Underground Mining of Metalliferous Deposits
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Lecture No. 18
Horizontal Drivages - I

HORIZONTAL DRIVAGE

Drivage

- A general term for a roadway, heading, or tunnel in course of construction. It may be horizontal or inclined but not vertical is called a drivage.
- All horizontal or sub-horizontal development openings made in a mine have the generic name of drift.
- These are simply tunnels made in the rock, with a size and shape depending on their use—for example, haulage, ventilation, or exploration.

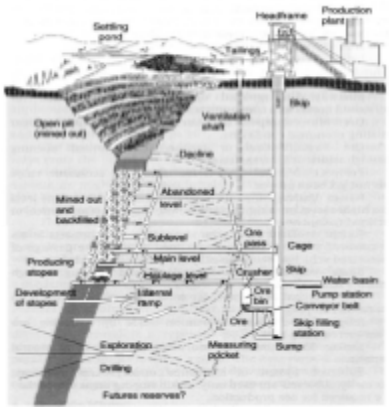

Figure 1. A general layout and construction of underground mines

- A drift running parallel to the ore body and lying in the footwall is called a footwall drift, and drifts driven from the footwall across the ore body are called crosscuts.
- A ramp is also a type of drift.
- Because the drift is such a fundamental construction unit in underground mining, the process by which it is made should be described.

- There are basically two way to construct the drift in underground excavation.
    - Drilling and blasting method
    - Mechanical cutting technique

EXCAVATION TECHNIQUES – HORIZONTAL OPENING

Discrete method of excavations

1) Drilling
2) Blasting
3) Loading
4) Transportation

Continuous method of excavations

1) Continuous mechanised excavation
2) Simultaneous Loading transportation

Semi-Continuous method of excavations

1) Continuous mechanised excavation + Loading + Transportation
2) Drilling + Blasting + sizing + continuous Loading transportation

HORIZONTAL DRIVAGE | Drilling and Blasting

There are five separate operations involved in extending the length of the drift by one round, or unit volume of rock.

Listed in the order in which they are done, these are

1. drilling,
2. blasting,
3. loading and hauling,
4. scaling, and

5. reinforcing.

Classification on drilling manner

Within the large variety of excavations using explosives, numerous machines have been developed which can be classified into two types of drilling manners:

1. Manual drilling

This is carried out with light equipment that is handheld by the drillers.

It is used in small operations where, due to the size, other machinery cannot be used or its cost is not justified.

The modern handheld rock drills are developed trending to be lighter, more convenient, and more efficient.

Except the widely used pneumatic handheld drill, some new energy sources, like hydraulic, electricity and internal combustion engine, are also developed.

2. Mechanized drilling

The drilling equipment is mounted upon rigs with which the operator can control all drilling parameters from a comfortable position.

These structures or chassis can themselves be mounted on the wheels or tracks and either be self-propelled or towable.

- Most mines use diesel-powered, rubber-tired carriers on which several drills are mounted; these machines are called drill jumbos. The drills themselves may be powered by compressed air or hydraulic fluid.
- A pattern of parallel blastholes is drilled into the rock face at the end of the drift. The diameter of these holes ranges from 38 to 64 mm (1.5 to 2.5 inches), but in general one or more larger-diameter uncharged holes are also drilled as part of the initial opening.
- These latter serve as free surface for the other holes to break as well as expansion room for rock broken by the blast.

- Explosives may be placed in the blastholes in the form of sticks or cartridges wrapped in paper or plastic, or they may be blown or pumped in.

BLASTING

Heading Round

Blastholes drilled in the face of a tunnel are collectively known as the round when blasted at a time. They must be drilled and positioned efficiently.

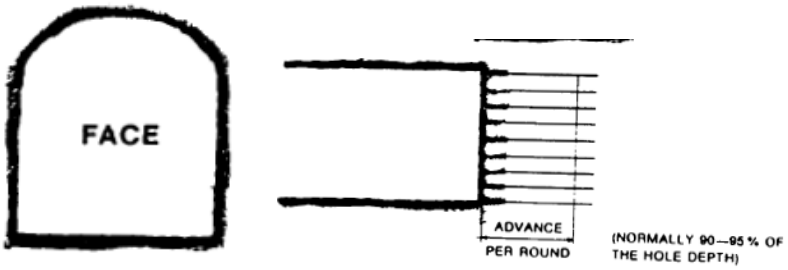

Figure 2. Advance per round of blast

The round is arranged in a pattern.

The initial step in advancing the headings/tunnels is making an opening into the solid face to produce a void and to create a face or plane of relief, as deep as it is practical. The plane of relief, or void is called the cut.

A round consists of several classes of holes.

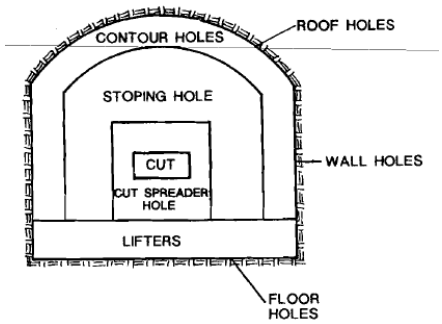

Figure 3. Hole types used in a round

They are composed of chemical ingredients that, when properly initiated, generate extremely high gas pressures; these in turn induce new fractures in the surrounding rock and encourage old fractures to grow.

In the process rock is broken and displaced.