Lecture : 6

① Rittinger's law $\rightarrow$ $W_R = k_R \left(\frac{1}{\bar{D}_{VSP}} - \frac{1}{\bar{D}_{VSf}} \right)$

② Kick's law $\rightarrow$ $W_k = k_k \ln \left(\frac{\bar{D}_{VSf}}{\bar{D}_{VSP}} \right)$

③ Bond's law $\rightarrow$ $W_B = k_b \left(\frac{1}{\sqrt{D_{pp}}} - \frac{1}{\sqrt{D_{pf}}} \right)$

Coarse crushers:

Jaw, Gyratory & Crushing rolls:

Theoretical capacity of jaw crusher,

$$\theta = \frac{\rho_p A W_j N_j (1-\varepsilon)}{60}$$

* A – area of swing
  w_j – jaw width
  N_j – no. of swings per min
  ε – porosity of particles

Intermediate size crushers:

Roller mills, hammer mills, Cage mills

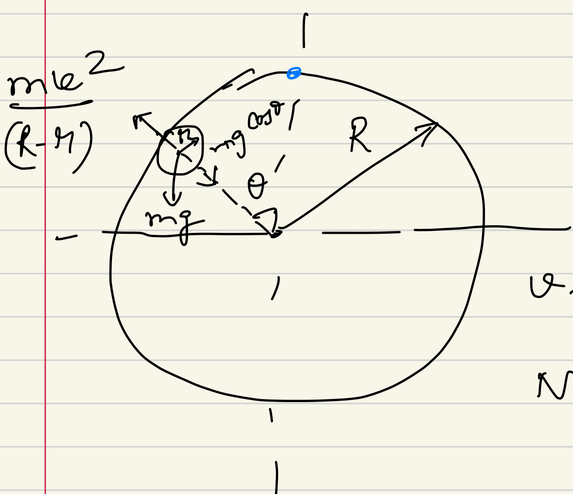
Fine size reduction:

ball mill, rod mill, pebble mill

1) Cascading:

2) Cataracting:

3) Centrifuging:



$$mg\cos\theta = \frac{mv^2}{(R-r)}$$

v - peripheral speed

N - speed of rotation (rev. per min)

$$v = 2\pi N (R-r)$$

At critical speed, $\theta = 0^\circ$, $N = N_c$

$$\cancel{m} g \cos\theta = \frac{\cancel{m} v^2}{(R-r)}$$

$$g \cos\theta = \frac{\left[2\pi N\,(R-r)\right]^2}{(R-r)}$$

$\theta = 0°$

$$\Rightarrow \boxed{N_C = \frac{1}{2\pi}\sqrt{\frac{g}{R-r}}}$$

* Usually ball milling is operated $\sim$ 60-75% of critical speed.