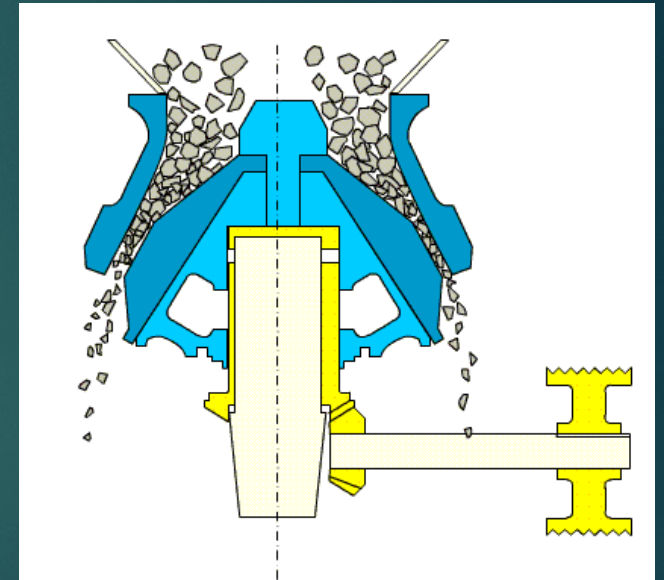
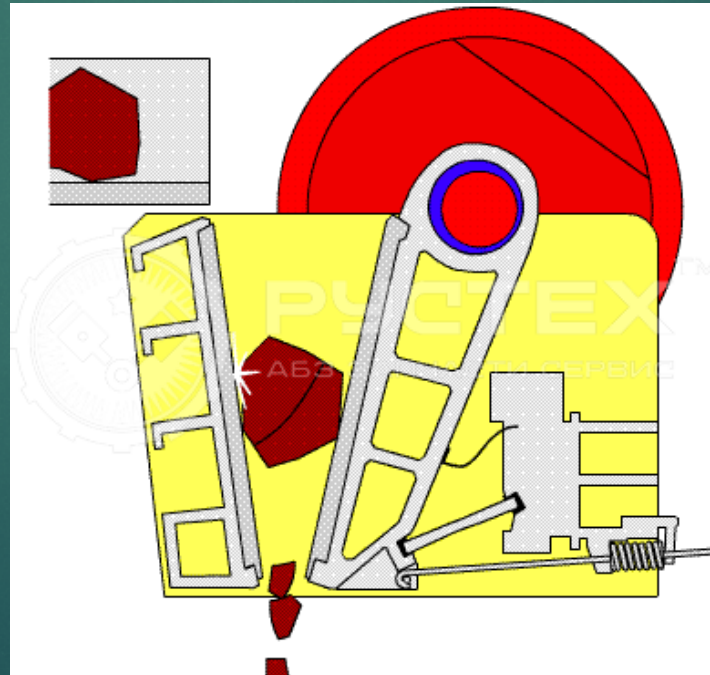
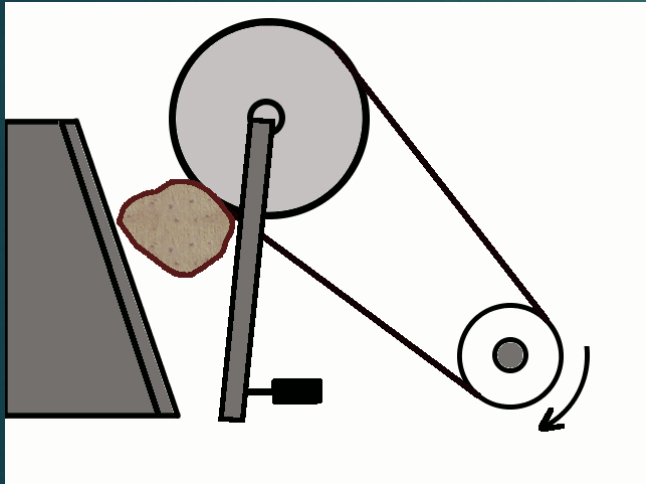


CRUSHER PLANT



Introduction To Crusher Plant :

❑ What is Crusher Plant?

- A **Crusher plant** is one-stop crushing installation, which can be used for rock crushing, garbage crushing, building materials crushing and other similar operations.
- It reduce the large rocks into smaller rocks, gravel, or rock dust as per requirements.
- In mining operations, the crushing plants is very use full in meeting the production requirements while keeping capital and operational costs to a minimum.

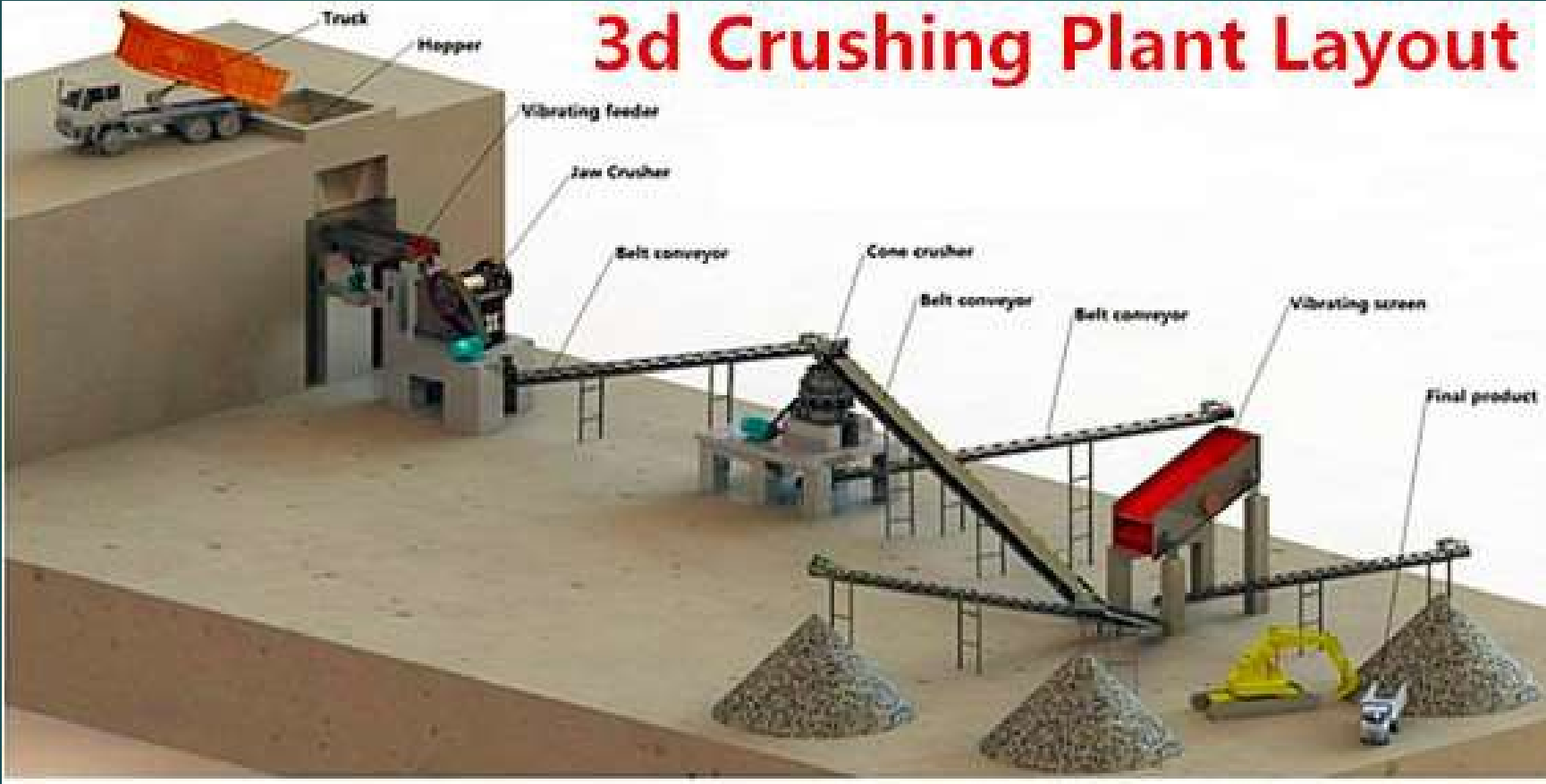
Introduction To Crusher Plant :

□ The fundamental goal for the design of a crushing plant:

➤ An installation.....

- Meets production requirements
- Operates at competitive cost
- Complies with today's tough environmental regulations
- Can be built at a reasonable price
- Despite the rising costs of equipment, energy and construction labor.

Crusher Plant looks like.....



Components Of Crusher Plant.....

➤ Crushing plants make use of a large range of equipment, such as a pre-screener, loading conveyor, intake hopper, magnetic separator, crushing unit: such as jaw crushers and cone crusher etc.

- Belt conveyor
- Vibration feeder
- Vibrating screen
- Crusher
 1. Jaw crusher
 2. Gyratory crusher
 3. Cone crusher
 4. Roll crusher
 5. Impact crusher

1. Belt Conveyor :



- Belt conveyor systems are used extensively in the field of construction.
- Belt conveyor is widely used for transferring lump materials.
- **For example:** when coal, mineral ores, rock stones are crushed, belt conveyors can be used to transport them.
- They frequently provide the most satisfactory and economical method of handling and transporting materials, such as earth, sand, gravel, crushed stone, mine ores, cement, concrete, etc.
- Because of the continuous flow of materials at relatively high speeds, belt conveyors have high capacities.
- During the construction of the Channel tunnel (between England and France) conveyors were used to move up to 2,400 tonnes of spoil per hour from the tunnel headings.
- Easy to operate and easy to maintain as it has simple structure.

1. Belt Conveyor :

- A conveyor for transporting materials a short distance may be portable unit. Figure shows portable belt conveyor.
- When a belt-conveyor system is used to transport materials a considerable distance, up to several miles in some instances, the system should consist of a number of different flights, as there is a limit to the maximum length of a belt.
- Each flight is a complete conveyor unit which discharges its load onto the tail end of the succeeding unit.



2. Vibration feeder :

- **vibratory feeder** delivers materials smoothly to crushers or other crushing equipment to get maximum crushing capacity.
- A vibrating unit with heavy counter weight provides consistent and powerful vibrating motion.
- **Vibrating feeders** work to continuously and evenly feed lump, particle and powdered materials from hopper to jaw crusher, cone crusher, belt conveyer, bucket elevator, vibrating screen and crushing machines, etc.



3. Vibrating screen :

- **vibrating screens** are the most important screening machines primarily utilised in the mineral processing industry.
- They are used to separate feeds containing solid and crushed ores down to approximately 200 μ m in size, and are applicable to both perfectly wetted and dried feed.
- The frequency of the screen is mainly controlled by an electromagnetic vibrator which is mounted above and directly connected to the screening surface.
- The high frequency vibrating screens usually operates at an inclined angle, traditionally varying between 0 to 25 degrees and can go up to a maximum of 45 degrees. Besides, it should operate at a low stroke and has a frequency ranging from 1500 - 7200 RPM.



4. Crusher :

- A **crusher** is a machine designed to reduce large rocks into smaller rocks, gravel, or rock dust.
- Crushers may be used to reduce the size, or change the form, of waste materials so they can be more easily disposed of or recycled or to reduce the size of a solid mix of raw materials (as in rock ore) so that pieces of different composition can be differentiated.
- In industry, crushers are machines which use a metal surface to break or compress materials into small fractional chunks or denser masses.
- Some crushers are mobile and can crush rocks as large as 60 inches.

➤ Types of Crusher :

1. Jaw crusher
2. Gyratory crusher
3. Cone crusher
4. Roll crusher
5. Impact crusher

MAIN CRUSHING CHARACTERISTICS

Reduction ratio

The reduction ratio is the ratio of the maximum size of particles or grains of the crusher feed to the maximum size of the crusher product.

The reduction ratio shows how many times the particle size has reduced during the crushing.

$$i = D_{\max} / d_{\max}$$

Thus, the reduction ratio is calculated as the relation of the maximum size of sieve holes through which particles of the crusher feed and the crusher product pass.



Crushing stages

Depending on the size of the crusher feed and the crusher product, the crushing stages are defined as:

- Stage 1 - primary (coarse) crushing
- Stage 2 - secondary (medium) crushing
- Stage 3 - tertiary (fine) crushing



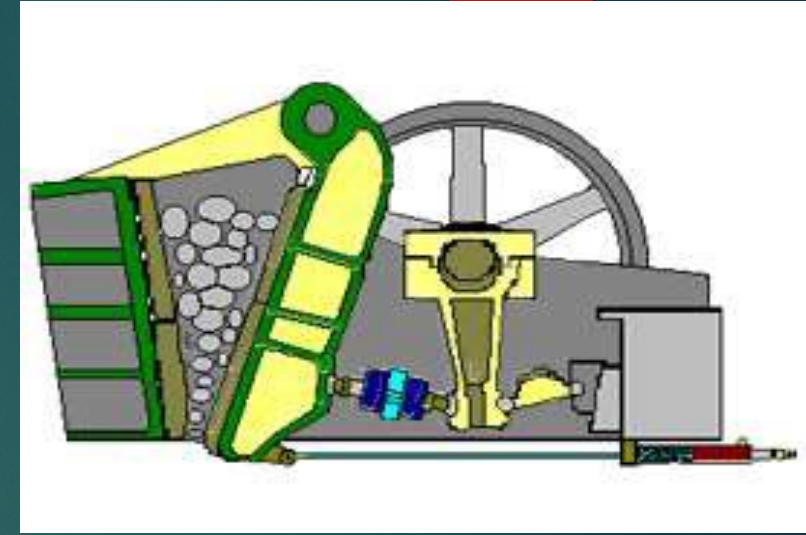
4. Crusher :

➤ Types of Crusher :

1. Jaw Crusher :

Working Principle:

- These machines operate by allowing stone to flow into the space between two jaws, one of which is stationary while other is movable.
- The distance between the jaws diminishes as the stone travels downward under the effect of gravity and the motion of the movable jaw, until the stone ultimately passes through the lower opening.
- The movable jaw is capable of exerting a pressure that is sufficiently high to crush the hardest rock.
- Jaw crusher is driven by a motor, and the moving jaw moves up and down via eccentric shaft.
- The angle between fixed jaw and moving jaw becomes smaller when the moving jaw runs down, then the materials are crushed into pieces.
- It will become bigger when the moving jaw runs up.
- The moving jaw plate leaves the fixed jaw plate under the action of pole and spring, and then the end products come out from the crushing cavity



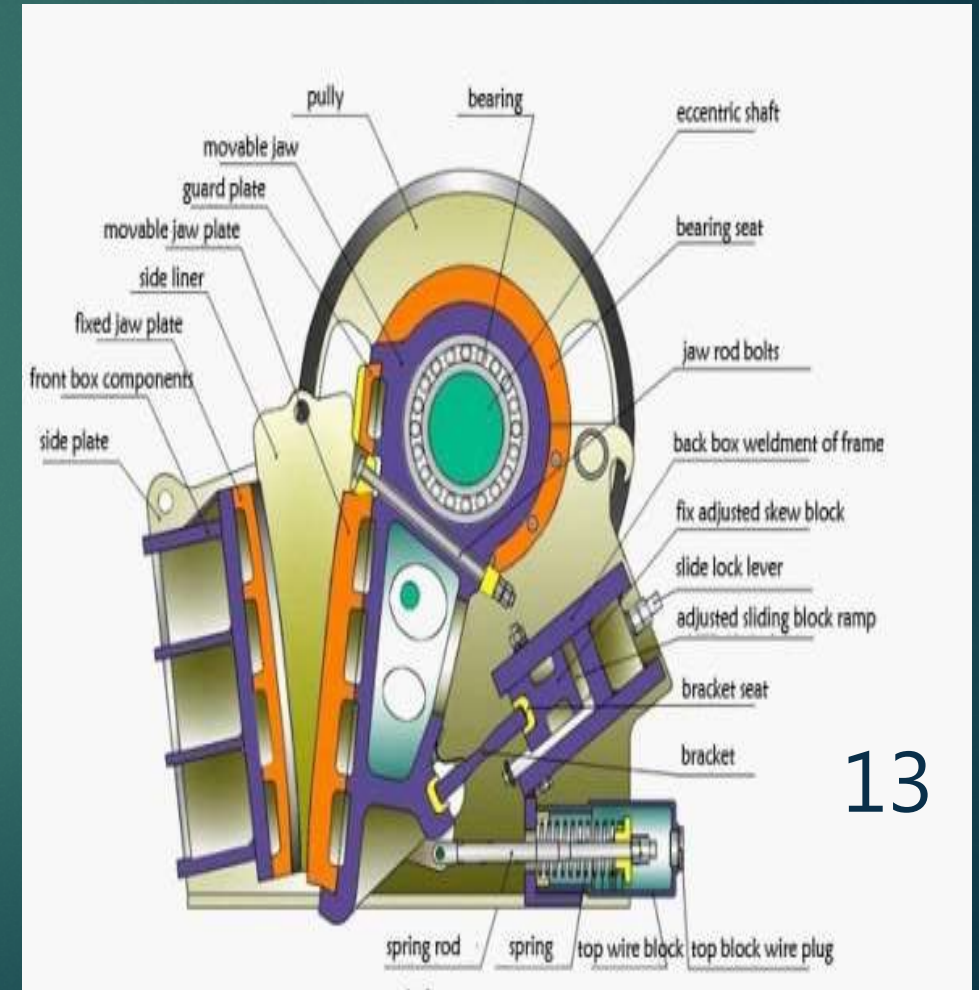
4. Crusher :

➤ Types of Crusher :

1. Jaw Crusher

Benefits and Features:

1. Jaw crusher has deep Crushing cavity and no dead area, which improve production capacity and output.
2. Jaw crusher has simple structure, operational reliability and low operation cost.
3. Jaw crusher has low noise and little dust
4. Jaw crusher has light weight for easy transportation and assembly
5. Jaw crusher can achieve both "coarse and medium" crushing and "medium and fine" crushing.



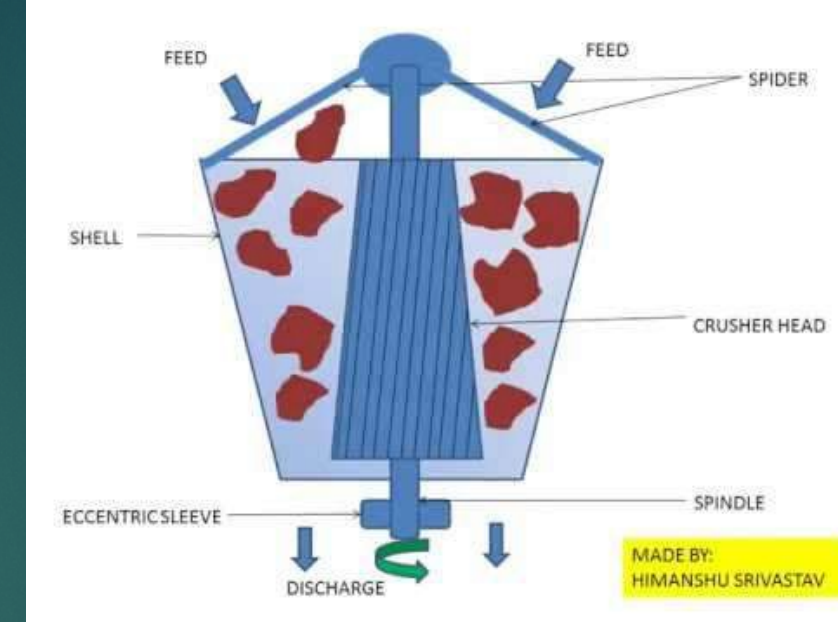
4. Crusher :

➤ Types of Crusher :

2. Gyratory Crusher :

Working Principle:

- These crushers are characterized by a gyrating mantle within a deep bowl.
- They provide continuous crushing action and are used for both primary and secondary crushing of hard, tough, abrasive rock.
- To protect the crusher from uncrushable objects and overload, the outer crushing surface may be spring-loaded or mantle height may be hydraulically adjustable.
- A gyratory crusher is similar in basic concept to a jaw crusher, consisting of a concave surface and a conical head; both surfaces are typically lined with manganese steel surfaces.
- The inner cone has a slight circular movement, but does not rotate; the movement is generated by an eccentric arrangement.
- As with the jaw crusher, material travels downward between the two surfaces being progressively crushed until it is small enough to fall out through the gap between the two surfaces.

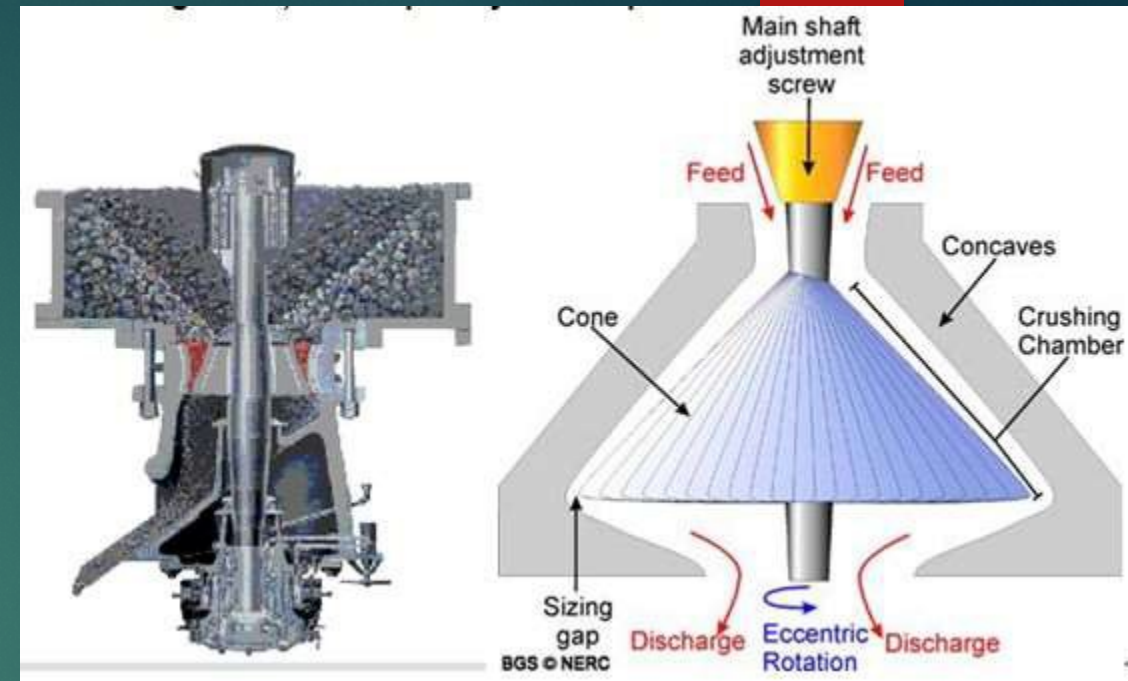
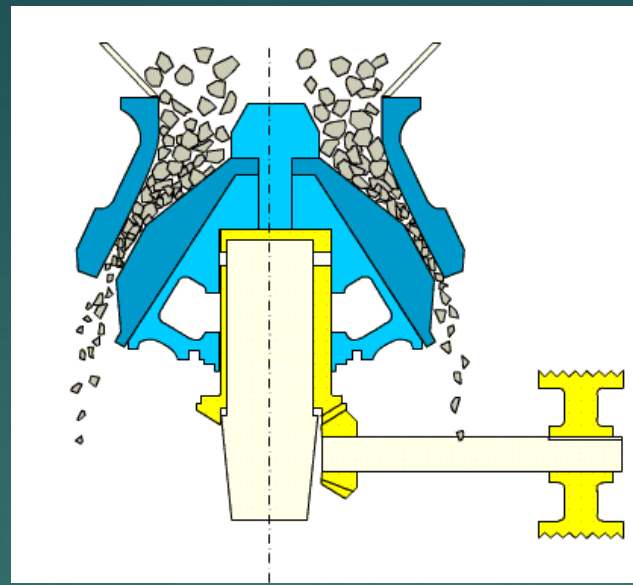


4. Crusher :

➤ Types of Crusher :

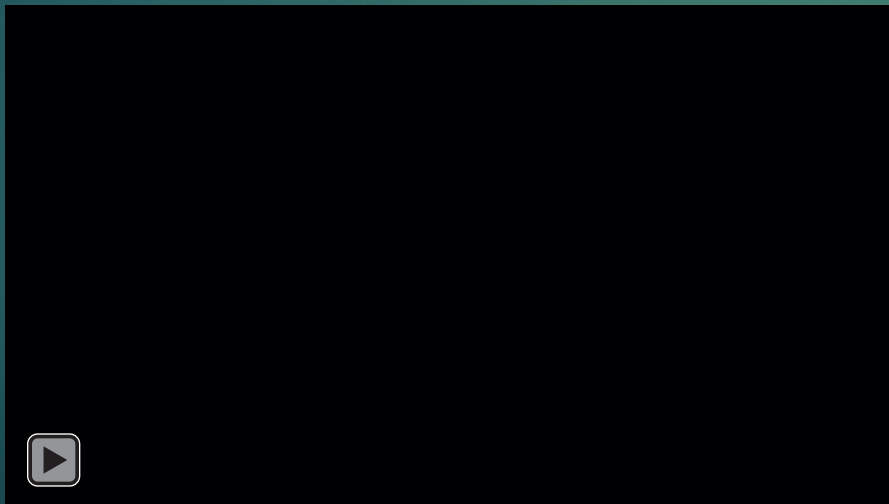
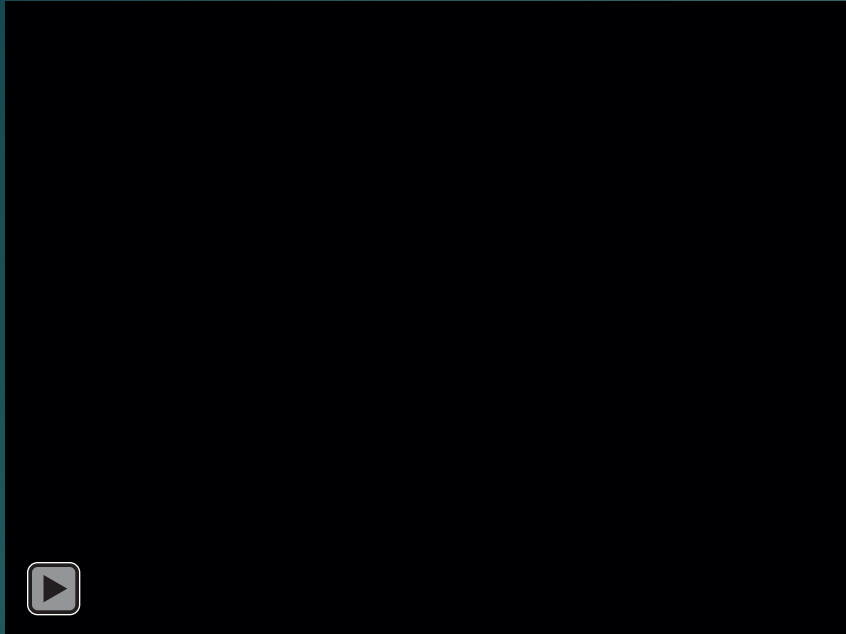
3. Cone Crusher :

Working Principle:



- Cone crushers are used as secondary or tertiary crushers.
- They are capable of producing large quantities of uniformly fine crushed stone.
- When Cone crusher is working, the motor drives the eccentric bush via bevel & pinion gear.
- Mantle core is forced to swing by the eccentric bush, which makes the mantle sometimes close to the concave, and sometimes far away from concave.
- The raw materials are pressed, impacted and finally crushed in the crushing chamber.

OPERATING PROCESS OF CONE CRUSHERS



4. Crusher :

➤ Types of Crusher :

3. Cone Crusher :

Benefits and Features:

- 1.Improvement of production volume for 16%.
- 2.It improves the operation rate and convenience of facilities.
- 3.Maintenance is possible with the sleeve exchange at the site without welding.

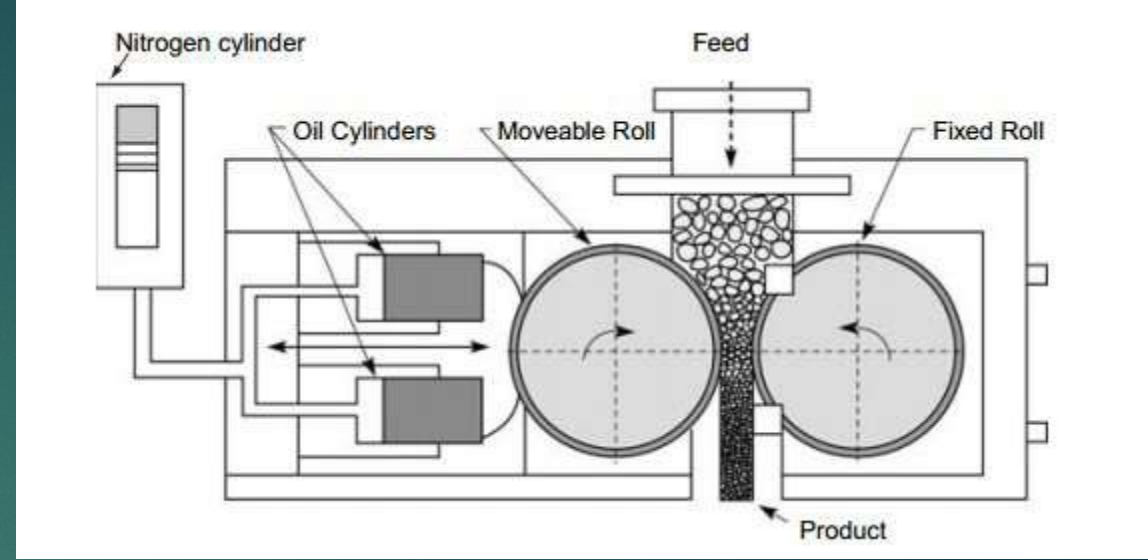
4. Crusher :

➤ Types of Crusher :

4. Roll Crusher :

Working Principle:

- Roll Crusher are used for producing additional reductions in the size of stone after the output of a quarry has been subjected to one or more stages of prior crushing.
- A roll crusher consist of a heavy cast-iron frame equipped with either one or more hard-steel rolls, each mounted on a separate horizontal shaft.
- Single Roll: With a single roll crusher, the material is forced between a large diameter roller having knoblike teeth and an adjustable liner.
- Because the material is dragged against the liner, these crushers are not economical for crushing highly abrasive materials. But they can handle sticky materials.
- Double Roll: Roll crushers with two rollers are so constructed that each roll is driven independently by a flat-belt pull.
- One of the rolls is mounted on a slide frame to permit an adjustment in the width of the discharge opening between the two rolls.



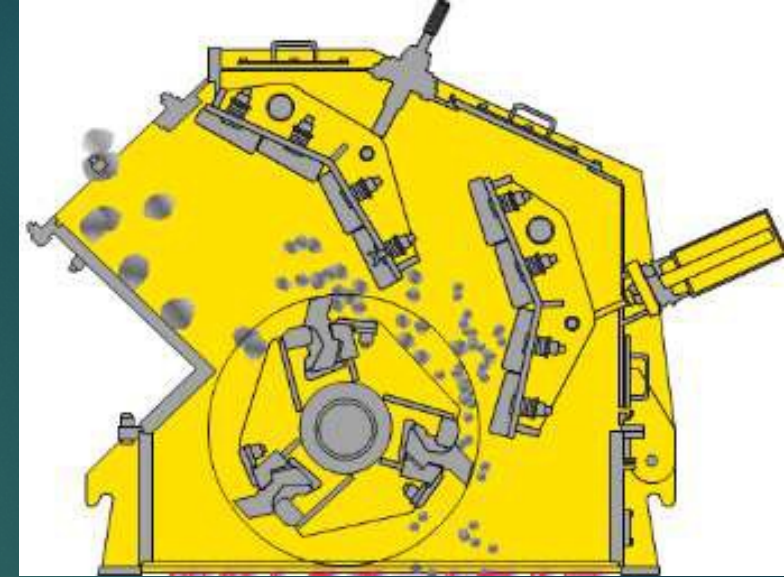
4. Crusher :

➤ Types of Crusher :

5. Impact Crusher

:Working Principle:

- In impact crushers stones are broken by the application of high speed impact forces.
- Advantage is also taken of the rebound between the individual stones and against the machine surface to utilize fully the initial impact energy.
- The design of some units additionally seeks to shear and compress the stones between the revolving and stationary parts.
- Speed of rotation is important to the effective operations of these crushers as the energy available for impact varies as the square of the rotational speed.



5. Selecting crushing equipment :

➤ In selecting crushing and screening equipment, it is essential that certain information be known prior to making the selection.

1. The kind of stone to be crushed.
2. The maximum individual size of the feed stones and perhaps the size ranges of the feed to plant.
3. The method of feeding the crushers.
4. The required capacity of the plant.

5. The percent of material falling within specified size ranges.

6. Process :

1.Raw materials are evenly and gradually conveyed into jaw stone crushing equipment for primary crushing via the hopper of vibrating feeder.

2.The crushed stone materials are conveyed to crushing plant by belt conveyor for secondary crushing before they are sent to vibrating screen to be separated.

3.After separating, qualified materials will be taken away as final products, while unqualified materials will be carried back to the stone crushing equipment for recrushing

- And customers can classify final products according to different size ranges.
- All the final products are up to the related standards within and beyond China.
- Of course, according to different requirements, customers can adjust the size of their final products from this stone crushing plant.

4.Clients will get the satisfactory products after objects being crushed for several times .

- Dust is generated during the working process while the dust control units are needed.

CRUSHER PLANT PROCESS :



Calculation of the crusher capacity

Jaw crusher capacity, kg/h:

$$\Pi = 60 V n \mu \gamma,$$

where V is the volume of the crusher product falling out of the crusher during the backward movement of the moving jaw, m³.

μ - porosity coefficient of crushed materials,

μ - 0.30 ... 0.65 (the lower value corresponds to the coarse crushing);

γ - density of materials, kg/m³.

Volume of the crusher product

$$V = \frac{2e + S}{2} hb,$$

b - the length of the crusher feeding and the discharge mouth, m.

Scheme for calculating the jaw crusher capacity

