

Supplementary Materials: Modelling the Compaction Step of a Platform Direct Compression Process

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Table S1. Key technical specification of tablet press in this study with specific type of tooling.

Parameters	KG RoTab	Fette 1200i	GEA Modul P
No of punch stations	8	24	21
Max tablet output per hour (TPH)	19,200	140,000	140,000
Fill weight control mechanism	Main compression force measurement	Main compression force measurement	Pre-compression displacement at equal force
Feed frame design (no. chambers)	2 chambers	3 chambers	2 chambers
Punch type	D	B	B
Punch Shape	Shield (Triangular)		
Tip edge width (mm)	8.5		
Perimeter of punch tip (mm)	27.8		
Cross sectional area of punch tip (mm ²)	54.8		

Table S2. DoE run order of experiments for three different formulations on three tablet presses. The centre points are shown in bold.

Runs	Pre-Compression Force	Main Compression Force	Press Speed
1	-1	-1	+1
2	1	1	+1
3	-1	1	-1
4	-1	1	+1
5	1	-1	+1
6	0	-1	0
7	-1	-1	-1
8	0	0	0
9	-1	0	0
10	0	0	0
11	0	0	+1
12	1	1	-1
13	0	1	0
14	1	-1	-1
15	1	0	0
16	0	0	-1

Table S3. Main compression force applied to achieve the target tablet porosities of 10%, 15% and 20% for each formulation on each tablet press.

Tablet Press	Formulation	Target Porosity (%)	Main Compression Force (kN)
KG RoTab	1	10	13.50
		15	11.16
		20	8.83
	2	10	13.98
		15	9.40
		20	4.81
	3	10	10.56
		15	5.14
		20	1.50
Fette 1200i	1	10	15.65
		15	13.39
		20	11.12
	2	10	15.71
		15	13.08
		20	10.45
	3	10	13.60
		15	9.86
		20	6.12
GEA Modul P	1	10	17.97
		15	15.19
		20	12.40
	2	10	18.03
		15	14.27
		20	11.41
	3	10	16.10
		15	12.20
		20	8.29

Table S4. Process parameters used to validate the models.

Tablet Press	Formulation	Main Compression Force (kN)	Pre compression Force (kN)	Tablet Press Speed (TPH)
KG RoTab	Plastic	6.86	1	14,400
	Plastic	10.64	1	14,400
	Elastic	6.9	1	14,400
	Elastic	10.99	1	14,400
	Brittle	7.14	1	14,400
	Brittle	10.92	1	14,400
GEA Modul P	Plastic	7.17	1	50,000
	Plastic	11.35	1	50,000
	Elastic	16.13	1	50,000
	Elastic	19.18	1	50,000
	Brittle	10.18	1	50,000
	Brittle	15.60	1	50,000

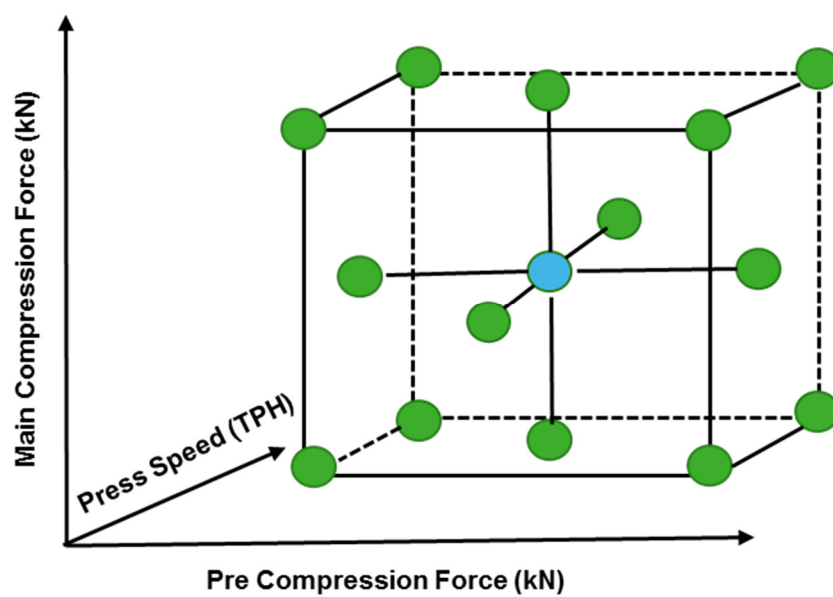


Figure S1. Full response surface design DoE with 14 runs (green) and 2 centre points (blue).