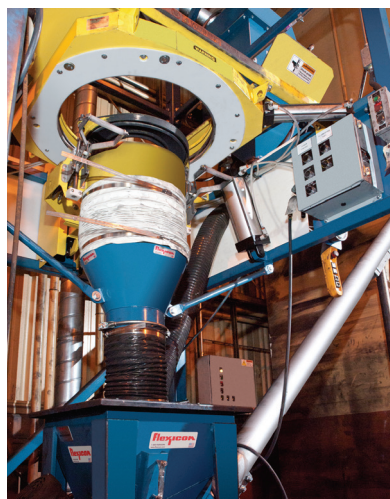
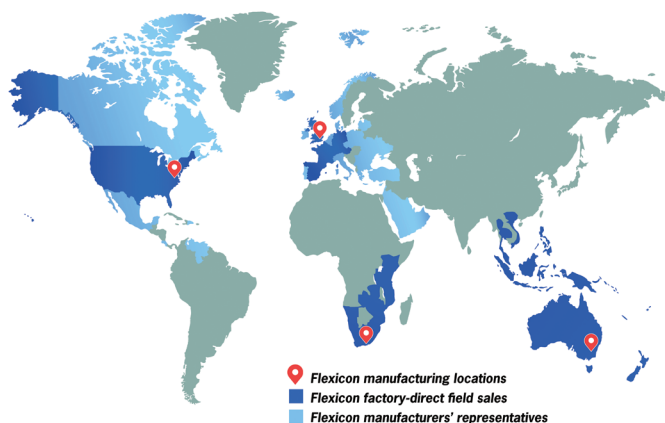




Bulk Bag Handling System Slashes Carbon Black Inventory, Keeps Compounding Line Clean

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BREA, CA — Elastomer manufacturer Kirkhill-TA Co. slashed inventories of carbon black and improved plant cleanliness by replacing a large silo storage system with a BULK-OUT® bulk bag discharging system from Flexicon Corp. It allowed the company to cut inventory by 90 percent, while preventing carbon black dust from contaminating the plant environment. Cost savings and improvements in efficiency and competitiveness accrued as side benefits.

The bulk handling system is the latest upgrade for this company that began making gaskets, seals and other elastomeric products in 1919, and gradually shifted production from general industrial products to highly engineered silicone parts for commercial and military aircraft, missiles, and even the Space Shuttle.

Carbon black is one of Kirkhill-TA's main processing materials. Adding carbon black to an elastomer reduces its rate of thermal expansion, thereby enabling it to maintain an airtight seal in high temperature applications. It can also modify elongation, rigidity and other physical properties, and impart conductivity to prevent static discharge.

As Kirkhill-TA moved from mass production of industrial parts to lower-volume production of aerospace parts, it became unnecessary and costly to maintain carbon black inventories in silos. "With railcars, we had to bring in 300,000 lb (136,363 kg) of carbon black pellets at a time," said Larry Pierce, Esterline's Vice President of Technology. "We only received shipments a few times per year, and were tying up close to \$250,000 in inventory with each shipment."

In addition, the city of Brea decided to tear up the railroad tracks that supplied the plant to expand its park space. "We were the only industrial facility left in the city, and agreed to it," says Pierce. "In return, the city gave us a loan to buy the new bulk off-loading system."

Also, Kirkhill-TA's parent company, Esterline Technologies, put a premium on controlling inventory costs.

Kirkhill-TA had several priorities for its new materials handling system. It had to improve inventory efficiency and keep costs in line. It needed to use as much of the existing infrastructure as possible. Finally, it had to prevent carbon black dust, caused by the friable pellets rubbing against one another, from escaping into the plant or processing equipment.

Carbon black is produced by burning heavy oil or tar to form soot-like particles. When airborne, they can penetrate operating equipment. "Carbon black tends to soak up lube oil," Pierce said. "If it gets into the bearings and rollers, they will wear out prematurely." It can also cause short circuits.

Because carbon black is a petroleum product, California classifies it as a hazardous material. While carbon black ships as 1-3 mm diameter pellets to reduce the likelihood of airborne release, manufacturers must remain vigilant to prevent spills and the cleanup that would follow.



The bulk bag discharger, hopper and flexible screw conveyor from Flexicon fully contain carbon black pellets, preventing dust from entering the plant environment. A SPOUT-LOCK® clamp ring forms a sealed connection between the bag spout and the TELE-TUBE® telescoping tube, which keeps the bag taut as it empties/elongates, promoting discharge. The sealed system is vented through the black hose to a BAG-VAC® dust collector that contains displaced dust and collapses empty bags, eliminating dust caused when bags are flattened manually.



Kirkhill-TA receives carbon black in bulk bags to minimize inventories. Carbon black imparts important properties to the elastomers that Kirkhill-TA manufactures.

Railcar System Handled Bulk Deliveries

Kirkhill-TA had a significant infrastructure to handle carbon black, with a rail off-loading station, including screw conveyors and bucket conveyors, and two storage silos.

Carbon black pellets flowed from the silos to the company's Banbury mixers two ways: by pneumatic conveyor and, when weight in the silo fell below 50,000 lb (22,675 kg), by large steel totes that hold approximately 2,000 lb (909 kg) of carbon black. "They are like bulk bags made of steel. We move them by forklift and gravity feed the carbon black into a weighing container with an integrated weigh scale that sits on a mezzanine above the mixers. When the container and pellets reach the weight required for the recipe, the container's chute opens, discharging the material into the mixer for compounding with elastomers prior to molding into finished seals," Pierce explains.

The pneumatic conveyors are no longer utilized, but the steel totes and weighing system remain as part of the new bulk handling installation.

Bulk Bags Simplify Handling

Bulk bags were a clear choice for receiving carbon black. First, they are available in 1,000 and 2,000 lb (455 and 910 kg) sizes, large enough to receive bulk discounts. While vendors charge less for bulk railcar shipments, the savings are largely offset by higher rail transportation costs. By switching, Kirkhill — TA would pay only a fraction of a cent per pound more for bulk bag deliveries. Add in the savings from minimizing inventories and eliminating silo maintenance, and the bulk bag system pays for itself.

The Flexicon discharger also improves site cleanliness. First, it moves bulk material handling operations inside the facility, so any accidental leaks are contained within the plant. The discharger also uses dust-tight connections to fully contain carbon black until final addition to the mixer.

Trucks deliver 10 to 12 palletized bulk bags at a time. A forklift raises each bag by its straps and delivers it to a storage site on the mezzanine. When carbon black is needed, the forklift operator attaches the bag straps to a detachable bag lifting frame, then lifts the frame into the cradle on the bulk bag discharger.

The discharger unloads carbon black pellets from the bulk bag into a purpose-built hopper, from which a 15 ft (4.5 m) long, 4.5 in. (11.4 cm) O.D. flexible screw conveyor, also from Flexicon, transfers the material to a steel tote. At this point, the operation proceeds as it did originally using the steel totes; a forklift transports the tote along the mezzanine to the container above one of the mixers, where it releases its load.



Dust is created as 1-3 mm diameter carbon black pellets rub together.

Air-tight System Yields Cleaner Plant

The bulk bag discharger is engineered to fully contain the material being unloaded, preventing contamination of the product and plant environment. The bag spout is attached to a SPOUT-LOCK® clamp ring, which forms a sealed connection between the clean side of the bag spout and clean side of a TELE-TUBE® telescoping tube (through which the material is discharged). The tube pneumatically raises the clamp ring, allowing the operator to make a dust-tight connection with the bag spout. The tube then lowers, elongating the bag to fully discharge the pellets. Also promoting full discharge, FLOW-FLEXER® bag activators — two plates located under the bag — raise and lower opposite bottom edges into a "V" shape, directing material toward the bag spout.

Above the clamp ring, a POWER-CINCHER® flow-control valve encircles the upper portion of the bag spout to allow retying of partially empty bags. When the bag is empty, the operator actuates the BAG-VAC® dust collector, which generates a vacuum within the sealed system, collapsing the empty bag dust-free for retying and removal.

The conveyor encloses a flexible stainless steel screw with specialized geometry to minimize compression of materials like carbon black that tend to compress in conventional conveyors.

As the screw rotates, it self-centers within the plastic tube, providing clearance between the screw and tube wall, allowing sufficient space for pellets to flow without damage.

The intake end of the conveyor attaches to the outlet of the hopper. At the discharge end, a 5 hp (4 kW) motor drives the screw as the material passes from the conveyor outlet, through a 6 in. (15.2 cm) diameter flexible downspout into the steel tote. Being fully enclosed, the conveyor further assures plant cleanliness.

A batch timing control activates the conveyor for a repeatable time interval to fill the tote.

"We reduced inventories of carbon black from 500,000-1,000,000 lb (227,000-454,000 kg) to 50,000-100,000 lb (22,700-45,400 kg)," Pierce says. "The bulk off-loading system improves efficiency and competitiveness and brings our costs in line."



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