and promote the smooth progress of the roadway excavation work. Secondly, through the mine survey work, it can also protect the safety of life and property of the tunnelling construction personnel, improve the safety and effectiveness of the tunnelling construction, and avoid releasing a large amount of toxic gases during the construction process, which endangers human health; Finally, by using mine survey work, the construction error can be reduced, the error of roadway excavation can be analyzed in advance, and corresponding measures can be formulated to solve it.

### 2.2 Effectively Reduce the Incidence of Safety Accidents

Doing a good job in mine survey can also effectively reduce the incidence of safety accidents. In the actual mining process, there are many dangerous factors, therefore, the probability of safety accidents is high, which also threatens the safety of life and property of construction workers and the social image of mining enterprises to a great extent. By strengthening mine survey, the construction site can be effectively detected, and the deformation of underground roadway can be comprehensively predicted, thus reducing the incidence of safety accidents from the source. In addition, in the actual mining process, waterproof is also an important production link. If the fault water and groundwater in the mine leak during the

production process, it will bring huge economic losses to the enterprise. By strengthening mine survey, the leakage of fault water and groundwater in mines can be effectively prevented and treated in advance, and the problems related to waterproofing can be solved in time, so as to reduce the incidence of safety accidents. Finally, through mine survey, it can also effectively prevent the roof from falling off in the process of mining, avoid affecting the normal mining work and prolong the construction time.

### 3. Common Problems in Mine Survey Work

#### 3.1 Problems in Drawing Review

In the mine survey work in China, the most important problem is drawing review. Drawing reviewer is an important part of mine survey work, and plays a very important role in the accuracy and efficiency of mine survey work. However, according to the current situation of mine survey in China, there are still many problems in drawing review in the actual survey process. First, the preparatory operation of mine surveyors in China is perfect and comprehensive. In the specific mine survey process, there are often problems such as lack of drawings or incorrect drawing information. Second, the road markings are not uniform in drawing, which makes it difficult to cover multiple roads. The imprecision of design drawings virtually increases the safety risks in mining, so attention must be paid to it<sup>[2]</sup>.

#### 3.2 Problems in Measuring Equipment

At present, there are still problems in measuring equipment in mine survey in China. Compared with developed countries, China's mine survey work started later. Therefore, a series of technologies and hardware facilities need to be improved, and there is still a big gap compared with developed countries, which also affects the benefits of China's mine survey work to a certain extent. Due to the defects in mine survey equipment, when the specific mine survey work is carried out in China, it is easy to be affected by signals and equipment performance, which hinders the survey process. In addition, the advanced degree of the measuring equipment is not enough, which makes it easy to be interfered by the magnetic field around the mine in the measuring process, which reduces the measuring accuracy.

## 4. Application of Mine Survey in Safety Production of Metal Mines

#### 4.1 Geometric Orientation by Mine Survey

Mining enterprises can complete the geometric orien-

tation of mine safety production by using mine survey work. In the actual mine survey work, the so-called geometric orientation mainly includes two parts, one well orientation and two well orientation. Among them, in the process of actual operation, the orientation of a well is usually connected in the form of triangles, so workers need to determine temporary points on the mine first, and then determine a relative temporary point under the mine. A triangle can be formed between the two points and two perpendicular lines hanging in the shaft. By observing the corners, the coordinates and azimuth angles of corresponding points in the mine can be measured, and then the geometric orientation can be realized. In the process of actual operation of two-well orientation, the workers need to observe the situation of two vertical shafts, connect the two fixed wells with tunnels, and then hang a vertical line in the shaft of each vertical shaft, so as to realize the observation on both the well and the underground, and realize the geometric orientation.

#### 4.2 Gyro Orientation Using Mine Survey

Mining enterprises can also use mine survey work to complete gyro orientation. Workers need to strengthen the analysis of material orientation mode, and use gyroscope and theodolite for orientation. This orientation mode is also called gyro orientation. In the actual application process, it will not affect the shaft of vertical well, and the operation is relatively simple, which can effectively avoid the situation of stopping production caused by occupying the shaft. However, according to the actual situation of mine survey work in China, the application of gyro orientation in mine survey work in China is less, because it does not have systematic operation rules and data solution methods.

In addition, the application process of gyro qualitative needs to involve gyro and theodolite, and its practical application process is as follows: First, workers need to randomly select a point on the ground to determine its proportional constant value, and then through more than six observations, determine three proportional constant values, and take the average value of these three constant values as A, which can be calculated as a proportional constant value within 50 km of Fiona Fang for a long time; Second, workers need to determine a known edge on the ground and measure the azimuth of the gyro. Thirdly, after returning to the ground, the workers need to measure the gyro azimuth at the known edge of the ground.

## 5. Conclusions

To sum up, in the process of safety production in actual

metal mines, mine survey work plays an important role, which can effectively improve the quality and safety of mining. Therefore, mining enterprises need to strengthen investment in mine survey work to ensure its comprehensiveness, so as to give full play to the benefits of mine survey work and promote the development of mining industry.

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