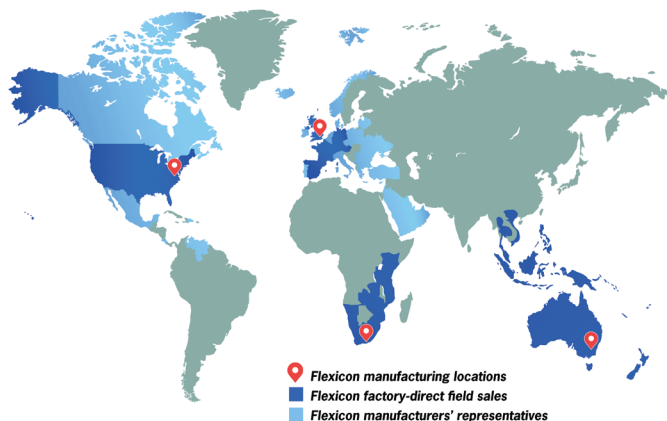




Graphite and talc powders are transferred from twin cantilevered bulk bag dischargers through two flexible screw conveyors to the blender mounted on load cells, at rear. The batch discharges into an 80 cu ft (2265 l) surge hopper from which two smaller flexible screw conveyors supply two package lines.

Bulk Handling System Triples Seed Lubricant Production

II-1132



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Bulk Handling System Triples Seed Lubricant Production

LINCOLN, NE — High-speed planting methods have fueled demand for seed-flow lubricants such as EZ-Slide®, made by Van Sickle® Paint Manufacturing, a unit of Diamond Vogel®, Orange City, IA.

These formulations improve seed planting by reducing static electricity and/or moisture that causes the seeds to 'bridge'. "Farmers pour this material in with their seeds to coat them so that they don't clump," says Tom Hubers, project engineer. "It makes everything plant better." The products come in three versions: a graphite powder, a talc powder, and a talc-graphite blend.

Van Sickle entered the lubricant business 10 years ago. "It was a manual operation," Hubers says. Workers dumped 50 lb (22.5 kg) sacks of graphite and talc into a blender. "They would pre-label containers of various sizes in one room, and then bring them into another room to fill one by one. They'd put the container under the filler, step on a pedal to start the cycle, fill it, screw on the cap, and put it in a box. It was a labor-intensive operation," Hubers says.

Converting to bulk bag discharging

To automate and expand its packaging operation, Van Sickle leased a new warehouse and distribution center in 2020, dedicating half of it to packaging the seed lubricants. In addition to the efficiency gains achieved by automation, the new system enables the company to purchase talc and graphite in 2,200 lb (1 tonne) bulk bags at lower cost than in 50 lb (23 kg) bags.

Materials are now handled, from unloading of the bulk bags through blending and final packaging, using three BULK-OUT® model BFC bulk bag dischargers and five flexible screw conveyors, all supplied by Flexicon Corp.

One discharger feeds a packaging line that fills graphite into 1 lb (0.45 kg) and 5 lb (2.25 kg) containers. The other two dischargers — one for graphite and one for talc — deliver material to a blender that empties into a surge hopper. From there, the mixture is conveyed to two packaging lines, one filling 8 lb (3.5 kg) jugs and the other filling 20 lb (9 kg) and 40 lb (18 kg) boxes.

Bulk bags of graphite and talc are stored near the production floor for quick delivery to the dischargers, each of which is equipped with a bag lifting frame and an electric hoist and trolley that rides on a cantilevered I-beam, allowing bulk bags to be hoisted from the plant floor into the frame without using a forklift.

Once the bag straps are hooked onto the lifting frame, the operator uses a pendant to hoist the assembly, roll it into the frame, and lower it into position. Here, a SPOUT-LOCK® clamp ring atop a pneumatically-actuated TELE-TUBE® telescoping tube connects the bag spout securely, after which the telescoping tube exerts continuous downward tension on the clamp ring and bag spout as the bag empties and elongates, promoting



From two bulk bag dischargers, two large diameter flexible screw conveyors transport talc and graphite to the blender while the 80 cu ft (2265 l) surge hopper feeds the blended batch into two smaller flexible screw conveyors supplying two packaging lines.



Each bulk bag discharger is equipped with a BAG-VAC® dust collector that contains dust within the sealed system and collapses empty bags prior to tie-off.



As the bag empties and elongates, the TELE-TUBE® telescoping tube exerts continuous downward tension on the SPOUT-LOCK® clamp ring and bag spout, promoting flow and evacuation.

flow and evacuation.

Although the graphite and talc powder flow freely, they tend to pack and bridge during storage. As a result, each discharger includes three mechanisms to promote flow: FLOW-FLEXER® bag activators that raise and lower opposite bottom edges of the bag into a V shape; a vibrator mounted on the exterior wall of the hopper beneath the discharger; and an in-hopper agitator. All start and stop automatically in sync with the operation of the dischargers and conveyors.

Hands-off discharging and conveying

The unloader dedicated to feeding a graphite filling line discharges into a 20 cu ft (566 L) hopper that charges a 15 ft (4.5 m) long, 4.5 in. (114 mm) diameter flexible screw conveyor, which is routed to the packaging line's feed hopper at a 45 degree incline.

The screw is the only moving part contacting material, and is driven by an electric motor above the discharge point, preventing material contact with seals.

A high-level sensor on the hopper triggers an audible alarm indicating when to replace the bag, while a low-level sensor prevents the conveyor from operating in a "starved" condition.

The two dischargers dedicated to the talc and talc-graphite products share the same features as the graphite-only discharger, but they utilize 25 ft (7.6 m) long, 8.6 in. (219 mm) diameter flexible screw conveyors, also inclined at 45 degrees, that discharge into a blender mounted on load cells. The dischargers and conveyors operate alternately to attain the desired talc or talc-graphite ratio and target weight, typically 750 lb (340 kg). "We can pick whatever batch size and blend ratio we want, and the control system dispenses automatically," Hubers says. The high-throughput of the large-diameter conveyors shortens batch cycle times.

Under gain-in-weight control, the load cells supporting the blender interface with the discharger's PLC to run and stop the conveyor. Once the weight gain of talc or graphite-talc mixture approaches 50 lb (22.5 kg) of the target weight, the conveyor slows to dribble speed, stopping immediately prior to reaching the target weight to account for material still in-flight, which results in accurate and repeatable batches.

At the end of the blending cycle, the talc or talc-graphite mixture gravity feeds into an 80 cu ft (2,265 l) surge hopper equipped with a bin activator that promotes flow into two 15 ft (4.5 m) long, 4.5 in. (114 mm) diameter flexible screw conveyors. Oriented opposite one another, they transfer the powder to the packaging lines for 8 lb (3.5 kg) jugs and 20 and 40 lb (9 and 18 kg) boxes. Because the weigh-batching and blending cycles repeat back-to-back, the surge hopper is never empty, and operation is continuous.

Because talc and graphite are both highly aeratable and prone to dusting, each discharger is vented to an optional Bag-Vac® dust collector, which contains airborne dust displaced from the hopper during discharge, and collapses empty bags prior to tie off and removal, eliminating dust generated when empty bags are flattened manually.



This bulk bag discharger and flexible screw conveyor feed a graphite packaging line that fills 1 and 5 lb (0.45 and 2.25 kg) containers.



The gain-in-weight control system enables operators to specify graphite-talc ratios and batch weights.



Van Sickle's EZ-Slide® talc/graphite seed-flow lubricant.

"As soon as the system is done filling one batch, it gets the next batch ready," says Jason Vore, manager of process engineering. "We fire up the vacuum system, suck everything out of the bulk bag, collapse it, tie it off, swap out bags, and hit 'go' again. Running full out, we might change a bag every 25 or 30 minutes."

Throughput triples

Overall system throughput is three to four times higher than it was at the old facility. "We can produce as many 1 lb containers in a day as we used to in a 40-hour work week," Vore says, "Our output per worker-hour has about tripled."

Only two or three people run the packaging operation now, and the heaviest thing they lift is a 32 lb (14.5 kg) carton of finished product. "The level of comfort, the amount of physical labor, and the cleanliness in the new facility is so much better," Hubers says. "It's not even comparable to what we had."

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