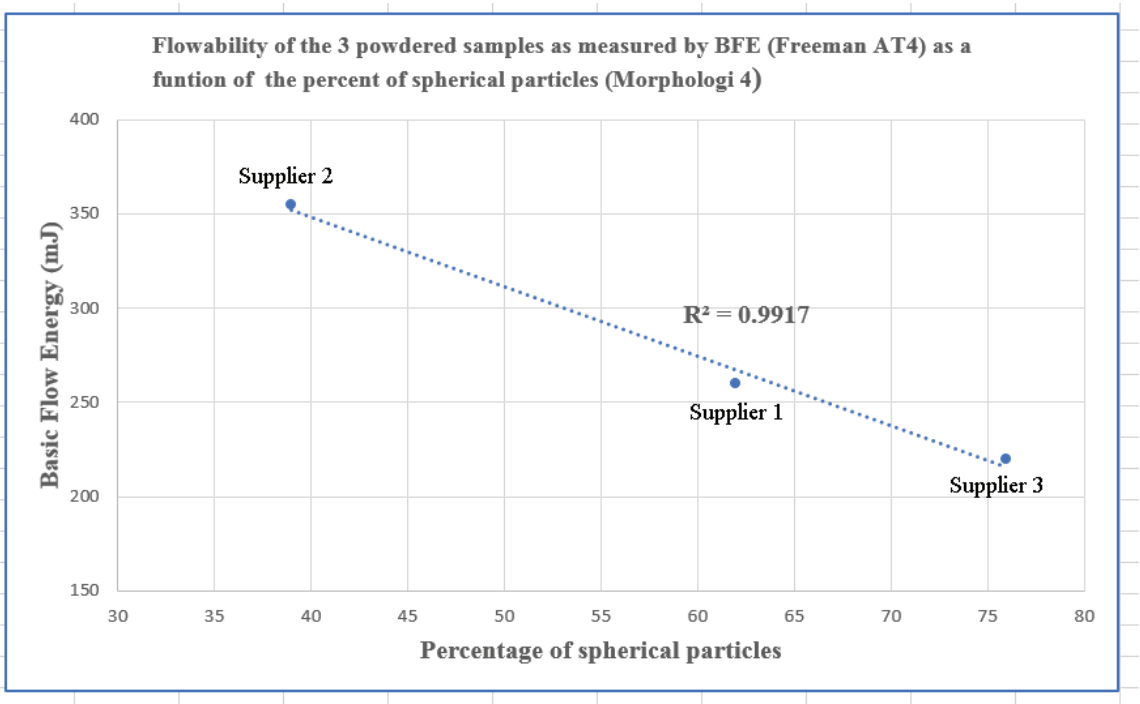
Automated particle size and shape characterization of metal powders for additive manufacturing

Alan F Rawle, Malvern Panalytical, 117 Flanders Road, Westborough, MA 01581, USA

Abstract

The rapid, automated, and operator-free determination of size and shape distribution in powdered materials is of vital importance in characterizing the suitability of a material for subsequent processing. Excessive fines may provide both flowability and health hazard issues. Too spherical material may provide issues with material rolling off a substrate as well as potentially maximizing void space. We report on the rapid, automated measurement of the size and shape distribution parameters of several metal powders via a high-speed static image analysis system. Powders in the size range 0.5 – 1500 µm are dispersed onto a large glass substrate and the material scanned to provide key size distributions parameters such as x_{10}, x_{50}, and x_{90} based on both number and volume/mass considerations plus a variety of shape parameters such as circularity and aspect ratio.

In this paper, we will show how 3 materials from different vendors can be rapidly characterized by both size and shape parameters, measured on a Morphologi 4 instrument, and directly related to powder flowability (Basic Flow Energy) as measured on a Freeman AT4 powder rheometer.



We will also examine (with sets of synthetic images) how agglomerates can be distinguished and classified on a range of shape parameters.