

# Volkmann Vacuum Conveying Applications



## Powder Handling in the Pharmaceutical Industry: A Case Study



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## **Powder Handling in the Pharmaceutical Industry** **A Case Study**

VOLKMANN Inc.

*The correct handling of bulk solids throughout the entire production chain is critically important during the manufacturing and processing of pharmaceutical products. From the loading of reactors and stirring vessels with active pharmaceutical ingredients (APIs) in potent powder state, through the transport of finished tablets or capsules, vacuum conveyors are used to ensure enclosed transfer. The flexibility and user-friendly operation of Volkmann vacuum conveyors to perform multiple tasks in the production chain is demonstrated in the following case study at Rottendorf Pharma, Ennigerloh, Germany.*



The broad range of Volkmann vacuum conveyors allows optimum customization to the specific conveying task.

Originally founded as a family business in Berlin in 1928, Rottendorf Pharma GmbH has been located in Ennigerloh, Westphalia since 1949. After the death of founder Andreas J. Rottendorf, the company was converted into a public corporation. Today Rottendorf runs an experienced and competent contract manufacturing pharmaceutical company in Europe, developing and producing solid oral dosage forms for many reputable international pharmaceutical companies. Rottendorf operates a second contract manufacturing facility in Valenciennes, France. Rottendorf has approximately 900 employees with annual revenues of ~\$130 million Euros. Their key competencies cover the areas of development, production, packaging, laboratory and service. They are FDA audited.

Due to the high potential for contamination in active ingredients such as Tamoxifen, Flutamid or Clomifen handled within the facility, all manufacturing steps at Rottendorf are conducted in separate clean rooms; each with its own access, air management system (100 % intake and exhaust), personnel sluices, and laboratory. For all production steps – weighing of the raw materials, granulation, drying, compacting, mixing, tableting and tablet coating – only the most advanced technology machines are used. Volkmann pneumatic vacuum conveyors are the chosen conveyors for feeding, transporting and discharging the bulk solids throughout the various production steps.

Working as a fully enclosed system, these pneumatic feeding systems not only transfer powders from point A to point B, they actively eliminate product contamination. During the powder or tablet transfer, there is always negative pressure inside the system to eliminate dust emissions or spillages and to keep the production area clean.

In contrast to older mechanical conveying methods such as auger conveyors, the Volkmann vacuum conveyors allow quick and easy product changes resulting from their “no tools required” dismantling and cleaning. This feature is particularly compelling due to the many product changes Rottendorf faces as a contract manufacturer.

In seeking a product transfer solution to their manufacturing issues, the advantages of vacuum conveying were obvious to management at Rottendorf; however, Rottendorf needed a modular design to accommodate their wide range of applications while still providing improvements to material flow throughout the production facility. Other critical factors that weighed in their decision making process were the types of vacuum pumps available, the design of the receiver vessel, and the availability and interchangeability of the filters and necessary valves.

Volkmann vacuum conveyors offered considerable advantages when compared to older technologies such as suction conveyors, and delivered the other features required by their operation. As a result, Rottendorf selected Volkmann vacuum conveyors initially to work in the feeding of powder into their tablet presses.

### **Feeding powders into tablet presses**

The Volkmann Pneumatic Pharmaceutical Conveyor (PPC) replaced an existing older technology suction system to feed powders into tablet presses. In addition to the improvements related to mounting and disassembling, resulting in easier cleaning, the Volkmann conveyors also provided the sought after production boost in conveying capacity due to their ability to maintain constant material flow and product transfer with no segregation or separation and eliminate difficult hand transfer of powders.



Feeding of pharmaceutical powder into a tablet press with a Volkmann Vacuum Conveyor (shown on top of the tablet press)

The Volkmann PPC provided automatic feeding to the tablet press by picking up the powder mixture from the base of a pharmaceutical container. The PPC's integrated level control system guaranteed the required and constant amount of powder was fed into the press and eliminated the press sensitivity issues occurring when a large inlet hopper discharges its heavy load of powder.

The Volkmann PPC was also able to convey the most delicate powder mixtures with no significant segregation or separation, even when the active ingredient was only present in very small proportions. This is a result of the special design of the PPC system allowing high levels of vacuum based on the pump pulling as low as 28 inches of mercury.

As batch sizes kept increasing in size, so did the IBC container sizes, making the lifting and handling of these huge containers to the top of the tablet presses highly impractical. The Volkmann PPC was able to cleanly transfer the product from the container without any lifting. In addition, the segregation of APIs as a result of the funnel flow and rat holing that occurred from gravity pull during IBC container discharging was also eliminated with the Volkmann PPC.

Volkmann's IQ/OQ and validation documentation also played an important role in Rottendorf's decision to choose Volkmann conveyors for its manufacturing operation. Mr. Antonius Piekenbrink, responsible for the shop floor area and maintenance at Rottendorf, stated: "Apart from the very positive experiences we had with the conveying and handling by Volkmann vacuum conveyors, their pharmaceutical documentation is exemplary."

These advantages of the Volkmann PPC series has led many tablet press manufacturers to offer their tablet presses with Volkmann PPC conveyors installed. In so doing, pharmaceutical companies are guaranteed an approved loading system when purchasing a new tablet press.

### **Emptying of powder-laden trays after drying**

Rottendorf had been using a manual operation where an operator would lift heavy tray sheets laden with powder and then empty them by tipping them over, creating significant airborne dust

in the process, and increasing the opportunity for explosion. Rottendorf was seeking a method of powder conveying to eliminate this loss of powder, increase protection of the workers and improve ergonomics.

Rottendorf initially investigated a tray-tilting device to transfer the powder, but that machine would have required too much floor space in the limited production area and the actual discharging of the trays would have increased production times in order to avoid any dust generation. However, as a result of their positive experiences with the Volkmann PPC series in transferring powder into their tablet presses, and after attending Volkmann's 24<sup>th</sup> annual "ATEX, Explosion Protection & Powder Handling" seminar where prevention methods for avoiding explosions from powders were explored, Rottendorf elected to use an ATEX-certified Volkmann aspiration and feeding system to empty their powder-filled trays once the powder had been oven-dried.

Using a wide suction nozzle (similar to the one used as a vacuum cleaner accessory) the material was aspirated under vacuum from the tray's surface and then moved via negative pressure through the conveying line over the necessary height and distance to feed the powder into the dry milling process. According to Mr. Norbert Göbel (Head of Department Dispensary, Granulation & Blending at Rottendorf): "Our mission is accomplished; the powder spillage in the milling area has been significantly reduced by using a Volkmann vacuum conveyor."

As a result of these positive experiences with Volkmann vacuum conveyors in their German facility, Rottendorf now successfully uses Volkmann products at their contract manufacturing site in France as well.



A Volkmann vacuum conveyor for the feeding of a blister packaging machine (not shown) with coated tablets/pills

### **Choosing the appropriate system**

These Rottendorf applications illustrate how Volkmann's vacuum conveying technologies can be put to work in today's demanding pharmaceutical manufacturing environment. Volkmann's in-house experienced engineers can draw from a wide range of proven design modules, where they maintain control of the processes, to develop the appropriate solution. For instance,

specific “add on’s” can make Volkmann’s vacuum transfer even more gentle to convey finished tablets, capsules and pills without damage, segregation or separation.

### **About Volkmann**

Volkmann employs approximately 80 people and in addition to its extensive manufacturing and test center in Germany, has daughter companies in the United Kingdom, France, Holland, and the United States, as well as trading partners in other major industrial areas of the world. In-house manufacturing also allows unlimited adaptations and the ability to design customized solutions. A wide range of pneumatic and electrical operated vacuum pumps are available to suit client requirements. Useful accessories offered include:

- Modular sack/bag feeding stations (under aspiration or enclosed)
- Pharma standard mobile trolleys and hoists (up-down and swiveling) which make it possible to use the same conveyor for different applications and ensure easy access for cleaning
- WIP & CIP options

Volkmann’s pneumatic vacuum conveyors are free of ignition sources and fully ATEX-approved for use in explosive environments and were the first such conveyor to receive this certificate from German TUV. Almost daily conveying trials are preformed in the test center with various bulk materials from all types of processes throughout all industries. Additional test facilities were established in the U.S. division at the Hainesport, New Jersey facility in 2008.

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