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Sensor and digital twin solutions developed in DiGreeS project for improvement of scrap-based EAF steelmaking

Tuesday 12 May 2026 14:00 (20 minutes)

On the path toward low-carbon steelmaking and increased circularity, the Electric Arc Furnace (EAF) will be pivotal for European steelmakers. Within the EU-funded Horizon Europe project "Demonstration of Digital twins for a Green Steel value chain (DiGreeS)"an integrated digitalisation approach is being developed across the steel value chain to leverage process data and human experience for seamless industrial integration. DiGreeS aims to deliver a user-friendly digital platform for networked production, built on novel and soft sensors and related process models to support efficient feedstock verification and real-time control in EAF steelmaking. Artificial intelligence (AI) techniques will be fully exploited to optimise industrial data usage.

The presentation highlights concepts and first results from two DiGreeS use cases focused on scrap-based EAF steelmaking.

The first use case targets Heavy Melting Scrap (HMS) verification using camera images and surface chemical analysis (LIBS) to provide bulk analysis of HMS truckloads with emphasis on copper and sulphur content. Sensor data will be used to train an AI model to classify the HMS pieces and assign a "representativeness indicator"to pieces of each class. This approach aims to minimise unexpected impurity levels in scrap input and improve the crude steel quality. The presentation will cover sensor selection, adaption, calibration, software development and first laboratory trial results.

The second use case addresses real-time EAF control focussing on assessment of foamy slag quality, and built on that, control and optimisation of carbon and oxygen input for increased energy efficiency. Sensors such as acoustic emission and structure-borne vibration sensors as well as an in-situ off-gas measurement system will be installed at the Saarstahl Ascoval furnace. Their data, together with the arc current harmonics analysis and slag balance calculations, will feed an AI model for comprehensive foamy slag quality assessment, which will be embedded in an existing dynamic EAF process model for enhanced on-line process monitoring and control. The presentation will report on the sensor and process model configuration and first results of their implementation at Ascoval's EAF.

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