

DEM Simulation of a Screw Feeder Using the Adhesion Powder

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The simulation of the screw feeder was carried out by a disintegration element method (DEM). This simulation model was compared with the feed rate of the small screw feeder at 45 mm diameter and 215 mm length with potato starch powder of 45 μm average particle size. The potato starch could change the adhesion force between the particles by controlling quantity of water. Therefore, it was used as adhesion powder. Each parameters of the DEM simulation determine the value of the angle of repose by comparing actual measurement value with simulation. In addition, the angle of repose was measured using potato starch containing the different moisture. As a result, the repose angle of the powder and the porosity increased by increasing quantity of moisture, and the flowability of the powder got worse. In the screw feeder of the actual machine, it was found that powder is hardly fed at 25% of moisture. Because a value of the adhesion was chosen properly, in simulation, we were able to reproduce flowability and feed rate of the powder well.

Keywords: DEM simulation, Screw feeder, angle of repose, moisture, feed rate, flowability