

GRINDING

Grinding is the final stage for size reduction processes. The aim of grinding is to obtain liberation of gangue and ore minerals, provide suitable size, surface area for further processes or producing suitable sized material for industrial usage. Main forces applied during grinding process are **impact, compress or compaction, shear and friction**.

Equipments used for grinding are called “mill”. The type of mill is chosen depending on ore characteristics for grinding or final size of the product. Generally, in ore processing plants, ball, rod, or open mills are used.

Grinding process is performed as wet or dry depending on ore or process. In addition, other equipments like classifier or others are chosen depending on the grinding type. Additionally, for dry grinding about 1.3 more energy is needed compared with wet grinding.

Following grinding processes, transferring material from grinding circuits to other processes or classifying material based on size distribution, different classifiers are used through characteristics of ore as size, physical and chemical properties. These classifiers mainly consist of hydrocyclones, mechanical classifiers (spiral classifiers, centrifuge classifiers) or air classifiers.

OBJECTIVE

Determination of various parameters on grinding performance with laboratory type steel ball mill.

MATERIALS AND EQUIPMENTS

- * Laboratory ball mills
- * Sieves in various sizes
- * Plastic containers

Sample: Limestone (The product of hammer crusher)

Laboratory Work

- 1) Determination of ball mill dimensions (dimensions, volume)
- 2) Each group will be asked to conduct grinding with the ore assigned to their group.
- 3) Product will be subject to sieve analysis.

Questions for Further Investigation

- 1) Give a brief theoretical information (max 5 pages including images, tables and all)
- 2) Explain experimental work in detail. (Experimental method, all work, measurements and evaluation of the results)
- 3) Results (Including your personal opinion and discussion)
- 4) Reports will be handled before due date to the related Research Assistant.
- 5) Make sieve analysis chart depending on the sieve analysis results of feed and products of grinding
- 6) Show d_{50} and d_{80} size of each product
- 7) Calculate the size reduction ratio (F_{80}/P_{80})
- 8) Calculate m and k modules and calculate the average particle size.
- 9) Calculate the energy needed for grinding by Bond work index.