

5 BLASTHOLE METHODS IN OPEN PIT MINING

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As we know, open-pit mining operations mainly include perforation, blasting, loading, transport, and discharge of soil. Blasting is an essential part of it, and it accounts for 15-20% of the total cost of open pit mining. And the quality of blasting directly affects the efficiency of equipment such as mining, transportation, and coarse crushing and the total cost of the

mine. Today I would like to share some common blasting methods in open-pit mining and their application.

In open-pit mining, the commonly used blasting methods are as follows:

Classification by blasting method: shallow hole blasting, medium and deep hole blasting, chamber blasting, multi-row hole differential blasting, multi-row hole differential extrusion blasting, pot blasting, external application blasting, hole by hole blasting technology.

5 common blasting methods

1. Shallow hole blasting

Shallow hole blasting hole diameter is small, generally, about 30~75 mm, hole depth is typically 5 meters below, sometimes up to 8 meters or so, such as ***YUAN-PCR200-PRO top hammer pneumatic crawler rock drill (PCR200 CRD)***.

Advantages

- 1, with flexibility and the full range of use;
2. For ore deposits with complex burial conditions and high ore grade requirements, separate blasting and separate mining can be carried out to reduce dilution rate;
- 3, drilling tool is relatively simple, easy to master; advantages
4. Less preparation work;
5. The blasting ore has small lumpiness, which is easy to meet the requirements of loading and crushing;

6. Compared with chamber blasting and deep hole blasting, the use of explosives consumes fewer stars.

Disadvantage

cannot adapt to the needs of large-scale production, and in charge, wiring, overshoot this disadvantage

Several links are prone to loopholes, resulting in explosion accidents

Application:

Shallow hole blasting is mainly used for the production of small scale open pit mines or quarries, adit rock, tunnel excavation, secondary blasting, new open pit mountain bag processing, the formation of slope accessible single trench transport path and some other unique blasting.



YUAN-PCR200-PRO Top Hammer Pneumatic Crawler Rock Drilling Rig in Indonesia
Borehole diameter: 76mm

2. Deep hole blasting

Deep hole blasting is the blasting method of drilling deeper holes with drilling equipment as the charging space of mine explosives. The deep hole blasting of open pit mine is mainly based on bench blasting. Deep hole blasting is a widely used blasting method in open pit mines. The puncture depth is generally 15 ~ 20m. The aperture is 75~310mm, and the commonly used hole is 200~250mm.

Such as

QIN-PCR200-DTH pneumatic crawler drilling rig with bore hole 90-140 mm

HAN-D50-DTH (CM351) pneumatic crawler drilling rig with bore hole 90-165 mm

Features:

A large number of rock ore blasting, generally 200,000 ~1 million t;

Advanced blasting techniques can be used for deep hole blasting. Such as differential blasting, extrusion blasting and blasting areas with special requirements can be used by throwing blasting, directional blasting;

The blasting operation is safe, and the management is simple. There is no particular requirement for the explosives except the deep holes with water. The blasting method is also flexible.

Application:

Deep hole blasting is widely used in the production of large mines such as ditching, stripping, and mining. The blasting volume accounts for more than 90% of the total blasting amount of large veins.

Classification:

The deep hole is divided into the deep vertical hole and inclined deep hole. Most of the deep vertical holes are drilled by impact punch. The inclined deep hole is usually drilled by a cone drill or a subsurface drill. The inclination to 75 ° ~ 80 ° in general.



QIN-PCR200-DTH Pneumatic Crawler Drilling Rig in Africa

Borehole diameter: 90-140 mm

3. Cavern blasting

Chamber blasting is to place explosives in the pre-cut chamber, the concentration of charge. There are no rules for the number of missiles for each detonation. Some of them are loaded with dozens of tons, hundreds of tons or thousands of tons. Due to no small amount of blasting, so also known as heavy blasting.

Application:

Open-pit mines are used only in the period of capital construction and under specific conditions, while quarries are used when conditions permit and when mining is in high demand.

The advantages and disadvantages:

advantages

1. A small amount of preparation work can be done in a short time to complete a large number of rock blasting work;
2. Suitable for stones with various hardness, especially in places with complex topography and free from construction conditions;
- 3, do not need special drilling equipment, the general use of the tunnel can be used to dig tunnel;
- 4, there is no particular requirement for the explosives used, the bombs used in deep hole blasting can be used in chamber blasting.

disadvantages

Tunneling operator, poor drilling conditions, blasting more chunks.



HAN-D50-DTH Pneumatic Crawler Drilling Rig in Middle East
Borehole diameter: 90-165 mm

4. Multiple row hole differential blasting

In recent years, with the rapid increase of the bucket capacity of excavator and the production capacity of open pit mine, more and more blasting amount is required for each time of regular excavation blasting in open pit mine. At present, the blasting method with a large amount of primary blasting in China is multi-row hole differential blasting and multi-row hole differential extrusion blasting. These two methods can blast 5 ~10-row holes at a time, and the blasting ore rock amount can reach 300,000 ~ 500,000 t.

Differential blasting refers to the blasting method of blasting the adjacent holes in a brief time (calculated by ms) in a pre-designed sequence.

Advantages of multi-row millisecond blasting:

- (1) a large amount of blasting, reduce the number of blasting and avoiding the time, improve the utilization rate of stope equipment;
- (2) to improve the quality of rock crushing, the bulk price is 40%~50% less than that of single-row hole blasting;
- (3) the efficiency of perforation equipment is improved by about 10%~15%, which is due to the increase in the utilization coefficient of working time and the reduction in the number of operations of perforation equipment and filling area after blasting;
- (4) improve the efficiency of equipment procurement and transportation by about 10%~15%.



DRILL PANGOLIN DRILL BIT 90-250mm

5. Multi-row hole differential extrusion blasting method

Multi-row hole differential extrusion blasting refers to multi-row hole differential blasting in the case of residual blasting pile on the working face. On the one hand, it can prolong the effective time of blasting and improve the utilization and crushing effect of explosive energy. On the other hand, the blasting width can be controlled to avoid the flying of ore and rock. It is advisable that the interval time of multi-row hole differential extrusion blasting is 30% ~ 50% larger than that of ordinary differential blasting.

Compared with multi-row millisecond blasting, multi-row millisecond extrusion blasting:

Advantages are:

(1) Mineral rock crushing effect is better. This is mainly due to the blocking of slag piles in front, and each row of drilling holes including the first row can increase the charge and be fully broken under the extrusion of slag piles.

(2) More concentrated detonation. For mines using railway transportation, the roadway may not be dismantled before blasting, thus improving the efficiency of mining and transportation equipment.

The disadvantage is that:

(1) high consumption of explosives;

(2) the working platform should be more comprehensive to accommodate the ballast piles;

(3) the blasting height is significant, which may affect the safety of excavator operation.

Besides, no matter what blasting method is adopted, "blasting safety regulations" must be strictly implemented during blasting operations, and safety warning signs should be set up to ensure the safety of personnel and property.

