Less Bulky Bag Discharge

KEITH SIMPSON, Spiroflow Systems Inc.

Spiroflow Systems Inc. offers nine different types of bulk bag dischargers that have been introduced and developed over the past 25 years to meet most applications. Models range from simple hanging frames for the easiest flowing dust-free plastic granules, to dischargers capable of promoting the flow of the most difficult products, to those able to totally contain the most obnoxious chemicals or active pharmaceuticals.

But there are always special applications in which a customized solution is required. To meet these challenges, Spiroflow Systems applies its years of engineering and technical experience. This article centers on an extraordinary challenge from one of the world’s leading chemical manufacturers that required a system that could operate in an area with restricted height and space requirements, as well as in a hazardous environment. It was one of the most customized challenges the company has ever undertaken.

Situation Evaluation

The chemical manufacturer was seeking a replacement for a labor-intensive manual-tipping system in which 40-pound bags of product are emptied into various process vessels. The manufacturer elected to source its bulk materials and additives in 2,000-pound Super bulk bags. To achieve this, the manufacturer required an unloader complete with an integral loss-in-weight metering feeder to ensure the dispensing of the correct material weight into each of the process vessels. The unloader had to be fitted with product flow aids that would also assure the

discharge of the more difficult materials. Operator protection and safety were other paramount considerations.

The manufacturing facility had limited headroom. It was specified that the Spiroflow bulk bag discharger should not exceed 108 inches in height when operational, and be capable of collapsing down within a height and width of 80 inches to facilitate movement around the plant. In operational mode, a height of 51 inches was required for the bulk bag body; then its suspension loops extended another 10 inches above that. To cap it all, the unit also had to operate within a hazardous environment and be mobile.

For the hazardous environment, several components had to be customized to prevent any electrical sparks or static discharge. For example, the conveyors had to be designed with anti-static tubes, and butterfly valves had to be used to isolate the unit from any vapors. Special static-dissipating casters additionally had to be customized for internal transport of the machinery. The control panel, moreover, was placed in an explosion-proof enclosure.

Restricted Headroom

Spiroflow’s Model T5 bulk bag discharger was designed specifically for restricted headroom applications, and was specified and customized just for this application. With this design, the upper section of the bulk bag discharger can be removed by lift truck and brought to floor level, so the bag can be inserted. The bulk bag itself is suspended by its loops from a lifting frame that is installed into the mountable upper section (which can also be demounted) via a lift truck. The upper section makes it possible to lift the frame and bag from underneath, thereby eliminating the height of the lift truck mast that must normally extend over the top of the bag, and considerably reducing the amount of headroom required.

The upper section of the bag is designed to be lifted and docked on the lower half of the bulk bag discharger. This part of the machine has a docking seal on its top surface to interface with a mating flange on the upper frame to prevent dusting during the bag-emptying process.

The requirement to meter the bulk components and ingredients by weight was also

straightforward. Spiroflow's Model T3 loss-in-weight bulk bag discharger is designed for just such applications, and is capable of metering several bags and/or partial bags, while keeping a record of what has been dispensed.

Customized Details

For this application, the chemical manufacturer had some very specific requirements and site constraints—all in addition to the ability to operate in an explosive gas hazardous environment. The overall dimensions of the bulk bag dischargers, along with the two separate halves, had to be suitable for use at multiple locations on-site. To add to the complexity, the route between locations is through a service elevator that also has height and width restrictions.

To accommodate these restrictions, the overall width of the frame was reduced so that straddle-type lift trucks could be used on-site. Special static-dissipating casters were furthermore designed, along with lift truck access points, to permit maneuvering the unit without using a lift truck and causing sparks from the buildup of static electricity.

On-board controls include intrinsically safe components, XP motors for the two integral screw conveyors and the product agitator. The electrical enclosure, with its digital weight indicator for batch feeding of a setpoint-controlled weight, was fitted with an air purge system to allow use in hazardous environments.

The machine features a four-corner dish-mounted, two-part bag massage system. Here the air cylinders are mounted on the lower frame, and the massage paddles are hinged and attached to the demountable upper frame. A side-tensioning frame is also included, and pneumatic air cylinders are fitted in place of the usual coil springs to allow the lowering of side-frame height when the unit is being moved

around in the facility.

The lifting frame that attaches to the bag loops is only 2-inches tall and uses sections that shorten the vertical length of the loops by spreading them out horizontally. Every detail on the machine is defined by total height restriction clearances. Parts of the route to the process area are not only restricted to 80 inches in height, but also 80 inches in width.

The collection hopper — into which the discharged material flows — incorporates an integral agitator that prevents bridging across the inlet of a horizontal Spiroflow flexible screw conveyor. This short conveyor is fitted with a Pro-screw spiral that pushes material into a second 4-1/2-in. conveyor, which is fitted with a flat-section auger mounted at 80° to the horizontal.

Both conveyors and the feed hopper (that comes along with a vibrator and agitator) are mounted on the weigh frame to precisely regulate the amount of material that exits the inclined screw and thus rendered lost to the system. This serves to assure accurate dosing of materials by weight into the various process vessels.

Customizing the T5 low headroom and T3 loss-in-weight bulk bag dischargers to meet the chemical manufacturer’s requirements, as well as the height restriction and hazardous environmental conditions in the plant, is one of most challenging retrofits Spiroflow Systems has ever undertaken. The equipment was delivered to the manufacturer in late 2008 with installation and startup expected in the first quarter of 2009.

For more information, contact Spiroflow Systems by e-mailing info@spiroflowsystems.com [1] or visiting www.spiroflowsystems.com [2].

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