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Secured EAF performance through process discipline —including constraints of raw material and experience

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Electric Arc Furnace (EAF) steelmaking plays a central role in the transition toward low-carbon and resource-efficient steel production. Increasing energy costs, environmental regulations and needed raw material flexibility demand continuous improvements in energy efficiency and process performance. The operating personnel in steelmaking plants getting younger, more than 10 years in the same profession has become rare. Building and maintaining deep-experienced staff as well as a highest level of safety is difficult.
This paper outlines key strategies for reducing electrical energy and material consumption in EAF operations through advanced process control, supportive smart-tools, and real-time data utilization. The integration of smart add-ones around the EAF combined with dynamic furnace control systems, including electrode regulation, foaming-slag control, and optimized oxygen and carbon injection, enables more stable process conditions, increased safety and lower downtimes. Raw material flexibility in EAF steelmaking is becoming increasingly important as the availability of high-quality scrap declines and competition for scrap intensifies which makes the entire situation even more difficult. The need to work with ore-based iron units is driven by quality requirements and the demand for cleaner steel. As a result, advanced process control and adaptive operating strategies are essential to maintain productivity, energy efficiency, and final steel quality under more variable raw material conditions.
Well-proven and reliable solutions for EAF process optimization from scrap yard until tapping are presented in this paper.

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