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DIGITAL TRASFORMATION IN REHEATING AND HEAT TREATMENT FURNACES: SHP

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The digital transformation of industrial steel plants is crucial for optimizing efficiency, enhancing product quality, and ensuring sustainability. By integrating digital technologies, these plants can significantly improve monitoring, control, and predictive maintenance of reheating and treatment furnaces. Traditional systems often lack detailed real-time data and rely on external observations, leading to undetected issues and suboptimal performance.

The Shape (SHP) system exemplifies this transformation by creating a comprehensive digital twin of the furnace, including burners and other critical components. It enables real-time and historical data analysis of various physical and chemical quantities, such as pressures, temperatures, optical flame data, and mechanical vibrations. This data helps maintain optimal operating conditions, combustion efficiency, and predictive maintenance, adding significant value to the thermal process.

The SHP system architecture includes smart sensors installed on various furnace parts to analyze critical quantities. These devices perform significant data processing onboard, optimizing data sampling methods and frequencies based on operating regimes. They transmit data via long-range wireless communication to gateways, ensuring reliable communication and simplifying installation. Data is then transmitted through the plant LAN to a micro server, which stores the data locally. This server provides access through an intuitive web interface for real-time and historical data display, performance indicators, and fault alarms. Local data storage eliminates the need for cloud processing, ensuring data ownership protection and low impact on the plant's Ethernet network.

The SHP system enhances information quality and quantity, enables predictive maintenance, and offers optimization suggestions. It supports the creation of virtual sensors and real-time process evaluation, improving plant reliability and product quality. An industrial application example demonstrates the system's capability to monitor critical variables, calculate fuel and air flow rates, and derive combustion efficiency and component health, ultimately optimizing process quality and enhancing plant reliability.

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