

Modeling granular material blending in a Tote blender using a finite element method and advection-diffusion equation multi-scale model

Yu Liu^a, Andrew Thomas Cameron^a, Marcial Gonzalez^a and Carl Wassgren^{a,b,*}

^a*School of Mechanical Engineering, 585 Purdue Mall, Purdue University, West Lafayette, IN 47907-2088, U.S.A.*

^b*Department of Industrial and Physical Pharmacy (by courtesy), 575 Stadium Mall Drive, Purdue University, West Lafayette, IN 47907-2091, U.S.A.*

* Corresponding author at: School of Mechanical Engineering, Purdue University, West Lafayette, IN 47907-2088, U.S.A., Tel.: +1 765 494 5656, *E-mail address:* wassgren@purdue.edu (C. Wassgren).

Abstract

A multi-scale model is presented for predicting the magnitude and rate of powder mixing in a Tote blender. The model combines particle diffusion correlations calibrated from experiments with transient advective flow field information from finite element method simulations. Predictions of the mixing rate from the multi-scale model compare well quantitatively to published experimental data for side-side and top-bottom loading conditions. The multi-scale model, since it does not directly model individual particles, is expected to scale well to systems of industrial interest.

Keywords: Blending; Granular material; Finite element method; Multi-scale model

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