

Evaluation of Coating Uniformity in a Seed Coating Process by DEM

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Abstract

In the seed processing industry, seeds are commonly coated with a protective layer consisting of fertilisers and pesticides. A batch seed coater is typically used to ensure all seeds are coated. This consists of a cylindrical vessel by a rotating spray disk in the centre, onto which the coating liquid is fed. The seeds are driven around the vessel by its rotating base, and are mixed by two baffles on either side of the vessel. In the present study, DEM simulations are used to model the seed coating. Corn seeds are used for this purpose and its shape is captured using X-Ray micro tomography. The shape is simulated by using the ASG2013 software, provided by Cogency, South Africa. For analysing the coating uniformity of the seeds, a coating model has been developed whereby the coating is simulated as very fine spheres projecting tangentially from a ring at the edge of the spinning disk. Once the spray contact a corn seed, they are removed and their mass is attributed to the corn seeds. The distribution of mass of spray spheres on the corn seeds and their coefficient of variation are evaluated for a range of process conditions such as spinning disk rotational speed, droplets size and baffle arrangement. The outcome provides guidelines how to improve the coating uniformity.

Keywords: Particle Shape; DEM; Coating; Seed Processing;