SUCCESSFUL APPLICATIONS OF VERTICAL-ROLLER-MILLS IN PHOSPHATE PROCESSING

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To keep up with increasingly challenging tasks in the processing of ores and industrial minerals, the design of the process as well as the choice of the equipment to be installed will become more complex. This accounts for the process step of grinding in particular, as it has significant impact onto the performance of the downstream sorting process and represents a major share in the overall operating expenditures of a mining operation. Especially with increased requirements to the grinding product, alternative technologies such as compressive comminution in Vertical-Roller-Mills (VRM) can offer efficient solutions and replace conventional grinding technology.

VRM technology has several intrinsic benefits. The system for combined crushing, grinding and drying offers a very high reduction ratio at low energy consumption and low specific wear rates. The internal circuit of compressive grinding and immediate classifying leads to improved mineral liberation and a narrow particle size distribution. Online adjustable process parameters allow the system to respond quickly to fluctuations in feed mass flow and mineralogical composition. With several thousands of VRM’s installed in various industries, including the grinding of phosphate rock and phosphate concentrates, VRM technology proved to be more than suitable for the different grinding tasks in phosphate processing.

Next to various installations for phosphate concentrate grinding, especially hard rock operations like Foskor Ltd. (Phalaborwa, RSA) and EuroChem (Zhanatas, Kazakhstan) clearly benefit from VRM technology. Since 19 years Foskor operates a Loesche VRM for the comminution of pyroxenite hard rock (BWi ~ 25.3 kWh/t). Due to a close cooperation between Foskor and Loesche, the mill is operated with good performance data and positive impact on the production. In January 2016 another Loesche VRM for the processing of pyroxenite phosphate rock (BWi = 18.5 kWh/t) went into operation at EuroChem in the south of Kazakhstan. Despite strong fluctuations in the feed material, the mill is operating smoothly at very positive performance data.

The paper summarizes the key features of Loesche VRM technology and its benefits for the comminution of phosphate materials. The status in successful hard rock applications of the VRM technology, such as Foskor (Phalaborwa) and EuroChem (Zhanatas), is presented. Selected performance data is reported and compared to results of conventional ball mill circuits.

Figure 1 – LM 50.4 with elongated classifier at Phalaborwa, Foskor