Contribution ID: **94**   Type: **Oral Presentation**

New approaches for CO2 emissions reduction and process performances improvement in EAF thanks to application of deep process modelling and control to scrap melting and slag foaming

Wednesday 13 May 2026 08:50 (20 minutes)

The technologies related to EAF steelmaking have continuous developments aiming the improvement of the process performances and of the environmental impact mainly through the reduction of energy consumption, the increase of productivity, the increase of metallic yield and promoting the reduction of CO2 emissions.

These improvements pass strongly by improved capability to monitor and control the scrap melting evolution and thanks to capability to evaluate the effect of new injected materials in terms of slag foaming but these aspects are not evident with the typical system available on -site.

In particular to monitor both aspects it is necessary to understand the evolution of the whole process and reacting volume in terms of components, energies involved, undesired effects on the plant. For this reason all informations available have to be collected in a whole view and representation in order to derive the evidences of phenomena behavior and suggesting control action related to them.

For this reason Feralpi Siderurgica has strongly worked in the development of these aspects with internal skill also with its own EAF on-line dynamic process modelling approach in order to make evident the status of the process in each moment and to be able to better understand the technological results of the management actions.

These are the preconditions for the subsequent improvement of the control rules to be applied.

In last years also thanks to the R&D projects activities Feralpi has realized several steps in the different sites related to the applications of mathematical modelling for EAF processes prediction, process modelling of steel treatment in LF enabling also steel temperature management and scrap melting rate predictions.

Further steps of this development included the real time prediction model in EAF, the application of alert functions for abnormal energies distribution or chemical injections as related to correctness of steel temperatures as support to production management.

The applications realized in different R&D projects are reported including the coupling with plants and sensors development necessary to support the process control.

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Session Classification: Automation and Digitalization in Electric Steelmaking III

Track Classification: EEC 1 - Technological Advancements: EEC 1.A Innovations in electric arc furnace (EAF) technology