Versatile Compression Force Measuring System for Rotary Tablet Presses

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ABSTRACT

Compression force has become more important in in-process quality control of tablet compression. In this study, two different designs of industrial rotary tablet presses were tested for versatility of the designed force measurement systems. Both presses were equipped with force measuring systems designed by using commercially-available equipment and instruments so that the procedure can be easily reproduced for commercial applications. A remote installation technique was used for installing an HBM® load cell at the compression roller's eyebolt. A bridge amplifier, analog to digital converter, and microcontroller from TSM® were used to determine the average maximum compression force, with the result displayed on a 4- digit LED display. C programming language was used to develop the program for the microcontroller. The calibration method was designed by installing a calibrated HBM® load cell on a modified lower punch, then manually pressing a modified upper punch onto the load cell with static force and collecting data for making the calibration curve. A linear relation between the punch's load cell and the data collected on the microcontroller resulted from both machines' calibrations. Testing the calibrated machine by applying static force comparable to the LED display was done to study the reliability of the calibrated force measuring system. Two direct compressible diluents, lactose and microcrystalline cellulose, were compressed into 12 mm, flat, bevel-edged tablets at the normal production speed of 400 tablets/minute at various compression forces on both calibrated tablet presses. Both the pressure-tensile strength profile and the pressure-tablet thickness profile were studied. The results were similar to work of other researchers while the tablet compression process was done according to industrial standards. This proved that the retrofitted machines could be used for both research work and industrial tablet compression.

Key words: Compression Force, Rotary Tablet Press, Versatile