

MINING METHOD (UNDERGROUND METAL)

Rock Burst

Explain causes and prevention of rock burst.

Rock burst : It is a sudden violent failure of rock in and around mine opening. In the rock bursts the strain energy is released from the stressed rock mass violently with a magnitude of seismic events ranging from 1 to more than in a Richter scale.

Causes of rock burst :

1. Presence of fault, dykes and geological disturbances, their presence increases the occurrences of rock burst.
2. Rate of face advance : Lower the rate of face advances more be the chances of rock burst.
3. Extraction height and depth of working : More the height of extraction and depth of working more would be the occurrences of rock burst.
4. Decrease in abutment size will increase the occurrences of rock burst.
5. Increasing the span of face will increase the incidents of rock burst.

Occurs of rock burst :

1. It occurs in strong brittle rocks which contain few ore and existing fracture.
2. Rocks are weak in tension and strong in compressive and hence large quantity of potential energy is stored in the rock under high compressive strength.
3. Rock bursts occurs frequently if the rate at which the energy is released is greater than the rate of which the energy can be dissipated in a non violent fracture process as the excavation enlarge.
4. Rock burst occurs frequently if the amount of energy released increases rapidly with the increase of stopping span, while energy can be dissipated non violently remains almost constant.
5. Some of the gravitational energy is increased as strain energy in stress concentration in rock and the remainder is released either non violently through crushing of rock and supports and violently through, which is generally known as rock burst.

Prevention of rock burst :

1. By reducing the energy release slowly by developing yielding pillars which yield gradually instead of accumulating high stress over the pillars.
2. Leaving no remnant pillars in the goaf since these pillars will be under the envelope of very high stress as the time passes on.
3. Avoid dykes, fault and other geologically disturbed zone which are highly stressed, working should be starting from the near by spot of the disturbed area and shall be moved away from them.
4. By fracturing the rock ahead of the face blasting which will reduce the level of stress in the rock.
5. By back filling the extracted out area and providing very high support density in the face.
6. By partial extraction of the developed pillars or by leaving pillars spaced regularly along the whole length of the long wall panel.

7. By reducing the kinetic or seismic energy which is produced due to tectonic forces, gravitational forces and also due to stresses induced by mining activity.
8. By having limited no. of working face and mining the faces towards, each other must be avoided.
9. By pre-distressing with blasting.
10. By providing adequate supporting in the underground mine working.
11. By introducing special short firing technique.

Factor affecting the rock burst :

* Both severity & fracture of rock burst increases with depth due to increases strain in rocks but rock burst have been reported in surface, mine as well as shallow mines due to tectonic stress.

* The frequency & intensity of rock burst vary with the kind of rock burst are most common in brittle rocks.

* Rock that stand well as long as excavation are small may develop rock burst after.

Mechanical Characteristics of rock burst : Rock usually connected with rock burst depending upon that it is strong or brittle.

1. **Rock type** : Plastically or visco elastically deformable rocks fall slowly & are less likely to bursting.
2. **Petrology** : Igneous & metamorphic rocks are generally of no bursting zone than sedimentary rock.
3. **Mineralogical composition** : More siliceous rock quartz in those containing hard members are belongings to burst classes & carbonates & other sharp mineral are belonging to non burst classes.
4. **Geological features** : Measures geological features also played a role on the process of burst dyke may cause weakness in the mild structure and the rate increases in burst process in their rock series.

FACE MECHANIZATION

Describe use of jumbo drill with air leg.

Jumbo drill with air leg : Where compressed air is the motive power for drills air legs may be advantageously used to mount the compressed air drills.

- An air leg is essentially a long cylinder in which a piston is actuated by compressed air controlled valve which is also used to release the air pressure to lower the piston.
- An air leg relieves the operator of the fatigue involving in holding the drills and keeping it, pressed forward as the leg exerts an upward lift and a forward feeding pressure on the drill.
- The air leg does not increase the rate of penetration of feed and is used for drifts up to 2m height. In underground mine drilling rigs or jumbos have to be used for high speed drilling of large size drifts.
- The term jumbo are after used synonymously but jumbo is a portable carrier for underground use.
- A jumbo has a crew 3-4 operator who performs various operations of

setting a drill, drilling, dismantling etc.

Describe various transportation machineries like L.H.D., rocker shovel, Spiral chutes and draw points, scraper etc.

Spiral chutes : A narrow opening in mine working through which broken ore is loaded into mine car. The term also applied to a box like structure equipped with controlling gate fitted to such opening.

Draw Points : A draw point is a place located at the bottom of stopping area and from where ore can be loaded manually or by machines into tubs or mine cars. It has no controlling gate.

L.H.D. : It is used to perform, loading, hauling and dumping of bulk material. Applicability :

- Gradient 1 in 6.
- Floor condition required strong and good.
- Maximum speed for empty L.H.D. 8-30 mile per hour.

Advantages :

- Greater flexibility.
- High speed for transport (12 kmph)
- Maximum labour required.
- Higher productivity.

Disadvantages :

- Difficult in heavy load movement.
- High maintenance cost.
- Large consumption of engine.