QUICK FIXES

Ryan Grevenstuk, Flexco, USA, outlines the top ten belt conveyor challenges that can be identified with a simple visual inspection, what problems they can cause, and how to fix them in a short period of time.

Introduction

It is easy not to notice a common problem when looking at a belt conveyor system every single day. However, a quick visual inspection can mean the difference between a productive day and a costly day for a cement operation. It is also helpful to know what to look for when walking the line, as sometimes small irregularities can end up causing big problems.

The top ten conveyor challenges that can be identified with a simple visual inspection, what problems they can cause, and how to fix them in a short period of time, are listed below:

Damage to belt cleaners, premature wear of fasteners, carryback, mistracking of belt

Causes

Unskived splices; fasteners interfering with the cleaners.

Solution

Skive the belt before applying splices, when possible, and use low profile fasteners with a coined edge. Skiving the belt reduces the fastener profile on the belt, resulting in improved fastener-cleaner compatibility and increased fastener service life. When the skiving layer is removed, the fasteners are installed so they are even or slightly below the belt surface. This outcome reduces the chances of the fasteners getting caught on belt components and even the structure itself. Any contact with cleaners, rollers and skirting can damage both the belt and the components, resulting in reduced component life, downtime and maintenance issues.

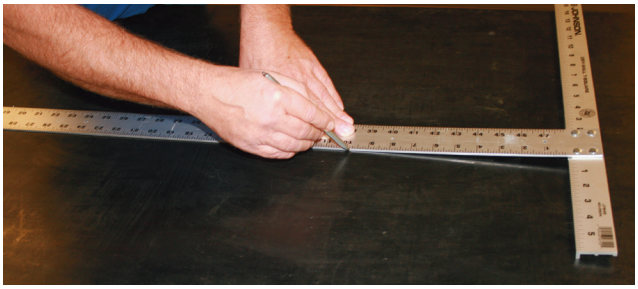
The process of skiving also creates stronger splices. The splice on a properly skived belt will last much longer as a lower profile is being achieved, while preventing excess wear and tear on the fasteners.

Furthermore, when a belt is skived, it removes the top rubber layer from the belt, placing the top and bottom plates of each fastener closer to the carcass, resulting in improved strength of the belt splice.

Premature belt splice failure, uneven lagging wear, early cover wear at trough line

Causes
Poor transition distance.

Sometimes the need for quick fixes can be prevented. A properly squared belt can extend the life of the belt and help avoid mistracking.



If fasteners are wearing prematurely, skiving the belt may be the key to longer splice life.

If cleaners are not mounted properly and are not taking into account the belt's material path, cleaning efficiency could suffer.

Solution
Check the transition distances and verify that the distances are in line with CEMA standards. Typically for fabric belts, CEMA recommends a transition distance of four times the belt width.

Belt ripping right behind the splice, premature belt failure

Causes
Fasteners that are too large for the smallest pulley.

Solution
Check the minimum pulley (where the belt wraps 90˚ or more) diameters against both the belt manufacturer's recommendations, as well as the fastener manufacturer's recommendations. Using a pulley diameter that is smaller than the belt and/or fastener's recommended size can produce excessive bending stresses with the possibility of belt splice failure.

Belt slippage

Causes
Small pulleys; incorrect lagging; worn lagging.

Solution
The proper pulley diameter is crucial to belt performance. When it comes to slippage, the surface area where the belt goes from full tension (top) to partial tension (bottom) and shrinks puts an extensive amount of pressure on the lagging to move with it and prevent slip. While CEMA does not specifically recommend a pulley diameter by application, the engineers of conveyor systems make recommendations for pulley diameters based on the design of the conveyor. Often, the small pulley will be substituted to save costs without consideration for this belt shrink – if they minimise the pulley size, they also minimise the area in which the lagging can help the belt shrink as it wraps around the pulley. Reducing the size of the pulley this much may cause slippage. Additionally, it should be verified that the correct lagging is being used and is in good condition. New rubber lagging that is slipping may indicate that ceramic lagging, with a higher coefficient of friction, should be used instead. If there are any tiles missing or flat spots on older lagging, then it is time to replace it.

Mistracking, poor splice life

Causes
Improperly squared belt.

Solution
Square belt using appropriate tools. An accurate, squared cut will enhance belt and splice performance and ensure that the belt tension is distributed evenly across the belt. It also discourages mistracking, which can occur when a cut is made on an angle, causing the

belt to wander. Squaring the belt involves marking the centre of the belt at 3 – 5 ft intervals for approximately 20 ft from the splice area, drawing a centre line based on those markings, and using a square to draw a line that is perpendicular to the average centre line across the belt width. A proper belt cutter (as opposed to a utility knife) should be used for a safer, straighter cut.

Spillage at the load zone

Causes
Poor skirting; no impact protection.

Solution
Check and maintain skirting with an easy-to-use system. Skirting is important in the load zone as it stops material spillage leaks, controls dust emissions and eliminates other resulting problems, such as belt damage and mistracking. A skirting system that is easy to service and has corrosion resistant components for less maintenance is recommended. It should be ensured that proper impact protection is available and the belt is properly supported in the load area. Impact protection should take into account lump weight and drop height, and should deliver maximum protection to the belt in the load zone.

Belt damage, conveyor structure damage

Causes
Belt mistracking.

Solution
Before finding a device that can help solve the problem, the type of mistracking must first be identified. Misalignment of rollers or pulleys, an incorrect splice and material buildup are just a few of the things that can get a belt off track. If a belt is constantly moving back and forth, it is experiencing wander, while a belt that runs to one side constantly is simply mistracking. The device that is chosen depends on which type of mistracking is occurring, along with the belt tension, belt speed, thickness, width, and whether the belt reverses.

Belt damage from seized rollers

Causes
Seized rollers cut into belt.

Solution
Conveyors should be regularly inspected for seized (non-rotating) rollers. For steel rollers, look for flat spots with sharp edges; these should be replaced immediately or risk cutting the belt. For composite rollers with a steel core, look for flat spots with sharp edges; these should be replaced immediately or risk cutting the belt. For composite rollers without a steel core, replace when feasible.

Belt cleaners not working properly, resulting in carryback

Causes
Incorrectly mounted cleaners or belt cupped when passing by cleaners.

Solution
Ensure that the cleaners are mounted correctly by reviewing installation instructions. A plant in Canada had developed a whole system to clean up its carryback. The plant supervisor felt it was efficient and

Pulleys that are too small in diameter can cause several problems, including slippage and splice failure.

Ensuring that the belt conveyor components are compatible with each other is key to all parts running smoothly.

limited downtime. However, after seeing a new cleaner installed, the plant superintendent realised that all of the other cleaners were mounted incorrectly. Based on this observation, new cleaners were installed and mounted correctly throughout the plant. The result was an 80% decrease in carryback. Furthermore, if the belt is cupped, introduce a hold down roller to flatten the belt and ensure proper cleaner-to-belt contact.

Poor cleaning edge and a dirty belt

Causes

Poor attack angle, worn blade, or incorrect blade in reference to the material path.

Solution

Pole location is vital to the success of the cleaner as it permits the correct blade attack angle, encourages maximum cleaning performance and ensures maximum blade life as the entire wear area of the blade can be used. Optimal cleaning can be attained by paying close attention to the material path of the belt, which is typically the centre two thirds of the belt width. Choosing a blade that is only slightly wider than the material path can decrease blade wear and replacement.

Summary

Along with visual checks every day, operations should perform a yearly belt conveyor audit. The audit can be carried out by an internal team; however, participation by a third party is helpful. Simple maintenance tasks that may have gone unnoticed can be identified and addressed by a plant's team, or components can be replaced that will make the equipment run more efficiently. If nothing else, an audit can help keep the equipment running longer.

Whether a plant is performing proactive maintenance or reacting to a repair need, preparing to work safely is key. In addition to wearing personal protective equipment, using appropriate lock out/tag out procedures and making sure personnel are secured to a sturdy structure, following the proper procedures and using the right products is an essential part of safe and successful belt maintenance.

Over time, carryback, spillage, improper fastener selection and mistracking can cause serious problems for a belt conveyor system. Although these may seem to be everyday issues, solutions are available and are integral to an operation's success. All too often, plant operators do not realise there is a problem until production is halted, which affects the operation's bottom line. Quick and easy visual inspections can prevent this from occurring.