Facilitating scale-up in Direct Compression: from a small-scale single-punch to a large-scale rotative tablet press via transfer learning

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The Problem

single-punch compaction simulator
- simple and flexible
- quick results
- low material consumption

large-scale rotative production press:
- complex and expensive
- different process dynamics
- high material consumption

data scarcity

difficult to develop accurate predictive models for tablet CQAs, e.g. tablet weight consistency.

transfer knowledge from small scale to large scale with addition of process dynamics.

The Approach

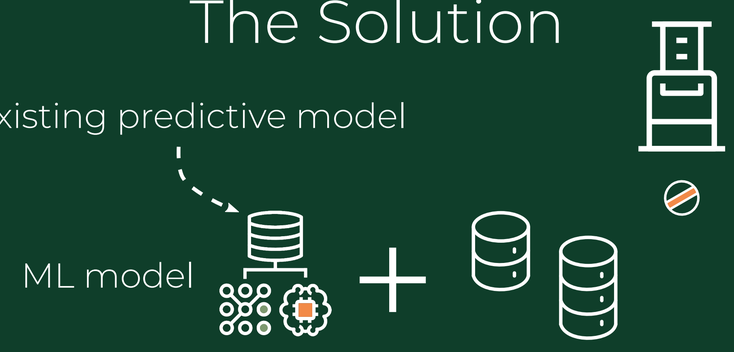
Large data set on
small-scale single-punch tablet press

+

Small data set on
large-scale rotative (C)DC press

The Solution

Existing predictive model



transfer learning

new ML model

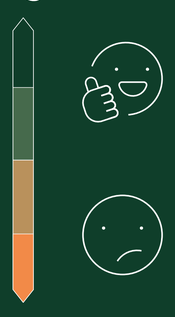
Can predict formulation flow:
- using formulation properties
- capture the effect of process settings for large-scale rotative press

Case Study

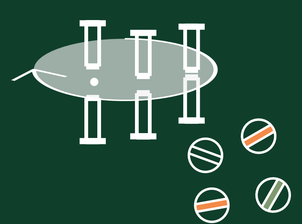
An API powder with poor flow properties is evaluated for processing via direct compression:

- Select appropriate fillers, e.g. microcrystalline cellulose (MCC) and lactose (LAC), to compensate for the API's poor flow (+ add 1% magnesium stearate).
- Maximise the API content in the formulation.
- Achieve consistent tablet weight (RSD < 2%).
- Evaluate transfer to large scale (C)DC production equipment (GEA Modul P)

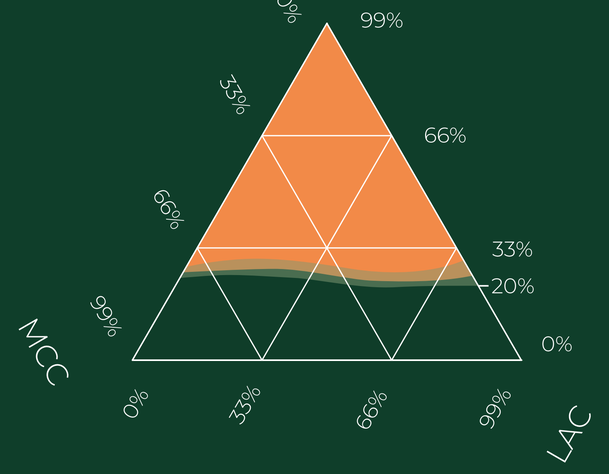
Formulation flow ≈
tablet weight RSD < 2%

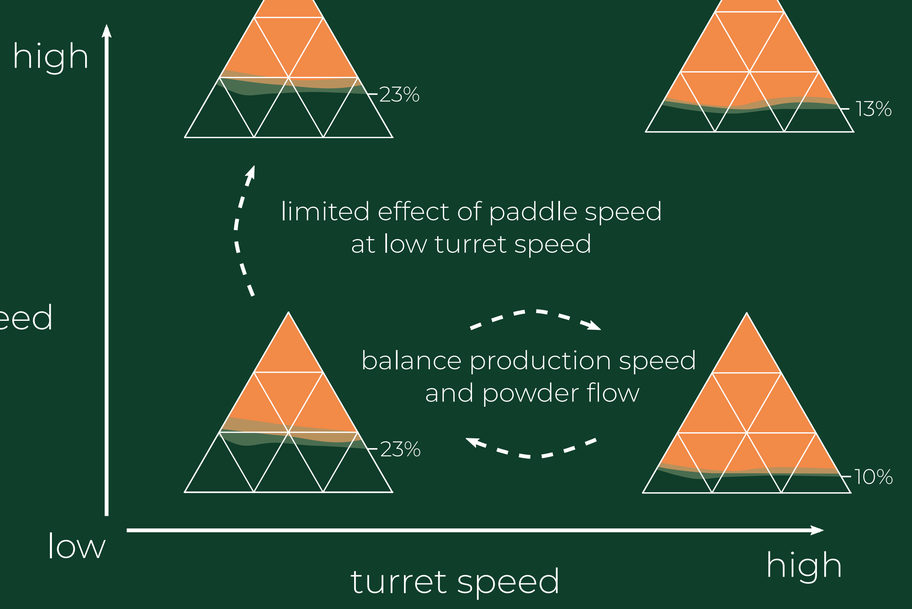


small-scale single-punch press | large-scale rotative (C)DC press



API X





NOTE: extreme process setting values for showcase purposes

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Grab the poster

Our solution helps you with:

- Formulation Candidate Shortlist
- Faster Development and Scale-Up
- Minimising Experiments