AUSTRALIAN

BULK HANDLING REVIEW

www.bulkhandlingreview.com
VOLUME 25, ISSUE 4 | JULY/AUGUST 2020

In this issue:
Keeping Australia moving during COVID-19
Bulk outside the box
28-page conveyor feature

Staying safe around belt conveyor danger zones

Recognising hazards is a key step toward preventing conveyor-related injuries. Dan Marshall, a Process Engineer for Martin Engineering, tells *ABHR* about some of the most common risks to avoid.

A CONVEYOR IS TYPICALLY A massive, complex and extremely powerful system. It is usually constructed of rubber belting, set on rolling idlers, wrapped around large steel drums at each end and driven by a high-torque motor. As a result, a conveyor presents enough danger zones that the entire system should be considered a hazard.

The belt

In most applications, a conveyor belt moves at a relatively constant speed, commonly running somewhere between 0.5 and 10 metres per second. An Olympic sprinter has a reaction time of about 0.18 seconds (roughly one-fifth of a second) when poised at the starting line and totally focused on the race. If this athlete becomes tangled in a conveyor belt traveling 1.5 meters per second, the person would be carried 0.27 meters before even realising what has happened.

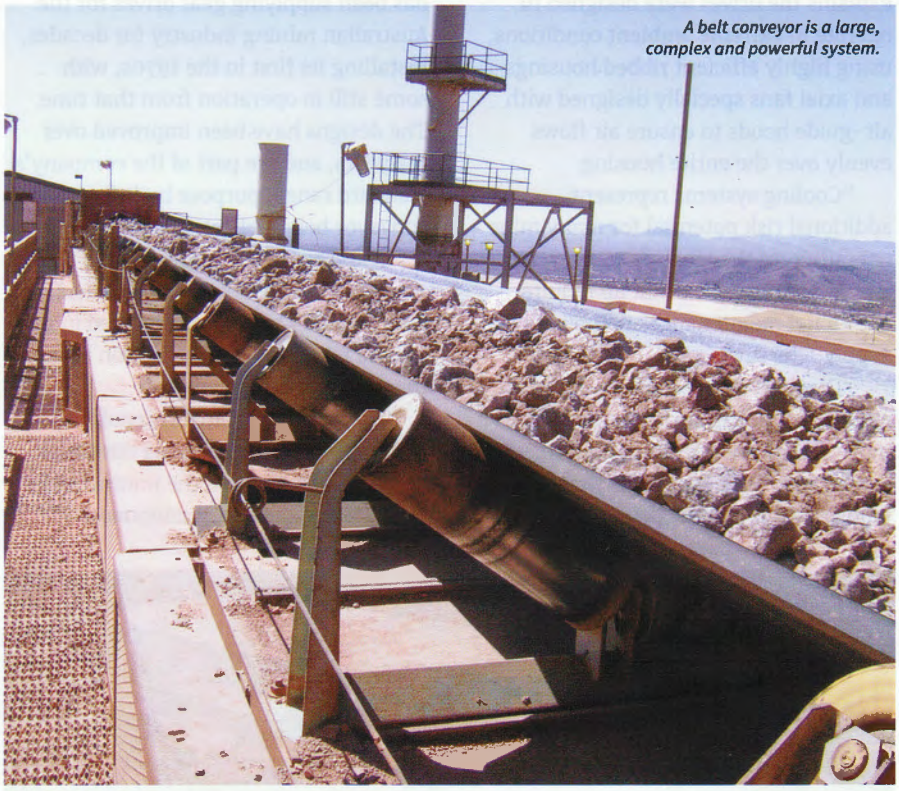
A conveyor worker would likely require a longer time to react to a hazard, meaning they are likely to be pulled further, increasing the potential to strike many more components, or be pulled farther and harder. Most conveyors are engineered with the ability to start remotely. The system may go from dormant to active at any time at the push of a button. This quick transition can catch a worker off guard, leading to serious injury or death.

"When a conveyor belt is moving, there will usually be more tension on the carrying side," Dan Marshall, Martin Engineering Process Engineer says. "If the conveyor is merely stopped and de-energised, that tension may remain in the belt in the form of stored energy."

Marshall says a system under tension will always try to approach equilibrium, or in other words, will try to release the energy. This release likely comes in the form of a pulley slip, which occurs when the belt slides around the head pulley to equalise the tension. The distance the belt will move is proportional to the amount of tension stored and the belt's modulus (elasticity), possibly several metres. If a worker is on the belt or close enough to be pulled in during this sudden release of energy, injuries can occur.

When performing maintenance or repairs, procedures for lockout/tagout/blockout/test-out should always be followed when working on a stationary conveyor, and systems should be equipped with anti-rollback devices (also known as backstops) on the head pulley.

Many of the moving parts on a conveyor belt system are rotating components. These parts include idlers, drive shafts, couplings, pulleys and speed sensors. Items rotating at a high speed pose the risk of entanglement or entrapment.



A belt conveyor is a large, complex and powerful system.

The system

"There's a simple rule of thumb regarding conveyors: If it's moving, don't touch it," Marshall says.

"The most common way to prevent inadvertent contact is with suitable guarding that renders the moving components inaccessible."

"All moving machine parts should be guarded with adequately constructed, properly installed, functioning and well-maintained guards," Marshall says.

There are many pinch points on

Belt conveyors move massive amounts of material, often at very high speeds.

a conveyor, components that the belt actually touches or comes near, including the drive pulleys, snub pulleys, idlers, stringer, chute walls and deflectors. If a worker's limb travels with a conveyor belt, it will meet one of these components and become trapped between the belt and the obstruction.

The same thing can happen with a tool, which can pull a worker into the entrapment faster than the person can let go.

"Effective fixed guards should be absolute in their protection. Workers should not be able to reach around, under, through or over the barrier separating them from moving components," Marshall adds.

Many of the fatalities around conveyors have happened when a worker was cleaning fugitive material from the structure or components of a conveyor system. The process of cleaning may put a worker in proximity to a very dangerous machine. The need to shovel, sweep or hose off accumulations puts the worker within arm's length of the conveyor, and often closer.

Airborne dust can also cause numerous health risks, ranging from material build-up in the lungs to explosions. Categorised as either respirable or inhalable according to particle size, dry, solid dust particles generally range from about 1 to 100 microns (µm) in diameter. According to the United States Environmental Protection Agency, inhalable coarse particles are 2.5–10 µm in size. They are typically caught by the human nose, throat or upper respiratory tract. In contrast, fine respirable particles (under 2.5 µm) can penetrate beyond the body's natural cleaning mechanisms (cilia and mucous membranes), travelling deep into the lungs and causing long-term or chronic breathing issues.

While it's virtually impossible to prevent all fugitive material from escaping a conveyor structure, taking practical steps to minimise it as much as possible helps reduce the dangers it can introduce. When clean-up is necessary, performing the job while the conveyor is running should not be an option. Operators concerned with the cost of lost production from stopping a conveyor to clean need only consider the consequences of an accident to confirm the wisdom of this rule.

"Using new and emerging technologies, even poorly performing conveyors often don't need to be replaced or rebuilt, but merely modified and reconfigured by knowledgeable and experienced technicians installing the right modern equipment," Marshall says.

"Specialised conveyor training and trusted resources from global suppliers are helping to raise operator awareness to make conveyor systems cleaner, safer and more productive." B

Belt clamps can be as small as two bars or as large as a giant vice.