# ASSESSMENT OF POWDER FLOWABILITY AT THE ONSET OF FLOW AND DYNAMIC CONDITIONS

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**Abstract**

There are extensive industrial and academic studies reported in the literature on the characterization of flowability for powders at the onset of flow using shear cell testing. The well-established theory of Jenike is commonly applied to the shear cell results in design of mass flow gravity hoppers. Design of powder process equipment, where the particles are already in motion (i.e. dynamic regime beyond the onset of flow), remains a challenge. Powder rheology has emerged in recent years with a promise to address the characterization of powder flow at the dynamic regime. Many recent publications in the literature report the data measured by Freeman Technology Powder Rheometer (FT4), a few of which have managed to correlate the results to practical observations or process behaviour. In the present study, an attempt is made to critically analyse the flowability measurement methodology of the FT4 and fit its results to the characteristic bulk cohesion of various powder materials. Several materials with wide range of cohesive and frictional properties are considered. It is found that the specific torque energy (energy normalized by sample mass) during the upward motion of FT4 provides a representative ranking for the material's flowability behaviour.

**Keywords:** Flowability, Dynamic Powder Flow, Powder Rheology, Cohesion, Freeman Technology FT4

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