New tools for process monitoring in iron ore pelletizing – XRD in combination with PLSR

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ABSTRACT

To cope with varying raw material qualities and increasing prices for energy a more frequent and accurate monitoring of the processing of iron ore became focus in pelletizing plant operations. Traditionally quality control of raw materials and pellets has relied on time consuming physical testing and wet chemistry or the analysis of the elemental composition. The mineralogy of iron ore pellets that defines the properties and bevaviour in the blast furnance is not frequently monitored. One fast method to analyze the mineralogical composition of iron ore pellets and raw materials is X-ray diffraction, XRD. Recently statistical methods like similarity analysis or partial least square regression (PLSR) in combination with XRD raw data became more and more popular to handle large amount of data and to correlate process relevant parameters directly with an XRD measurement. PLSR can be used to correlate process parameters directly from the XRD pattern without investigating the mineral content. Analysis within minutes compared to time and labour intense traditional physical and chemical methods as well as the additional information about phase composition enables efficient processing of iron ores pellets. The practical use for the direct determination of mineralogical and physical process parameters during pelletizing will be illustrated.