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Modeling Granular Flow with Heterogeneous Mixtures Under a Movable Gate.[1] MICHAEL ROEING-DONNA, NICHOLAS POHLMAN, JIFU TAN, Northern Illinois University — The transfer of material using a conveyor system is used in almost every modern manufacturing process. The predictability of this mass transfer is critical to the efficiency of the process and can cause issues when the material flows irregularly, but efficient control of the opening gate for a heterogeneous mixture is not fully understood. We used a discrete element method (DEM) approach to simulate granular flow in a conveyor system to understand the role of complex particle geometries and a dynamic gate on the mass transfer. A uniform material model was validated previously with experiments on local granular velocity profile and mass transfer rate. Next, we modeled the impact of the non-spherical material and the dynamic exit area on the flow profile. Two parameters characterized behavior, the material mass flow rate decreased by nearly 15{\%}and local orientation of the elongated granular material aligned with the belt. The orientation of the shearing, non-spherical particles can be important when attempting to optimize the local flow profile for temporally consistent mass flow. Spatial and temporal analysis of an adjustable exit is performed to identify its effect on producing consistent flow.

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