

Piyawut Kaewrit 2009: Flocking Process Improvement in Latex Glove Industry.
Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering,
Department of Mechanical Engineering. Thesis Advisor: Associate Professor
Chawalit Kittichaikarn, Ph.D. 79 pages.

The flocking is an important process in latex glove industry and has complicated multiphase flow phenomenon. About 35 % wastes are produced by this process. This paper presents a numerical study of flock particle flow inside the flock cabinet using commercial software of Computational Fluid Dynamics (CFD). Flow inside flock cabinet was modeled in three-dimensional domain with Eulerian-Lagrangian method. The standard k- ϵ with standard wall functions was solved for the continuous phase while the discrete phase (particle) was modeled based on Lagrange approach and Stochastic tracking with Discrete Random Walk (DRW). The 13th flocking process models were studied. The experiment was performed to validate and confirm a process improving results. In the experiment, The air was delivered with average velocity of 4.5 m/s and the uniform flock with equivalence diameter of 50 μm was injected into the cabinet at the rate of 0.01 kg/s. Velocity, pressure, trajectory, accretion and waste of flock particle were measured. From the results obtained, it was found that the CFD can predict the two phase flow inside the flock cabinet and had an error less than 15 %. To reduce the effect of flow in center channel, the dampers at outlet of nearby channels were adjusted to make an angle of 40° to the flow direction. With these adjustments, it could increase the flock accretion approximately 15 % and could reduce waste at least 29 % compare to those before adjustment. This result is an improve in efficiency of the flocking process.

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Thesis Advisor's signature

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