GOVERNMENT POLYTECHNIC FOR GIRLS

AHMEDABAD

COURSE: ADVANCE CONSTRUCTION TECHNOLOGY

COURSE CODE : 3350605

TOPIC: BLASTING

DRILLING AND NECESSITY

- Drilling is the process of making hole in solid material like rocks, timber, metal, etc for blasting rock drilling is necessary to make hole in the rock to place exposive in the drillhole .
- Necessity

1. Breaking rocks for the foundation of dam.
2. Getting stone from quarry.
3. Making roads in mountains .
4. Tunnelling
5. Sinking caissons and well foundation
6. Laying pipeline in the rocky strata.

Mountain drilling

TYPES OF DRILLS

- Drills can broadly be classified into the following two categories:

1. Abrasion drills
2. Percussion drills

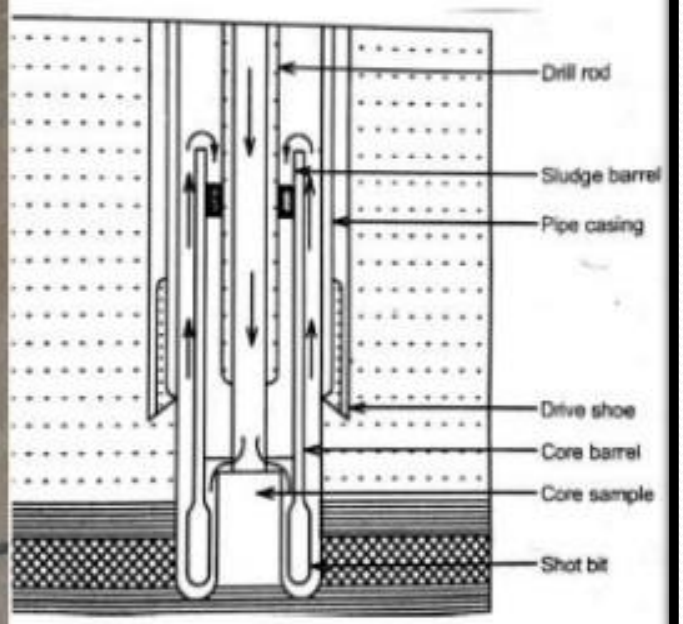
ABRASIONS DRILLS

In this type of drills the grinding of rock into the small particles is carried out through the abrasions effect of a bit which roatates in the hole. Common type of abrasions drilld are as under :

1. Short drills : short drills is a tool that depend on the abrasive effect of chilled steel shots to insert or penetrate the rock . The essential parts of a short shot drill of are as follow

1. A shot bit
2. Core barrel
3. Sludge barrel
4. Drill rod
5. Water supply
6. Power drive rotation unit

SHOT DRILLS


Drill rod
Sludge barrel
Pipe casing
Drive shoe
Core barrel
Core sample
Shot bit

2. Diamond drills : Primarily the diamond drills are used for exploration drilling , where cores are desired for the purpose of studing the structure of the rock . The diamond drill are avaliable in four standard size 37.5 mm [1 ½”] , 47 mm [1 7/8”] , 60 mm [2 3/8”] and 75 mm [3”] . Larger size are also avaliable , but they are very costly . For larger diameter holes shot drills are more economical tyhan diamond drills .

A diamond drilling rig consists of the following components :

1. A diamond bit
2. A core barrel
3. A jointed driving tube
4. A rotary head to supply driving torque

DIAMOND DRILL

PERCUSSION DRILLS

- In this type of drills , the disintegration of rock in to small particles is achieved by the impact from the repeated blows. Common types of percussion drills are as under:

(A) Churn drill :

This types of drills consists of a long steel bit which is mechanically lifted up and dropped down to disintegrate the rock . This drill can be used to drill holes vartically only . With the help of these drills it is possible to drill holes of 150 mm diameter so to a considerable depth, irrespective of the hardness of rock

CHURU DRILL

(B) DRIFTERS

This is an air- operated drill similar to a jack – hammer . But it is so larger that it requires mechanical mounting. It is used for drilling vertical and horizontal holes . They are extensively used in tunnel work and diameter up to 120 mm .

(C) JACK HAMMER

This is an air operated drill which can easily be carried from one place to the other . It is also known as a sinker and its is mainly used to drill vertical holes . Jack hammer are used to drill holes for depths varying from 3 m to 6m .

DRIFTERS

JACK HAMMER

(D) PISTON DRILL

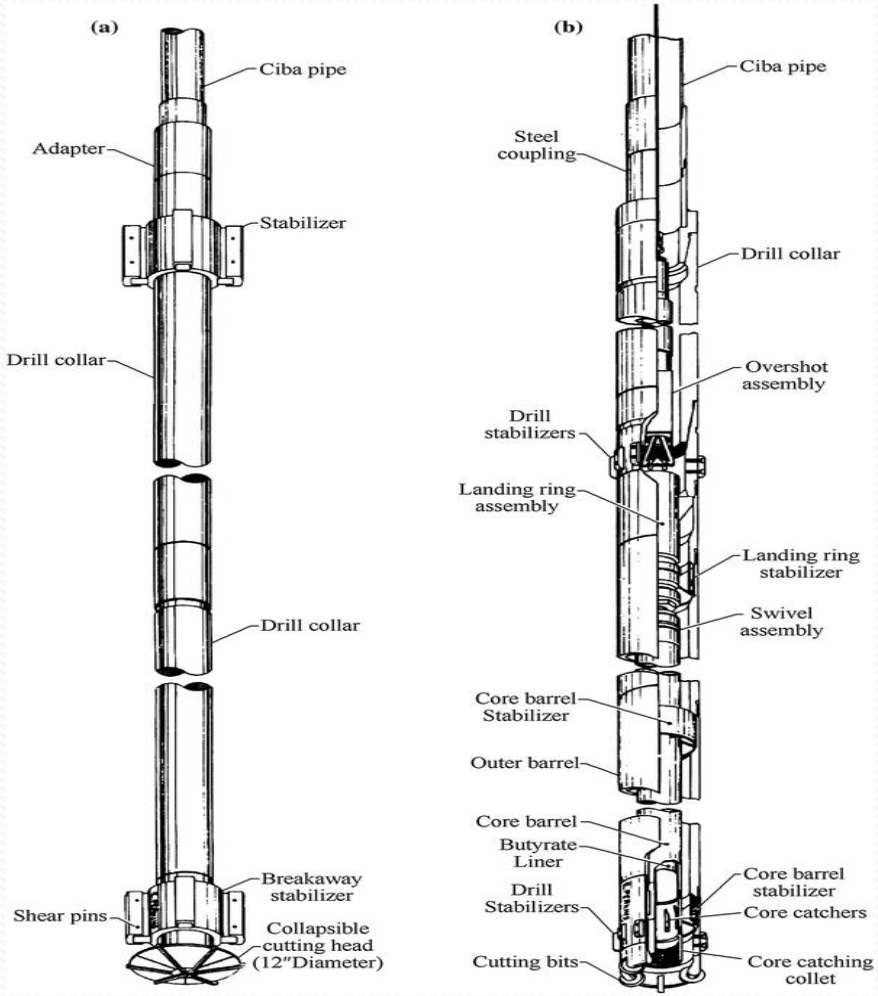
It is a self propelled machine which is mounted on crawler track . The stock and rotation of piston are transferred to the drill rod through the hollow drill tube . The practial depth depth limit of a piston drill about 20 m and so.

(E) ROTARY HAMMER DRILL

Rotary hammer drill is also known as roto hammer drill is an electric drill type dedicated to drilling hole masonry . The rotary hammer drill is a percussion drill that use a weight to creat the impact force on the masonry bit.

(F) WAGON DRILL

These are drifters which are mounted on masts and the masts are mounted on two wheels or more so as to provide easy portability of the drill . The wagon drills can be used to drill holes upto a depth of about 10m or more and they give better performance as compared to jack hammer . They can be used to drill at any angle from down to slightly above horizontal .


(a)
Ciba pipe
Adapter
Stabilizer
Drill collar
Drill collar
Breakaway stabilizer
Shear pins
Collapsible cutting head (12"Diameter)
(b)
Ciba pipe
Steel coupling
Drill collar
Overshot assembly
Drill stabilizers
Landing ring assembly
Landing ring stabilizer
Swivel assembly
Core barrel Stabilizer
Outer barrel
Core barrel
Butyrate Liner
Drill Stabilizers
Core barrel stabilizer
Core catchers
Cutting bits
Core catching collet

WAGON DRILL

SELECTION OF DRILLING METHOD AND EQUIPMENT

- Holes are drilled into the rocks for different purposes like blasting grouting , investigation , etc . The drilling method and equipment should be so selected that maximum work can be done at minimum cost .
- The following factor should be consider :

1. Hardness of rock
2. Depth bore hole
3. Nature of terrain
4. Texture of rock
5. Purpose of hole
6. Avaliability of water
7. Size of project
8. size of core required

GUIDELINES FOR SELECTION OF DRILLING EQUIPMENT

- Jack hammer – For small hole up to 3m depth .
- Diamond drill – For drilling hole up to 8 cm diameter.
- Shot drill - For obtaining cores of 8 to 20 cm diameter.
- Piston drill – For drilling blast holes of 15 cm dia up to 15 m depth .
- Rotary drill – For drilling blast 15 to 20 cm dia up to 90 m depth .
- Diamond drill – For drilling inclined holes for getting corer up to 75 mm dia .

SELECTION OF DRILLING PATTERN

The term drilling pattern is used to indicate the spacing of the drill hole .

The following factor affect the drilling pattern :

1. Type of rock
2. Depth of hole
3. Size of hole
4. Size of drilling
5. Type of drill
6. Depth of rock layer
7. Strength of rock
8. Quantity of explosive
9. Speed of explosion
10. Quantity of stemming
11. Number of holes
12. Arrangement of holes

ECONOMY OF DRILLING HOLE

- Diameter of hole depth of hole and drilling pattern should be so selected that maximum work can be done at minimum cost . If blasting is to be done for getting aggregate there are two method : one, closely spaced shallow holes are drilled to get small pieces of rocks which can be directly fed into crushers . Larger diameter deep hole are drilled to separated large rock masses which can be blasted again .
- If small diameter holes are spaced close together the better distribution of the explosives will result in a more uniform rock breakage .
- Larger diameter holes enable greater explosive loading per hole making it possible to increase the spacing between the holes and thereby reducing the number of holes and the cost of drilling .

THANK YOU

Courtesy : Dr.R.P.Rethliya Sir