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Leveraging Optical Emission Spectroscopy (OES) for Enhanced Process Control in Ladle Furnace (LF)

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The Ladle Furnace (LF) serves as a secondary metallurgical process unit for adjusting the composition and temperature of molten steel for casting. Changes and transformations in the steel industry—such as green steel and digitalization—emphasize the need for real-time process control and enabling measurement solutions. This work aimed to study how optical emission spectroscopy (OES) data can be used in process control of ladle furnaces. To this end, data from industrial ladle furnaces was employed to analyze and quantify changes of slag composition continuously and in real time.
The results show that OES can be used to provide real-time data about the chemical composition of slag in ladle furnaces and thus allowing timely process control. Finally, some special benefits of using OES in steelmaking are discussed, specifically, the ability to measure the slag chemical composition in the Ladle Furnace in real-time. OES can yield such information that is not possible or practical to acquire using traditional methods during the process. This cultivates several important use cases and helps operators make accurate decisions.

Speaker Country

Finland

Speaker Company/University

Luxmet Ltd

Primary authors: Ms KORHONEN, Eveliina (Luxmet Ltd); Mr ILMAKANGAS, Tuomo (Luxmet Ltd); Mr HAAVISTO, Valtteri (Luxmet Ltd)

Co-authors: Mr JOKINEN, Mikko (Luxmet Ltd); HUHTALA, Pekka (Luxmet Ltd)

Presenter: Mr JOKINEN, Mikko (Luxmet Ltd)

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