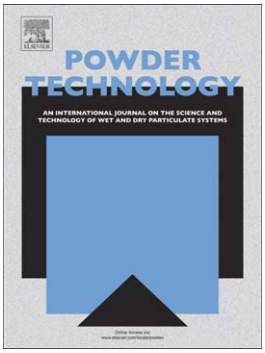

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3D Printed Agglomerates for Granule Breakage Tests

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Abstract

In the research into agglomeration, a long term barrier is the lack of a universally accepted method to evaluate the breakage propensity of agglomerates. Computer simulation is often used but is limited by the lack of identical, controlled agglomerates to test and validate simple models, let alone replicate the complex structure of real industrial agglomerates.

This paper presents work on the characterisation of strength of model test agglomerates prepared by a 3D printing production method enabling fully reproducible structures. Agglomerates were designed using Solidworks 2014 software and printed by an Objet500 Connex 3D printer. Materials with different mechanical properties were used to print the particles and the inter particle bonds, allowing a series of combinations of bond strength, particle strength and agglomerate structure to be tested. Compression and impact tests were performed to investigate the breakage behaviour of the printed agglomerates in terms of agglomerate orientations, bond properties and strain rates. This method will allow more rigorous testing of agglomerate breakage models.

Keywords: 3D printing; Agglomerates; Breakage test; PolyJet technology