Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Particle jamming in the gap between a blade and boundary in a granular mixer CARL WASSGREN, SHRIKANT SWAMINATHAN, Purdue University, JENNIFER CURTIS, University of Florida, BRUNO HANCOCK, BILL KETTERHAGEN, Pfizer, Inc. — The jamming of particles between the blade of a vertical axis mixer and a cylindrical container wall is examined. A single particle model is developed to understand the factors influencing jamming and experiments are performed to investigate jamming as a function of the mixing blade rotational speed, fill height, and gap width. For the range of angular speeds investigated, the rate at which jamming occurs is independent of the blade speed. The jamming rate is proportional to fill height for level fill heights less than twice the blade height, but remains constant for larger heights. This trend is the result of the blade not being completely covered by the particles for level fill heights less than approximately two blade heights due to the deformation of the surface during operation of the mixer. Jamming is a more complex function of the gap width. For gap widths less than a critical distance, which is a function of the particle-boundary friction coefficient as predicted by the single particle model, no jamming occurs. At the critical width, the rate of jamming increases abruptly to its maximum value. Increasing the gap width further decreases the jamming rate until at a gap width of approximately five particle diameters the jamming rate is zero.

Carl Wassgren
Purdue University

Date submitted: 09 Nov 2012 Electronic form version 1.4