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Recycling of Steel Mill Dusts With the RecoDust Process – Scale-up of A Pilot Plant

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Abstract

In case of using galvanized steel scrap as an input material for basic oxygen furnaces (BOF), the generated dust in the off-gas contains up to 18 % zinc. Due to the volatility of zinc, the dust cannot be recycled into the steelmaking process because of an enrichment of zinc in the production chain. High zinc loads in blast furnaces lead to an increasing energy and reducing agent consumption, might damage the refractory materials, and hence shorten the furnace's campaign life. In addition, high zinc input into blast furnaces might also cause operation difficulties as well as a decrease in product quality. Therefore, an internal recycling of zinc-rich dusts via the sintering plant is limited.

The current publication presents the so called RecoDust process, a pyrometallurgical process, which aims for a selective recovery of the valuable metals iron and zinc from steelmaking dusts. The concept is based on a combined reducing-oxidizing treatment. The heart of the process is the so called Flash-Reactor, in which the zinc is reduced and evaporated. The off-gas is post-combusted in a converter, where zinc is converted to crude zinc oxide. Iron oxide and other non-volatile components accumulate at the bottom of the Flash-Reactor and are tapped. The RecoDust process therefore provides two products: the RecoDust slag, with approximately 50 % iron and the filter dust with up to 90 % crude zinc oxide.

The pilot plant operates at up to 300 kg/h of throughput. The current challenge is an up-scaling of the pilot plant to 1,000 kg/h. This comprises the installation of a new pneumatic conveying system to transport the dust into the Flash-Reactor using the fuel gas stream, which is natural gas. First experiments have already been performed and the results are eagerly awaited. The current research project is part of K1-MET, which is financed within the Austrian Competence Center program COMET.

Biography:

Wolfgang Reiter works for more than six years on the development of the RecoDust process. After his Bachelor of Science degree from the Montanuniversität Leoben in Metallurgies he will finish his Master degree in March 2020. .

Speaker Publications:

1. Untersuchungen der pneumatischen Förderzustände von Prozessstäuben mit Partikeldurchmesserverteilung kleiner 500 µm aus der Eisen und Stahlindustrie im Nieder- und Mitteldruckbereich, Stahl und Eisen, 2018. RecoDust—An Efficient Way of Processing Steel Mill Dusts, Journal of substainable Metallurgy, 2019.
2. "The RecoDust process – Upscale of a Pilot Plant"; https://doi.org/10.1002/srin.202000191

12th World Congress and Expo on Recycling; Berlin, Germany- April 20-21, 2020.

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