

# Discussion on support technology of coal mine soft rock roadway

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**Abstract:** China is rich in coal resources. In most cases, coal resources are obtained through the way of mining. In the process of mining, it is necessary to control the application of mining technology, otherwise it will easily cause damage to the geological structure. With the increasing demand of social resources in recent years, shallow mining has been unable to meet the needs of the society, while deep mining is facing the problem of soft rock layer, which can not guarantee the stability and safety. Based on this, this paper will focus on the coal mine soft rock roadway support technology.

**Keywords:** coal mine; soft rock roadway; support technology

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## 1. Introduction

Soft rock strata are characterized by low strength, large porosity, insufficient cementation, obvious influence of mechanical activities, or clay and minerals with expansive characteristics, which are loose in texture and often located in deep surface. With the increase of coal mining depth, coal mining enterprises must excavate soft rock roadway when deep mining work, and the texture of soft rock makes it unable to effectively support the quality of the upper layer, which seriously affects the mining work and the safety of coal mining personnel. Therefore, to deal with the supporting problem of soft rock roadway is the key content of deep coal mining.

## 2. Deformation characteristics and composition of soft rock roadway in coal mine

### 2.1 Deformation characteristics of soft rock roadway in coal mine.

The stability of soft rock roadway is often greatly affected by the unique mechanical properties of soft rock. Through the analysis and study of the existing underground coal mine related data, it can be learned that the deformation of soft rock has the following characteristics: First, it has very obvious performance in time and space effect; Secondly, both roof and floor of soft rock

roadway will have obvious deformation, which is mainly manifested in the high coefficient of roof subsidence and the phenomenon of caving. The floor is prone to strong bulging. If the soft rock contains a lot of clay rock, it will also cause more serious floor bulging due to the flooding of clay rock. Finally, the soft rock roadway often has a very strong response to stress and environmental changes. If there is construction near the soft rock roadway, or it is eroded by water, or it is affected by blasting and mining activities, it will lead to severe deformation of the soft rock roadway.

### 2.2 Composition of soft rock roadway deformation in coal mine.

Soft rock roadway is mined from soft rock strata. Affected by the characteristics of soft rock, soft rock roadway also has certain deformation. Usually, the deformation is composed of the following three parts: the first is the deformation caused by roadway excavation, which has a great relationship with excavation work, so it usually occurs in the initial stage of roadway excavation; The second is the deformation caused by rheology of roadway surrounding rock. Since the surrounding rock runs through the whole service period of roadway, this deformation can occur at any time. A third is affected by all kinds of activities of soft rock tunnel excavation deformation, the

deformation of roadway is one of the most significant, the influence of any artificial roadway within or near the roadway (such as mining, renovation, and processing support roadway) and dig new or geological movement factors (such as clay rock roadway product collapse under the influence of water, water rise) will lead to the deformation of soft rock tunnel excavation.

### 3. Support technology of soft rock roadway in coal mine

#### 3.1 Project Overview.

Taking the soft rock roadway support engineering of a coal mine as an example, this paper briefly introduces the general situation of the engineering. A rock roadway in the mine is located 1180m underground with a total length of 1832m. The upper face of the roadway has been fully worked and the lower face has not been worked. Through the measurement of the actual depth of the roadway, it is found that the location of the roadway is deep, the geological conditions of the surrounding rock are relatively complex, and the deformation and failure types of the roadway are very similar to the deformation and failure characteristics of the soft rock roadway. Then the tunnel was tested and its physical and mechanical properties were measured. Its density  $\rho$  is  $2478 \times 103 \text{ kg/m}^3$ , elastic modulus  $E_t$  is 38.3gpa, Poisson's ratio is 0.164, uniaxial compressive strength  $R_c$  is 53.3Pa, vertical dead weight stress is 32.2mpa.

#### 3.2 Soft rock roadway support selection in coal mine.

The support of soft rock roadway is a difficulty in coal mining, and there is no absolutely reliable solution at present. Due to the influence of the physical characteristics of soft rock, it is necessary to take the characteristics of soft rock into full consideration when choosing the support technology of soft rock, reduce the pressure of support body by releasing the stress of surrounding rock, and ensure the stability and safety of soft rock roadway by the secondary support technology. In general, u-section steel can be used to support the backfill technology. U-shape compressible support is widely used in coal mine soft rock roadways, its essence is a kind of passive supporting technology, the advantages of this technology is to support after a limit pressure will produce shrinkage, and stent retraction move will make of the surrounding rock pressure drop, keep the surrounding rock pressure is greater than

the bearing capacity of support, thus ensuring the normal use of roadway. But due to the relatively smooth surface of u-shape yielding support, the surrounding rock at the beginning of the excavation molding tend to be relatively rough, thus creates a point contact between phenomenon, this makes the u-shape compressible support force is not uniform, to a certain extent impact on the performance of the bracket, so want to cooperate with wall after filling technology, in order to make support uniform stress. Back-wall filling technology is to fill the gap between u-shaped steel reclining support and rock wall with cemented hardened material, so that the support can be in close contact with surrounding rock, so as to ensure that the technology can give full play to its performance and effect.

### 4 Conclusion

Coal mine accidents not only affect the safe production of coal mine enterprises, but also pose a serious threat to the personal safety of coal miners. In essence, the reasons leading to frequent coal mine accidents are not only equipment factors, but also technical deficiencies. In the final analysis, coal mines can not meet the corresponding safety production conditions. As the roof disaster is the main type of coal mine accident, the main cause of the roof disaster is the lack of support construction technology. The physical strength of soft rock itself is low, so the stability of soft rock roadway is easily affected by stronger surrounding rock stress due to the depth of excavation. Therefore, in the construction process, it is necessary to investigate the characteristics of the strata in the mining area, design the technical scheme and details of supporting construction, so as to ensure the safety in the mining process.

### References

- [1] Xu, G., 2018. Application of prestressed anchor and soil nailing wall combined support technology in foundation pit support of a power plant [J]. *Engineering Construction and Design*, 390(16):54-55.
- [2] Guan, L.G., 2019. Study on optimization of section shape and combined support technology of expansive soft rock roadway [J]. *Inner Mongolia Coal Economy*, (6):30-33.
- [3] Zhao Y., 2019. Research on application of combined support technology of soft rock roadway [J]. *Contemporary Chemical Industry Research*, 39(03):114-115.