Reduce your Fluid Bed Process Costs with PAT

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Introduction

Fluidised bed processes are important pharmaceutical processes which support both granulation and coating applications. By understanding and controlling the critical process parameters (CPP) that influence the properties of powder, consistent high quality granules can be obtained during fluidised bed granulation. Equally, by understanding and controlling the critical process parameters that influence dissolution, consistent dissolution profiles can be achieved for extended release products during fluidised bed coating.

In a fluid bed granulator or coater this can be achieved through physical process measurements including \textbf{granule/spheroid size data} that are analysed in an integrated manner through process analytical technologies (PAT).

Process analytical technology (PAT) has been defined by the FDA as a mechanism to design, analyze, and control pharmaceutical manufacturing processes through the measurement of Critical Process Parameters (CPP) which affect Critical Quality Attributes (CQA).

The practical implementation of PAT involves the online or inline integration of \textbf{‘smart technology’} such as process control sensors to well proven and accepted process equipment like Glatt fluidised bed systems and using the real time data from the sensors to model and control the process.
Figure 1: Mean particle distributions during fluid bed granulation runs. All fluid bed granulation trials were circa 40 minutes in duration. Graph illustrating the wetting, agglomeration and drying phases – typical of a fluid bed granulation process.

There are several benefits to be obtained from the proper implementation of PAT which include quality improvements, positive regulatory impact, occupational safety, minimising environmental impact, improving R&D know-how and operating cost.

Figure 2: Particle size growth during the spray coating process using real-time measurement data from the Eyecon Particle Characteriser.
Benefits to you – our customer

The reduction in operating cost can be significant and is realised through a number of PAT related benefits. These include:

- **Accelerated Scale-up and Technology Transfer**: It is possible to accelerate scale-up and technology transfer through greater real-time characterisation of the granulation or coating processes, leading to significantly reduced costs.
  
  ‘*We have seen the Eyecon in action. It really does reduce formulation development and technology transfer schedules*’ Norbert Pollinger - Head of Glatt Technology Centre

- **Real time monitoring**: feedback controls and results. Maintain vigilant process control of challenging processes and to rapidly troubleshoot process deviations.

- **Improved cycle time**: This can impact cost savings through reduced product release times, reduced sample preparation time, minimized reliance on end product testing, faster real time analysis times and optimal use of parametric release.

  ‘*The Eyecon™ 3D particle characteriser has really helped us understand our process at a new level. The ability to acquire images and size distribution data of our spheroids in real-time is a significant improvement for this process. The savings we realized are significant and tangible*’ James Burke - Director for Manufacturing at Alkermes Pharmaceuticals

- **Inventory reduction**: (through parametric release and improved cycle times)

- **Increased capacity**: utilization of production facilities and optimisation of production schedule

- **Reduce reprocessing expenses**: by minimizing batch loss/ rework risks

- **Future proof**: your process equipment with PAT technology against changing regulatory requirements.

- **Continuous processing**: PAT is an enabler for continuous where reduced operating cost compared to batch may be achieved through speed, production efficiency, the need for less material in experimental runs and a reduction in inventory of product and materials.
Eyecon module for PAT Particle characterisation

For fluidised bed and continuous manufacturing equipment like MODCOS, Glatt offer Eyecon - a ‘smart’ PAT module designed to integrate with our equipment and empower our customers for online real time process control.

Eyecon may be used for detection of the **end point** for granulating, drying and coating or to immediately **detect process deviations**. For spheronisation process Eyecon’s measurement capability facilitates precise control of spheroid shape, size and surface morphology which is crucial to optimising yield and meeting predetermined dissolution profiles.

The Eyecon particle characteriser is a direct imaging system that generates on screen images of product in addition to real time particle size and shape information. Eyecon is a lightweight, self-contained module consisting of a light source, optics and sensor which feeds data to a laptop running Eyecon software and/or may be integrated with Glatt View® process control system via OPC.

Unique instrument features include

- non product contact
- real time size & shape data
- colour images of product
- portable – can be detached for at line/bench top which may be applicable for some DOE investigations.

Data from the Eyecon™ is provided in the form of D values allowing direct comparison to sieve results. However with information on particle shape and surface topography, automatically generated PDF reports including size distribution histograms the Eyecon utility goes far beyond the traditional sieving process.

Eyecon is offered as an integrated module on newly ordered equipment or subject to suitability may be retrofitted to existing equipment.

**For More Information on Eyecon™ Please Contact**

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