Conveying systems for fully automated, unmanned feeding in the pharmaceuticals industry

The customer
SANDOZ Pharma AG manufactures specialist pharmaceutical products for the treatment of cardiovascular disorders, illnesses and symptoms of ageing in the central nervous system, hormone imbalance, disorders of the bone metabolism and immune system and for the treatment of asthma and allergies.

The main focus of the investments were the extension and modernisation of the production lines for SANDOZ medicines and remedies, and expansion of equipment for environmental protection and safety.

In the following, a spokesperson from the company explains the advantages in production using automatic materials handling systems from AZO.

The task
The task facing us was to install conveying systems for the fully automated feeding of machines for tablet production, for filling hard capsules and for capsule inspection.

A particular challenge was that the handling during feeding was as gentle and non-destructive as possible using pneumatic conveying equipment, since direct top feeding using containers was not feasible due to insufficient clearance.

Another challenge was to install the under pressure generator outside the production process. Production safety, hygiene and closed systems were a key issue in the decision for investment.

THE SOLUTION

“\r
In AZO we have found a partner company which has supplied us with efficient conveying systems that allow us to attain our goal of implementing unmanned, automatic production lines. ”

Quote from the customer
The task
The task facing AZO was: segregation-free feeding of the tablet press from the 1600 litre batch container. Streamlining of the mixing process led to this size container. As the existing ceiling clearance was insufficient for feeding the tablet presses in free fall from 1600 litre containers, AZO’s pneumatic conveying systems with their low profile were obviously the most suitable solution.

The AZO solution
The AZO solution
In order to extend a fully automated production line for tablet manufacture, the following investments were necessary:
• AZO vacuum impulse conveying system for feeding the tablet press
• computer-operated tablet press
• dust filtration unit
• checkweigher for online in-process inspection
• metal detector
• weighing and conveying systems for tablets

subsequent AZO vacuum conveying is integrated into the vibration frame. The vibration device is needed to make sure the container is emptied without leaving any residue. The transported material is fed via the receiver into the filling hopper on the tablet machine. Automatically purged filters in the receiver clean the required conveying air. The conveying air is supplied via a vacuum pump to the central suction unit. The vacuum pump and control logic were housed without difficulty in a soundproofed cabinet inside the pelletising cabin. Feeding was fully automated and was controlled by the request indicators. As soon as the tablet material in the filling hopper on the pelleting machine drops below a certain level, a new conveying cycle is initiated.

“The exceptionally good experience we had with AZO’s vacuum impulse conveying systems led us to go one step further and to install more complex, unmanned production lines, which also operate at night.”
Quote from the customer

The reliability
The fully automated, segregation-free AZO vacuum impulse conveying system for feeding the tablet press made handling of packaging safer and reduced the need for analyses. Even with the low ceiling clearance above the tablet presses it is now possible to work from 1600 litre batch containers.

The AZO feeding system ensured dust-free, hygienic production rooms. Variation in bulk density from attrition with granulates were eliminated. Operating staff have no contact with the product throughout the entire process from pellet material down to the individually dosed medicine. It was therefore possible for AZO to implement unmanned tablet production in line with the customer’s requirements.

“The AZO vacuum impulse conveying system transports granulate and powder mixes carefully and segregation-free. Pneumatic conveying has therefore established itself in our firm as an ideal, alternative feeding system.”
Quote from the customer
Fully automated, unmanned filling of hard gelatine capsules

**The task**
The task facing AZO was: automatic feeding of the capsule filling line with powder mixes, pellets and empty capsules.

![Diagram](Image)

1. powder mix
2. empty capsules
3. vacuum impulse receiver
4. low-velocity vacuum receiver
5. vacuum pump
6. capsule filling machine
7. capsule weighing unit
8. belt conveyor
9. 600 litre finished products hopper

**The AZO solution**
The AZO solution
Both powder mixes, pellets and empty capsules are fed through the AZO low-velocity vacuum conveying systems to the capsule filling machine in order to fill hard gelatine capsules.

“In extensive tests we were able to demonstrate that there was no negative impact on the consistency of the contents of the individual doses of medicine as a result of pneumatic feeding.”
Quote from the customer

Automation of this production line was extended with feeding of the empty capsules that is controlled by demand. The empty capsules are removed from a 600 litre container using a special AZO suction nozzle. This system eliminates any blockage in the intake opening and thus ensures safe discharge of the empty capsules at all times. The partial vacuum needed for conveying can be regulated so precisely that the empty capsules are not exploded during transport.

Compresion of the capsules is also ruled out with this careful conveying. Special lining of the receiver and a specially designed discharge mechanism prevent damage to capsules, which would lead to interruptions in the filling process and would make unmanned production impossible. The vacuum pumps that create the partial vacuum for providing powder or pellets and supplying empty capsules, are housed together with the control logic for the vacuum conveying line in a sound-proofed cabinet. The conveying air is passed into a central exhaust air disposal system.

“The capsules are transported by the AZO low-velocity vacuum conveying system with the utmost care and without the slightest damage.”
Quote from the customer

**The reliability**
The changeover to fully automatic capsule filling with AZO has led to a maximum level of reliability in this production line and an extremely high standard of quality.

Segregation-free feeding from 1600 litre batch containers is now in successful use here. Careful feeding of the empty capsules from the 600 litre containers is carried out without causing damage.

The machine running time has been increased without the need to introduce shift operation. Despite low ceiling clearance above the capsule filling line, feeding with pellets and empty capsules from containers was possible. In addition, there is the advantage that AZO conveying systems are easy to clean and compact in design.

“A production line equipped like this allows us to fill hard gelatine capsules to a high standard of quality automatically and in unmanned operation.”
Quote from the customer
Automated feeding of capsule inspection lines

The task
The task facing AZO was: feeding capsule inspection lines with filled hard gelatine capsules with automatic low-velocity conveying systems from AZO. The hard gelatine capsules are subjected to a visual inspection after the filling process and the 100% weight check.

“Thanks to automated, unmanned production, we have been able to increase the machine running time with the capital-intensive tablet pressing and capsule filling lines to 24 hours, without having to resort to using staff in conventional shift work. A financial advantage that will allow us to produce even more cost-effectively in future.”

Quote from the customer

The AZO solution
The capsule inspection lines are fed with the filled hard gelatine capsules by the AZO low-velocity vacuum conveying systems. In parallel with feeding of the empty capsules, a special AZO air intake pipe ensures that the filled capsules are drawn smoothly. The capsules are conveyed carefully into the receiver from the 600 litre containers via a vacuum conveying line operating according to the low-velocity vacuum principle. Damage to the capsules through compression or crushing is ruled out with this process. The conveying air is guided to the vacuum pump, which is also connected here to a central exhaust air cleaning system.

Now that it is possible to use the 1600 litre batch container, there have been considerable savings on account of less changes for packaging and less outlay for analyses and documentation. Without the use of this batch container, it would have been necessary to change the standard drums used until then eight times over the same period of time. AZO therefore satisfied the high requirements for quality from SANDOZ Pharma AG to the maximum with its automated materials handling systems.

The reliability
The automated feeding of capsule inspection lines with filled hard gelatine capsules is afforded maximum reliability with the low-velocity vacuum conveying systems from AZO. In this production line, feeding of the capsule inspection line is automatic and driven by actual demand. The clearance above the capsule inspection line is extremely low considering the conveying capacity. The design is unusually straightforward and, as a result, it is very easy to clean. All in all, AZO identified the customer’s requirements correctly in providing this automated solution for pharmaceuticals manufacture and has implemented it such as to meet quality targets to the maximum. The excellent collaboration and open communications made it possible to find solutions that were perfectly matched to the particular needs of this pharmaceuticals company.

When it came to drafting these plans, AZO’s extensive experience with automated materials handling systems in the pharmaceuticals sector was of great benefit.

“Thanks to automated, unmanned production, we have been able to increase the machine running time with the capital-intensive tablet pressing and capsule filling lines to 24 hours, without having to resort to using staff in conventional shift work. A financial advantage that will allow us to produce even more cost-effectively in future.”

Quote from the customer