

From 20kg bags to 1 tonne FIBCs equals a radical re-think

Recent developments required a radical re-think as the raw material was soon to be supplied in 1-tonne FIBCs

Nutec Ltd, UK, are specialist contract manufacturers and packers of products dedicated to animal nutrition and health. Among the many contracts fulfilled at their Staffordshire based facility is the process of a particular animal feed/medicinal product that involves the measured blending of an additive to raw material and final packaging and despatch. The existing process and packaging procedure had always been handled efficiently, accurately and safely but recent developments required a radical re-think as the raw material was soon to be supplied in 1-tonne FIBCs – Flexible Intermediate Bulk Containers - and not in the usual 20kg bag format.

Previously, pallets of the 20kg bags of raw material were positioned by forklift truck onto a 10ft. high mezzanine floor, adjacent to a receiving hopper into which operatives would split and gravity feed the individual bag contents for conveying to the blender via an existing 6" diameter Flexicon screw conveyor. The product's flow characteristics were very good but each bag could vary in content by up to 0.1kg. This inconsistency in the ratio of raw material to additive was adjusted by the amount of additive in the blender, determined with the use of load cells on the blender. Efficiency and accuracy in the process was high with minimal wastage. From the blender, the final compound was conveyed to the packaging area where it was packaged into bags varying from 1kg to 25kgs, for final despatch to the client. With the prospect of receiving bulk product in FIBCs, Nutec turned to Flexicon (Europe) Ltd (FEL) as they already installed another system. The requirement for any new system would be fourfold:

1. It should handle FIBCs.
 2. It will produce accuracy in weight delivery of raw material.
 3. It must be easily cleaned.
 4. It must be housed next to the blending process.
- As this was a fixed, existing line among other processes, space had always been at a premium and further upgrades would need to account for this.

After consultation FEL designed and developed a system then ran a pilot line at their Herne Bay



The discharge frame, control panel and intermediate hopper

facility to prove the system could deliver specification prior to commissioning.

The system comprised:

1. Bulk bag discharge frame
2. 225Ltr capacity intermediate hopper
3. 2mtr long, round, flexible screw housed in a 4" UHMW polyethylene tube housing
4. 788Ltr capacity transfer bin, free standing on a platform scale
5. Dust extraction system
6. A control panel to include a gain-in-weight product transfer program

In complying with industry standards all contact parts were made in stainless steel finish. Using a forklift truck, a 1-tonne FIBC attached to a cruciform by four Z clips is raised and secured in position on the bulk bag frame above the receiving hopper. Unlike alternative methods of feeding the bag spout through a traditional iris valve, the bulk bag/hopper interface consists of a manual Spout-Lock' clamp ring positioned above a pneumatically actuated Tele-Tube' telescoping tube. Together, the devices enable an operator to make a quick, dust-tight connection between the bag spout and hopper, and to automatically elongate the bag as it empties to promote flow and evacuation.

By simple push-button control the telescoping tube raises the clamp ring assembly allowing the bag spout to be pulled through the ring. It then lowers and seals the clean side of the bag spout to the clean side of the telescoping tube and continues to lower until the bag spout is pulled taut.

Once the spout is untied, the telescoping assembly exerts continual downward tension on the spout, elongating the bag as it empties. The high-integrity, dust-tight seal between bag spout and clamp ring allows full-open discharge from the bag with no risk of dust inhalation by the operative.

From the receiving hopper material is gravity fed into the throat of the self-centring flexible screw conveyor where it is conveyed over 2 mtrs through 45° for discharge into the transfer bin. A low level warning indicator on the control panel warns the operator of the status. The operator is then able to replenish the raw material supply and continue production of the expected 12 tonnes per day output. During product transfer from the bag to transfer bin, dust within the system is extracted and despatched via a perimeter wall to an outside-located dust extraction unit.

The control panel features a 2-set point PLC based controller for gain-in-weight accuracy and works in conjunction with the platform scale on which the transfer bin freely sits. As the operator starts the system from the control panel the first set point enables fast flow for rapid fill. When

achieved, the second set point enables manual or automatic flow control at dribble feed rate until the accurate batch weight has been achieved within +/- 200grms on 400kg batch. The controller is suited for all filling applications and can be programmed to suit varying strengths of product "potency".

Once the total batch weight has been achieved the hinged lid on the transfer bin is closed, the bin then removed from the load cells by forklift truck and elevated to the 10ft high mezzanine floor. At the base of the transfer bin is a discharge outlet. When positioned, the butterfly outlet is manually opened to gravity feed the hopper which in turn feeds the mixing vessel, via an existing Flexicon screw conveyor, with the precisely measured batch of raw material for compounding with the additive. This procedure now eliminates the need for bag disposal and reduces operator contact with the product and associated risks of dust inhalation. The existing plant performed the final stages of production from this point forward. To facilitate regular cleaning-in-place the flexible screw and tube housing can be easily cleaned by removing the screw cap and reversing the drive. This evacuates any residual material and minimises an otherwise labour-intensive task. In addition, the transfer bin is fitted with a floor-mounted, hinged step for easy access and cleaning. The particular product line is batch specific and the

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Operator addressing the control panel for gain-in-weight programming.



The Spout Lock™ clamp ring and Tele-Tube™ telescoping tube allow quick, dust-tight connections between bag spout and hopper and elongates bag as it empties to promote flow.

integrity of product quality with effective traceability has been maintained without compromise. This system has fulfilled the specification in every respect enabling a major changeover in production techniques with no loss of profit and the minimum of disruption.

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