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Inline Acoustic Monitoring to Determine Fluidized Bed Performance During Pharmaceutical Coating

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1. Introduction

In the pharmaceutical industry, fluidized beds are often used to coat pellets or granules containing an active pharmaceutical ingredient, or nonpareils pellets for use in multiparticulate dosage forms. Within a fluidized bed, compressed air is forced into the bottom of a chamber containing the pellets. Physical drag forces exerted on the pellets result in a fluidized movement. The coating solution is distributed by an atomizing nozzle positioned either above or in the pellet bed. Fluidization allows for coating and drying to occur within a single unit operation. A fluidized bed provides efficient mass and heat transfer; however, as a downside, it can be challenging to operate. The multivariate nature of a fluidized unit operation can make it difficult to choose optimal operating conditions. As suggested by the pharmaceutical quality by design (QbD) framework, such operating conditions are inlet air temperature, inlet air flow rate, air dew point, atomizing spray rate, total coating time, and total drying time (1). Poorly

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