Cumberland Eliminates Spillage And Dust Problems

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Cumberland Pencil Co. (located in Borrowdale, in England’s picturesque Lake District), started as a cottage industry in the mid-19th century to make pencils from locally mined graphite. The company now produces some 750,000 fine art and graphic pencils per week, sold worldwide under the brand name of Derwent.

Cumberland’s foray into colored pencils means the company now must contend with its primary raw material, China clay. China clay is a semi free-flowing powder that tends to be aerated when it is exposed to the atmosphere. The way it was handled in the plant was causing significant airborne dust. Cumberland received the clay in 55-lb. bags, which were manually carried to a weigh station. There, the bags were opened and the contents weighed, along with as many as eight other additives needed for the recipe. The material was refilled into empty bags, and when the batch was complete, the bags were manually dumped into a mixer for blending. The emptying and refilling of the bags, and their subsequent discharge into the blender, all contributed to material spillage and airborne dust.

After considering possible solutions, Cumberland settled on an automated, bulk-

solids handling system that transfers clay to the blender with no exposure to the atmosphere. Designed and manufactured by Flexicon (Europe) Ltd., the sealed system consists of a discharge frame that empties bulk bags of clay into a receiving hopper, from which the material is transferred by a flexible screw conveyor to a weigh hopper. Besides eliminating dust, the system has also minimized the clay's tendencies to cake, smear, pack, bridge, cavitate and rathole.Under the new arrangement, the clay bag's carry handles are attached to a cruciform connected to the hoist, then the bag is located precisely above the receiving hopper.

The bag's contents are discharged into the 60-gal capacity hopper through a sealed, telescoping tube. The bottom end of the tube is connected to a collar in the lid of the sealed hopper and the top end has a patented Spout-Lock® clamp ring that attaches to the bag's spout.

A push-button, pneumatic control raises the top of the telescoping tube toward the bag, with the clamp ring in the open position, allowing the bag spout to be pulled through the ring. The clean side of the bag spout is pulled down over the clean side of the telescoping tube, and the ring is locked in place over it, and the tube assembly is lowered until the bag spout is pulled taut.

Once the spout is untied, the telescoping tube assembly exerts continual downward tension on the spout, elongating the bag as it empties into the hopper. The tension keeps the spout taut and helps maintain a steady flow of material. The discharger is also equipped with Flow-Flexer® Bag Activators' two pneumatically driven plates that raise and lower opposing bottom edges of the bag at timed intervals, loosening compacted material. As the bag lightens, the stroke of the bag activators increases, forming the bag into a steep "V" shape. This eliminates dead spots and results in total evacuation.

From the receiving hopper, the clay is gravity-fed into the throat of a 10-ft. long flexible screw conveyor that transfers the clay vertically into a 88-lb. capacity conical weigh hopper. Feeding is assisted by a side-mounted, "Flexifinger" vibratory flow-promotion device.

The screw conveyor consists of a flexible screw, housed in a 6-1/2 in. diameter tube. The screw has a flat configuration, designed for efficient transport of non-free-flowing materials. It is driven from its top end by an electric motor with right-angled gear drive assembly that is located above the material-discharge point, thereby preventing powder from contacting and damaging the drive seals. Since the screw is fully enclosed, there is no spillage or dust.

The weigh hopper is mounted on load cells that transmit gain-in-weight data to the control system, which reduces the flowrate to a trickle as the batch nears its pre-determined target weight. When the target weight is reached, a pneumatically activated slide-gate valve opens to allow gravity discharge of the measured batch into a bag, still under tight dust-control conditions. The bag is then taken to the mixer for blending with other ingredients of that particular recipe. If any material from a measured batch is unused, the excess can be returned to the main hopper by lifting an access flap and pouring the powder through the screen.

For more information, visit www.flexicon.com [1].

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