

Smart coating technology that automatically adapts to batch ratio

The TP R Optima perforated coating pan provides fully automatic adjustment of all parameters during the coating process for an impressive batch size range from 10% to 100% filling volume with one and the same drum. **Jordi Carrera**, sales director of Romaco Tecpharm, explores the process optimisation benefits and flexibility of this new tablet coater.

Coatings are applied to tablets for different purposes. Amongst other things, they make tablets easier to swallow; protect them from light, air and moisture; or mask an unpleasant taste when they are taken. Film coatings are additionally used to control the release of the active ingredient in the human body.

When it comes to the application, pharma manufacturers have their sights set on two main goals. First is maximum batch size variability as a condition of responding quickly and flexibly to changing customer requirements and market trends. As much automation as possible is the second goal to ensure consistently high product quality coupled with shorter processing times.

Previous generations of tablet coaters were only able to offer variable batch sizes by exchanging the drum – a time-consuming task. Subsequently, larger batch size ranges have become possible with a single drum. Having said that, quite a few technologies require manual intervention to achieve good results.

The GMP-compliant in-wall design of the TP R Optima tablet coater provides for a strict separation between technical and production area.

CONTINUOUS MONITORING OF PARAMETERS

The newly developed TP R Optima coater enables tablet coatings of all kinds to be produced in a fully automated process for a wide range of batch sizes. The machine operator can access the formulation with the predefined process parameters via the HMI, which then runs automatically. This eliminates the need for parameters such as the spray distance and angle or exhaust air flows having to be adjusted (or re-adjusted) manually.

"The coating suspension is accurately applied to the product for any batch volume between 10% and 100%"

All parameters are monitored continuously during the coating process. The system automatically adapts them to the formulation, which means the operator is no longer required to be present throughout the coating process, freeing them up to attend to other tasks.



Automatic extendable spray arm with self-adjusting movable spray nozzles allows for variable batch sizes from 10% to 100%.

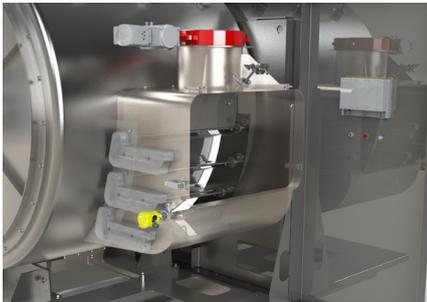
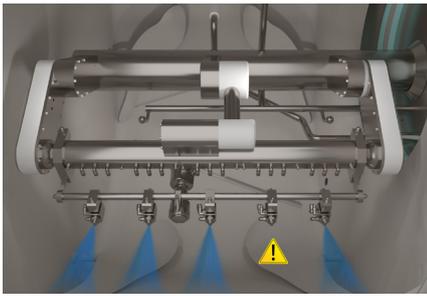
This highly automated coater delivers absolutely reproducible results. Optimal process control is guaranteed, because all manual intervention during the coating process is eliminated. For example, sampling can take place directly without having to stop coating and open the machine.

INTELLIGENT SONAR SYSTEM

The key to the TP R Optima tablet coater's ability to automatically adjust the parameters during the coating process lies in a sonar. Acoustic wave sensors continuously measure the complete tablet bed and use the data to determine batch volume. The tablet bed inclination, which varies according to the turning speed of the drum, is measured in the same way.

Therefore, the new perforated coating pan from Romaco Tecpharm allows for the ultra-precise application of the spray liquids over the entire batch size range from 10% to 100%. This is achieved as a result of the interaction between the sonar's real-time data and a newly developed nozzle arm with a three-point extension mechanism, which automatically adjusts the spray angle and distance without interrupting the coating





Blocked spray nozzles are automatically detected and cleared on the spot.

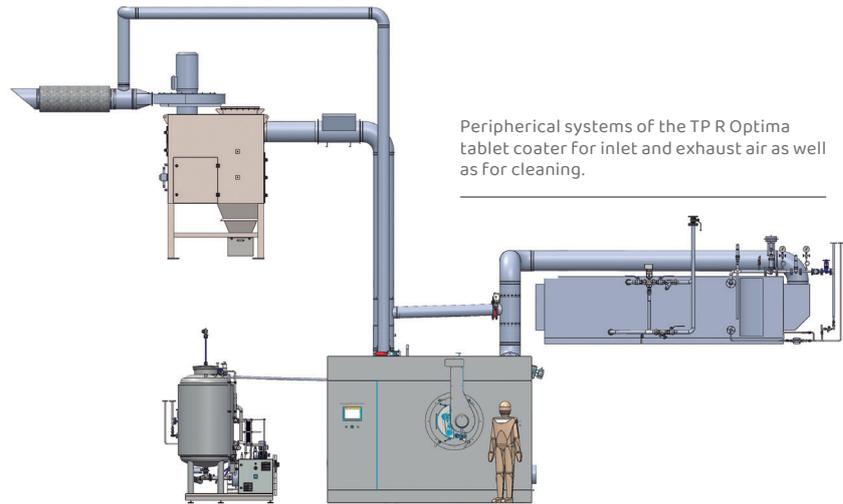
process. The long reach of the nozzle arm ensures that the suspension is applied to the tablets exactly as per the formulation, even with very small batch sizes.

SHORTER PROCESSING TIMES

Drying is a particularly important step in the tablet coating process, which begins while the spray liquid suspension is being applied. The inlet and exhaust air temperature and flow rate are crucial to the efficiency of the spraying and drying processes, as is correct air flow behaviour in relation to the batch size. Near loss-free application of the suspension and rapid drying will otherwise be impossible. It is also extremely important to adjust the drying air to prevent the product in the coater from becoming too moist, causing individual tablets to stick together.

The TP R Optima tablet coater uses a bypass to adjust the supply of process air. The vacuum that is created inside the drum can be varied according to the batch size; it stabilises the air flow and diverts the air towards the automatic air exhaust flaps. These flaps can be opened individually and continuously in a controlled manner, so that the process air is directly guided through the product. The coater's high spraying and drying efficiency is reflected in the short processing times – generally between one and three hours depending on the product – as well as the reduced energy usage.

With the precise control of the air flow inside the drum, the coating suspension is accurately applied to the product for any batch volume between 10% and 100%. In other words, the system prevents the liquid from simply running over the tablets or from being



Peripheral systems of the TP R Optima tablet coater for inlet and exhaust air as well as for cleaning.

Did you know?

Romaco Tecpharm's TP R Optima spray arm and its three-point extension mechanism are patented.

discharged without being applied. Together with the high spray accuracy, this results in a significantly lower consumption of the coating suspension and a material saving of up to 60% compared to other coating methods, depending on the application.

CLEARING CLOGGED SPRAY NOZZLES

The newly developed coating technology includes a system for automatically detecting and clearing clogged spray nozzles. The risk of such blockages occurring is actually very low in practice, but it increases as the suspension's viscosity increases.

Directly downstream of the peristaltic pump, the newly developed coating pan has a load cell that measures the amount of spray liquid being pumped. If the load cell registers that liquid is no longer exiting from one of the nozzles, the coater initially attempts to unclog that particular nozzle by building up maximum pressure. If this is not possible, an individually configurable mechanism takes over – depending on the product being processed, either the coating process continues and the system simply issues an alert, or the process is immediately interrupted. In this way, the coating pan's response to nozzle blockages can be fine-tuned to the product in question.

GMP-COMPLIANT IN-WALL DESIGN

The TP R Optima tablet coater was designed in conformity with the standards of Good Manufacturing Practices (GMP). All product-contacted parts on the inside of the coater are readily accessible and easy to clean using wash-

in-place (WIP) procedures, so that cleaning validation is totally straightforward.

There are no dead spaces where product residues could accumulate, leading to cross-contamination. The design of the spray arm particularly rules out such critical spaces due to its extendable and retractable mechanism.

Furthermore, the tablet coater's in-wall design enables strict separation between the 'grey area' and the production area in the cleanroom. If servicing is required, the technician can carry out the necessary work without having to enter the cleanroom, eliminating the need to decontaminate the area after servicing. What is more, is the batch being processed does not necessarily need to be disposed of following a service assignment in the 'grey area' and can be processed further once the work is completed.

NEXT-LEVEL PROCESSING AUTOMATION

Romaco Tecpharm's new perforated coating pan combines very high flexibility with premium product quality and a previously unattainable level of automation in tablet coating.

Nevertheless, the system still allows individual parameters to be adjusted manually, if required.

The TP R Optima tablet coater, which is available in seven different sizes and sourced through Romaco's local agent PMD Packaging, is equally suited for product development with laboratory-scale batch sizes and for scale-ups to larger production volumes. The machine is also ideal for suppliers producing under contract which need to run a wide range of batch sizes on one line and often face 'last-batch challenges', especially during campaign manufacturing. ■

PMD Packaging – pmdpackaging.co.za
Romaco Tecpharm – www.romaco.com