Smarter process for spheroidization of irregular shaped metallic powders and DEM Simulation: Electrolytic powder

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Abstract

Electrolytic powders are inherently dendritic in nature and thus resist the flow because of the irregular morphological features. This limits the application of electrolytic powders wherever flowability is the main concern. A selected size range of highly pure electrolytic iron powders (99.99% purity) with mean particle size of 325 Mesh were taken for spheriodization in a specially fabricated atmosphere controlled spheriodization apparatus to get desired powder shape and size. Powder characterisation was done using scanning electron microscopy, Image analysis software for sphericity measurement, and Hall flow meter for flow ability. The Discrete Element Modelling (DEM) Simulation was employed in the study to analyse the forces and energy dissipation during spheriodization. After spheriodization it was observed that there was substantial reduction in flow time to 30 seconds from no flow in initial dendritic powder and improved spherical acceptable particles to 90% was achieved. Thus, overall process for spheriodization of electrolytic iron powder has been established economically.