



White Paper

Many sticky Returns - A Gold Mine seeks Solution to Carryback

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It sometimes occurs that the conveying of bulk solid materials via belt conveyor poses a significant problem due to the conveyed material's characteristics. The following article presents one such case, and the solutions found to solve the problem.

(From the archive of "[bulk solids handling](#)", article published in Vol. 35 (2015) No. 5 , ©2015 bulk-online.com)The word "downtime" in any industry is a veritable curse word. Unscheduled work stoppage is particularly troublesome for a system that depends on the efficiency of its conveyors and can add to pressure from investors who know the company is Cronos Pro - in the most literal sense - sitting on a gold mine.



Formerly known as the Rosario mine, Barrick Gold Corporation and Goldcorp jointly procured the property and formed PVDC in 2006. (Pictures: © Martin Engineering)

This was the issue facing the Pueblo Viejo Dominicana Corporation (PVDC), a gold mining company located in the province of Sanchez Ramirez, 55 miles (89 kilometers) northwest of Santo Domingo in the Dominican Republic. Within weeks of opening production, operators realized their brand new conveyor belt cleaners were unable to adequately address the area's overburden. They observed extreme amounts of carryback on discharge belts causing expensive equipment

failures, unscheduled downtime and costly man-hours. “We lost nearly USD 250 000 in revenue due to clogged pulleys and headers from abrasive dust and belt fouling in the first year,” said Ed Power, General Process Maintenance Superintendent at PVDC. “We decided to invite a team of experts from Martin Engineering to assess the problem.” The four-person team came to the conclusion that site construction planners had not anticipated the consequences of clay and sulfur in the soil on the new equipment. PVDC, formerly known as the Rosario mine, had drawn environmental concerns from local residents for several years between its initial opening in 1975 and closing in 1999. In 2006, Canadian companies Barrick Gold Corporation and Goldcorp jointly procured the property from the Dominican government and formed PVDC, amounting to the largest single foreign investment in the history of the Dominican Republic. What began with a USD 2.6 billion estimate to resurrect the operation ended with USD 3.7 billion in construction and environmental remediation costs, but site surveys showed it remained a solid investment.

Cohesion and Adhesion

“This is not a deep mine operation. Rather, the ore and rock is quarried,” said Alfonso Granata, General Manager of PeGran, the local dealer and service agent for Martin Engineering products. “This particular bulk material offers a unique challenge as it moves through the system.”



The carryback had the consistency of toothpaste, adhering chunks of aggregate to the belt and causing damage to pulleys and headers.

The carryback on discharge conveyors caused the whole system to suffer excessive downtime. According to Mike Lenart, Mechanical General Supervisor for PVDC, "The substance had the consistency of thick toothpaste, which was also able to adhere small chunks of aggregate to the belt, causing a destructive carryback that wreaked havoc on our pulleys and headers. It was a mess." The clay and sulfur in the soil at the PVDC site work in tandem: **Particulate cohesion:** Production is 365 days a year, however, between April and October

the area can receive as much as 6-feet (183 cm) of precipitation. Moisture can cause cohesion in fine clay particulates, which reacts to load pressure, causing it to stick to the contact surface [1]. **Sulfur adhesion:** Throughout human history sulfur has been used in a variety of applications as a strong adhesive and sealant [2]. This can cause gumming on the belt and adhere aggregate that would have previously been discharged to remain as part of the carryback.

Solutions



The original conveyor belt cleaners could not manage the overburden, resulting in carryback that caused

equipment failures and downtime.

The original primary and secondary belt cleaners and dust suppression systems were not adequately addressing the overburden. "Our search for a solution included Martin Engineering, due to their reputation in the industry," said Power. "We wanted to quality test all of our options, so we also included the original equipment manufacturer and a third supplier. "Martin Engineering representatives created a full site report, complete with assessments and equipment recommendations. Along with the report, the team added a presentation containing budget and timeline to help site managers explain the issues, needs and solutions to company executives. Once the corporate office gave the green light, technicians from each competitor attached belt cleaners to three of the site's main discharge points. Martin Engineering equipment was installed on the large discharge belt that presented the most carryback. "The superior product was immediately apparent once the quality testing phase started," Lenart said. "Though testing lasted for weeks, the Martin product was more effective, hands down."



Martin Engineering replaced existing primary cleaners at sixteen discharge points, fitting them with low-adhesion urethane blades.

Barrick accepted most of the team's recommendations, and installation took just two weeks. Martin Engineering replaced the existing belt cleaners with QC1-Cleaner XHD primary belt cleaners at sixteen discharge points. These extra heavy-duty units are able to handle speeds of up to 1,200 FPM (6.1 m/s) on belts as wide as 96 inches (2.438 meters) and pulley diameters of more than 30 inches (762 mm). Installers fitted them with low-adhesion urethane blades specifically designed for sticky and tacky material. Able to withstand temperatures from -20° to 160° F (-30° to 70°C) with up to 12 inches (305 mm) of wear life, the blades endure high summer temperatures and constant production schedules with more time between replacements. "The curved scraper is designed in sections, adjusted individually to conform to the belt, assuring continuous contact across the belt profile," said Granata. "Martin manufactures different cleaning blades, which

specifically address the chemical make-up of almost all types of conveyed bulk materials.”



Sixteen additional secondary belt cleaners were attached behind the header, equipped with tungsten tipped blades.

Sixteen additional Martin DT2H secondary belt cleaners accompanied the primary units to mitigate belt fouling. Attached two to three feet behind the header, the units were equipped with tungsten tipped urethane blades suited for heavy-duty applications. To avoid product loss due to fugitive material, the Martin Engineering team also installed 300 feet of Apron seal skirting constructed from 70 durometer EPDM rubber composite for its low abrasion index characteristics.

Training

“We were also impressed by the warranty on the equipment,” said Power. “And to make sure we had the proper maintenance to comply with the terms, Martin Engineering trained a team of local people to recognize potential problems throughout the entire conveyor system and either fix the issues or offer recommendations.”



Access doors and view points facilitate routine observation of potential trouble spots and contribute to easier maintenance.

Martin Engineering has been at the forefront of conveyor training since it began its education program in 1991. The company has set the industry standard with

“Foundations”, a reference book and training series now in its fourth edition. Thousands of personnel have been trained in numerous languages on basic operations, safety, maintenance, online education and advanced engineering. Both PeGran employees and select PVDC employees were also trained by Martin Engineering on its Walk-the-Belt program, which takes a holistic view of the entire conveyor system. “This assures people both inside and outside of PVDC have the expertise necessary to achieve high operating standards, keeping the conveyor system running at maximum productivity, as well as recognizing potential hazards,” Granata pointed out. “We’re out there every two to three weeks doing inspections. We provide a detailed report on the state of the equipment and recommendations on how their trained internal team can safely perform main-tenance.” “Their focus on workplace safety was important to us,” Lenart added. “Even the equipment design has extra elements built in that help protect operators and maintenance staff.”

Resuming Operations

Operations are now more predictable and consistent, which is important to company profit forecasting. According to Barrick’s website, “The autoclaves have achieved targeted and sustainable run rates, but will undergo some planned downtime for scheduled maintenance in the second half of 2014.” PVDC projections for the current fiscal year put annual gold yield at 1,040,000 ounces, a 22 percent increase from the previous year. This has made executives and stakeholders more confident in the sustained operation of the mine, which is forecasted to yield profit for the next 25 years. “Ongoing follow up from Martin Engineering has been an important part of keeping the whole system running smoothly,” Power concluded. “They are just as committed to protecting our investment as we are, which means our conveyor carryback issues are all but gone.”

References:

2. AuthorLastname, AuthorFirtnameInitials.: *ReferenceTitle*;
ReferenceLocationAndYear.

3.

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