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Experiments in a flighted conveyor comparing shear rates in compressed versus free surface flows[1] NICHOLAS POHLMAN, HANNAH HIGGINS, KAMILA KRUPIARZ, RYAN O'CONNOR, Northern Illinois University — Uniformity of granular flow rate is critical in industry. Experiments in a flighted conveyor system aim to fill a gap in knowledge of achieving steady mass flow rate by correlating velocity profile data with mass flow rate measurements. High speed images were collected for uniformly-shaped particles in a bottom-driven flow conveyor belt system from which the velocity profiles can be generated. The correlation of mass flow rates from the velocity profiles to the time-dependent mass measurements will determine energy dissipation rates as a function of operating conditions. The velocity profiles as a function of the size of the particles, speed of the belt, and outlet size, will be compared to shear rate relationships found in past experiments that focused on gravity-driven systems. The dimension of the linear shear and type of decaying transition to the stationary bed may appear different due to the compression versus dilation space in open flows. The application of this research can serve to validate simulations in discrete element modeling and physically demonstrate a process that can be further developed and customized for industry applications, such as feeding a biomass conversion reactor.

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