

Automatic analysis of non-metallic inclusions in steel using

FE-SEM

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A field emission scanning electron microscope (FE-SEM) is a highly powerful tool for a wide range of different material characterization applications. The technique of automatic analysis of non-metallic inclusions using FE SEM is being presented on a regular industrial practice.

The crucial part in the multistage steelmaking process is having knowledge about the inclusion types and the origin of their formation. In general, a distinction is made between exogenous (slag entrapment, refractory material, re-oxidation products) and endogenous inclusion types. In praxis the distinction between these two types is difficult. Only a developed SEM technique of the automatic analysis of inclusions enables following the development of non-metallic inclusions during various industrial production steps, and evaluating the influence of different steel producing processes on steel cleanliness. For each analysis, an area of 9 mm² is scanned, and all the inclusions larger than 1 mm are detected automatically and analysed using the EDX detector. A large quantity of different data for each inclusion type (number, chemical composition, size, surface area, etc.) enables obtaining a measurable view of the level of steel cleanliness.

The general technique of automatic analysis of non-metallic inclusions is being represented on some industrial examples and shows that automatic analysis is highly suitable for industrial steelmaking process optimization.