A Road Map for Selecting Pneumatic Conveying Systems for Packaging & Refill Applications

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Demystifying Pneumatic Conveying Systems for Packaging & Refill Applications

It's one thing to move materials during the production process, but when it's a finished product on the packaging line, choosing the right material handling system is essential. Getting it wrong can result in squandered production time, product loss and wasted raw materials.

Pneumatic conveying systems are a viable option when moving product from the manufacturing line to the packaging line, but often choosing the right system can seem overwhelming.

There have been many technical papers written about dense phase and dilute phase conveying, and whether the system should be a negative or positive type of system; however, there often seems to be lack of definitive information that plant engineers can use to clearly define their own system. It's similar to getting lost when a local gives directions because instead of giving a straightforward route, the unfamiliar are led through a maze of back roads.

Just as there are various factors given consideration when planning a route to a destination, such as time, distance, conditions, purpose and safety, there are many factors to take into account when designing a pneumatic conveying system to deliver a finished product to a packaging line.

Pharmaceutical Packaging Application Utilizing VAC-U-MAX Receiver

In packaging operations, the most common pneumatic conveyor systems are vacuum conveying systems, but before heading into that topic, a basic understanding of the components that make up a pneumatic conveyor system is essential.

THE FUNDAMENTALS

A standard pneumatic conveying system consists of five basic pieces of equipment that come together to work as one:

- a pick-up point;
- a convey tubing;
- a vacuum receiver;
- a vacuum producer, and;
- a control module.

The selection of a pick-up point depends on the type of container used to store materials or products. If the product is in drums or box, then a pick-up wand, inserted into the container, may be used to pull material from the container into the convey tube. When material is stored in bags, ergonomic bag dump stations that reduce spillage are often utilized. This allows the emptied material to flow by gravity into the vacuum conveying line. For supersacks or large totes, bulk bag dischargers are frequently the choice as a pick-up point.

From the pick-up point, material flows through convey tubes to the vacuum receiver. There are a number of different types and sizes of vacuum tubes that are utilized and chosen, depending upon application.

Vacuum receivers transfer material from above the packaging machinery through discharge valves on the bottom. The material is conveyed from the pick-up point to the vacuum receiver until it reaches a pre-determined load, or is "made", then the discharge valve opens and the material drops into the packaging machine.

Vacuum producers are the core of pneumatic conveying systems and work with the control panel to manage the flow of material through the convey tubes to the vacuum receivers. Two of the most common vacuum producers are venturi powered units that run on compressed air, and positive displacement pumps that run on electricity; and, each has its advantages and disadvantages.

The advantage of units that run on compressed air is that there are no moving parts and therefore require no maintenance, and are ideal for use in hazardous areas. The disadvantage of using compressed air is that over time, it can be expensive even though it offers lower upfront costs than positive displacement pumps.

Although positive displacement pumps have higher upfront costs and moving parts that require oil changes twice a year, they are very reliable pieces of equipment that have long equipment lives and a lower overall operating cost.

The most basic vacuum conveying system is a timed system, consisting of two basic cycles—a convey cycle and a discharge cycle. The control panel, which often works in concert with some type of level control on the packaging machine or feeder, dictates the amount of time that the system conveys product to the receiver and then how long the discharge valves are open to drop the material into the packaging machine.

Because each packaging operation has unique requirements, individual components are selected from each of the five basic pieces of equipment to design a conveying system that achieves the packager's desired outcome.

STANDARD VS. CUSTOMIZED

Many users of vacuum conveying systems often assume they need an expensive custom, one-of-a-kind solution. However, pneumatic conveying companies with extensive industry experience in the packaging arena, like Belleville, NJ-based, VAC-U-MAX, have pre-engineered systems that address common conveying problems in the packaging line and customizes them by providing option capabilities that address product specific needs.

A pioneer in vacuum conveying solutions since 1954, VAC-U-MAX is one of the few suppliers who routinely design and build custom and semi-custom pneumatic systems and support equipment for conveying, batching and weighing dry materials. Vacuum conveying systems are adapted according to how much automation a manufacturer desires and the amount of packaging equipment involved.

In a packaging line, whether moving caps and closures, glue chips, or dry materials such as powders, conveying experts compile a great deal of information about the application to design an efficient vacuum conveying system. Perhaps the most common issues packagers face when implementing a pneumatic conveying system is product quality control; because, when moving powders and dry materials

Sanitary Stainless Steel Powder Receiver by VAC-U-MAX

change in size, density, and texture can occur and potentially affect product performance.

To learn more about how a pneumatic conveying systems can reduce costs, create a safer environment, increase throughput and production, visit www.vac-u-max.com/pneumatic.

Capsule Filling Application Utilizing VAC-U-MAX Sanitary Stainless Steel Receivers

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