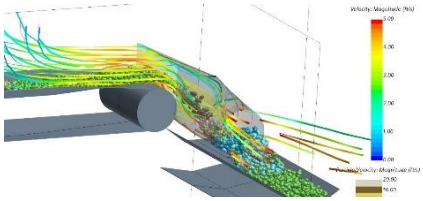
SIMULATING GRANULAR MATERIAL FLOW USING DEM

May 30, 2022 – Humboldt, SK – The design of material handling 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. PAMI has worked extensively on issues related to granular flow using the Discrete Element Method (DEM).

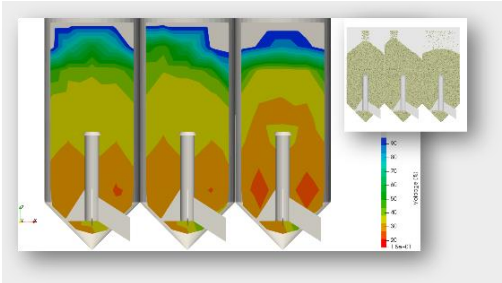
Specific aspects of part geometry, component alignment, and operational settings can have a major impact on the product conveying system. Mining ore and granular material handling systems (conveyors, elevators, gravity driven piping systems, chutes, etc) are applications which PAMI has experience with. Larry Jorgenson, P.Eng., Technical Sales Representative with PAMI notes, *"Before DEM, material handling systems were often developed and improved through a trial-and-error method. Today, DEM can save design time and allow for better understanding of wear and dust generation within the system on-screen, before investing in capital purchases and shutdowns for installation"*



Material Flow Simulation using DEM

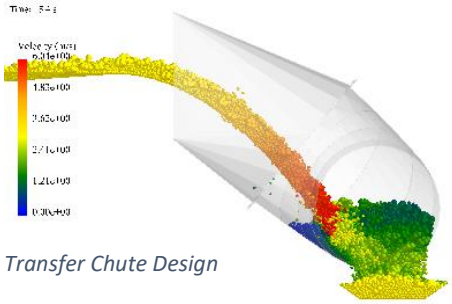
PAMI has designed several transfer points, employing material flow simulations using the discrete element method (DEM) as part of the design improvement process.

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.



Simulating Granular Flow using DEM

"Complex geometries are no match for the DEM software", noted Jorgenson. 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. For example, the effect of louver geometry and flow path dimensions investigated virtually resulted in mitigation of overflow issues that were identified during the design process.



Transfer Chute Design

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.

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. *"DEM software is potentially a bigger deal than computer assisted drafting (CAD) was to architecture. If you or your team are involved in designing products that interact with moving material, you will benefit by investing in DEM analysis."*

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