



Product News

EDEM: Solving Powder Handling Issues using Granular Material Simulation

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Edinburgh, United Kingdom – [EDEM](#) software means engineers can gain understanding of the mechanics of their systems beyond what is obtainable on the basis of experiments alone.

Powders are at the core of numerous applications in the pharmaceutical, food, additive manufacturing, chemicals and other process manufacturing industries. Powders are involved in a range of applications from storage, transportation and delivery to processing stages such as mixing, compaction, or agglomeration. Handling and processing powder materials present unique challenges to industry because of their variable physical characteristics and flow properties. Due to their fine sizes and wide size distribution, their flow and behavioral characteristics are prone to even the smallest of variations in properties and operating conditions, such as moisture content and duration of storage. There are many challenges linked to powder handling including non-uniform mixing, segregation, caking, blockages, arching, breakage, attrition and more. These can have a strong impact on the productivity of operations and the final product quality attributes. For instance, poor powder flow can lead to blockages in a bin or hopper that might stop the production line, which will affect the efficiency of the whole operation and create health and safety issues for plant operators. An inefficient mixing process can negatively impact downstream processes such as granulation, milling and tableting. It can adversely impact

product quality and result in potential batch failure and added costs due to production delays. When handling powders, process engineers and operators are also faced with many questions such as what device/design to use for a given powder, what mixing speed will help achieve a uniform blending, what is the maximum fill level possible, etc. Understanding powder behavior is critical for minimizing these problems, ensure manufacturing efficiency and avoid product quality issues. Traditionally, process engineers have had to rely on empirical methods such as physical testing to understand their systems and operations. These methods are time and labor intensive as well as expensive and they do not provide all the answers. Numerical modelling tools can help understand processes better and provide key insight into operations. The Discrete Element Method (DEM) in particular has proven capabilities in capturing the complex macro-mechanical behavior of a wide range of granular solids, including powders, and to do so for a wide range of process and operational conditions. DEM is proven to be a valuable predictive tool for simulating processes in powder handling industries including powder mixing, powder conveying, spreading, milling, drying, granulation and tablet coating, to name a few. Using a DEM tool such as [EDEM](#) software means engineers can gain understanding of the mechanics of their systems beyond what is obtainable on the basis of experiments alone.