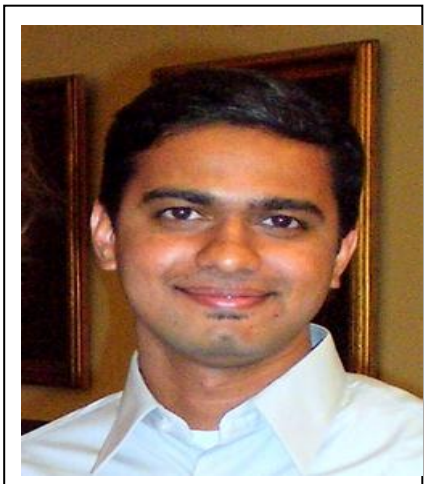

Dhananjay Pai received his B.Tech degree in Food Engineering & Technology from University of Mumbai, India in 2006. He completed his MS in Food science in 2008 from Purdue University during which he has published two papers and one book chapter. He is currently a PhD candidate working with Prof. Martin Okos in the area of pharmaceutical and food powder compaction.

Agricultural & Biological ENGINEERING

Dissertation Defense

Speaker: Dhananjay A Pai

Title: Mechanistic methods in modeling the compact properties of viscoelastic pharmaceutical and food powders

Major Professor(s): Prof. Martin R. Okos

Date: Wednesday, June 06, 2012

Time: 2:30 P.M.

Location: ABE 301

Abstract:

Compaction of viscoelastic powders is an important process in food, pharmaceutical, ceramic and detergent industries. This research work aims to make compaction of viscoelastic powders more mechanistic by relating the microscopic phenomenon of contact area formation during powder consolidation, to the macroscopic compact properties, viz. density and tensile strength. Pharmaceutical (MCC-APAP) and food (Soy protein based) powders were selected for this purpose. Variation of compact density and tensile strength of MCC-APAP mixtures was studied as a function of compaction pressure, drug (APAP) and moisture contents. The maximum viscoelastic contact area between two particles was estimated by combining viscoelastic properties, compaction pressure and time. Semi-analytical models were proposed to predict the density and tensile strength of compacts made from each powder, as a function of total viscoelastic contact area in the compact. Thus, it was shown that contact area takes into account the important raw material and compaction variables of viscoelastic powder compaction.

Application:

This research provides a mechanistic understanding of viscoelastic powder compaction which is central to several industries. It is also expected to facilitate designing new soy-powder based compaction products that can be used in nutraceutical/tablet manufacture.