Case history: Versatile filler improves container-filling operation
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PNEUMATIC CONVEYING
Case history

Versatile filler improves container-filling operation

Chemical producer BASF Corp. recently decided to upgrade its Washington, N.J., manufacturing plant by adding a dedicated packaging room for filling its surfactant additives into drums or bulk bags prior to shipping. The room is designed for increased cleanliness and control of the container-filling operation. The company's additives are formulated as liquids and then converted into powders for use in many items, including personal care products such as toothpaste, mouthwash, soap, shampoo, and laundry detergent. The additives are used to reduce a material's surface tension, making the materials easier to formulate and use for various products. Previously, the company had been using a manual bagger to package the additives. However, the manual bagger was causing many problems, including making the operation slower than desired and causing ergonomic issues and quality control difficulties. The company wanted to replace the manual bagger with an automated process that was accurate, efficient, and capable of maintaining superior quality control.

Problems with the manual bagger

To fill the drums and bulk bags using the manual bagger, an operator first moved a container onto a weigh-filling station. Then, the operator opened a slide-gate valve and filled the container while periodically checking the container's weight. If the weight exceeded the set limit, the operator would have to manually remove material to achieve the right level. After filling, the container was manually moved onto a pallet for transport to a shipping area.

"The manual bagging process required multiple steps, took too much time, and exposed operators to possible injury from handling the containers," says Sherri Molomo, senior process

A pallet of four drums is mechanically conveyed into the dedicated packaging room where they await filling.
engineer at BASF. "In addition, we make various excipient additives for customers who use our products in their formulations. The packaging room was built to meet cGMP regulations and guidelines to satisfy these companies' requirements. We needed a bagger that would also meet these rigid quality standards."

Searching for an efficient solution
About 2 years ago, the company began looking for a solution to the manual bagging problems. It researched and talked with several different equipment suppliers but wasn't satisfied with what it found. Eventually, the company turned to PME Equipment Co., Flanders, N.J., a manufacturer's representative that the company had previously worked with and trusted. PME recommended that the company contact Flexicon Corp., Bethlehem, Pa., a manufacturer of bulk bag fillers, bulk bag dischargers, flexible screw conveyors, pneumatic conveying systems, drum dumpers, weigh batching and blending systems, and bulk handling systems with automated controls.

The chemical company contacted the supplier and, happy with the supplier's products and suggestions, requested that it visit the plant to examine a unit the company was using in another production line. From that initial visit and minimal testing, the supplier was able to custom-design a fully automated rear-post rotating-head bulk bag and drum filler to fit with the company's newly designed container-filling system.

The company purchased the filler during the process of building the packaging room, but the room's walls were constructed before the container-filling equipment was available to be put in. Luckily, the supplier was able to build the bulk bag filler so that it could come apart and be reassembled inside the room. In October 2005, labor contractors installed the filler with the supplier's technical support team overseeing the installation.

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The new automated container-filling system

The new container-filling system consists of a roller conveyor that moves containers in and out of the filling station, the supplier’s custom-designed rear-post bulk bag and drum filler, a rotary valve that accurately meters the required material amount into the filler, a weigh-filler scale that regulates material flow and shuts down the operation when a preset weight is reached, and an Allen-Bradley PLC that automates operations.

The filler is 10 feet 10 inches high and 6 feet 2 inches square. The filler’s structural components are constructed of carbon steel with stainless steel paint, and its material contact areas have sanitary construction with Type 304 stainless steel. The company typically packages the additives in 55-gallon fiber drums that are 22 inches in diameter or in 2,000-pound bulk bags that are 55 inches tall and 4 feet square. Because of this, the fillhead interface is adjustable to accommodate the different sizes of the drums and bulk bags. The filler also has two interchangeable fill heads that can be easily and quickly changed depending on whether drums or a bulk bag is being filled.

The chemical company added a dust collector that’s attached to the filler via a flexible hose. The bag and drum filler supplier provided a dust extractor that enables the dust collector to capture any dust particles that rise up during filling. This allows the containers to be filled without getting dust into the workplace and endangering operators’ health.

Filling the drums and bulk bags

To begin the packaging process, an operator places four drums or one bulk bag onto a pallet before the pallet enters the packaging room. The operator then selects the appropriate material-loading program on the PLC and pushes a button to move the pallet into the room on the roller conveyor. Additives are transported from the main plant to a vessel located above the rotary valve.
The drum-filling and bulk-bag-filling processes are slightly different. When filling drums, the operator attaches the drum-fill adapter with automatically rotating fill head. A pallet with four plastic-lined drums is conveyed into the packaging room and positioned on the filling station's deck, which is located below the filler and above the weigh-filler scale. The operator then presses a start button on the PLC and additives are gravity-fed into the first drum. The scale transmits the drum's weight data to the PLC, which automatically stops the gravity-flow of material when the correct weight has been loaded. Once one drum is filled, flow is interrupted while the fill head rotates to fill the next drum in sequence. After all four drums are filled, the PLC directs the filler head to rotate back to its home position while the operator seals the plastic liners and puts lids on the drums. The roller conveyor then transports the drums out of the packaging room and into the shipping area.

“This was an interesting application for several reasons,” says Larry Storna, regional application engineer at Flexcon. “First, we built a new filler that was designed specifically for BASF’s application. Then we needed to make sure the system could accommodate both drums and bulk bags without dust escaping into the atmosphere. We also had to design the system so that operators could quickly exchange the rotating drum head and the bulk bag filling head to provide an efficient filling operation. In addition to that, the construction on the packaging room had started before we could get the filler installed so we couldn’t simply supply the filler welded together like we normally do. Instead it had to be constructed so that it could be completely disassembled and then reassembled to connect to the other equipment in the room. It was a great challenge for our engineers.”

The filler has two interchangeable fill heads that can be easily and quickly changed depending on whether drums or a bulk bag is being filled.

When filling a bulk bag, the operator attaches the bag's four hanging straps to the loading frame's corners and connects the bulk bag fill spout to the fill head. A removable inflatable collar is attached to both the filler and the bag, providing a dust-tight connection and sealing the additives in the bag. The filler's frame is then raised to accommodate the bag's height. The bag sits on a pallet, which is positioned under the filler and on top of the weigh-filler scale. The scale transmits the weight data to the PLC, which automatically stops the gravity-flow of material when the correct weight has been loaded. The bag is then closed and the roller conveyor transports it out of the packaging room and into the shipping area.
Filler packages up numerous benefits

The chemical company has been extremely pleased with the filling system. "The automated loading process significantly enhances the additives container-filling operation and increases operator productivity," says Molomo. "Most important, it has improved operator ergonomics and safety by eliminating operator involvement in the filling process. Operators no longer have to worry about incurring injuries while handling the filled containers."

The filling system has decreased the chance of cross-contamination during container-filling and has reduced filling cycle times for a more efficient operation. The plant operates 24 hours a day, 7 days a week, and because the new system can fill four drums at a time instead of one, slow operation is no longer an issue. In addition, the new system provides higher levels of quality control than the old manual system did.

With the new system, operators no longer have to worry about incurring injuries while handling the filled containers.

The filler requires little maintenance with only general check-ups needed. For example, the company checks the gears and motors once every 6 months or so to ensure that they're working properly. Since the new filler has been in operation, the company has only made one change. The company decided it wanted to size the additives as they emptied from the rotary valve into the filler. The supplier designed a completely new structure assembly for the upper half of the filler so that size reduction equipment could fit between the valve and the fill head.

"The biggest concern for us was that all the equipment in the packaging room had to work properly in conjunction with the other equipment," says Molomo. "Flexicon worked diligently to design a rear-post filler that would work perfectly for our process. From the beginning, the filler has worked better than we could have hoped for. We've been extremely happy with it. Our products have become better because we're using better tools."

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Note: To find other articles on this topic, look under "Bagging and packaging" in Powder and Bulk Engineering's Article Index at www.powderbulk.com or in the December 2006 issue.

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