

**Automatic weight-control in a rotary tableting machine**

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A Manesty Betapress 16 station rotary tableting machine has been fitted with an automatic weight control system. With the control system in operation, constancy of tablet weight is maintained in the face of changes in machine operating speed and granule size or shape distribution; gradual drift due to wear is also held in check. An adjustable upper and lower weight limit can be set, and any tablet falling outside the limits (despite the constancy of the mean tablet weight) can be directed by a small air-blast onto a rejection chute.

The basis of the system is as follows:

(a) the pressure rolls have been modified by machining cavities in the axles so that piezo-electric load washers (Kistler Ltd., type 903A) can be mounted inside the axle body. As each punch head contacts the pressure roll, an electrical pulse is produced from the load washer. The pulse voltage is proportional to the pressure applied to the powder in the die by the punch.

(b) the pulses are amplified and fed to a discriminator unit. This unit inspects the voltage of each pulse. If it is within the acceptable limits for the tablet being made, nothing is done. If the pulse voltage is too high or too low, a signal is sent to a stepping motor which drives, through appropriate gearing, the fill adjusting screw on the machine. This screw sets the level to which each punch drops as it passes under the powder feeding frame, and thus the amount of powder entering the die. For a pulse which is too large, the screw is raised by one step of the stepping motor, so that the amount of powder is reduced. For a pulse which is too small, the reverse happens. Thus the machine is kept at and near a preset mean tablet weight.

(c) when a pulse is too high or too low, a signal is also sent to a small rapid-acting solenoid valve which controls a compressed-air supply. This signal is sent some four compaction events later, at the time when the out-of-specification tablet is just leaving the die table. The tablet is deflected by a jet of air so that it enters a chute for reject tablets, separate from the chute carrying the bulk of the within-specification tablets. Because the pulse discriminator locks onto the operating speed of the machine, change in machine speed makes no difference to the efficiency of the rejection system. The high and low levels for rejection can be set by the operator.

(d) the amplified pulses are available for recording either by a high-speed u.v. chart recorder, or by a storage oscilloscope. Both methods have been used. If provision is made to collect the tablets serially as they come from the machine, it is possible to produce individually weighed tablets, with a record of their weight, at the full output rate of the tableting machine, 1500 tablets per minute.

(e) the force to eject each tablet has also been monitored and a signal obtained, though currently nothing is done with this information.

A number of test runs have been carried out with the system, to determine what the control limits are. The ultimate limit is, of course, the quality of the granulation used to feed the machine.

**The properties of tablets made from direct-compression bases on an automatically controlled rotary machine**

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Four direct-compression bases, Celutab in the hydrous and the anhydrous form, Emcompress special and spray-dried lactose, have been compared with a traditional lactose granulation with respect to the initial physical properties of the powder, their tableting performance and the characteristics of the tablets produced. The tablets were made on an automatically-controlled instrumented machine, a Manesty Betapress, so that compression force was continuously monitored. The following tablet properties: tensile strength by diametral crushing, porosity, weight, coefficient of variation of weight, surface microindentation hardness and