Machine learning in direct compression: supercharging process and formulation design with quantitative tools

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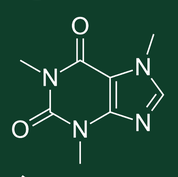
The Problem

active pharmaceutical ingredient



expensive

scarce

formulation and process development

tablets

The Approach

>50 powders
>350 formulations
50k tablets

material properties

Pre-processing

blend properties

Mechanistic relations

Expert knowledge

ML model

The Solution

in-silico formulation development on a single punch tablet press

ML model

API characterisation using <50g

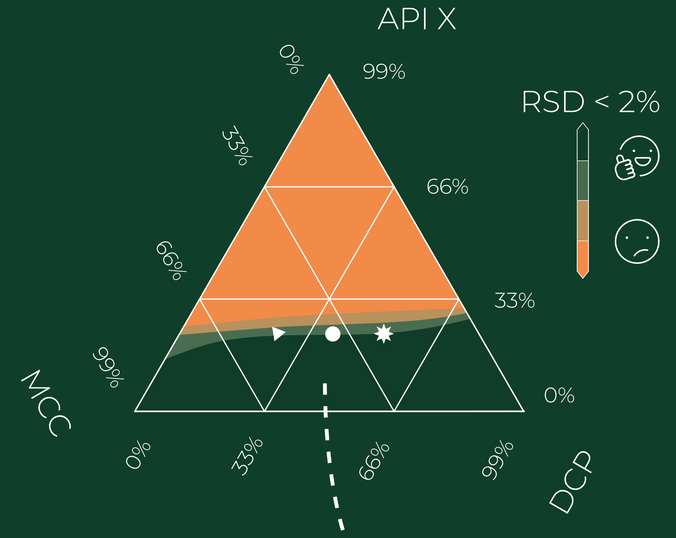
formulation flow
tensile strength
ejection stress

Case Study

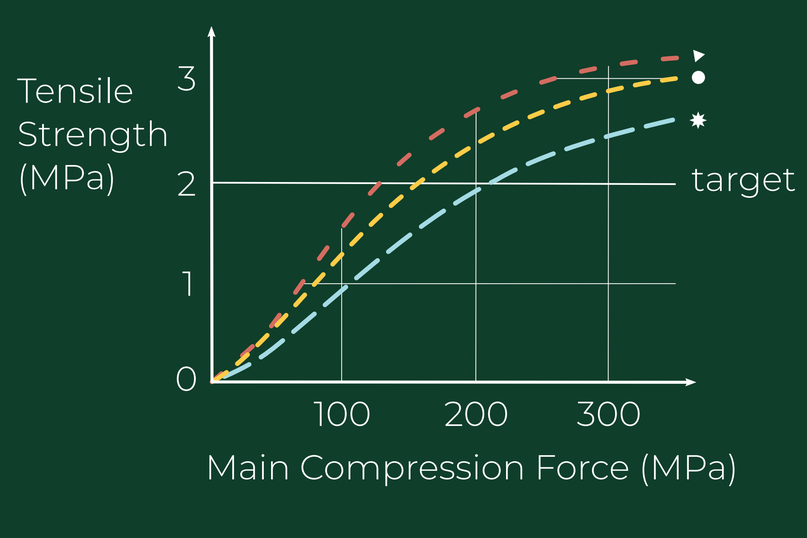
An API powder with poor flow and tablettability properties is evaluated for processing via direct compression:

- Select appropriate fillers, e.g. microcrystalline cellulose (MCC) and dicalcium phosphate (DCP), to compensate for the API's poor flow and tablettability properties (+ add 1% magnesium stearate).
- Maximise the API content in the formulation.
- Achieve consistent tablet weight (RSD < 2%).
- Produce tablets with the desired strength (2 MPa) at an intermediate tableting speed.
- Minimise ejection stress (<3 MPa) at an intermediate tableting speed.

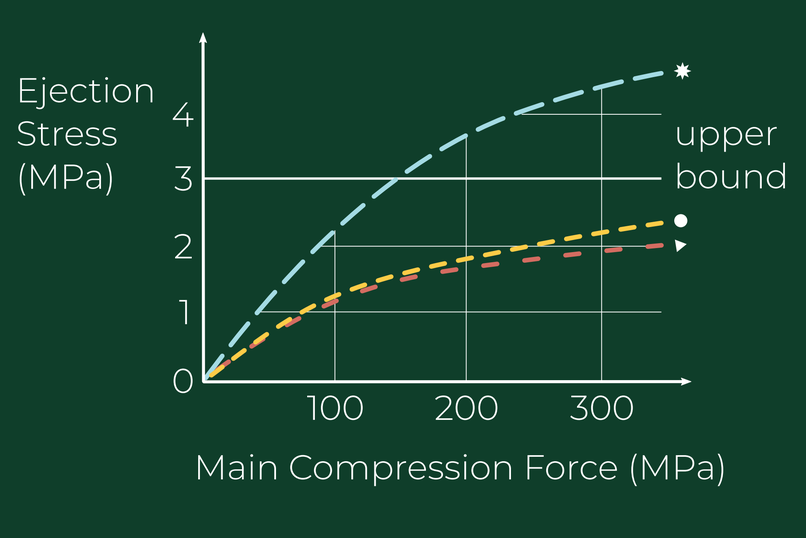
The Flow



The Strength



The Stress



3 formulations selected!
API: 26 % (w/w)
MgSt: 1 % (w/w)
filler ratios: 1:2, 1:1, 2:1

Grab the poster

Our solution helps you with:

- Formulation Candidate Shortlist
- Faster Development
- Minimising Experiments