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CHANGING THE WAY SCREENING IS DONE IN AFRICA

SAFETY AROUND **THE CONVEYOR BELT'S RETURN SIDE**

The extraordinary expense of ignoring safety standards both monetarily and operationally cannot be ignored. By Dan Marshall – Process Engineer, Martin Engineering

The return side of the conveyor may be the most deceptively hazardous part of a conveyor system. With long gaps between rollers and carrying no cargo, there is an extensive list of injuries inflicted on workers from the return side of conveyors in the Occupational Safety and Health Administration (OSHA) database. Caused by nip/shear points, belt contact and reach-in hazards from working around a running conveyor, these injuries stem not only from a lack of satisfactory protection of both the worker and system, but also inadequate training. Many experts will attest to the fact that efficiency and safety are inextricably linked.

Belt return hazards

- **Nip points** are created where a moving element of the conveyor machinery meets another rotating or moving component. Based upon common belt speeds and average human reaction times, a shovel or other tool in an entrapment situation will pull the worker using the tool in with it before the person can even let go.
- **Shear points** occur when the edges of two machine parts move across or close enough to each other to cut a relatively soft material. An example of this is where the belt quickly passes a stationary beam or component, which can trap a limb, abrading it or severing it.

Fugitive material

The fugitive material hazards posed around the belt return begin with the discharge at the head pulley. An insufficiently cleaned belt can cause carryback to drop along the entire belt path and spill into walkways or on the return belt. This produces a trip hazard and a possible violation. In addition, dust can get into cracks and divots in the belt, release along the belt path, and foul gears and bearings of rolling components, causing them to seize and creating a possible fire hazard.

Inadequate cleaning technology and tensioning systems allow carryback to collect directly beneath the discharge zone. If not addressed, material accumulates quickly until the belt runs along the top of the pile, creating carryback across the entire profile while abrasion degrades the belt face and frays the edges.

Fugitive debris on the return side of the belt can rapidly reach the tail pulley. Once caught between the belt and the pulley, these material chunks can recycle through over and over again, each time putting a new divot in the belt, as well as gouging and fouling the pulley face. This material can become ground into fine dust or ejected from the pulley. Plows are often used to clean the inside of the belt and protect the tail pulley and belt from damage (Figure 1).

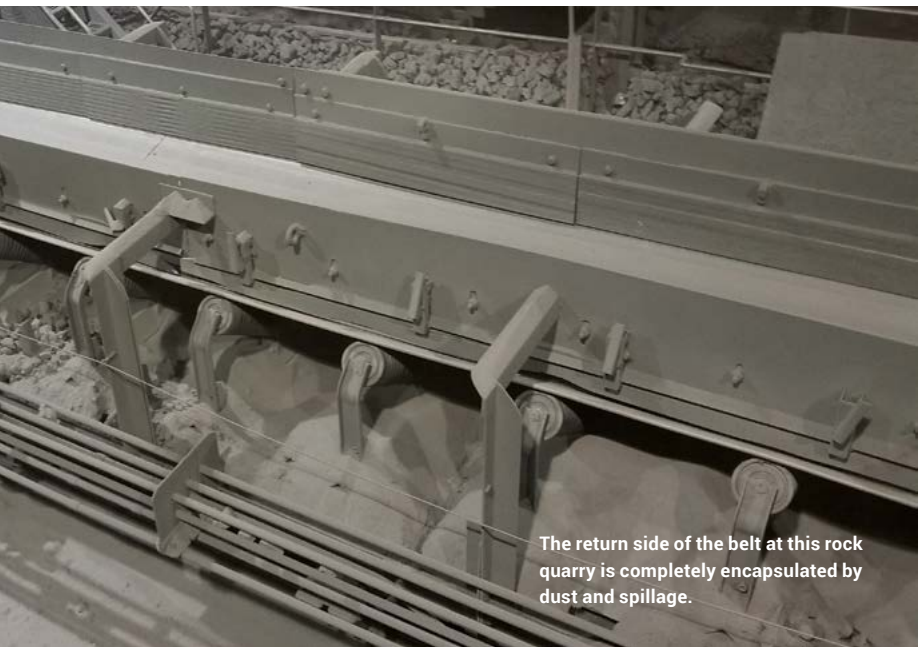
Other equipment hazards

Many operators focus on cargo side issues and neglect the return side, where belt tracking should be of pivotal concern. When left unchecked, the belt can drift into the structure, causing fraying and the potential for a fire hazard.

While issues from fugitive material to belt tracking can cause a number of mechanical problems, each one also represents a safety hazard. If components are not functioning at 100%, there is an increased likelihood of a situation that may put a worker in danger while trying to fix the problem. An operation's interests are best served by taking actions intended to prevent the mechanical problems and the accompanying potential for injury, rather than just protecting the worker from hazards that will likely be present with guarding.

Steps toward minimising return belt hazards

According to OSHA, operators should adhere to the standards set



The return side of the belt at this rock quarry is completely encapsulated by dust and spillage.

KEY TAKEAWAYS

- The return side of the conveyor may be the most deceptively hazardous part of a conveyor system.
- An insufficiently cleaned belt can cause carryback to drop along the entire belt path and spill into walkways or on the return belt.
- Many operators focus on cargo side issues and neglect the return side, where belt tracking should be of pivotal concern.
- Operators must choose the proper equipment to minimize accidents.

by the American National Standards Institute (ANSI), which recommends detailed inspections of the entire conveyor mechanism. The first step is identifying potential problems before they occur (Figure 2). The second step should be putting an emphasis on training and enforcing strict lockout-tagout procedures for any activities on or around the conveyor system.

The third step is for operators to choose the proper equipment to minimize accidents. New equipment designs dispel the myth that conveyors are inherently dirty and in need of constant maintenance.

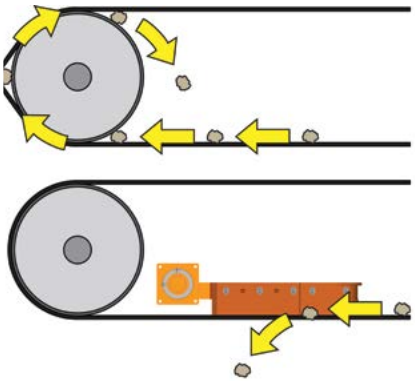


Figure 1: A V-Plow helps prevent repeated entrapment of material between the belt and tail pulley.

Figure 2: Proper signage should be displayed wherever a hazard presents itself.

Safe and efficient cleaning

In the past, belt cleaners were rigid, linear pieces of hardware made out of various materials from brick to plastic that earned the name “scrapers” or “wipers” because that’s what they did. They had a low operational life, broke or cracked often and significantly contributed to belt wear. Modern primary cleaners are usually mounted at the head pulley, made from engineered polyurethane, which is forgiving to the belt and splice, but still highly effective for dislodging cargo. Typically supported by mechanical or pneumatic tensioners designed to meet the needs of the application, the designs require significantly less monitoring and maintenance of blade tension.

As conveyor speeds and cargo volumes increase to meet production demands, secondary belt scrapers are often installed immediately after the belt leaves the head pulley to address dust and fines that escape the primary cleaner. Generally equipped with

Figure 3: Innovative belt cleaning technology can improve cleaning, safety, and the cost of operation.

Figure 4: Cleaning a damaged belt with a scraper blade.

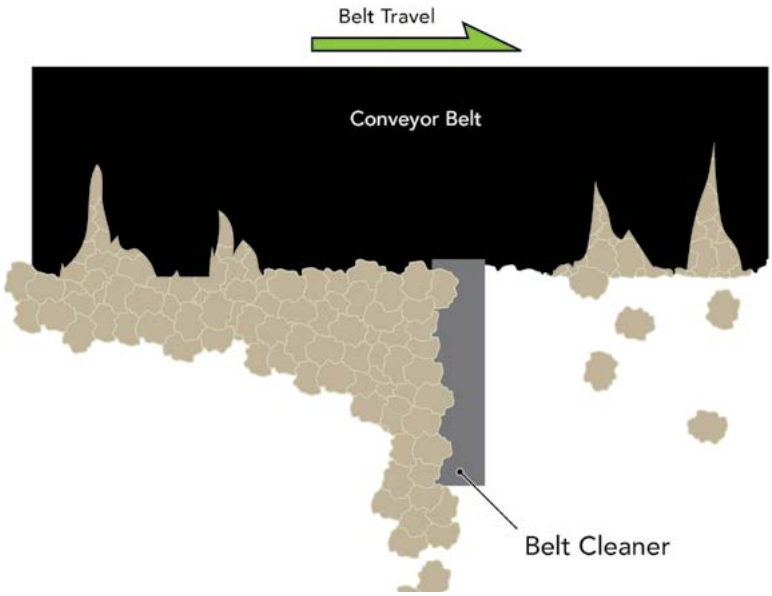


Figure 5: Thoroughly clean a damaged belt with a washbox.

spring or air tensioners that easily adjust to fluctuations in the belt, secondary cleaners are particularly efficient for applications that produce wet, tacky or dusty carryback.

In most applications, normal belt wear can yield valleys and depressions in the belt. Dust and fines that get into these blemishes often remain even after passing under primary and secondary belt cleaning blades, becoming dislodged by the impact of any return idler the belt meets (Figure 4). This causes dust and spillage in areas away from the head pulley.

In such cases, operations may choose to install a Washbox Cleaning System, which combines secondary cleaners with water spray bars enclosed in a self-contained unit that captures residue and drains wastewater safely away from the work area (Figure 5).

Even on a clean belt, mistracking is another concern, especially for operators of long conveyors. Previous **belt tracking systems** were reactionary pieces of equipment designed to help prevent belt contact with the mainframe, however these designs have historically experienced problems with friction heat, edge degradation and belt curling.

Some longer systems may require a series of modern upper and lower trackers hung from the mainframe every 21 to 50 m and on the return run directly prior to the tail pulley.

Tail pulley protection from build-up riding on the return side of the belt using a V-Plow or diagonal plow can extend the life of the entire system by minimizing fouling of the pulley face that can lead to mistracking.

The workhorse of tail pulley protection, the V-plow safely clears debris without harming the belt.

Installing adequate guarding that encloses the system and has the correct mesh size and mounting distance from the hazard also helps protect workers from fugitive material and reach-in injuries. For systems that are considered "guarded by location" (too high to reach), gates may not be required, although most countries have standards that require guarding against falling bulk materials.

Conclusion

From head pulley to tail pulley, return side belt care is essential to maintaining an efficient and productive system. By installing modern equipment that helps remedy common return side problems, operators reduce the time workers spend near the system servicing and cleaning it. This mitigates hazards, reduces downtime and improves compliance.

In addition to resolving many mechanical problems, these improvements will help prevent injuries caused by incidental contact with a moving belt that can pull a worker into pinch and shear points, some of the most prevalent workplace hazards in bulk handling operations. ●