

Case history

Dust-tight flexible connector fittings seal the deal

A flour mill replaces two clamp-and-sleeve connectors with dust-tight connector fittings to improve a packaging operation.

Bob's Red Mill Natural Foods Inc., Milwaukie, Ore., produces a range of flours, meals, cereals, and other products that are distributed to food stores. Since starting operations, the company has connected equipment in the process lines, which includes mills, screeners, packaging machines, and other equipment, with standard clamp-and-sleeve connectors. However, these connectors leaked dust into the facility and required a lot of time and labor to remove from the line when cleaning the equipment between product runs. The company needed to find a better way to connect the process equipment to eliminate dust leaks and reduce maintenance.

Clamp-and-sleeve connectors cause problems

The company operates the mill 24 hours a day, 6 days a week, with 13 stone grinding mills, each producing about 900 pounds of various flours or meals per hour. The product moves from a mill to a horizontal vibratory screener that discharges it at a controlled rate to a packaging machine's auger feeder. A clamp-and-sleeve assembly connects the vibratory screener's discharge to the auger feeder inlet. Depending on the

product, the feeder meters anywhere from 10 ounces to 5 pounds of product into a bag.

Since each packaging machine is designed to package more than one product, operators must thoroughly clean the screener and feeder between product runs to prevent cross-contamination. To access the equipment interiors, operators used a screw driver and wrench to loosen a connector assembly's clamps and remove the sleeve. After cleaning the equipment, operators reinstalled the connectors, repeating this process several times each shift to ensure product quality.

According to Bo Thomas, Bob's Red Mill superintendent of engineering and maintenance, the clamp-and-sleeve connectors required a lot of maintenance and leaked product into the facility. "The clamps were a pain because some of them were difficult to access because of where they were located," says Thomas. "And the time it took to remove and reinstall the connectors reduced our packaging efficiency. Fugitive dust also occasionally escaped onto the equipment through



A standard clamp-and-sleeve connector between the vibratory screener's discharge and auger feeder's inlet often allowed material to leak out onto the equipment, creating housekeeping and maintenance problems.

the connection points, causing safety, housekeeping, labor, and product-loss problems. Additionally, an operator could unknowingly install a sleeve so tight between the equipment that the vibration from the screener would transfer to the auger feeder. This was a problem because the vibration caused the material to dribble out of the feeder and throw off the bag weights.”

Connecting with a solution at food expo

In January 2009, Thomas decided to upgrade two packaging lines to reduce maintenance and downtime and eliminate fugitive dust. He traveled to the Northwest Food Manufacturing and Packaging Expo in Portland, Ore., to look for a better way to connect the screeners and feeders. While at the expo, Thomas stopped at a supplier’s booth showcasing a clamp-free connector fitting that provides dust-free material transfer between process equipment. The fitting uses welded- or bolted-on spigots and internal snap-in connectors rather than external clamps or bands to secure the connector to the process equipment.

“When we saw the fittings, we knew they’d improve the equipment cleanout time,” says Thomas. “A short time after the expo, the supplier’s sales rep visited our facility and took some photos and measured

the space between the equipment to properly size two fittings for us.”

This supplier, Powder-Solutions Inc., Chanhassen, Minn., is a distributor and engineering firm that specializes in solving material transfer problems for industries that handle and process powders and other bulk solids. In July 2009, Thomas ordered two custom BFM connector fittings from the supplier, each 6 inches in diameter and 8 inches long, and four Type 304 stainless steel adapter spigots. After receiving the flexible connector sleeves and spigots, the company’s maintenance crew disassembled the existing connectors, welded the spigots in place on the screener discharges and feeder inlets, and snapped in the connector sleeves.

The connector fitting

The BFM fitting consists of a flexible connector sleeve with a snap-band collar on each end and two metal adapter spigots, each of which connects to a piece of process equipment’s material outlet or inlet. The fitting’s 0.040-inch-thick Seeflex 040 connector sleeve is constructed of a clear, non-ether-based, long-lasting, static-dissipative polyurethane and is certified for use in USDA and 3-A powder applications. The sleeve’s collar consists of an exterior layer of molded polyurethane over a fabric



The new flexible connector fitting between the vibratory screener’s discharge and auger feeder’s inlet easily snaps into place without tools and maintains a dust-tight seal during operation.

strip with a flexible stainless steel snap-band backing. Each collar's exterior is ringed with two ridges that conform to a spigot's interior channels. When installed, the snap-band exerts an outward pressure that pushes its ridges into the spigot's channels, creating a positive interlocking seal. The spigots are available in Type 304 stainless steel, Type 316L stainless steel, or carbon steel and can be made to transition from square to round and to be welded or bolted onto the process equipment.

The connector fitting is for gravity-flow applications in which food, grain, pharmaceutical, mildly abrasive powders, or other materials move vertically between process equipment. The fitting's flexible sleeve is suited for use in process lines in which vibration, expansion and contraction, or portability issues prevent permanent solid-pipe connections. And since the BFM fitting installs inside the spigots, there are no pinch and wear points that typically occur with traditional hose-and-clamp connectors. This makes it well suited for use in repetitive-motion applications, such as those that use vibratory sifters, vibratory conveyors, oscillating sifters, or reciprocating or horizontal differential-motion conveyors.

"The BFM fitting is a tool-free connector that's simple to install and remove in seconds with your hands, which is a huge time-saver over having to unscrew and rescrew clamps,"

says Kyle Alger, Powder-Solutions inside salesperson. "The leak-proof design eliminates fugitive dust, significantly reducing housekeeping time and labor requirements. And because we stock a large inventory of standard and unique sizes, we can get an order out quickly; there's not much of a wait time from when an order is placed to when it's received."

Connector fittings improve mill's production operation

Since installing the two connector fittings in the packaging lines, the time it takes the operators to remove them to clean the equipment has been significantly reduced, which has helped decrease maintenance requirements and improve the packaging operation efficiency. "The fittings are easy to maintain and are completely tool-free," says Thomas. "The operators just pop them out, clean out the equipment, and then pop them back in; they're so easy to use. And because the fittings are a set length, they install the same way every time, so there's no longer a potential for them to be installed too tightly, which ensures that vibration is never transferred to the feeders."

Thomas admits that the fittings are little more expensive than clamp-and-sleeve connectors, but says that they're worth it, especially considering the time and money the company has saved on maintenance, cleaning, and labor. "They're one of the best things that we've found; there's noth-

ing negative about them at all," he says. "Since installing the first two fittings, we've been replacing all of the remaining clamp-and-sleeve connectors in the facility with the supplier's fittings. We have more than fifty installed throughout the plant at this time. I've been putting them everywhere there's a transfer point because they make things so much easier for our operators." **PBE**

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