How Automatic Bulk Bag Discharging & Powder Metering Improved Operational Efficiency, Plant Safety

Improved product efficiency, combined with intrinsically safe standards of operation for powder handling within a hazardous area, are among the benefits gained by installing a fully automated bulk bag discharge and batch metering system at the Huddersfield site of Holiday Dyes & Chemicals Ltd.

As one of the UK’s principal manufacturers of chemical dyes, the company’s production relies on consistency of formulation, with a primary target of “right first time” performance for raw material proportioning and blending. The task was to automate what had hitherto been a largely manual system. This was accomplished through close liaison with Jacobs Engineering and Holliday Dyes & Chemicals’ engineers to design a fully enclosed mechanical conveying system.

The raw material, which is received in flexible intermediate bulk containers (FIBCs), is dispensed by a reactor vessel for processing intermediate liquid chemical hatches.

In the interests of safety, all equipment and instrumentation is designed to minimize the probability of fire or explosion, in accordance with the latest European safety regulations. The inherent simplicity and gentile handling characteristics of the rotating spiral conveyor offered a number of key advantages in this application. Primarily, the absence of air as the conveying medium ensures that the powder maintains its moisture content, which is essential to limit the risk of ignition within the system through electrostatic discharge.

Further benefits afforded by a totally enclosed conveying system such as this, include protection from dust emission to the environmental atmosphere and the consistency of material transfer between the bulk bag, batch weighing hopper and process reactor.

The batch weigh hopper controller incorporates an alarm, which maintains a no material/no feed status. The horizontal metering conveyor, which charges the reactor, operates only after receiving a start signal from the main PLC. Once 95% of the batch feed stock has been discharged, the conveyor switches to a trickle speed until the precise quantity of powder has been delivered.

Being of modular construction, the bulk bag discharge station was readily installable on one of the upper floors. The associated batch weighing hopper and transporter conveyor was specifically designed to provide a very compact installation, which included a combined horizontal and vertical coreless auger conveying system featuring a customized transfer junction.

To assist with free flow of the very cohesive powder, which is prone to clogging, a combination of two assistors was employed. A rotary agitator operates immediately above the horizontal feeder auger and, above that, a low energy “Flexifinger” vibratory grille. Bags weighing up to 1 ton can be accommodated above the discharge unit, which incorporates an enclosed bag spout interface and flow control valve, designed to enable dust-free connection and disconnection when changing bags.

Article submitted by Charles Parish, Flexicon Corporation.

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