Digital Solution for Optimizing Scrap Yard Management

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ABSTRACT

SCOT is proposed as technical solution for automated classification, stock control and characterization of the raw material in steelmaking scrap yards. SCOT improves the management of scrap as a key raw material in this sector through the digitalization of the process. Several cameras and sensors are integrated into existing scrap yard assets and combines the feedback from the devices with deep learning models (prepared to detect the areas of interest of each image and classify the type of scrap they contain) and a modular management software. This software manages the information generated by the different subsystems and performs sensor data fusion to identify the scrap material movements with reduced hardware requirements. The full system has already been installed in several industrial plants from ArcelorMittal and it has proven to be an essential tool for the characterization and control of the raw material in the scrap yard, capable of estimating the residual content of the classified scrap by analyzing the EAF process and optimizing the main scrap management operations.

Keywords: scrap yard, scrap management, stock control, scrap inventory, automatic classification, bucket charge, residual content, steelmaking, digitalization

INTRODUCTION

Ferrous scrap is one of the main pathways to achieving the decarbonization commitment of steel companies. In addition, scrap can be considered one of the most complex industrial raw materials. Also considering high-quality steel production requires a strict control of the raw material, its control is key in the steel industry of today, but even more so in the future. Nowadays, if process data are analyzed, there is extensive literature showing analyses and evaluations which show that around 60% of the total cost of electrical steelmaking route process corresponds to metallic raw material. Furthermore, scrap yards are, probably, the least automated area of the steel shop. Accordingly, current scrap quality assessment practices consist basically of visual inspection by qualified personnel. This visual assessment is used both for the definition of penalties for low quality scrap and for the allocation of the storage area. The scrap mix used during the process is defined according to the estimated characteristics of the stored material and the market situation.