

Thesis Title The development and application of analog to digital software monitoring program for tablet compression parameters.

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ABSTRACT

To study compaction and compression behaviors of materials and to formulate tablet dosage forms, an instrumented tablet machine is essential. Normally, a strip chart recorder is employed as a monitoring device. This study found that the signal obtained from either compression event or displacement registered on the chart paper would be less than those on oscilloscope. The discrepancy was greater at higher compression force and at high speed of tableting. Therefore, the analog to digital convertor was employed to convert the signals from the strain amplified and transform to digital signals which could be stored in the computer. The data could be retrieved later on for further manipulation. The sensitivity of the computerized-measuring device was 7.84 millivolts. Speed of data collection could be selected at 3 levels, i.e., 1, 2 or 4 msec depended on size of data needed to be stored. The magnitude of compression force obtained from the A/D converter was found to be higher than that shown on the recorder. The computerized system was also used to study pressure-volume relationships. It was found that microcrystalline cellulose (MCC) required greater upper punch displacement and higher energy of compaction than the other fillers, i.e., spray-dried rice starch (SDRS), dicalcium phosphate dihydrate (DCP),

pregelatinized starch (PS) and lactose (L), whereas DCP need lowest values of both parameters. Force and energy of compaction depended on the density of each material. DCP and L exhibited greatest die wall forces (F_r), which was believed to be due to their fragmentation behavior. The hysteresis loop obtained from the compression cycle was related to F_r . The plastic materials showed lower values of both F_r and hysteresis loop than did brittle materials. Heckels plot analysis indicated that MCC exhibited highest slope value, which implied permanent deformation. SDRS and PS which deformed elastically possessed lowest slopes. Intercepts of the plots, which suggest the residual die wall force, of DCP and L appeared to be lowest.

It could be concluded that the computerized system employing A/D converter designed in this study was a useful tool to monitor the compression events with high accuracy.