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Scrap-Aware Adaptive Process Control for Electric Arc Furnaces

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This presentation introduces a scrap-aware adaptive electrode and process control concept for Electric Arc Furnaces (EAFs). The system performs an in-situ scrap classification based on process-integrated signals to identify scrap stratification, density distribution and expected melting behavior. These indicators drive an adaptive control layer that continuously adjusts transformer tap position, reactor step, and phase-specific current setpoints representing arc length. Control characteristics are automatically switched according to prevailing scrap conditions, improving arc stability across bore-down, melting, and refining phases. A simplified melting model estimates remaining scrap height and supports optimized burner coordination. Plant trials show improved arc stability, energy efficiency, and reduced melting time, particularly for heterogeneous scrap mixes.

Speaker Country

Austria

Speaker Company/University

INTECO melting and casting technologies

Primary authors: RUST, Christian (INTECO melting and casting technologies); Mr STEINWIEDDER, Thomas (INTECO melting and casting technologies)

Presenter: RUST, Christian (INTECO melting and casting technologies)

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