

## Accepted Manuscript

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PII: S0032-5910(14)00559-2  
DOI: doi: [10.1016/j.powtec.2014.06.016](https://doi.org/10.1016/j.powtec.2014.06.016)  
Reference: PTEC 10344

To appear in: *Powder Technology*

Received date: 17 March 2014  
Revised date: 5 June 2014  
Accepted date: 10 June 2014



Please cite this article as: Todd A. Kingston, Theodore J. Heindel, Granular Mixing Optimization and the Influence of Operating Conditions in a Double Screw Mixer, *Powder Technology* (2014), doi: [10.1016/j.powtec.2014.06.016](https://doi.org/10.1016/j.powtec.2014.06.016)

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# Granular Mixing Optimization and the Influence of Operating Conditions in a Double Screw Mixer

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## Abstract

Granular mixing processes often seek a high degree of homogeneity, and in some instances, can influence simultaneous processing, such as chemical reactions and heat and/or mass transfer. However, specific operating conditions and differences in particle size, shape, and/or density lead to segregation and reduce the mixing effectiveness of these processes. In this study, red oak chips and glass beads are mechanically mixed using a laboratory-scale double screw mixer and the mixing effectiveness is evaluated under various operating conditions. Qualitative optical visualization from four spatially aligned and temporally synced projections is combined with quantitative composition and statistical analysis techniques to optimize and investigate the influence of different operating conditions on the mixing effectiveness of the screw mixer. For the parameters considered in this study, the best mixing performance occurs when the screw rotation speed is  $\omega = 60$  rpm, the dimensionless screw pitch is  $p/D = 1.75$ , the

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