Featured Story
Page 22
5 Steps to Compare Wet & Dry Dust Collection
Combustible dust control requires properly designed equipment to help minimize hazards.

Bulk Bag Conditioning System

Material Transfer & Storage's Material Master Bulk Bag Conditioning System is a patented system that uses hydraulically actuated pivoting conditioning arms with extended travel and features v-shaped tubular breaker profiles to efficiently return even the most severely agglomerated materials to a free-flowing state. The unit accepts a wide range of bulk bag sizes.

Material Transfer & Storage
www.materialtransfer.com

Roller Gate Valve

The Mucon RGV Roller Gate Valve is designed to meet the needs of the bulk materials handling industry for a robust, heavy-duty isolation valve. Its patented blade support system provides uninterrupted flow of material through the valve body but can still accommodate an inlet deflector if required by the application. Preloaded, self-wear compensating seals prevent the loss of process material and are replaceable without removing the valve from the process line.

Mucon USA
www.muconusa.com

Online Exclusive

Infographic: Ways to Improve X-ray Inspection Processes
X-ray technology is used more and more commonly in food and beverage processing to perform quality checks, but even using X-rays for inspections can have issues.
www.bit.ly/2bcTx1Y

Special Section Inside

Wastewater Processing
between pages 34 & 35

Featured Products

Colorimetric Analyzer

The CA6 Colorimetric Analyzer from Electro-Chemical Devices provides accurate and reliable measurement of manganese or iron levels in municipal drinking water production, food and beverage processing, and other high-purity water processes. The Model CA6 is an online sequential sampling analyzer. A sequence of sampling, analysis and results processing is performed and repeated using colorimetric methods.

Electro-Chemical Devices
www.acdl.com

Bulk Bag Weigh Filler

Spiroflow Systems’ Spirofill C Series bulk bag weigh fillers deliver high accuracy gain-in-weight bulk bag filling for low- to medium-volume end users. Up to 20 bulk bags can be filled per hour. Standard accuracy is 1 percent or better, however accuracies of +/- .5 percent are typical. Standard features of this two-post design filler include a filling nozzle, quick-release latchable hooks or tubular bars for bag suspension, and an NTEP-approved load cell weigh platform.

Spiroflow Systems
www.spiroflowsystems.com
SAFE SILICON POWDER MOVEMENT

Dust-free, pneumatic conveyance improves li-ion battery production

Dave Beger, Flexicon Corporation

The future of lithium-ion (li-ion) batteries — found in laptops, phones, hybrid cars and other applications — may be taking shape at a U.K. startup, Nexen Ltd., built a plant at its headquarters in Abingdon, Oxfordshire, England, to produce a silicon anode it developed that significantly improves the energy density and operating life of li-ion batteries.

A critical part of producing the silicon anodes involves transferring precise amounts of silicon powder and other ingredients from a bag dump station to a slurry tank for mixing in an aqueous solution, using a dilute-phase Pneumati-Con vacuum conveying system from Flexicon.

The transfer is dust-free and safe. Silicon powder is combustible and can be explosive under certain conditions, so Flexicon analyzed the powder and developed the pneumatic system — including dust control and explosion protection measures.

Bag dump station contains dust

The first step in transporting the powder is manually emptying bags of silicon powder and additives into the bag dump station mounted on a floor hopper. A bag tray support provides a work surface for the operator to stage, clean and open bags.

A dust collection system — which is integral to the bag dump station — draws airborne dust through two cartridge filters. As this occurs, reverse pulse jets automatically clean the filters. Any accumulated dust gathered from the filters is returned to the hopper.

Image: Silicon powder and additives are manually emptied into the bag dump station and floor hopper. The station includes a bag tray support and dust collection through two cartridge filters. Powders flow from the hopper outlet through a pickup adapter into the pneumatic conveying line.

Images courtesy of Flexicon.
“Reliance on a complete system avoided a piecemeal approach to equipment selection and installation.”

System feeds the weigh hopper
The powder flows from the bottom outlet of the floor hopper through a pickup adapter into the two-stage pneumatic conveying line.

The first vertical section rises 90 degrees from the hopper outlet and connects to the second horizontal section. This second section runs from the silicon unloading area to the main processing area.

The receiving hopper empties into a slurry makeup vessel.

A side-channel blower downstream of the filter-receiver atop the receiving hopper provides a vacuum that pulls the material through the pneumatic line, improving dust control.

The fully enclosed system transfers the silicon powder virtually dust-free. Since the system operates under vacuum, even if the integrity of the enclosed system is unintentionally compromised, the silicon powder will remain within the conveying system.

Filter receiver is isolated & safe
The filter receiver separates the silicon powder from the air stream before the powder enters the receiving hopper. Like the bag dump station, it has a reverse

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SEPTEMBER 2016 | www.processingmagazine.com 59
SILICON ANODE SUBSTITUTION BOOSTS LI-ION BATTERY PERFORMANCE

New technology replaces conventional carbon/graphite anodes (the negative electrode terminal) in Li-ion batteries with a proprietary silicon formulation structure that increases the energy density of the cell and addresses the inherent expansion issues of silicon.

The global market for improved Li-ion anodes is enormous because they are found in consumer electronic devices such as smartphones, tablets, and laptops. The largest emerging market is electric vehicles for which demand is expected to triple.

pulse jet system that automatically cleans the filter cartridges at timed intervals. The filter-receiver is isolated in a safe area.

This receiver is protected with an explosion-relief panel designed to exhaust the energy associated with an explosion without causing a catastrophic failure of the filter-receiver.

At the bottom outlet of the receiving hopper, a pneumatically actuated slide gate valve discharges the silicon powder into the slurry tank.

One set of load cells beneath the floor hopper at the bag dump station, in combination with load cells beneath the filter receiver, sends signals to the programmable logic controller (PLC). The PLC automates the delivery of a predetermined amount of powder to the slurry vessel.

A low-level sensor near the bottom of the floor hopper signals the PLC to stop the conveyor until more material is dumped into the hopper to achieve the total batch weight.

On the receiving hopper, a high-level sensor signals the PLC to stop the conveyor if the hopper is about to overflow in the event of a system malfunction.

Reliance on a complete system avoided a
p piecemeal approach to equipment selection and installation and created a safe and efficient design, construction, installation and commissioning service provided by the vacuum conveying system's manufacturer.

David Boger is vice president, Global Business Development, for Flexicon Corporation. During his tenure at Flexicon, Boger has held the positions of service engineer, applications engineer, sales manager, and vice president, sales and marketing. He holds a Bachelor of Science degree in chemical engineering from Rensselaer Polytechnic Institute, Troy, New York.

Flexicon designs and manufactures bulk handling equipment with manufacturing facilities located on four continents and a world headquarters located in Bethlehem, Pennsylvania. Flexicon manufactures a broad range of equipment including flexible screw conveyors, tubular cable conveyors, pneumatic conveying systems, bulk bag fillers, bulk bag dischargers, weigh batching systems, manual dumping stations, drum/bulk/container dumpers, and custom-engineered, plant-wide systems integrated with new or existing processes.

Flexicon Corporation
www.flexicon.com

SYSTEM HIGHLIGHTS

- Dust collection with reverse pulse jets that clean the filters and return dust to the hopper
- Improved dust control with a fully enclosed system
- Isolated and safe filter receiver
- A PLC that automates the delivery of a predetermined amount of powder to the slurry vessel
- A low level sensor that signals the PLC to stop the conveyor until more material is added to the hopper
- A complete system to avoid a piecemeal approach to selection and installation

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