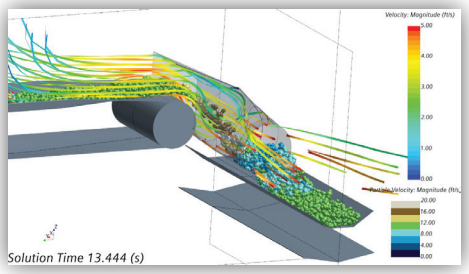
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

DISCRETE ELEMENT METHOD

Real Life. Real Tests. Real Benefits.



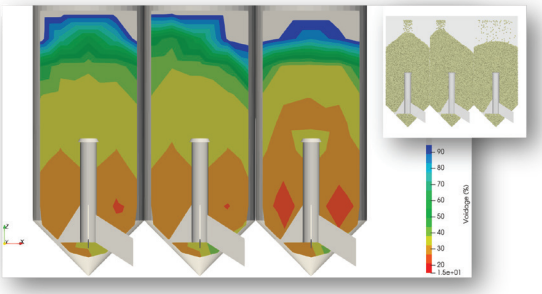
SIMULATING GRANULAR MATERIAL FLOW

The design of equipment whether it be grain, mining ore, or soil, presents a unique engineering challenge. Flowability, dust generation, and material breakdown are all performance considerations that are unique to this field.

TRANSFER POINT DESIGN

Specific aspects of part geometry, component alignment, and operational settings can have a major impact on the product conveying system. Mining ore and granular material handling systems (conveyors, elevators, gravity driven piping systems, chutes, etc) are applications which we have experience with. PAMI has designed several transfer points, employing material flow simulations using the discrete element method (DEM) as part of the design improvement process.

In addition to understanding and improving material flow, PAMI has also investigated the airflow patterns around transfer point components that are induced from the movement of the conveyor, and the ore itself. By considering both the flow of both material and air, deeper insights into the generation and transport of dust can be gained long before components are manufactured.

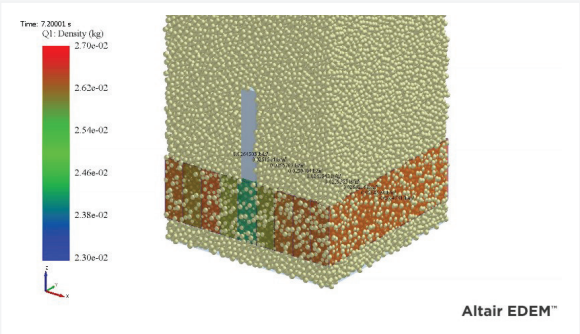


REDESIGNING MATERIAL FLOW THROUGH PROCESSING EQUIPMENT

In support of clients developing grain handling and processing systems, PAMI uses the discrete element method to simulate the behaviour of granular material as it interacts with processing machinery. The effect of louver geometry and flow path dimensions were investigated virtually, which mitigated overflow issues that were identified during the design process.

Processes can often be sensitive to the distribution of material (porosity) within the machinery; however, porosity is notoriously difficult to measure in a continuous process. In the picture featured right, the severity of disruption caused by structural members passing through the bulk of grain was assessed during the design process using our DEM tools.

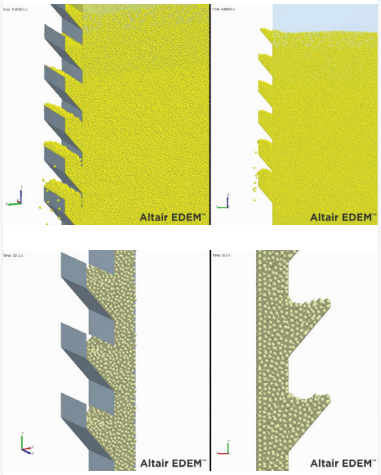
Issues related to flow performance were identified and mitigated during the design process by using DEM simulation methods. This led to reduced physical prototyping efforts by the client, ultimately resulting in shorter design cycles and lower system development costs.



EDEM is high-performance software for bulk and granular material simulation. Powered by DEM, EDEM quickly and accurately simulates and analyzes the behavior of coal, mined ores, soils, fibers, grains, tablets, powders, and more.

EDEM simulation provides engineers with crucial insight into how those materials will interact with their equipment during a range of operation and process conditions.

Leading companies in the heavy equipment, off-road, mining, steel-making, and process manufacturing industries use EDEM to understand and predict granular material behaviors, evaluate equipment performance, and optimize processes.



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