SIMULATING AGGREGATE DRYING USING COUPLED CFD AND DEM METHODS

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ABSTRACT

This presentation describes the use of coupled CFD and DEM methods to simulate drying in an aggregate drum dryer used in the production of hot mix asphalt. To be properly coated by the asphalt binder, aggregate must be completely dried, a process accomplished in a counter flow drum heated by a direct fire burner. Attached flighting is positioned inside the drum to facilitate heat transfer. Because direct observation is impossible simulation provides the best opportunity to optimize flight design for increased drying efficiency. Commercial codes from ANSYS FLUENT and DEM-Solutions were coupled using an open source coupling developed in cooperation by Astec and ANSYS. The coupled CFD DEM simulation used an Eulerian model with heat transfer, mass, and momentum exchanged between the fluid and particle phases. A custom particle property to track the moisture content of the particle was created, and the mass transfer of moisture from the particle to the surrounding fluid was calculated. Results show the coupled model captures the drying process with drying occurring in the region observed in the drum. Further work to include moisture dependent cohesion into the particle model is on-going.