Gamlen Tableting Ltd.

Gamlen Tablet Press GTP-1

Save time and money with the only computer controlled, laboratory tablet press

Benefits

- Easy to compare formulations
- Can make multi-layer tablets
- Improved understanding of lubrication behaviour
- Manufacture preclinical and phase 1 product

Features

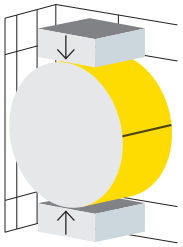
- Saves time, money and materials
- Quick and easy comparisons of processes, formulations and material grades
- Generates unique and useful information
- Quick and easy to use

Using the Gamlen Tablet Press GTP-1

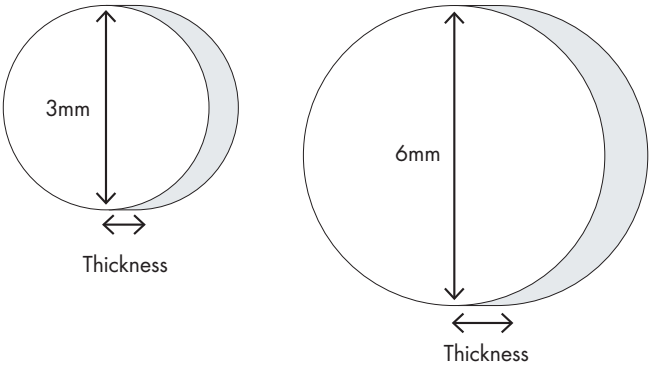
COMPARING TABLETS USING TENSILE FRACTURE STRESS

Fell and Newton (1968)* made two important discoveries. The first was how to calculate the tensile fracture stress (TFS) of a cylindrical tablet (formula 1), and take into account differences in tablet thickness and diameter to permit an accurate comparison of tablet properties.
The second was that the relationship between tablet compaction pressure and tensile fracture stress (TFS), is linear. This parameter has subsequently been called "tabletability"..

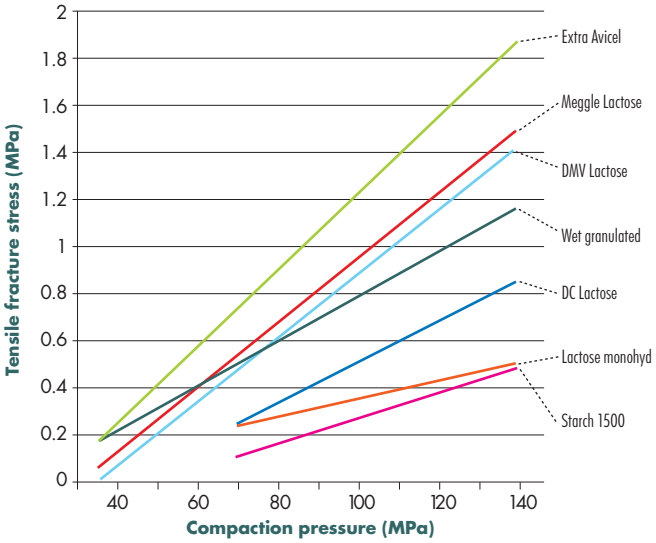
$$\sigma_t = \frac{2P}{\pi Dt}$$



Hardness Test



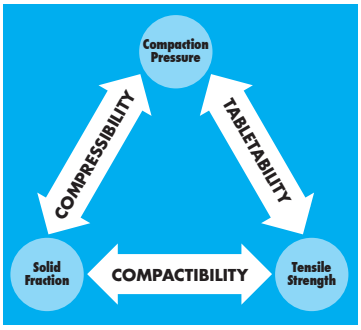
Using TFS we are able to compare the properties of tablets quickly and easily, and using small amounts of material. Simply manufacture a few tablets using the compaction force control feature of GTP, measure the TFS of the tablet (using the GTP with a suitable load cell, or a conventional hardness tester), and the differences between materials quickly becomes apparent.



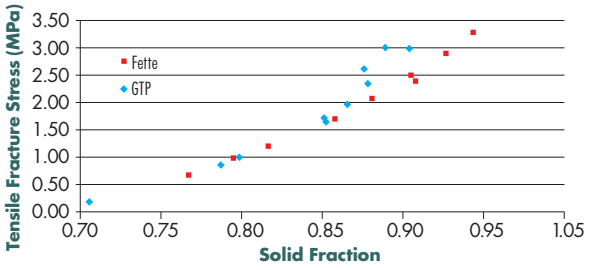
As an example, we recently published a study on the effect of granulation on the tabletability of spironolactone formulations…

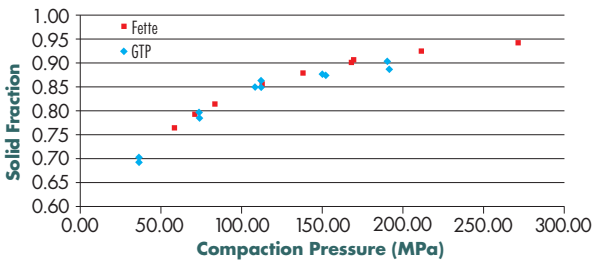
TABLETABILITY, COMPACTIBILITY AND COMPRESSIBILITY

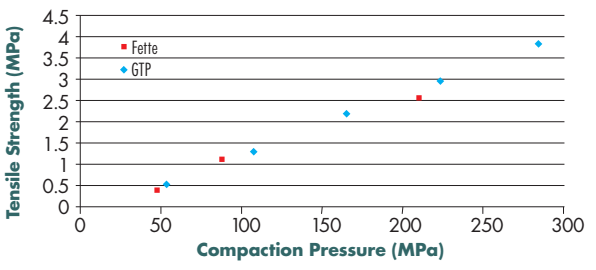
Comparing tablets and table formulations is not straightforward.. This is because when you make a tablet, several parameters vary at the same time. As the applied force increases, the thickness of the tablet decreases - the porosity reduces, and the density increases.



A further problem is to decide whether to compare tablets of the same nominal weight or the same nominal volume; as most materials differ in density, this will give different results.
The relationship between tensile fracture strength, solid fraction (density or porosity) and compaction pressure has been summarised in Figure 1.
Tabletability is defined as compaction pressure vs TFS. Compressibility is compaction pressure against solid fraction.
Compactibility is the relationship between TFS vs solid fraction. All are needed to fully define a materials.
The plots show the effect of compaction pressure on solid fraction and TFS of a GSK formulation

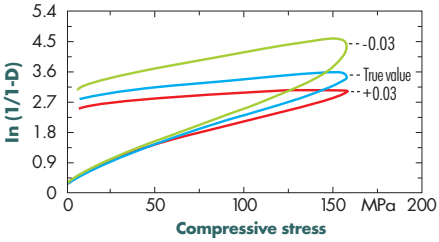




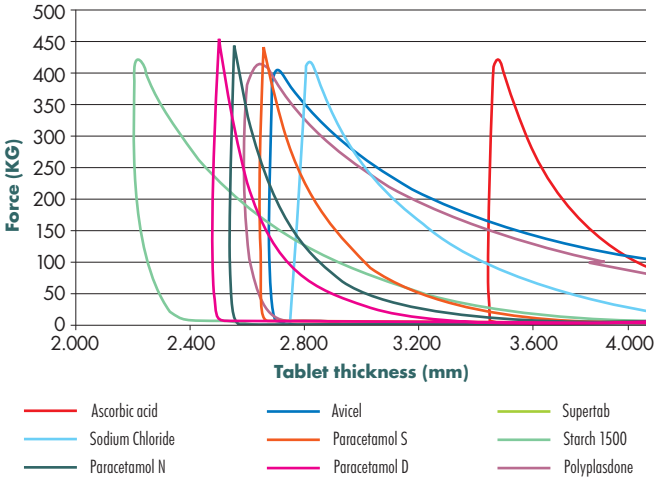


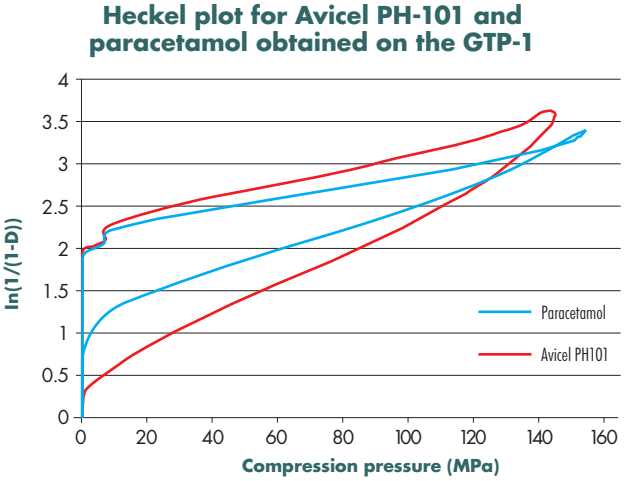
IN-DIE MEASUREMENTS ON THE GTP-1

To study the behaviour of materials during compaction, it is necessary to measure force and displacement simultaneously. This is technically complex, because punch position cannot be normally be measured accurately using a tablet press (either single station or rotary). The Gamlen Tablet Press gives an accurate simultaneous measure of punch position during compression which can be used to generate Heckel, Kawakita or other plots. These are used to try to understand the difference between materials. Small errors in punch position or density measurement have a major impact on these parameters which require careful correction.



Influence of errors in true density measurements upon Heckel plots, simulated using signals of a compression of Avicel to 3% porosity with correct true density D,D - 0.03 and D + 0.03 g/ml.

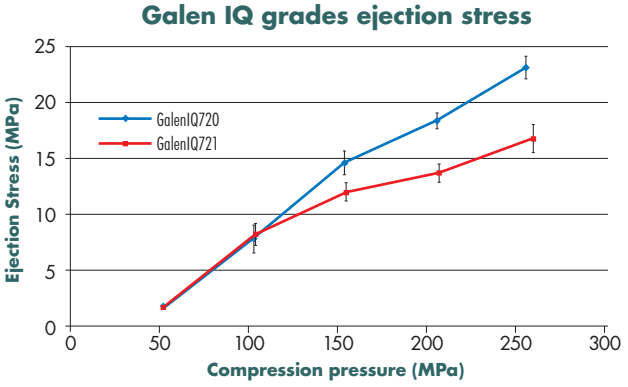


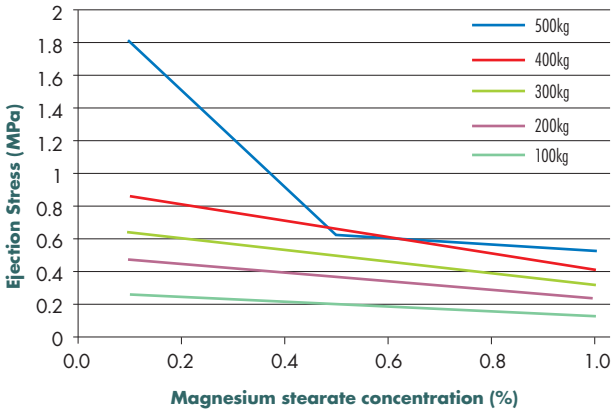


Force-thickness, and at-pressure Heckel plots for a range of materials on the GTP-1

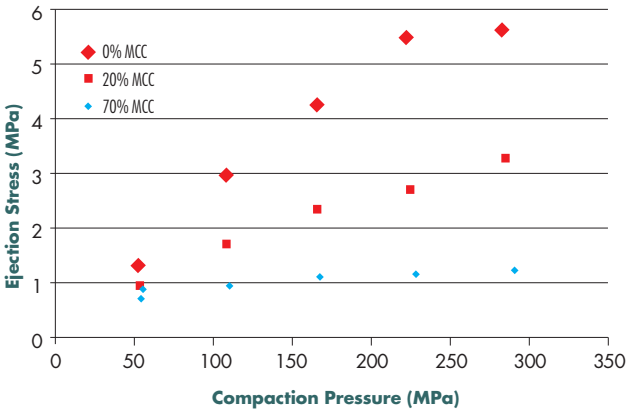
EJECTION STRESS MEASUREMENTS

Ejection stress measurements for individual tablets are not normally possible on a tablet machine. The forces are often small, and can never be related directly to punch displacement.
Using the Gamlen Tablet Press, single compaction events can be studied with ease . The impact of mixing on ejection stress is as expected, but sometimes ejection behaviour is quite surprising.
We are able to rapidly determine the effect of mixing parameters and composition on tablet press. Additional of non-lubricants can have a major impact on ejection, as seen in these data from GSK.





Effect of magnesium stearate concentration on ejection stress of Avicel PH 101 tablets at a range of compaction forces



Ejection shear stress comparison for WG1 with extra granular micro crystalline cellulose

Specification of standard machine

Tablet punch size	2-13mm diameter
Material capacity of the die	2-400mg
Data collection rate	10-2000Hz
Tablets/min	1
Maximum load	500 kg
Choice of 4 output units	Kilogram (kg) as standard; Kilopond (kp), Newton (N) or Pound (lb) on request
Load cell resolution	1:5000
Width between pillars	60 mm
Load Cell travel	30 mm
Test Height	Depends on pillar extension length. Maximum extension of 300 mm.
Load indication	Via PC software
Inputs & Outputs	USB interface. Load cell.
Test Speed Range	1.0 – 60 mm/min.
Fast down and return speed	60 mm/min
Calibration	Dead weights in kg or proving ring.
Power requirements	110/120 VAC 3.15 A or 220/240 VAC 1.6 A (External selection via fuse holder)
Machine dimensions	310(w) x 270(d) x 375(h)
Machine weight (without accessories)	16 kg
Shipping size	390 x 350 x 390 or 460 x 430 x 480
Shipping weight approx	20 kg

Patent Pending

Additional Options

- Powder pipette for accurate and reproducible dispensing
- Controlled humidity glove box, RH controlled to +1%, temperature to +1%

- Ejection rig for manual tablet recovery (useful for manufacturing)
- Extension pillars and ram system to enable use as a ram extruder.

- Bespoke design punch and die set
- 3 and 4 point bend tablet fracture rigs.

- Flight case for transport
- **Others on request.**

Sales and Customer Service

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