Packaging Quality Improved with Vacuum Conveying System Upgrades

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Vacuum conveying is very common in the food industry and while most suppliers say they can move product from point A to B, there are some applications that require deeper knowledge to thoroughly assess and meet all requirements for ergonomics, safety, efficiency and quality control.

In an ongoing project to improve processes whenever and wherever it can, a global manufacturer of private label retail, food service and specialty brand teas, purchased an extension conveyor system to improve efficiency and ergonomics.

Prior to implementing the extension conveyor, a vacuum conveyor system transferred raw materials into portable silos that workers rolled from one production machine to the next. Finished product was then transferred from silos to packaging machines using a VAC-U-MAX packaging vacuum conveyor. The new extension conveyor system, from another vendor, transported raw materials from large bags that workers cut and introduced into the conveying line. Once in the conveying line, material moved through the production process and the finished product conveyed to mobile silos.

The packaging conveyor, in use for 10 years, then transported the final product from mobile silos to packaging machines. The tea manufacturer produces multiple grades of teas and the new extension conveyor system generated a higher volume of fine particles in the final product of its high-grade whole leaf tea products, resulting in a quality control issue. Although the extension system vendor appropriately sized the system to gently move the whole leaf tea through the system, smaller particles (introduced into the system as result of breakage during transportation of raw materials from suppliers) further degraded while traveling through the extension system, creating a fine dust.

In addition, purging filters in vacuum conveying systems, forces some dust back into the receivers and therefore the product, which in most industries isn't an issue. After unsuccessful attempts to remedy the problem with the vendor of the extension conveyor system, the tea producer contacted

Carryover Tea Dust Captured and Safely Controlled with VAC-U-MAX Filter Separators.

VAC-U-MAX for a solution.

After consultation, it was clear that the other vendor's system wasn't pulling off the fine dust the process was creating, so all entrained dust remained in the product and carried along the entire process.

The fine tea dust, up to 200 microns in size, is very receptive to static charge and was clinging to the inside of the cellophane packaging that wrapped around the boxes resulting in quality control issues and increased costs through lost product, cleaning times and wasted production time.

The dust is just part of the product, but the company did not want to introduce it to the packaging machine because it makes cleaning and sanitation difficult. The inherent nature of fully enclosed vacuum conveying systems prevents loose powder and dust from becoming airborne contributing to a cleaner and safer environment all around.

Vacuum conveying systems are fairly simple, consisting of five basic parts, a pick-point where material enters into the conveying system, convey tubing which transfers material between equipment, a vacuum receiver (typically equipped with a filter, and therefore often referred to as a filter receiver) which is an intermediate holding vessel for materials, a vacuum source that powers the system, and a control panel that tells the system how to operate.

In essence, larger more sophisticated vacuum conveyor systems that connect multiple processes consist of several conveying systems (without need for multiple power sources or control systems), and therefore require multiple vacuum receivers.

Vacuum receivers are the second most modified component in a conveying system, after pick-up points, and are integral part of conveyor performance. When dealing with dust, system design requires interpretive consideration of multiple factors to reduce exposure and those factors change with each material, application and process.

In industries where equipment is taken apart and cleaned on an hourly, daily or weekly basis, like food and pharmaceutical processing, the use of filterless receivers, or cyclones (a specific design of filterless receiver that operates in a different manner), in combination with a filter separator can reduce housekeeping times, improve product quality, reduce the possibility of cross-contamination and help with allergen control.

The most common reason for including filterless cyclones in conjunction with filter separators is to eliminate the need to clean, maintain and replace six or eight filters from receivers that sit above equipment. Filter separator is located remotely on the ground for easy cleaning and located away from areas where dust can pose problems.

In those type of situations there is an extra unit sitting on the ground and each of the units on the silos have air locks instead of filters. It can be done without the expense of additional equipment but there is still dust in the product, which for many industries is not an issue.

In fact, most companies want to minimize the amount of carry-over of materials, but this application required maximizing the amount of dust captured. Carryover is the amount of product collected in the filter separator to separate the air from solids (dust) inside a vessel to prevent solids from reaching the vacuum pump. The retrofit to the other vendors extension system included design principles similar to the 10-year old packaging system that uses two filterless receivers that share a common filter separator to pull off the fines- except for the magnitude of scale.

During the testing phase for the retrofit, the raw samples looked pretty clean before going through the system and the veteran conveyor experts knew that only full-scale testing could prove the reduction in fine particle dust. A visual inspection of the raw samples before conveying and the after samples showed a marked difference in how much nicer the end product looked.

Swing-Away cover and Top-Load Filters eliminate confined space issues during filter maintenance.

After factory acceptance testing, a pre-engineered system arrived at the tea manufacturer with several retrofitted filter separators to integrate with the extension system to remotely maximize the amount of carry-over of tea dust drawn away from the extension system. The retrofit eliminated 70-80 percent of the fine dust from the product and the customer gained throughput because there is better product going to the packaging machines, less clean up needed, and no wasted production time.

To learn more visit www.vac-u-max.com and fill out a Request-for-Quote.

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