Contribution ID: **7** Type: **Oral Presentation**

Phenomenological prediction of surface defects: Fundamentals, tools, and results from slab casting

Friday 13 March 2026 13:50 (25 minutes)

The surface quality of continuously-cast products remains an important research topic due to its economic and practical implications for steelmakers. Surface quality problems are generally attributed to the presence of various kinds of defects originating from continuous casting. While the root causes of defects can be considered well-defined in scientific literature today, a frequent shortcoming in quality prediction is that the defect formation mechanisms have not been incorporated into the models. The common approach is to utilize caster data and machine learning algorithms with defect information as labels in classification. These approaches are often data-driven with limited interpretability and metallurgical assessment. To construct a phenomenological approach, machine learning models need inputs that describe the various metallurgical phenomena related to defect formation. This invited presentation provides an overview of the phenomenological approach developed for the prediction of surface defects in slab casting. The fundamentals of defect formation are briefly addressed, after which the InterDendritic Solidification (IDS) and CastManager tools utilized in the online simulation of solidification, microstructure evolution, and heat transfer are presented. Finally, progress and recent results from industry-academia collaboration in Finland are highlighted regarding the phenomenological prediction of longitudinal cracks, transverse cracks, and slag defects.

Author: NORRENA, Julius (University of Oulu)

Presenter: NORRENA, Julius (University of Oulu)

Session Classification: SURFACE QUALITY PREDICTION IN CC AT THE CROSSROADS: FROM PHENOMENOLOGICAL MODELS TO DATA DRIVEN MODELS AND HYBRID APPROACHES

Track Classification: Surface quality of long and flat semis: Plant results and lab experiments