Rock crusher

A rock crusher is a machine designed to take large rocks as and reduce them to smaller rocks, gravel, or rock dust. Rock crushers produce aggregates and ready-to-process mining ores, as well as rock fill material for landscaping and erosion control.

Process Crushing is the first step in converting shot rock into usable products,by taking large rocks and reducing them to smaller pieces. Crushing is sometimes continued until only fines remain. At some operations, all the crushing is accomplished in one step, by a primary crusher. At other operations, crushing is done in two or three steps, with a primary crusher that is followed by a secondary crusher, and sometimes a tertiary crusher or even a quaternary crusher.

Raw material, of various sizes, is brought to the primary crusher by rear-dump haul units, or carried by a wheel front-end loader. Primary crushing reduces this run-of-mine rock to a more manageable size.

Types

Jaw Crusher The jaw crusher squeezes rock between two surfaces, one of which opens and closes like a jaw. Rock enters the jaw crusher from the top. Pieces of rock that are larger than the opening at the bottom of the jaw lodge between the two metal plates of the jaw. The opening and closing action of the movable jaw against the fixed jaw continues to reduce the size of lodged pieces of rock until the pieces are small enough to fall through the opening at the bottom of the jaw. It has a very powerful motion.

[Gyratory Crusher] A gyratory crusher breaks rock by squeezing the rock between an eccentrically gyrating spindle (which is covered by a wear resistant mantle) and the enclosing concave hopper. As run-of-mine rock enters the top of the gyratory crusher, it becomes wedged and squeezed between the mantle and concaves. Large pieces of ore are broken once and then fall to a lower position (because they are now smaller) where they are broken again. This process continues until the pieces are small enough to fall through the narrow opening at the bottom of the crusher.

Impact Crusher There are two types of impact crushers. The Horizontal Shaft Impactor (HSI) and the Vertical Shaft Impactor (VSI). The HSI crushers break rock by impacting the rock with hammers that swing on a rotating shaft. The practical use of HSI crushers is limited to soft materials and non abrasive materials, such as limestone, phosphate, gypsum, weathered shales. HSI crushers achieve the highest degree of reduction. The VSI crushers can also break rock by impacting the material with rotating hammers, traditionally this is referred to as a "Shoe and Anvil VSI" and has similar limitations to the HSI crusher. The VSI crusher uses a different method involving a rotor with wear resistant tips and a crushing chamber designed to retain a protective layer of crushed rock for new rock to be crushed against - "rock on rock". Using this method materials with much higher abrasiveness can be crushed.

Cone Crusher A cone crusher is similar in operation to a gyratory crusher, with less steepness in the crushing chamber and more of a parallel zone between crushing zones. A cone crusher breaks rock by squeezing the rock between an eccentrically gyrating spindle, which is covered by a wear resistant mantle, and the enclosing concave hopper, covered by a manganese concave or a bowl liner. As rock enters the top of the cone crusher, it becomes wedged and squeezed between the mantle and the bowl liner or concave. Large pieces of ore are broken once, and then fall to a lower position (because they are now smaller) where they are broken again. This process continues until the pieces are small enough to fall through the narrow opening at the bottom of the crusher.

Technology For the most part advances in crusher design have moved slowly. Jaw crushers have remained virtually unchanged for sixty years. More reliability and higher production have been added to basic cone crusher designs that have also remained largely unchanged. Increases in rotating speed, have provided the largest variation. For instance, a 48 inch (120 cm) cone crusher manufactured in 1960 may be able to produce 170 tons/hr of crushed rock, whereas the same size cone manufactured today may produce 300 tons/hr. These production improvements come from speed increases and better crushing chamber designs.

The largest advance in cone crusher reliability has been seen in the use of hydraulics to protect crushers from damage from uncrushable objects entering the crushing chamber. Foreign objects, such as steel, have been known to cost thousands of dollars of damage to a cone crusher, and more costs in lost production.mill The advance of hydraulic relief systems has greatly reduced downtime and improved the life of these machines. mill raymond mill