

Continuous Dispensary System

Hosokawa Micron Ltd and AstraZeneca, one of the world's leading pharmaceutical companies, have completed the installation and commissioning of an integrated powder dispensary, for accurate weighing and blending of high volume drug formulations, on one of its major manufacturing sites.

An expected increase in production volume has led the AZ team to look at developing a new approach to the automation of dispensing for dry ingredients going into tablet formulation. Active ingredient in the formulation is potent and would normally require use of PPE for a manual weighing activity.

The challenge was to design a high accuracy dispensing system to a specified accuracy of +/- 1.0%, with full batch reconciliation for large volume "blockbuster" pharmaceutical products using combined Hosokawa technologies. Removing the previous restrictive practice of wearing PPE.



The Project Manager at AstraZeneca Engineering commented, "In spite of the complexity of the system and the many issues faced during the design and commissioning phases, Hosokawa have provided a dispensing system that more than delivers on the original design brief.

The success of the project is due mainly to the excellence of the project team at Hosokawa Micron Ltd Runcorn, who were able to meld the many pieces of proprietary equipment, from suppliers, both within the Hosokawa group and outside, into a fully integrated and fully automatic system.

The completed dispensary has produced a considerable number of batches to a weighing accuracy generally as low as 0.3% and where operator involvement is necessary, for example drum tipping, the system containment is designed down to 5ug/m³ to ensure operator safety."

System Description

Before any processing can begin a recipe is selected and this writes the unique process values for the system controlling feed rates, drive speeds and fill levels of the process equipment and vessels. Once the recipe is selected the system will assess the levels of the required excipients and will indicate the required quantities.

Charging takes place within two Hosokawa Downflow Booths, each housing two conveying systems and each one dedicated to a single excipient only. An excipient keg is presented for identification via a bar code reader and only when correctly identified will the pneumatic conveying system activate. The powder is then transferred via a dedicated suction lance through a vacuum sifter to a buffer storage hopper. The proprietary seals on this system were substantially modified by Hosokawa and AstraZeneca during commissioning and the resulting seals greatly improved cleaning efficiency.

Safeguards are in place to ensure no part drums are stored within the containment booth.

Charging of active ingredient takes place inside a two compartment active isolator with a demonstrated containment level of better than 5ug/m³ and again bar code reading of the product keg is required before the drum tipping system can activate. The system has the capability of using Near Infra Red (NIR) recognition.

Once the control system confirms all ingredients are filled within the dispensary to the required levels and all system components are in place, automatic dispensing of the ingredients commences. Excipient discharge is controlled by a number of highly accurate active loss-in-weight feeders operating simultaneously at predetermined feed rates to achieve the target weight set by the recipe. Accuracy is determined by a combination of level control, charging control and air balance across the feeders.

Active and additional excipient is dispensed through a continuous loss-in-weight feeder into the Hosokawa Micron Pharma design Extrudomix PM150 mixer, which ensures good dispersion and product flow. This standard mixer was extensively modified to suit the complex requirements following trials with placebos and detailed design discussions with the AstraZeneca.

After mixing, the product streams are gravity fed into a final stage batch cone mill which serves to fully homogenise the blend. This stage can be bypassed if the recipe so indicates.

Final product is collected in bulk containers via a special high containment split wafer valve and the combined final weights monitored. The feeders stopping automatically when the final bulk weight is reached and verified against the dispensed quantities.

The control system uses proven communications technology thus reducing the quantity of field cabling and delivering more information to the point of use. This is displayed within the processing area on interactive touch screens close to the downflow booths. The whole system is designed for Clean in Place (CIP) with water and detergent washes using a CIP skid incorporating automated washing and drying cycles.



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