2 · 2009

BOHLE INNOVATIV

WE DEVELOP YOUR FUTURE.

KOCO®

Extension of continuous production line.

The previous edition of Bohle Innovativ (#1-2009) presented Bohle`s new EASY FLOW® system, a continuous granulator with a down-stream fully integrated dryer.
To supplement the product line, Bohle is now introducing its latest innovation for continuous production operations: **The KOCO® continuous coater.**
Continuous processing in film coating significantly reduces production costs, minimizes intermediate storage and avoids costly in-process controls (IPC).
Furthermore, the new KOCO® coater provides a number of additional substantial advantages in comparison to a conventional batch processing method.
KOCO® closes the gap between tableting and packaging providing an integrated solution where all manufacturing steps are interconnected for continuous production flow.
This issue of Bohle Innovativ will provide deeper insight into the functions of KOCO® and its corresponding advantages, allowing a first glance into the innovative details of this system. →

In this issue:

Dear readers,

September 2009

On August 12th, I was fortunate to celebrate my 70th birthday. A reason to pause and reflect on many years of excellent co-operation with all of you.

It was on July 1st in 1981, when the newly founded Bohle Sondermaschinenbau GmbH started business in Ennigerloh, Germany. There were only four people involved at that time: Mr. Robert Stauvermann, responsible for all shop work, a part time office assistant, my wife Marianne and myself. In the beginning all engineering and design took place in rented office space. The actual manufacturing of equipment was subcontracted. After an initial starting period of two years we took a leap forward and opened our first workshop in a rented building. In 1985 we finally acquired a patch of land located in an industrial area. One year later the first Bohle manufacturing hall including adjacent office space was completed. The opening ceremony followed on Sept. 1st 1986.

After this successful start, sales increased by 50% for seven consecutive years. Bohle container blenders became more and more established and were used in large numbers throughout the pharmaceutical industry.

Beginning in 1990 the development of an additional machine commenced: The Bohle single pot granulator. In parallel we increased our sales activities and founded our first subsidiary, L. B. Bohle LLC, in the United States. In the following years additional equipment such as coating machines, sieving and milling equipment as well as automated docking stations was developed and built.

By the year 2000 Bohle coating systems had secured a solid technological head start over the competition resulting in a strong increase in sales. In addition our engineers began designing Bohle fluid bed technology.

Dear readers and friends, at this time I would like to take the opportunity to thank you for all the wonderful collaborations throughout the past. Furthermore I wish to announce further developments in our granulation and coating technology. This includes the KOCO® continuous coating system which is being addressed in detail in this edition of Bohle Innovativ. The KOCO® meets our theme "to be better than the market" in a very particular way.

Very truly Yours

→ Continuation: **KOCO®**

Coating pan and air flow

The geometry of KOCO®`s fullly perforated coating pan is much longer when compared to a regular batch coater. The well known counter current mixing spirals of Bohle`s batch coaters cannot be used in the KOCO® system. Tablets would be transported too fast from the charging side to the discharging side of the coater. To achieve a proper mixing of the tablet bed, the inside of the pan is equipped with anti-sliding-bars. All tablets move slowly through the coater in the horizontal direction. The residence time for a tablet is approximately one hour. Due to KOCO®`s excellent coating uniformity, the coater's applications include cosmetic coatings, taste masking or colour coatings. A charging pipe to continuously feed the coater is integrated into the front door. The back of the coater holds an integrated discharge module which is individually driven to control continuous discharge. To constantly measure the gun to bed distance, a laser measurement system is integrated into the spray arm. The measured value is used to determine and maintain the filling volume at a set level. In addition, the laser system controls the speed of the discharge module accordingly. Incoming process air is guided to the lower side of the coating pan and enters the tablet bed through the inlet air plenum.

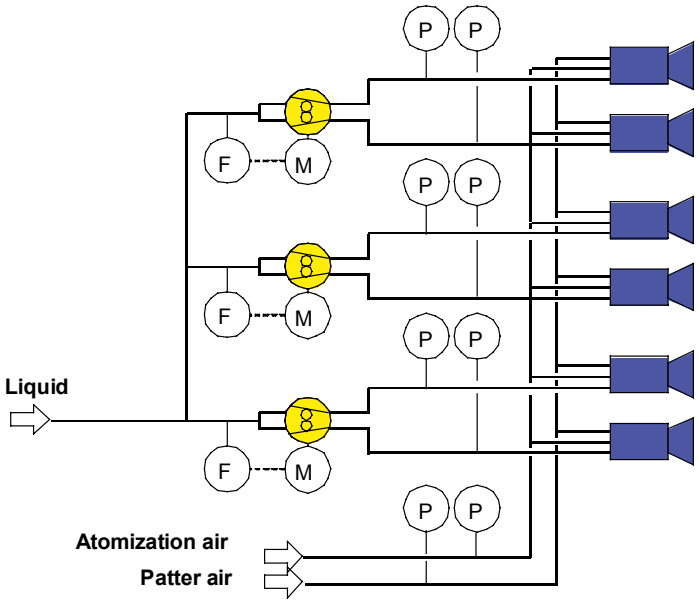
The exhaust air, after passing through the tablet bed, is also extracted at the lower side.
Spray nozzles are positioned directly above

the exhaust air plenum. Thus process air as well as atomized suspension flow in parallel. Process air flows directly through the tablet bed from the inlet air plenum into the outlet air plenum. The portion which leaves the tablet bed into the coating pan is pulled in laminar flow, without turbulence, back to the exhaust air section. The advantage of this air flow system is avoiding any risk of spray drying when process air meets the suspension spray since the inlet air cools down as it passes thru the tablet bed. The result is a high quality tablet core surface film with minimized coating solution loss. ■

Spraying system

KOCO®'s spray guns are supplied with coating suspension by peristaltic pump. The spray arm is equipped with six spray guns. These guns are divided into three groups. Each group can be switched on or off separately. Each spray nozzle is equipped with a pressure sensor to detect any possible clogging. In addition, each nozzle has an individual return flow assembly for recirculation of the suspension flow. This feature allows the coating suspension to stay in flow during the beginning or towards the end of the continuous process to avoid sedimentation during spray interruptions. Each nozzle group can be controlled individually to precisely adjust the required spray rate.

Dividing the six nozzles into three groups allows the start-up and shut down phases of the continuous process to be performed without any product loss. During the start-up phase the discharge side of KOCO® is tilted to its maximum inclination while tablet cores are continuously fed into the coater for an initial period of time. As soon as enough tablets have accumulated below the first two spray nozzles, this group is activated to commence spraying. After additional time the angle of inclination is decreased and tablets now accumulate below the second group of nozzles. The second group of nozzles is then activated for spraying. Finally the tilted pan is returned to the horizontal position and the fully automated continuous process is in operation (all nozzle groups spray).



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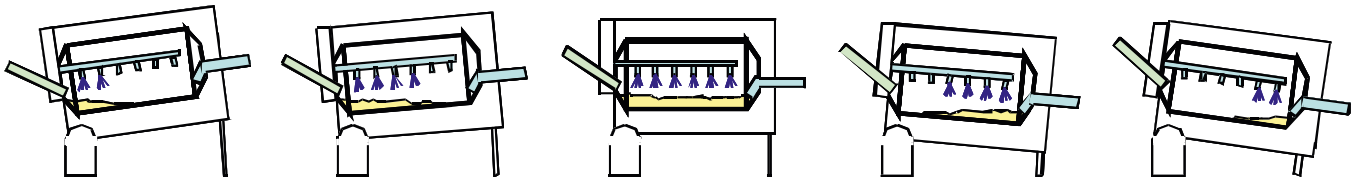
➔ Continuation: **Spraying system**



To complete the continuous coating cycle, the process is reversed by tilting the pan into a negative inclination while shutting down spray nozzles group by group as coated tablets are discharged.
Mounting or dismantling the individual spray guns from the support arm is simple and does not require any special tools. Gun to bed distance can be adjusted from the outside of the machine. The spray angle between support arm and tablet bed is adjustable as well. Adjustments can be made during the process through the front door. No loose supply lines for atomizing and pattern air are inside the coater. All tubing is fully integrated. Surfaces which are difficult to access for cleaning purposes are completely eliminated.
Atomizing and pattern air can be adjusted individually during the process. ■

Air handling units (AHU)

The supply air unit consists of a double-wall, isolated housing (sandwich design). Maintenance doors allow easy access to the filter inserts. The KOCO® is equipped with a steam heated coil to warm process air to a set value. A steam regulating valve controls the heating cycle.

The coating process itself is controlled by the exhaust air temperature. Thus process runs can be performed with a constant exhaust air temperature. Exhaust air temperature is controlled by adjusting the incoming supply air temperature. ■

Cleaning and inspection

The machine body with its self supporting fully welded housing has been developed and manufactured to meet the requirements of excellent cleaning. All corners inside the housing are rounded. For cleaning applications, internal surfaces are smooth and even with excellent accessibility. The modularly designed washing system can be upgraded with various options up to and including a fully automated cleaning system. Different levels of cleaning can be achieved. Starting with flushing the product contact surfaces as the simplest version, various upgrades can be incorporated to provide a full cleaning system including an integrated detergent station and final rinse cycle.
Large side doors with inflatable seals allow access to the inside housing and the outer coating pan for visual inspection. ■

This edition of Bohle Innovativ merely touches on a few aspects and advantages the KOCO® can provide as added value in pharmaceutical production. Along with cost reduction and time savings the newly developed coater provides numerous advantages to every pharmaceutical plant. Get more information on KOCO® and challenge us to integrate such a system into your plant! Take advantage of efficient continuous operations with Bohle and our continuous production line.

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