



DREXEL UNIVERSITY

Materials Science and Engineering

College of Engineering

Department of Materials Science and Engineering,

Candidacy Exam

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Die Wall Friction in Powder Compaction

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Abstract

The compaction of powder materials is a technique used widely in pharmaceutical and structural manufacturing industries. The development of friction as a direct result of compaction pressure, material characteristics, process parameters, and lubrication present during this process is discussed. The direct effects of friction in a system are observed, from tablet breaking strength and nonuniform layer densification. Using finite element modeling, friction is shown to directly impact the density distribution in the tablet. This finite element modeling and the density gradient reveal the need for careful control over the placement of die-wall pressure sensors during compaction. To supplement the die-wall sensor implementation, other methods of measuring friction in the system are presented. Additionally the inclusion of lubrication in the system is presented as a method of reducing the friction experienced, at the cost of tablet strength and green density.