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Real-Time Iron Ore Quality Optimization in Sintering and Pelletizing Using Integrated Online Analyzer and Advanced Process Control Systems

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Sintering and pelletizing are critical upstream process that impact the performance of ironmaking and steelmaking operations through the quality of sinter and pellet feed. Conventionally, iron ore quality has been monitored through offline laboratory analyses. However, it limits the potential of process optimization, as it does not allow for timely adjustments in response to real-time process variations. This study presents a novel approach to real-time ore quality optimization by integrating online analyzers with an advanced process control (APC) system across sintering and pelletizing operations. The pro-posed solution leverages proven analytical technology to deliver continuous elemental and mineralogical measurement of key performance indicators (KPIs), including Fetot%, basicity, moisture, MgO%, SiO2 % and Al2O3%. The real-time composition data of the feed stream is used as input to a model predictive control system, enabling closed-loop process control of material proportioning. By enabling continuous quality monitoring and automated process adjustment, this integrated solution not only optimizes ore quality and material costs in sintering and pelletizing but also enhances productivity, energy efficiency, and decarbonization potential in downstream blast furnace ironmaking and electric arc furnace steelmaking operations.

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