**Type of crushers:**

**1. Jaw Crusher**

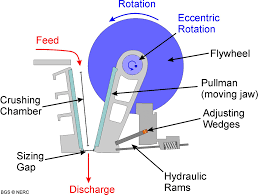
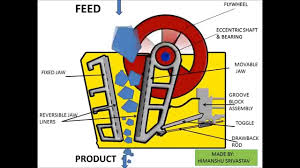
Large jaw toggles back and forth to crush lumps against a hard, rigid surface.

A jaw crusher uses compressive force for breaking of particle. This mechanical pressure is achieved by the two jaws of the crusher of which one is fixed while the other reciprocates. A jaw or toggle crusher consists of a set of vertical jaws, one jaw is kept stationary and is called a fixed jaw while the other jaw called a swing jaw, moves back and forth relative to it, by a [cam](https://en.wikipedia.org/wiki/Cam) or [pitman](https://en.wikipedia.org/wiki/Connecting_rod) mechanism, acting like a class II [lever](https://en.wikipedia.org/wiki/Lever#Classes_of_levers)or a [nutcracker](https://en.wikipedia.org/wiki/Nutcracker). The volume or cavity between the two jaws is called the crushing chamber. The movement of the swing jaw can be quite small, since complete crushing is not performed in one stroke. The inertia required to crush the material is provided by a [flywheel](https://en.wikipedia.org/wiki/Flywheel) that moves a shaft creating an eccentric motion that causes the closing of the gap.

Jaw crushers are heavy duty machines and hence need to be robustly constructed. The outer frame is generally made of cast iron or steel. The jaws themselves are usually constructed from cast steel. They are fitted with replaceable liners which are made of manganese steel, or Ni-hard (a Ni-Cr alloyed cast iron). Jaw crushers are usually constructed in sections to ease the process transportation if they are to be taken underground for carrying out the operations.

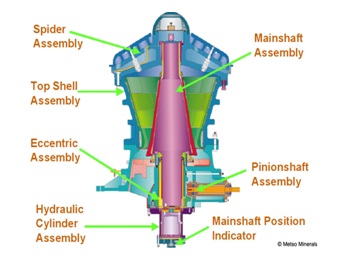
Jaw crushers are classified on the basis of the position of the pivoting of the swing jaw

1. Blake crusher-the swing jaw is fixed at the upper position
2. Dodge crusher-the swing jaw is fixed at the lower position
3. Universal crusher-the swing jaw is fixed at an intermediate position

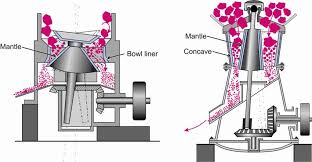
**2. Gyratory Crusher**

These machines operate on the principle of compressing the rocks in a cone. The rocks fall into the cavity from the top. The moving part is an eccentric cone. The rocks enter on the largest corner of the cavity but are compressed as the eccentric cone rotates. The outside cone is sometimes called the bowl, and the rotating cone is called the mantle. The bowl reduces in diameter toward the bottom, whereas the mantle increases in diameter with depth in the opposite direction. Gyratory crushers are preferred for slabs or flat-shaped rocks as they snap the rock better. Gyratory crushers are manufactured to handle tonnage flows up to 3500 tph. Sandvik purchased the line of Nordberg mobile primary gyratory crushers that can be moved from one site to another as the mine expands.



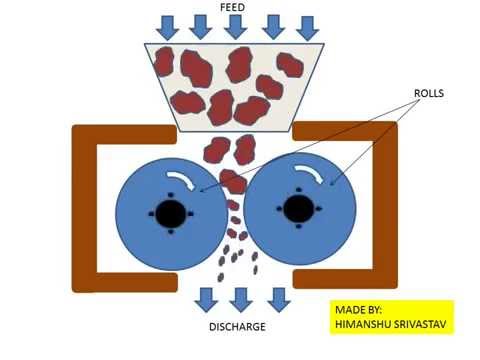
**3. Cone Crusher**

Cone crushers operate on the same principle as gyratory crushers. This allows a gradual reduction of the area between the two cones. The rotating cone or mantle is inclined, thus providing a combination of impact loads and compression loads. By comparison with the gyratory crusher, the outer bowl is inverted, and the mantle rotates at much higher speeds. There are two types of cone crushers: ¬ The standard type (for secondary crushing) ¬ The short head type (for tertiary crushing)



**4. Roll Crusher**

Roll crushers consist of two counterrotating cylinders. The gap between the cylinders is adjusted by threaded bolts. Roll crushers can use springs to hold the cylinders in place. Each cylinder is then driven by its own belt drive. Roll crushers are used for less abrasive stones than cone crushers. They are most effective on soft and friable stones, or when a close-sized product is required.



**5.Impact Crushers**

It uses plate hammer on the rapidly rotating rotor to generate high-speed impact to crush the materials in the crushing cavity, and casts the crushed materials along tangential direction to impact plate at the other end of the crushing cavity. The materials are crushed again, and then, they return to the plate hammer to undergo the process above repeatedly. The materials are bumping with each other when being sent between the plate hammer and the impact plate. The materials become cracked, loose and then comminuted by knocking by the plate hammer, impact with impact plate and bump between materials. The materials with grain size smaller than the gap between impact plate and plate hammer will be discharged. These machines operate on the principle of a set of rotating hammers hitting against the rocks. The hammers are fixed to a cylinder. The feed is from the top and as the rocks feed in, they fall between a breaker plate and the rotating cylinder. The hammers produce the required impact to chip the rocks. Impact crushers work best on rocks that are neither abrasive nor silica-rich, as these cause rapid wear of the hammers. Metso Minerals manufactures impact crushers for primary and secondary crushing.

