Success Story

U.S. CEMENT MANUFACTURER TAKES CONTROL OF FUGITIVE MATERIAL

Each transfer point received one new impact cradle and two belt support cradles.

[Rapid City, SD] - Grupo Cementos de Chihuahua (GCC) is a global producer of cement, ready-mixed concrete, aggregates and related products to construction industries in Mexico, the United States and Bolivia. The company began manufacturing operations in 1943, with a capacity of just 60,000 metric tons. Expanding gradually according to a clear strategic vision, the firm has developed innovative processes and technologies that contribute to dynamic growth, while fostering an environmentally-responsible, community-oriented culture.

Overall, GCC currently has an installed annual production capacity of 5 million tons: 2.5 million output from three plants in the U.S., and 2.5 million from five plants in Mexico and South America. After decades of gradual expansion, in 2001 the firm purchased the Dakotah Cement plant and all of its assets in Rapid City, SD, which added 950,000 tons to its yearly capacity. The facility markets a variety of cement and aggregate products to nine states through a network of terminals located in South Dakota, North Dakota, Wyoming and Colorado.

Like most cement manufacturing sites, GCC Dakotah employs an extensive conveyor system to handle raw materials and move finished product. In keeping with its long-range plans to employ industry best practices for bulk handling and fugitive material control in its plants, company officials conducted an extensive assessment of the conveyors in early 2013. It was determined that significant upgrades could be made on conveyor transfer points to reduce spillage and dust emissions, and they contacted Martin Engineering for a proposal.

The goals of the upgrades were to eliminate waste and unnecessary maintenance, while enhancing efficiency, allowing the system to contain dust within the material stream. Another objective was to minimize the negative consequences associated with fugitive material, including possible risks to worker health from airborne dust and the potential for slips, trips and falls. By avoiding accumulations that required cleanup, the company would also reduce the need for maintenance personnel to work in close proximity to fast-moving conveyors, helping further diminish the chance of accidents or injury.

“Virtually any time bulk material is moved, especially in large quantities or at high speeds, the potential exists to create and release dust,” explained Martin Engineering Product Engineer Dan Marshall. “Dust accumulation affects both safety and productivity, so it’s really more than just a housekeeping issue. Complicating the situation is the fact that bulk handling systems frequently must accommodate changing weather and material conditions, making dust management an even bigger challenge.”

Scope

The upgrade involved a significant overhaul of six transfer points on four conveyors, which were originally constructed in the late 1970s. All belts are 24 inches (61 cm) wide, and range in length from 40 feet (12.2 meters) to 110 feet (33.5 meters). During normal operation, they move 200-250 tons per hour of clinker from the storage building and carry it to the bins feeding the finish mills.

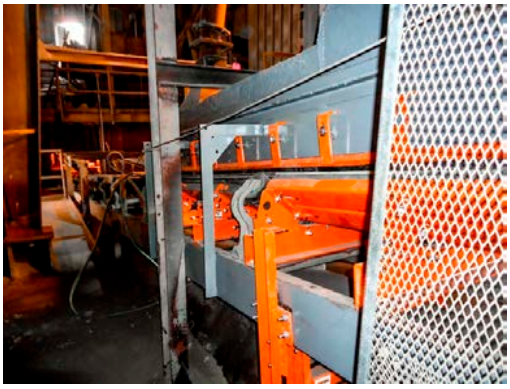
“Most of the material handling system at this plant was fairly standard issue for its time, but some of the components were nearing the end of their useful life,” commented GCC Maintenance Manager Ralph Denoski. “We were also aware that significant advancements had been made in some areas of bulk handling, and we wanted to take advantage of the latest technologies.”

With a detailed proposal from Martin Engineering in hand, GCC planned the upgrade process for a scheduled shutdown in March. In addition to supplying the components, Martin Engineering was responsible for planning and supervision of the project, while a mechanical contracting group assisted with the installation.

Work began on all four conveyors by disconnecting the material inlet chutes from the existing skirtboard system and removing the worn rubber skirt seals, clamps, supports, skirtboard chute walls and tail boxes. Existing idlers were also removed to allow mounting of new belt support systems and troughing roll assemblies.

Components

On each conveyor, three Martin® Trac-Mount™ Idlers were installed, spaced to deliver optimum belt support. The unique idler design delivers proper belt carriage, while stabilizing the belt line to improve sealing. Its slim profile requires only eight inches (203 mm) of space for 6-inch (152 mm) idlers, and the slide-in/slide-out frames allow service without the need to raise the belt or remove adjacent idlers. The units are available in standard or wide base frames and can be specified with steel or impact rollers. Martin Engineering can also custom-design Trac-Mount Idlers to meet individual application requirements.



To deliver positive containment of fugitive dust, each transfer point was outfitted with Martin® ApronSeal™ Skirting, a dual design with two sealing surfaces.

With new idlers and troughing roll assemblies in place, each transfer point received one new impact cradle and two belt support cradles. Installed under the loading zone, Martin® Impact Cradles absorb the force of falling material in a transfer point and stabilize the belt line to help prevent the escape of dust and fines. Rugged impact bars are composed of a top layer of low-friction, ultra-high molecular weight (UHMW)

polymer and a lower layer of energy-absorbing styrene butadiene rubber (SBR). Each bar is reinforced with a bed of steel angles, and adjustable supports facilitate easy installation, with the wings able to match any standard trough angle. The design also compensates for normal wear, with eccentrics in the wing supports delivering five degrees of adjustment.

Working in conjunction with the impact cradles is a pair of Martin® Support Cradles on each conveyor. Installed under the skirtboard of the transfer point, these cradles support the edges of the belt specifically to eliminate sagging. With the proper support in place, pinch points that can trap material and gouge the belts are eliminated, improving both sealing efficiency and belt life. The belt glides over low-friction polymer or stainless steel bars to minimize power consumption and heat build-up. To compensate for wear, the cradles adjust easily with hand tools, and the unique “box” design allows use of both the top and bottom surfaces to maximize service life. When the top eventually wears out, the bars can simply be flipped over to provide a second wear surface.

Sixteen feet of skirt board was installed on each transfer point, with new side/center supports and covers. The new skirt board is 7″ (17.8 cm) high on two of the conveyors, and 12″ (30.5 cm) high on the other two. Each system also included internal skirt board wear liners and a new tail box assembly with sealing components.

To deliver positive containment of fugitive dust, each transfer point was outfitted with Martin® ApronSeal™ Skirting, a dual design with two sealing surfaces. A primary seal is clamped to the steel skirt board to keep lumps on the belt, and a secondary seal or “outrigger” strip captures any fines or dust particles that may pass beneath the primary seal. The secondary seal lies gently on the belt and self-adjusts to maintain consistent strip-to-belt pressure, despite high-speed material movement and fluctuations in the belt’s line of travel. The one-piece construction requires less free belt edge than standard two-piece seal designs, and the EPDM rubber composite delivers good chemical resistance and low abrasion characteristics. It is available in continuous lengths up to 300 feet (91.4 meters).

Each conveyor was fitted with a Martin® Tracker™ for the return side, to help reduce edge damage, prevent spillage and extend belt life.

Each conveyor was then fitted with a Martin® Tracker™ for the return side, installed approximately 10 feet (3 meters) ahead of the tail pulley. By providing immediate and continuous precision adjustment of the belts, the Tracker™ helps reduce edge damage, prevent spillage and extend belt life.

Finally, each belt received one Martin® QC1™ Cleaner HD as a primary cleaner and one Martin® SQC2S™ Cleaner. The QC1™ features a special polyurethane blend and tungsten carbide tip to deliver service life 2-3 times longer than conventional urethane blades. Designed to provide excellent cleaning performance immediately, avoiding any break-in period, the assembly maintains consistent tension without frequent adjustment.

The Martin® SQC2S™ Cleaner incorporates individually-cushioned blades for effective sealing, buffering impact while maintaining cleaning pressure. The patented rubber buffer is designed to deflect as belt splices pass, protecting the belt, splice and blade.

The compact construction allows installation in close quarters, while the narrow profile resists material build-up. With all of the new components in place, technicians connected the original material inlet chute to the new skirt board system and sealed openings around cleaner assemblies, pulley shafts and other components using steel plate, flat bar and sheet rubber.

Results

The entire upgrade operation was completed in just 11 days during the scheduled outage, with crews working 12-hour days to accommodate the planned shutdown. While specific cost savings are difficult to quantify, Denoski said the difference is easily observed. "The production team responsible for that area has had nothing but positive feedback about the upgrades," he commented. "We're not losing product to spillage and dust, so that material can be sold instead of cleaned up off the floor. The manpower formerly spent on cleanup can now be directed to core business activities.

"Our experience with Martin Engineering has been very positive," Denoski concluded. "The company's greatest strengths are its knowledge of bulk material handling problems and the best solutions for addressing them. And the no-excuses guarantee gives us the confidence of knowing that it will stand behind its products."

With government agencies poised to more strictly enforce dust management regulations, suppliers of bulk material handling systems are investing significant research and development into the design of equipment and techniques that can help contain fugitive particles and thereby improve safety, regulatory compliance and productivity. By minimizing the negative consequences associated with dust and spillage, their goal is to enhance safety and efficiency, allowing bulk material handlers to return fugitive material to the process stream.

The Martin Engineering primary cleaner features a special polyurethane blend to deliver long service life.

In the past half-century, most conveyor systems were designed by matching capacity requirements with the most economical construction cost, while still adhering to codes and safety regulations. Instead, the Martin Engineering approach examines every detail for opportunities to make conveyors cleaner, safer and more productive. Literally reinventing conveyor technology from the ground up, designers are now revisiting every facet of component and system design, with fugitive material control, safety and ease of service as primary criteria.