300h Use of Lasentec Fbrm in-Process Particle Sizing Pat Technique to Study Top- and Bottom-Spray Fluid Bed Granulation Processes

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Purpose. Granulation of fine powders can be performed in a fluid bed processor by spraying solvent or a solvent/binder solution onto a fluidized powder bed (Top Spray Granulation) or by co-currently spraying solvent or a solvent/binder solution into a segregated dilute phase powder stream (Bottom Spray or PRECISION GRANULATION). As the powder characteristics change, the process variables must be adjusted to account for changes in the product particle size, bulk density, and flow characteristics. Using Focused Beam Reflectance Measurement (FBRM) and Particle Vision and Measurement (PVM), the chord length of particles in a fluid bed processor can be accurately measured in real time without sampling or extracting product. This measurement is typically performed offline after the process has been completed as part of a quality assurance program. Obtaining this Process Analytical Technology (PAT) measurement in real-time allows for continuous adjustment of process variables and detection of processing problems, and can be part of a process where the product is suited for real time release.

Methods. A matrix of Top Spray and Bottom Spray (PRECISION) Fluid Bed Granulation experiments were performed. Critical parameters included the liquid/binder spray flow rate, airflow rates, the atomization pressure, as well as the method of spray addition - top spray versus bottom spray. The in-line real-time particle distributions were characterized and controlled using in-situ PAT; Lasentec FBRM and PVM technology.

Results. The influences of raw materials, spray rates, spray location, atomization pressure, airflow rates, and filter cleaning were quantified and optimized to understand and improve product quality and yield. Target particle distributions were obtained by controlling these critical control parameters.

Conclusion. In-situ particle characterization with Lasentec FBRM and PVM were able to provide insight into the particle dynamics. This allowed the critical process variables to be adjusted to achieve the desired downstream particle characteristics and avoid downstream processing problems.