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Stirred Media Detritor

Metso Minerals, the world's largest supplier of grinding systems, provides customers with solutions for their specific grinding needs.

Within the metalliferous mining industry, economic pressures dictate the need to treat previous "untreatable" ores. These include polymetallic ores with the intergrowth of mineral values, ultra fine grained disseminated ores and refractory ores. Ultra fine grinding can enable liberation of values or maximize surface area to achieve required leach kinetics. Metso Minerals characterizes ultra fine grinding as 80% passing 15 microns or finer.

To meet this need, Metso Minerals licensed the Stirred Media Detritor (SMD) technology from ECC International Limited of the UK (now trading as Imerys). Cooperatively, Metso Minerals and Imerys engineers have adapted this technology for the specific requirements of the metalliferous industry.

Used in commercial operation since 1998, the SMD has proven effective in producing fine and ultra fine (sub 15 microns) product size for a wide range of metalliferous feeds.

Ore and Process Testing

Test work is essential to establish the ore grindability and the most efficient operating conditions to achieve the required product size.

Bench scale tests provide initial indicative performance. A more extensive bench scale program can be performed to investigate in detail the principal process variables and their affect on grind. When large scale continuous test work is required to assess differing operating conditions or to provide large quantity of product sample, a pilot 18.5kW SMD can be provided.

Top Screen SMD

The normal operating range is 5-100 kWhrs/ton which meets the majority of metalliferous fine and ultra fine grinding requirements. Maximum size for this type of SMD is an installed 1,100kW. Typically, feed size range is 30-100µm and feed slurry solids concentrations range is 20-60% w/w. Our engineers will review your specifications and recommend the optimum feed solids concentration to maximize grinding efficiency. The SMD normally operates in open circuit, although closed circuit is possible.

Media Selection

Media size, type and charge quantity are selected to meet your process specifications. Normally, a natural silica or ceramic media is recommended. Selection of the grinding media is essential for optimum grinding efficiency. The media selected should have well-rounded particles, with minimal cracks or flaws. Imperfections in the media will result in accelerated breakdown in the SMD increasing media consumption and component wear; affect charge viscosity; and overall efficiencies.

Operation

Feed slurry enters through a port in the top of the detritor. The impellers thoroughly intermix the feed slurry and the media. A predominantly axial flow regime throughout the grinding charge provides intense interparticle abrasion. This action utilizes the applied energy and maximizes grinding efficiency.

The axial flow within the charge constantly circulates particles across the media retention screens. Milled product discharges through these screens which are located around the top half of the unit. During the process, a proportion of the media will be abraded to below the screen aperture size and pass through the screens with the product. Therefore, media charges have to be monitored and replenished. Grinding media is added through a pneumatic feed port or the manual feed chute, both of which are located on top of the unit.

A launder collects the product as it flows through the screen. The number of exit screens depends on the grinding requirements and the required feed flow rate. The position of these screens automatically define the operating level within the SMD, thereby simplifying process control. The SMD is a highly flexible machine for a wide range of operating conditions.

Control of the feed mass flow, machine power draw and the correct grinding media charge ensures optimal grinding conditions are maintained for the specific feed and product parameters.

Advantages

Design enhancements include improve power efficiency with the following advantages...

- Open circuit operation
- Mechanically simple design
- Competitive capital cost
- Use of low cost, ceramic, natural silica sand or pebble media
- No steel contamination of product
- Capacity to operate continuously at full load power draw
- Low rotational impeller speed with shallow charge depth providing reduced abrasion of impeller and body liner coverings

