Product News

EDEM: Powder Calibration Report with Guidelines for DEM Simulation of Powder Handling Processes

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Powders are at the core of numerous applications in the pharmaceutical, food, additive manufacturing, chemicals and other process manufacturing industries. Powder handling and processing presents unique challenges to industry because of the variable physical characteristics and flow properties of powders. Understanding powders' flow behavior is critical to ensure manufacturing efficiency and avoid quality issues with the final product. The Discrete Element Method has proven to be a powerful tool to model and simulate a range of powder applications - providing key insights into processes such as mixing, granulation, segregation, coating, spreading, compaction and milling.One critical aspect in powder simulations using DEM is the formation of suitable virtual materials that provide a realistic representation of the behavior of the real material. This can be achieved by calibrating the input parameters and it is an important step towards accurate DEM simulations. However, it is also a genuine barrier for DEM applications and a challenge for many.To help users address this challenge, EDEM worked with leading organizations and experts from industry and academia to understand common problems and practices in powder calibration and comprehend the latest research advances in the field. This included hosting a 'DEM Powder Calibration' meeting in June in Edinburgh, UK which involved representatives from leading pharmaceutical companies, researchers from

universities as well as powder testing equipment providers Freeman Technology and Granutools.The findings and outcomes have been made available publicly by EDEM, in the form of a technical report that discusses the latest challenges and advances in powder simulation as well as providing guidelines for calibration. This comprehensive document discusses several key topics such as factors affecting particle behavior, standard calibration methodology, criteria for designing suitable calibration tests and critical factors per application area. It also describes the most common calibration tests available such as static and dynamic angle of repose, tapped density test and also more sophisticated tests such as FT4 Freeman Rheometer and Ring Shear cell test with guidelines as to which test is most suitable depending on the application.Dr Marina Sousani, EDEM engineer and main author of the report explained: “Many of our customers don’t know where to get started when it comes to simulating powders and unfortunately there is not one right answer when it comes to powder calibration. We realized that the issues and challenges faced are the same for many users, therefore we wanted to use our knowledge and experience to offer practical solutions and guidelines to help them develop appropriate DEM models and have confidence in their simulation results. This report is the first step in this direction and we intend to update it as research and developments progress.”The full report is available to download from the **EDEM website**.