

Monitoring the Drying and Grinding Process during Production of Celitement through a NIR-Spectroscopy Based Approach

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Abstract : Online measurement of the product quality is a challenging task in cement production, especially in the production of Celitement, a novel environmentally friendly hydraulic binder. The mineralogy and chemical composition of clinker in ordinary Portland cement production is measured by X-ray diffraction (XRD) and X ray fluorescence (XRF), where only crystalline constituents can be detected. But only a small part of the Celitement components can be measured via XRD, because most constituents have an amorphous structure. This paper describes the development of algorithms suitable for an on-line monitoring of the final processing step of Celitement based on NIR-data. For calibration intermediate products were dried at different temperatures and ground for variable durations. The products were analyzed using XRD and thermogravimetric analyses together with NIR-spectroscopy to investigate the dependency between the drying and the milling processes on one and the NIR-signal on the other side. As a result, different characteristic parameters have been defined. A short overview of the Celitement process and the challenging tasks of the online measurement and evaluation of the product quality will be presented. Subsequently, methods for systematic development of near-infrared calibration models and the determination of the final calibration model will be introduced. The application of the model on experimental data illustrates that NIR-spectroscopy allows for a quick and sufficiently exact determination of crucial process parameters.

Keywords : calibration model, celitement, cementitious material, NIR spectroscopy

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