

On-line grain size gauge for the hot strip mill based on laser ultrasonics

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The properties of high strength steels depend to a large extent on the austenite grain size prior to quenching. It is, therefore, very desirable to be able to characterize the austenite microstructure during the hot rolling process. However, the temperatures of the material of interest in the hot strip mill (HSM) range between 800-1200 °C, and move at 1-10 m/s, therefore the only method capable of measuring the microstructure in the bulk with these prerequisites is laser ultrasonics (LUS). It has previously been shown that it is possible to reliably measure the grain size in the HSM [1,2]. This project intends to realize an installation of a permanent LUS grain size gauge after the last stand, and before the run-out table, in the HSM and to monitor the microstructure.

In order to realize a robust LUS-gauge a grain size calculation model has been developed which is both temperature corrected and does not require a reference sample [3]. Additionally, the LUS-gauge has been equipped with optics for a long working distance of ~600 mm and suitable harsh environment protections. The installation of the gauge is intended to be finished in Q1 of 2022.

We will present some of the laser ultrasonic measurement results from this world first permanent installation of an on-line grain size gauge in a hot strip mill.

This work was partially financed by the strategic innovation program for Metallic material, by Vinnova, the Swedish Energy Agency, and Formas as well as the European Union's Research Fund for Coal and Steel (RFCS) research program under grant agreement nr. RFCS-2018-847296.

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