Controlling the heat output and optimizing the drying process to save energy with Atmoset SMT-12

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Much energy is lost when drying textiles in drum dryers because the drying performance cannot be optimally controlled depending on the product. Mahlo's new dryer controller Atmoset SMT solves that problem and optimizes the dryer's energy balance.

Atmoset SMT is based on our Optipac VMC 12 modular process control system. It is designed for monitoring and controlling drum dryers and controls the dryer's heat output as a function of the product's residual moisture. The result is better quality with less energy consumption.

Drum dryers are setups of steel drums that are heated with steam and wrapped by wet textiles for the purpose of drying. This is also called contact drying. Drum dryers are mainly used after wet treatment systems. There, the product is continuously dried in a single pass directly after the wet treatment.

Light product is over dried

Normally, drum dryers are oversized. There is a good reason for that: It is not always possible to adjust the machine speed to the required drying performance. However, the dryer must also be able to dry a heavier product at a product speed that is governed by the treatment time. This results in the fact that the product may be over dried, if it is lighter or if the product speed is slower. The over drying of the product leads to quality degradation and wasted energy.

Atmoset SMT enables the user to control the drying performance of a drum dryer so that the required residual moisture can be reached independent of product type and speed (to the extent that the dryer allows).

Basically, a drum dryer is a very slow system to control. Among others, this is due to the huge weight of such a type of dryer. If the drying performance needs to be increased, the steel first has to be heated. When the drying performance is to be reduced, the product has to cool the steel. Moreover, the large product load of a drum dryer contributes to this inertia. When a deviation of residual moisture is detected and the energy input is changed correspondingly, it takes at least two dryer lengths until this change of energy supply is reflected by a change of the residual moisture.

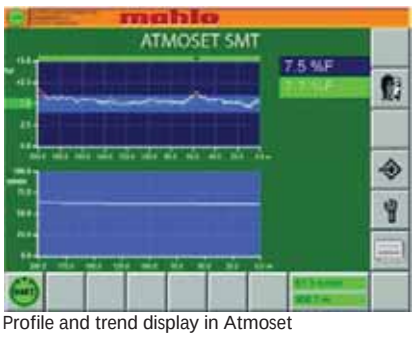
Another aspect is that energy is consumed in an uncontrolled way for preheating at the start of production and during machine downtimes.

Short response times by drum groups

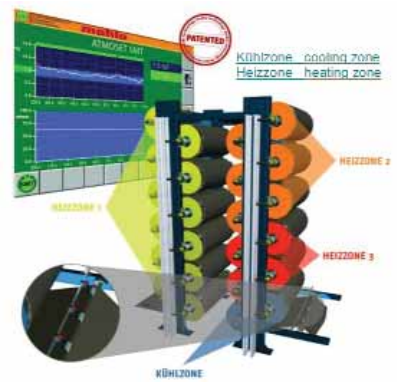
To be able to gain control of all of these factors, Atmoset SMT uses and combines different sensors and controllers. One of these is the **Textometer RMS residual moisture measuring device**. It is used to measure the product moisture. However, due to the inertia of a drum dryer, this measuring signal alone is not enough to control a drum dryer quickly and accurately. That is why the condensate temperatures are measured on multiple locations in the drum dryer. When the energy demand of the dryer varies the condensate temperature also changes, before a change of the residual moisture can be detected on the end of the dryer. Generally, the condensate temperature decreases with increasing energy demand. In return, the condensate temperature increases with decreasing energy demand.

Even shorter response times are possible when the drum dryer is subdivided into multiple drum groups. The condensate temperature is monitored in each of these groups, in which their being heated must be separately controllable. To be able to control this quickly and accurately enough, it is advantageous to have differently sized segments. A large segment allows for a quick response, in which a small segment allows for an accurate control.

The control of residual moisture occurs indirectly as follows: Actually, the condensate temperature is controlled. For this, the system is started with specified condensate temperatures for each drum group. It would be useful if these specified temperatures were as close as possible to the condensate temperatures that are to be



Profile and trend display in Atmoset SMT's visualization software.



Atmoset SMT saves 10-20% energy on drum dryers.

expected. This helps to considerably shorten the settling time. When the plant is then started, the energy demand increases. The condensate temperature measuring device detects this and the energy input is increased correspondingly. After a defined time, the residual moisture measurement is started. This checks as to whether the specified residual moisture is reached or not and changes the condensate temperature setpoints correspondingly. The energy input is varied until the desired residual moisture is reached.

Why this effort?

At the start, a forerunner is in the plant, which is dry in the dryer area and does not need to match with the product to be processed regarding the weight and possible moisture. When the plant is started, the forerunner first has to be dried. From the condensate temperature, when the system detects that more energy is needed - it is delivered. When the actual product reaches the dryer, the energy demand changes again. It is adjusted once again. When the product reaches the residual moisture measurement, this controller is started. Then, the residual moisture controller undertakes the adjustment of the temperature setpoint for the condensate temperature.

Given the inertia of a drum dryer, the result is a quick and sensitive residual moisture control allowing for a stable and efficient drying process. An optimal drying result is always reached independent of the product weight or web speed. The continuity of the production process and the reproducibility of the product quality are ensured. The energy consumption of the dryer drops significantly due to the optimized heat output. This saves energy costs. Further information can obtained from Al Ameen Trading, who represent Mahlo in Pakistan.◆