Vacuum Conveyors Panacea for Safety Hazards?

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Vacuum conveyors won't solve every safety hazard, but they do eliminate a great number of hazards inherent during manual transfer of powders and bulk solids, such as work-related musculoskeletal disorders (WMSD), fall, respiratory and dust explosions.

Until fairly recently safety improvements often fell into the intangible financial category of cost avoidance—reducing the potential for direct and indirect costs of injury and the resultant increase of insurance rates—relegating them to the bottom of the list of capital expenditures.

That model of thinking has shifted to one that bonds automation to safety. Automation increases safety by eliminating tasks that can cause injury, and Liberty Mutual asserts, "an environment of increased safety due to automation can also boost the bottom line."[1]

Manpower and labor costs are eternally hot topics across all industries, and the acute manpower shortage plaguing manufacturing today exacerbates manufacturing's already shrinking workforce.

This acute shortage increases the likelihood of worker injury due to new and untrained workers being more prone to accidents and injury, according to Liberty Mutual, "leading to absences, sick days, and workers compensation claims."[2]

Operator transfers ingredients from commercial containers with a wand and vacuum conveyor, conveying material into hygienic drums which meet specific weights.

Benefits of Vacuum Conveyors

Automating materials transfer with vacuum conveyors regularly produces savings through reduced manpower, reduced materials costs, increased uptime, improved product quality and a healthier, cleaner environment.

Available in a variety of sizes, types and materials of construction, including carbon steel, 304 or 316 stainless, basic vacuum conveying systems consist of a single pick-up point, a vacuum receiver, a vacuum producer, convey tubing and a control panel.

Vacuum conveying systems are fully enclosed, protecting materials from air, dirt and waste. Because product does not escape from vacuum conveying systems, particulates that can endanger workers

respiratory health or settle on equipment and surfaces posing an explosion hazard are prevented from entering the environment.

Air-operated venturi powered vacuum producers are by far the safest vacuum source for vacuum conveyors as they are by design intrinsically safe, generating no heat or sparks. Where compressed air is not sufficient, or when conveying materials at higher rates and longer distances, positive displacement pumps are the preferred vacuum source for vacuum conveying.

Suitable for food, pharmaceutical and chemical industries to load mixers, packaging machines, tablet presses, volumetric or gravimetric feeders and any other application where bulk dry powders are conveyed to processes from 300 feet away, vacuum conveying applications and designs are as diverse as industry itself.

Working with a seasoned vacuum conveyor manufacturer with decades of experience handling tens of thousands of powders, rather than an industry-specific equipment distributor, provides organizations a wider breadth of vacuum conveying options to reach organizational goals and budgets.

Vacuum conveyors can be as simple as pre-engineered up-and-in systems that work on timed intervals or can be sophisticated systems that simultaneously deliver materials from multiple pickup points with weighing and batching capabilities.

There are also mobile conveyors, which can be wheeled to different areas within a facility and used with a variety of process and packaging machines, maximizing utilization and floor space. Mobile and column lift conveyors raise and lower material receivers giving workers the ability to clean and sanitize at floor level eliminating the need for workers to clean from elevated surfaces in awkward positions.

VAC-U-MAX Mobile Vacuum Conveying System allows for varying heights and conveying rates.

Two of the most common reasons that facilities invest in vacuum conveying systems is to eliminate safety hazards inherent with manual handling or to meet production demands. Regardless of the primary goal, vacuum conveyors always provide a safer working environment with multifaceted cost benefits, with labor savings topping the list.

Typically, manual loading of process and packaging machines involves two workers to mitigate hazards associated with lifting and loading materials into elevated equipment like mixers, tumble blenders or auger fillers and therefore requires some climbing. Automating material handling also eliminates the need for two workers for safety purposes.

Bagel Processing Customer

When a global OEM of automation equipment for mid-sized and industrial bakeries designed a new 10-foot-wide topping spreader for a bagel customer its goal was to include a fully enclosed automated loading and reclaim system to eliminate needless labor and open manual handling which poses both worker and food safety hazards.

To fully eliminate laborers needing to climb and work on an elevated surface to monitor even distribution of material across the length of the dispensing machine, the vacuum conveying system included a distribution screw that evenly distributed toppings across the length of the dispensing machine, regulated by a level control.

Beyond eliminating ergonomic, repetitive motion and fall hazards, the bagel producer had significant annual savings in labor and administrative costs since the new system was more set it and forget it, no longer requiring a laborer for duration of the process.

VAC-U-MAX sanitary design Bag Dump Station with integrated dust collection system which automatically turns on when the door is lifted.

VAC-U-MAX Activator™ Bulk Bag Unloading System features four "No Maintenance" actuator petals that massage the lower portion of the bag alternating side-to-side pattern promoting optimal material flow to center of bulk bag.

Dust Mitigation

Safety doesn't always focus on WMSD's. Quite often, dust is the hazard needing mitigation. Manual dumping of bulk solids and powders creates a lot of dust that can get enter into workers breathing zones and settle in hard-to-reach places.

While vacuum conveying is often used to eliminate these hazards and reduce housekeeping costs associated with fugitive dust, sometimes vacuum conveyors are used as a solution to reclaim materials from dust collectors and prevent buildup within the collector.

In industries where raw materials dominate half of the cost of production, such as the paint and coatings industry, reclaiming and returning materials to the process not only reduces costs, but preserves product quality by ensuring all formulation weights make it into the product.

Paint Production Customer

To amplify the safety of its dust collection system that captures fugitive dusts released during the dispersion process; and, to get ahead of rising materials costs, a major paint producer wanted to automatically reclaim and return the captured dust back into the process using a vacuum conveyor.

Reclaiming Process

The process of reclaiming materials with vacuum conveyors is fairly simple. The captured dust included several fine powders, including Titanium Dioxide, which posed challenges such as sticking, bridging, clogging and ratholing.

Aside from optimizing the vacuum conveying system to handle the challenging of the material's characteristics and customizing the transitions to return the collected dust to tank, the system was fairly standard. The process is now zero-waste, the operators no longer need to wear respirators (a common benefit of vacuum conveyors) and the vacuum conveyor prevents the dust collector from experiencing a costly backup that requires downtime to remedy.

Reducing downtime is a great motivator to automate materials handling with safer vacuum conveyors—especially in industries where frequent cleaning and sanitation is mandatory.

Nutraceutical and Functional Foods Contract Manufacturer

For a global nutraceutical and functional foods contract manufacturer, air-powered mobile vacuum conveyors are the panacea for efficiency and cost savings on their powder filling lines. The 10 venturi-powered mobile conveyors at its facility conform to FSMA sanitation regulations and require no

VAC-U-MAX Sanitary Vacuum Conveyor mounted on rolling frame allows mobility and equipment access.

tools or special mechanical skills to disassemble for product change-over. With mobile units, rolling the conveyor away from other machinery and lowering the receiver allows safe simultaneous cleaning of both the conveyor and machine, instead of one after the other, delivering significant cost savings on changeover and assembly.

Since vacuum conveyors have no moving parts, maintenance is minimal compared to the screw conveyors and hoppers the contract manufacturer phased out. The ability for a single mobile conveyor to service multiple processes results in higher utilization.

Summary

Automating manual material handling with fully enclosed vacuum conveyors provide a safer working environment by preventing potentially harmful fugitive dusts from escaping, eliminating ergonomic and fall hazards associated with manual handling. With current labor shortages, rising inflation, and supply chain issues, manufacturers need to embrace every efficiency and cost cutting strategy. Automating with vacuum conveyors is an investment that delivers multifaceted cost benefits which is key to staying commercially competitive.

[1] https://business.libertymutual.com/insights/how-automation-in-manufacturing-can-improve-worker-safety-satisfaction-and-productivity
[2] https://business.libertymutual.com/insights/labor-shortage-in-manufacturing-causes-risks-and-solutions