

MECHANICAL OPERATION LABORATORY

B. Tech Chemical Engineering

**Semester :- 5th
Lab No- I-004**

Subject objective:-

Mechanical operation is basically dealing with the particles. Mechanical operation deals with particulate matter i.e. crushing of solid matter from large to intermediate and from intermediate to smaller one, also it deals with separation of solid particles from solid, liquid and gaseous streams. Mechanical operation covers significant area of engineering, therefore the utility of this particular course mechanical operation is significant as far as the industrial application is concerned.



Sieve Shaker

Sieves are used industrially on large scale for the separation of particles according to their size, for the small scale production of closely ground material and for carrying out size analysis. Generally woven wire cloth is used for the size analysis of very small particles.

Jaw crusher

The Crusher has a fixed jaw and a moving jaw pivoted at the top with the crushing faces themselves formed of manganese steel. Since the maximum movement of the jaw is at the bottom, there will be little tendency for the machine to clog, though some uncrushed material may fall through and have to be returned to the crusher. Further, the maximum pressure will be exerted on the large material which is introduced at the top.



Roll Crusher

Two rolls, one in adjustable bearings, rotate in opposite directions and the clearance between them can be adjusted according to the size of feed and the required size of product. The machine is protected, by spring loading, against damage from very hard material. Both rolls may be driven, or one directly and the other by friction with the solids.

Ball Mill

In its simplest form, the Ball Mill consists of a rotating hollow cylinder, partially filled with balls, with its axis either horizontal or at a small angle to the horizontal. The material to be ground may be fed in through a hollow turning on at one end and the product leaves through a similar turning on at the other end for continuous type operation. The outlet is normally covered with a coarse screen to prevent the escape of the balls





Cyclone separator

Centrifugal Separating devices consist of cyclone separators, rotational flow dust precipitators, and mechanical centrifugal separators, the cyclones being most widely used. The smallest particle size removable is about 5 micro meters, although smaller sizes as low as 0.1 micro meters have been separated in case where particle agglomeration takes place. The cyclone separator is uniquely conceived so that the solid particles are separated from gases under centrifugal flow path conditions to produce much greater separation forces than obtained by gravitational methods.

Double cone mixer

It consists of a horizontal trough container having a central shaft and a helical agitator. Two counteracting ribbons are mounted on the same shaft, one moving the solid in the one direction slowly while other moving it quickly in the other. The cone may be continuous or interrupted.



Filter press



Filter presses operate under pressure using the process of cake filtration. This involves sending slurry through the press, which is equipped with filter cloths. The cloths pick up the particles in the slurry and allow the solvent (water) to pass through. As more slurry moves through the press, the cake builds up and assists the filtration process. The rate at which the slurry moves through the press depends on the viscosity of the liquid, the thickness and resistance of the cake, And the pressure drop across each plate.