



IFPRI BRIEF TEMPLATE

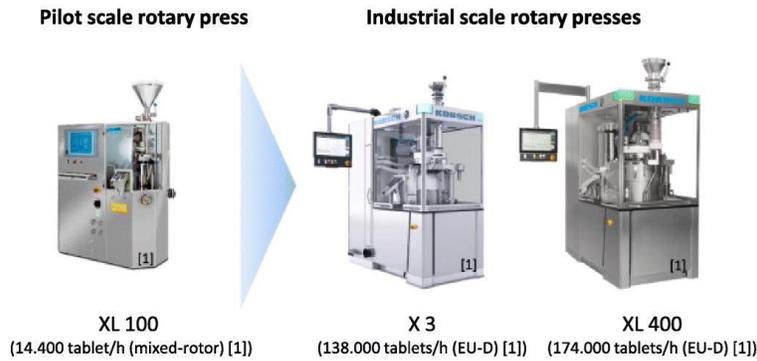
Check One: **Project** **Review** **Collaboration**
 Workshop **Other**

Descriptive Title	Powder Flow/Dry Systems
Working Title¹	Predicting Die Filling Efficiency and Tablet Weight variability in Industrial Tablet Presses
Technical Area²	Powder Flow/Dry Systems
Date	06/13/2023
Short Description	<p>Die filling affects several critical product properties including tablet weight and drug dose. Additionally, tablet weight variation can cause variations in applied compaction stress and subsequently tablet tensile strength and content uniformity. Developing a process on an industrial scale tablet press can be expensive and time-consuming.</p> <p>Therefore, the proposed work focuses on utilizing small-scale experimental measurement to predict die filling efficiency and tablet weight variation in industrial presses for different material properties, process parameters, and operation parameters. The predictive model will use data generated on industrial scale tablet presses and can be directly translated to a manufacturing operation.</p> <p>Past work done in this field within IFPRI and externally has focused on model lab systems with no suction and linear systems, and PLS based models which are not transferable due to empirical nature. The proposed work can be directly utilized in a tableting process for prediction of die filling behavior in industrial scale tablet presses.</p>
Objectives	<ul style="list-style-type: none"> • Develop a small-scale material characterization based mechanistic model to predict die filling efficiency and tablet weight variability in industrial tablet presses. • Investigate different material and pre-granulation type, tablet press geometry (especially filling shoe) and scale, as well as operation parameters such as paddle RPM and turret RPM • Prediction of critical paddle RPM for optimum die filling considering the effect of suction
Scope	Effect of powder, process, machine, and operation parameters on die filling efficiency and tablet weight variability

¹ Title used in meeting agendas and file archives

² One or more from the following list: W = wet systems; D = dry systems; F = particle formation; SR = size reduction; M = modeling; SE = systems engineering

Scale-up from pilot scale to industrial scale rotary presses

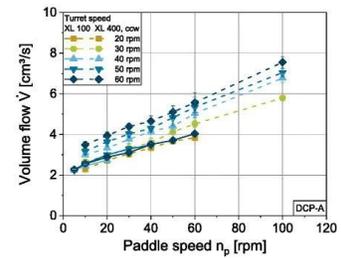


Model extension

$$\dot{V} = V_r \times n_p + \dot{V}_0 \rightarrow \dot{V} = V_r(t_{fill}) \times n_p + \dot{V}_0(\Delta p)$$

[1] KORSCH AG: <https://www.korsch.com/de>

Transferability of volume flows



Prediction of minimal paddle speeds for complete die filling

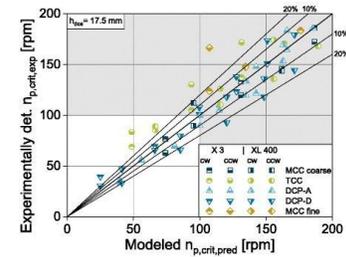


Figure 1: A predictive model developed for die-filling under gravity for tablet presses at different scales (<https://doi.org/10.1016/j.powtec.2023.118550>)

Recommended Contractors (2 or 3)		
Name	Institution	Email Address
Prof. Dr.-Ing. Carsten Schilde	TU Braunschweig	c.schilde@tu-braunschweig.de
Prof. Peter Kleinebudde	Heinrich-Heine-Universität Düsseldorf Universitätsstr	kleinebudde@uni-duesseldorf.de

Submitted By:	
Name	Organization
Rohit Kumar	Alkermes Inc.
Subhash Thakur	Vertex Pharmaceuticals
Umair Zafar	Novo Nordisk
Prof Csaba Sinka	University of Leicester
Prof Arno Kwade	TU Braunschweig