

Experiment No. 1

Object: To study construction and working of ball mill.

Theory:

In the ball mill, Impact and Attrition both are responsible for the size reduction. Rapidly moving balls are used for the comminution of brittle material.

Construction of Ball Mill

The ball mill consists of a hollow metal cylinder mounted on a shaft and rotating about its horizontal axis. The cylinder can be made of metal, porcelain, or rubber. Inside the cylinder balls or pebbles are placed. The balls occupy between 30 and 50% of the volume of the cylinder. The diameter of the balls depends on the size of the feed and the diameter of the cylinder. The diameter of the balls varies from 2cm to 15cm. The balls can be made of metal, porcelain, or stainless steel. The ball acts as a grinding medium.

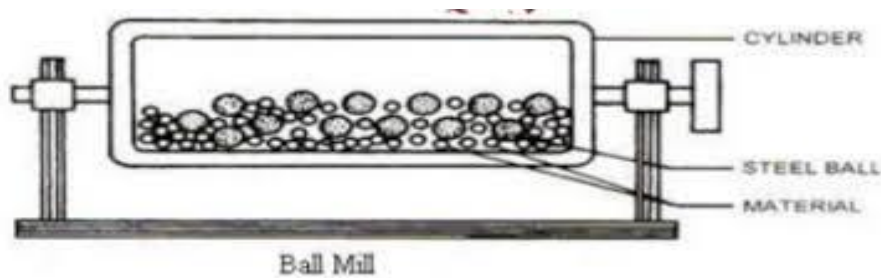


Figure: Construction of Ball mill

Working of Ball mill

The material to be ground is kept in a hollow cylinder. The material is placed up to 60% of the volume. A fixed number of balls is placed in the cylinder and then the cylinder is closed. The mill is allowed to rotate. Speed of rotation is an important point of consideration.

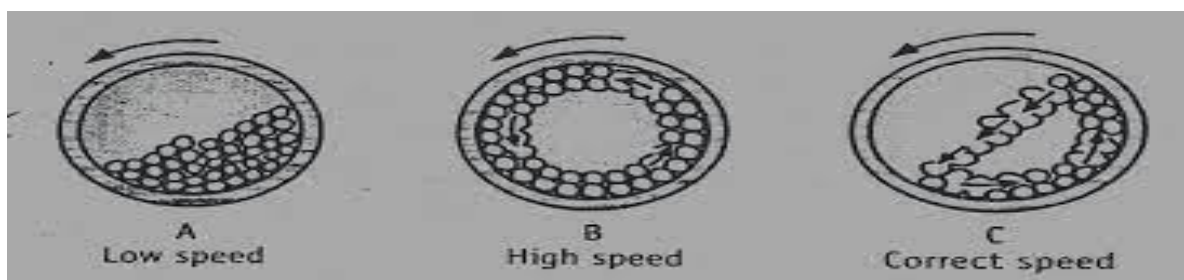


Figure: Speed of balls

At low speed, the mass of balls will slide or roll up one over another and will only produce an insignificant amount of size reduction. At high speeds, the balls are thrown to the cylinder wall due to centrifugal force and no grinding will occur. At 2/3rd speed centrifugation just occurs which is called the critical speed of the ball mill. At this speed, the balls are carried almost to the top of the mill and then fall in a cascade across the diameter of the mill. In this way, the maximum size reduction is obtained by the impact of the particles between the balls and by attrition between the balls. It is usually 0.5 cycles per second (cps).

Result: The construction and working of ball mill was studied.