Characterization and Microstructural of Hot Rolling Mill Scale

B. Maalem, A. BALASKA, A. HAMOUDA, Samira DJEMILI

Abstract : In the IMETAL-El Hadjar complex, during the steel manufacturing process, a significant amount of scale is produced onthe surface of slabs and billets of hot-rolled steel. In the various rolling mills, the quantity of scale produced is estimated to be about0.1% of the annual production of the steel complex. The quality of the thin steel sheet during the rolling process is affected by thebehavior of the iron oxide layers formed on their surfaces (scale).This amount of scale which is a fatal by-product of the forging and rolling processes can be reused in certain areas and applied byappropriate recycling techniques such as agglomeration of iron ores in the blast furnace as a raw material. This aspect of recycling istaken into consideration.The objective of this study is to identify the microstructural properties of the scale, using different analytical methods such as X-raydiffraction and scanning microscopy.Several samples were used for characterization of the locally produced scale.The analyzes of the results given by SEM showed that hematite and magnetite, the main phases present in the scale, are stacked inthin layers of a magnitude of the order of a micron meter. These phases of iron oxides are confirmed by the analysis of the spectragiven by the X-ray diffractometer.The presence of silicon in the scale is due to the covering powder used on the wall layers of the ladles.

Keywords : mill scale, Oxidation, hot rolling, Microstructural properties, SEM, X-ray.