Contribution ID: **399** Type: **Oral Presentation**

Laser ultrasonics for microstructure verification of heat treatments and thermal processes (LUMHEAT)

Thursday 9 October 2025 09:10 (20 minutes)

Metal microstructure can be determined in situ using laser ultrasound (LUS) measurements. As a non-contact, nondestructive measurement, this can be integrated at many positions in the steelmaking process, including measurement of hot and moving samples. Swerim has previously demonstrated the application of this technology as an on-line grain size gauge installed at the SSAB Borlänge hot strip mill [1].

The LUMHEAT project is a feasibility study within the program "Impact Innovation Metals & Minerals". The aim is to investigate how thermal and thermomechanical processes in the steel industry can benefit from the novel LUS based microstructure sensor. Several case studies are discussed, based on thermal and thermomechanical processes performed at Nordic plate, bar and strip mills. For each case the measurement conditions, observables of interest, and expected benefit of added data are considered.

The LUS microstructure gauge has also been redesigned to improve the optical working distance, simplifying placement and use of the gauge. This is expected to benefit not only the stated cases but also future measurements at other sites.

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Session Classification: Quality Control & Inspection

Track Classification: Rolling of long and flat product