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The application of continuous pneumatic jig for solid waste separation

Abstract

This study investigates the use of continuous pneumatic jigging as an efficient technique of solid waste separation, with a focus on the different materials of copper wire and rubber insulator. The research investigates the effect of several parameters on separation efficiency, such as air flow, pulse rate, vibrational force, and bed thickness. The 7-min experiment, which included the simultaneous use of jigging and vibration, gives light on the subtle relationships that govern particle movement. The results of the air flow and pulse rate investigation highlight the importance of concentration criteria and density discrepancies in obtaining appropriate separation. The usage of small particles refines the process for greater efficiency. A persuasive case is presented in the analysis of the vibrational impact for the efficacy of lower air flow rates coupled with higher vibrational force. This is consistent with the minimal fluidization velocity notion, emphasising the critical role of effective fluidization in particle separation performance. The analysis of bed thickness emphasises the significance of proportional modifications in air flow rate to maintain optimal separation efficiency. The research finishes with a synthesis of these findings, emphasising the attractive prospects of pneumatic jigging for solid waste separation, notably with copper wire and rubber insulator materials. The implications for waste processing scenarios, notably in the beneficiation or pre-treatment of waste electrical and electronic equipment prior to recycling, are discussed. This research lays a foundation for further exploration and application of pneumatic jigging in sustainable waste management practices.

Keywords

Defect states; Electrical properties; Heat treatment; PVA carbon nanofibers; Structural evolution