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PROCESSING AIR FOR FILM COATING

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The aqueous film coating process requires a large amount of energy to evaporate the water present in the coating suspension. The energy is provided by introducing hot air into the coating chamber.

Some useful comments on this evaporation process follow. For an extensive review of energy balances during the coating process, see the Thomas Engineering thermodynamic Analysis of Aqueous Film Coating (TAAC) Program. In simple terms, the energy to evaporate the water from the coating solution is supplied by a quantity of air that drops in temperature as it moves through the tablet bed.

To increase the amount of water which can be evaporated, either increase the volume or inlet temperature of the process air.

The amount of energy available for evaporation is proportional to the airflow volume and to the difference between the inlet and exhaust temperature. If the inlet temperature is 65°C, and the outlet temperature is 45°C, $\Delta T = 20°C$. If the inlet temperature is 85°C and the outlet temperature is 45°C, $\Delta T = 40°C$. This doubles the energy deposited in the tablet bed for the same quantity of air. If the CFM of air into the pan is 1500, a certain quantity of air passes through the process. If the CFM is 3000, the quantity of air (all other parameters unchanged) roughly doubles. If ΔT is the same for both conditions, the energy available to evaporate water also doubles.

Using the most widely accepted side-vented pans, the process air can pass through the system in a variety of configurations.

Configuration (A) is typical in the Accela-Cota and is an ideal design. This minimizes turbulence in the process area and also reduces blow back from the spray guns. Configuration (B), which is used in some cylindrical fully perforated pans, has been noted to distort the spray plume.

Some side-vented pans are not fully perforated or are not cylindrical. Since they are not fully perforated, the air volume is reduced. Additionally, they cannot have plenums pressed directly to the side of the pan. They require individual exhaust compartments which articulate with a master plenum. In one case, air is introduced through an opening at the front of the pan. Air is pulled across the bed causing turbulence in the spray zone and an uneven distribution of the air. This can be corrected by introducing the air through a slotted duct that reaches across the bed from the front to the back.

BATCH SIZE FLEXIBILITY

A common problem associated with all side vented pans is the tendency to run short loads not fully covering the exhaust plenum.

Configuration (C) illustrates that if a portion of the exhaust plenum (p) is not covered by tablets, some process air is pulled out of the pan without passing through the tablet bed. Several problems result from this condition. A significant amount of the energy from the inlet air will be lost directly into the exhaust. The exhaust temperature will not accurately indicate the tablet bed temperature. Usually, these temperatures are nearly equal but in this condition the exhaust temperature will be much higher than the bed temperature. One other problem is a turbulence in the spray zone caused by the air rushing over the bed to the opening.

As configuration (D) shows, the Accela-Cota uses exhaust reduction baffles (b) that can easily be installed to allow the tablet bed to cover the full exhaust opening preventing this imbalance. Three exhaust reduction baffles sizes are provided with the Accela-Cota: 4", 8" and 12".

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