Optimizing Tablet Coating Drop Size

Problem:
A pharmaceutical company introduced a new tablet coating formulation. The application required low flow rates and consistent small- to medium-size drops in a flat fan spray pattern.

Objective:
The Spraying Systems Co. nozzle being used was able to accomplish this process. However, it was necessary to characterize the nozzle and then optimize the spray parameters to help improve the coating efficiency of the proprietary tablet coating system. The pan coating system consisted of 3 spray guns across a 100 mm header which was designed to optimize total system efficiency.

Procedure:
The spray distribution, drop size distribution, and velocity distribution were collected and analyzed to offer a total spray characterization. The header was then designed and optimized for the system.

Solution:
The optimal flow rate, spray height, and nozzle spacing was determined from the results of the spray characterization data. The customer was then able to write procedures and methods to optimize their coating process which reduced maintenance costs and production downtime.
Technical Data

Figure 1. Drop Size vs. Air Pressure

The drop size distribution of the anti-bearding nozzle (nozzle B) provided droplets approximately 10 to 15 µm smaller than the standard SUE15 setup (nozzle A) at similar conditions. From these results, the optimal nozzle and operating conditions were chosen to accomplish this process.

- Nozzle A - Flow High
- Nozzle A - Flow Low
- Nozzle B - Flow High
- Nozzle B - Flow Low

Figure 2. Drop Size vs. Volume Flux

Tests were performed to evaluate performance at various operating conditions. Nozzle parameters were evaluated based on drop size uniformity and volume flux uniformity as a function of axial position along the flat spray. The results quantified the expected variations for low, medium and high dosing rates. The volume flux is largest at the center of the spray and decreases towards the edges of the spray with the most uniform region existing at the spray center at high air pressures. The medium dosing rate supplies the most uniform volume flux distribution and the drop size distribution does not change drastically.

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