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USE OF AUTO SHREDDER RESIDUES GENERATED BY POST SHREDDER TECHNOLOGY IN METALLURGICAL FURNACES

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Abstract

A total of 11 Million vehicles are annually discarded in the EU-25. This represents a total of 9 Million tonnes of waste that has to be managed properly. The EU Directive 2000/53/EC, which aims at reducing the use of hazardous substances in vehicles, to facilitate their dismantling and to increase the recovery and use of recycled materials in car manufacturing. Currently between 75 and 85% of End-of-Life Vehicles (ELV) are recycled, mostly for the metal content. The aim of the Directive is to increase the weight of re-use and recovery to 95% by 2015.

The common process to recover value-added materials from the car hulks associates shredding followed by an air classification, leading to a heavy fraction from which ferrous and non-ferrous materials are extracted, and a light fraction, mainly composed of plastics and residuals metals. This fraction undergoes Post-Shredder Treatments, to extract 30-50 wt % of materials valued as energy source in various processes of combustion. Among the remaining materials, two fractions are of great interest for iron and steel making industries: - one contains various plastics mixed with rubbers and traces of metals (copper). This fraction could be used as reducing agent to substitute the coke in blast and electric arc furnaces – a second fraction (-2mm) is rich in iron oxides (18 to 38%) and could be recycled in blast furnace to replace a part of the charged ores. In this respect, the chemical composition of each fraction is critical, and the following elements: Cl, Cu, Zn are to be specifically removed. Indeed, chlorinated compounds (such as PVC) can release corrosive compounds metal chlorides in the dusts, detrimental to the installations. Copper can contaminate and spoil the cast-iron produced. Zinc favors the development of scabs that modify the flow configuration inside the metallurgical furnaces.

The whole objective of the presented work is to define further sequences of separation processes to meet the requirement associated with a use in metallurgical furnaces of these two fractions, as reducing agents and recycled material respectively.

This paper will present the results of chemical and mineralogical characterization of fractions sampled on an industrial line of treatment of automotive residues. The results feed two mass balance models of a blast furnace and an electric arc furnace, to determine the amount of each fractions injectable in both furnaces considering the requirements for a smooth processing of a high-quality pig iron. Two global processes of separation, each dedicated to a given fraction, are also defined with the aim at increasing the quantity introduced in the furnaces.