ACCIDENT PREVENTION THROUGH ERECTION OF SUPPORT IN UNDERGROUND MINE

MINOR PROJECT

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INTRODUCTION

Underground mining is one of the most prominent mining method in India involving several man and machineries. Hence, to get better output it is necessary to provide a safe working environment which can be done by proper installation of supports.

Effective erection of support is necessary in underground mining because of the accidents occurring in mines resulting in loss of man and machinery.

This project mentions the risks involved in underground mining and the prevention of those accidents using proper supports.

TYPES OF SUPPORT

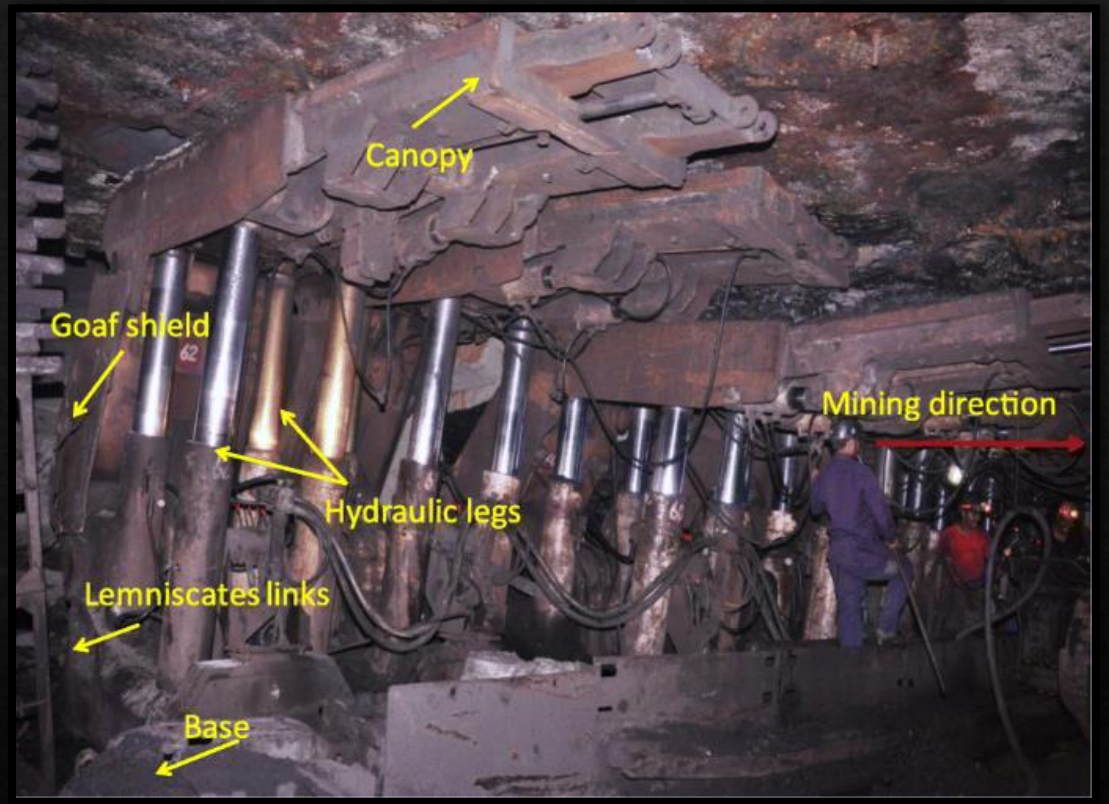
1. **TIMBER SUPPORT :**
   - TIMBER PROP
   - TIMBER BARS
   - SAFARI SUPPORTS
   - WOODEN COG,CHOCK AND CHOCKMATE

2. **IRON AND STEEL SUPPORT:**
   - ROOF BOLTS
   - RIGID PROPS
   - YIELDING PROPS (FRICTION & HYDRAULIC)

TYPES OF SUPPORT

3. SELF ADVANCING POWERED SUPPORTS:

FRAME
CHOCK
SHEILD
CHOCK- SHEILD



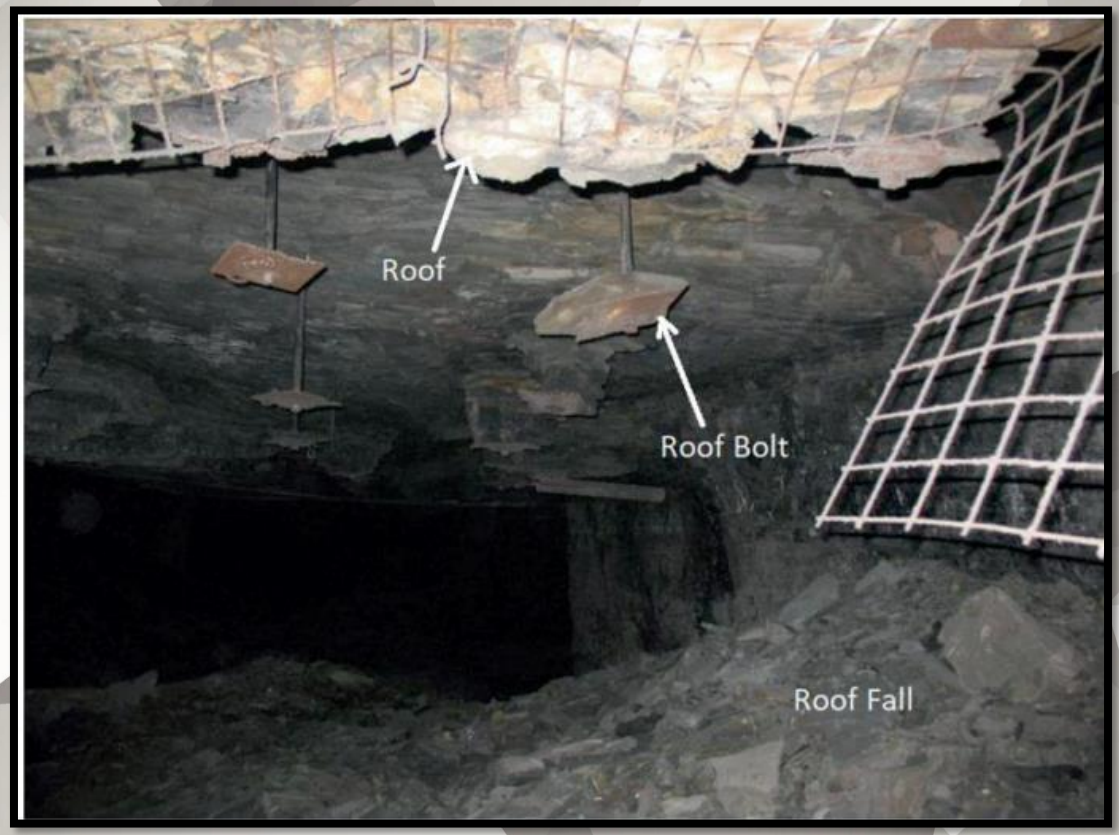
RISKS IN UNDERGROUND MINES

1. **ROOF COLLAPSE:**

When roof is left unsupported, after sometime the roof load causes sagging , bed separation and then it collapse.

2. **FLOOR SAGGING**:

A void is created after extraction of coal or mineral because of which redistribution of pressure occurs and then at the same time side pressure acts causing floor heaving.



RISKS IN UNDERGROUND MINES

3. SIDE SAGGING & SPALLING:

When the roof load comes on the side of pillars ,it bulges out and further small chunks of coal starts separating from the pillars making it thin, thus the pillar crushes.

4. GROUND MOVEMENT AND SUBSIDENCE:

If the roof over the void in underground mining is not supported effectively, depression of the ground surface occurs along with the structures standing on it.

LOSSES DUE TO ACCIDENT

1.LOSS OF MANPOWER : Accidents in mines can be fatal for the mineworkers due to unsafe working environment.

2.LOSS OF MACHINERIES : Any accident in mine can hamper the machineries being used. We may not be able to recover machineries trapped in roof collapse or pillar crushing.

3.LOSS OF RESERVE : These accidents can block the movement of man and machinery making the reserve inaccessible.

4.CAPITAL LOSS : Loss of machinery and inaccessibility to reserves can lead to a huge capital loss of the mine or company.

5.LOSS OF REPUTATION : Accidents in mine can damage the reputation and trust of the people working in the mine.This also leads to various regulatory offenses.

PREVENTION OF THE RISKS

1. FOR THE PREVENTION OF ROOF COLLAPSE:

   Erection of timber, hydraulic and friction pros.
   Roof bolting
   Roof stitching with wire mesh
   Self advancing powered support (in case of longwall mining)

2. FOR THE PREVENTION OF FLOOR SAGGING:

   Props with wooden flat base.

PREVENTION OF THE RISKS

3. FOR THE PREVENTION OF SIDE SAGGING AND SPALLING:

Side stitching with wire mesh.
Side bolting
Wooden lagging

4. FOR THE PREVENTION OF SUBSIDENCE:

Stowing with sand
Backfilling with waste rocks

FACTORS FOR EFFECTIVE SUPPORT

The effectiveness of ground support relies heavily on proper installation and maintenance.

- **Choosing the appropriate type and size of support:**
  Different ground conditions require different support systems.

- **Correct installation procedures**:
  Following established guidelines and ensuring proper anchoring and tensioning are essential.

- **Regular inspection and maintenance:**
  Identifying and addressing any damage or deterioration of the support system before it compromises its effectiveness.

IMPORTANCE OF SUPPORT IN ACCIDENT PREVENTION

- ***Reduced risk of accidents:***
  Proper support systems significantly minimize the chances of rock falls and collapse, leading to a safer work environment.

- ***Improved productivity:***
  When workers feel safe and secure, they can focus on their tasks and improve overall efficiency.

- ***Reduced operational costs:***
  Preventing accidents saves money by avoiding potential injuries, equipment damage, and production delays.

- ***Enhanced compliance with regulations:***
  Mine operators are obligated to comply with safety regulations, and effective ground support plays a crucial role in achieving this

CASE STUDY

Ground Support Success at the Kolar Gold Fields, India

The Kolar Gold Fields (KGF) in India, once a major producer of gold, faced significant challenges related to rockfalls and collapses during their peak operation years. These incidents resulted in numerous casualties and hindered production. To address these safety concerns, KGF implemented a comprehensive ground support program in the late 1950s.

CASE STUDY

Program Components:

- ***Ground characterization:*** Extensive geological mapping and rock mass testing were conducted to identify areas requiring different support strategies.

- ***Selection of support systems:*** Based on the ground conditions, a combination of rock bolts, cable bolts, shotcrete, and steel sets were implemented.

- ***Standardized installation procedures:*** Detailed guidelines were established for the proper installation and maintenance of each support system.

- ***Training and certification:*** Miners underwent comprehensive training programs on ground support techniques and safety protocols.

- ***Regular monitoring and inspection:*** A dedicated team continuously monitored ground conditions and support performance, making adjustments as needed

CASE STUDY

Results:

•Significant reduction in accidents: The implementation of the ground support program led to a 90% reduction in rockfall accidents within the first five years.

•Improved safety performance: The lost-time injury frequency rate (LTIFR) decreased by 85% during the same period.

•Enhanced productivity: Increased worker confidence and improved ground stability led to a 20% increase in production.

The Kolar Gold Fields' successful ground support program demonstrates the effectiveness of prioritizing safety through a systematic and data-driven approach. By investing in ground support technology, training, and monitoring, mines can significantly improve worker safety, enhance productivity, and ensure the sustainability of their operations.

CONCLUSION

- The erection of support systems plays a vital role in preventing accidents and ensuring the safety of workers in underground mines.
- By utilizing appropriate methods, choosing the right materials, and implementing effective maintenance strategies, mine operators can significantly reduce risks and create a safer work environment for everyone.
- By investing in innovative technologies and promoting a culture of safety awareness, the underground mining industry can continue to thrive while protecting its workforce.

THANK YOU !!!!!