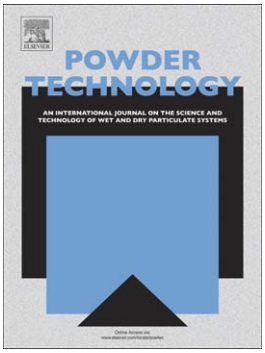

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Predicting Feeder Performance Based on Material Flow Properties

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Abstract

Purpose: Accurate and consistent delivery of materials by well-designed feeders ensures overall process stability. Importantly, feeding performance is strongly dependent on material flow properties. The purpose of this study is to develop a methodology that identifies predictive correlation between material flow properties and feeder performance. **Method:** The proposed methodology includes techniques to characterize material flow properties, methods to quantify feeding performance of a loss-in-weight feeder, and predictive multivariate analysis. Two approaches to correlate feeding performance and material flow properties were examined in the study: principal component analysis, followed by similarity scoring (PCA-SS), and partial least squares regression (PLSR). **Results:** Experimental results showed that selection of the optimal feeder screw to achieve optimum feeding performance is heavily dependent on material flow properties. Both approaches to predict feeding performance based on material properties were validated. In addition, a strong correlation between the initial feed factor of each material and its flow properties were observed. **Conclusion:** The work presented here has demonstrated an efficient approach to correlate material properties with gravimetric feeder performance. This approach is especially powerful in the early phase of process and product development, when the amount of a material is limited.

Keywords: Powder, Powder flow, loss-in-weight feeder, Multivariate analysis, Process development.

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