

Dynamics of a Particle Screening Process

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Abstract. Particle screening is one of the most important and most frequently used operations in process engineering. In this paper the simulation of the dynamics of a particle screening process in a tumbling screening machine is described. The Discrete Element Method is used to calculate particle movement. The wires of the screening mesh are geometrically fully described for the simulation model in a hierarchical approach. Some typical simulation results, which are in qualitative good agreement with experimental results, are presented.

Key words: *Particle screening, Discrete element method, Granular material, Screening, Sieving.*

1. Introduction

Particle screening is a basic operation in granular media industries. Almost all bulk goods are screened, i.e. sorted by size, during their production process. Examples for the application of screening technology are the chemical and pharmaceutical industry, food and feed, mining and carbon processing. In many cases the screening operation is crucial to assure the quality of the final product.

Especially for fine and medium sized particles tumbling screening machines have become the preferred type of screening machine. Due to their manifold possibilities of adjustment, lots of different bulk goods can be screened at the same time efficiently and to a high grade.

The simulation of screening processes is of great importance for the understanding of the particle movement and transportation inside of the screening machine. Furthermore, simulations can be used as a tool in the design and development of improved screening machines. Due to the particulate goods to be processed the Discrete Element Method [3] is applied in simulation. The motion of the tumbling screening machine is calculated using a multibody model [10].

2. The Tumbling Screening Machine

A sketch of a tumbling screening machine, as manufactured by Allgaier Werke GmbH, Uhingen, is depicted in Figure 1. The main part of the machine is