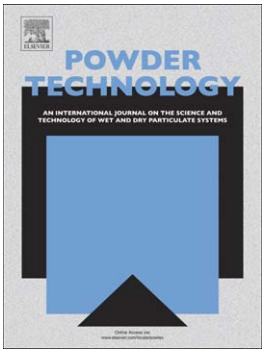
Accepted Manuscript



Statistical modelling of coating layer thickness distributions: Influence of overspray on coating quality

Andreas van Kampen, Reinhard Kohlus

PII: S0032-5910(17)30906-3
DOI: doi:10.1016/j.powtec.2017.11.031
Reference: PTEC 12950

To appear in: *Powder Technology*

Received date: 8 June 2017
Revised date: 24 October 2017
Accepted date: 10 November 2017

Please cite this article as: Andreas van Kampen, Reinhard Kohlus, Statistical modelling of coating layer thickness distributions: Influence of overspray on coating quality, *Powder Technology* (2017), doi:10.1016/j.powtec.2017.11.031

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Statistical modelling of coating layer thickness distributions: Influence of overspray on coating quality

Andreas van Kampen[a,1], Reinhard Kohlus[a]

[a] *Department of Process Engineering and Food Powders, University of Hohenheim, Garbenstr. 25, 70599 Stuttgart, Germany*

Abstract

This paper investigates the layer formation in spray coating processes. Based on a Monte-Carlo simulation, a stochastic model of the coating layer thickness distribution was derived. It couples the stochastic process of droplet deposition on the particle surface with the droplet shape constructed from a spherical cap model and the droplets wetting properties (contact angle). The model was successfully shown to be able to replace the simulation. A parameter study revealed recommendations for designing a coating process, which were in agreement with the works from other authors. The model was then used to investigate the influence of overspray on the coating quality in comparison with experiments. It was found that the presence of overspray not only reduces the process efficiency but also increases the coefficient of variation of the resulting layer thickness distribution. This was caused by an increase in droplet size due to a predominant drying of small drops. It was also found, that a higher solid content of the spray solution increases the coefficient of variation, not only due to a decreased number of droplets, but also due to a greater variability in the layer thickness each droplet introduces.

Keywords: particle coating, simulation, stochastic model, overspray, coating quality

Email address: Andreas.van.Kampen@uni-hohenheim.de (Andreas van Kampen)
[1]Tel.: +49 711 45923744; Fax: +49 711 45922298

Download English Version:

https://daneshyari.com/en/article/6675896

Download Persian Version:

https://daneshyari.com/article/6675896

Daneshyari.com