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KOMATSU

Aaron Gibbs and Mark Bayley, ASGCO, US, outline the key considerations for the correct specification, installation and maintenance of conveyor belt cleaning systems for coal handling.



THE IMPORTANCE OF

CLEAN CONVEYORS

With the need to improve efficiency, safety and productivity at today's coal mines, coal preparation plants, ports and bulk shipping terminals, and coal-fired power plants, good housekeeping and dust and carryback reduction are increasingly important. Belt cleaners are an essential and key part to any clean, efficient conveyor system: according to the US Mine Safety and Health Administration (MSHA), 39% of conveyor-related accidents occur while cleaning or shovelling around conveyors. Conveyor belt cleaners help remove product carryback and prevent it from falling off at various points along the return side of the belt, causing housekeeping and maintenance problems such as:

- Excessive build-up and wear on conveyor belt idlers and pulleys.
- Conveyor belt misalignment due to the artificial crown created by the carryback.

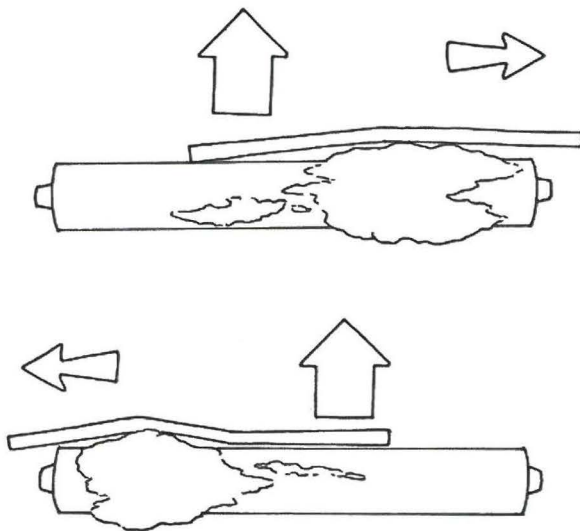
- Accumulation of material falling off conveyor belt idlers and structure onto the ground, buildings, vehicles or even people.
- Negative and unsafe work environment.
- Fines and penalties.

Cleanliness is essential for proper conveyor belt tracking. The key to controlling carryback is the installation and maintenance of an effective belt cleaning system. It is sound practice to use a multiple cleaner system to provide more than one pass at removing the material. These systems are typically composed of a pre-cleaner on the face of the head pulley to remove the majority of material, and one or more secondary cleaners installed further along the belt return to remove residual fines. Tertiary or follow-up cleaners can be positioned even further back along the conveyor return to remove any last material.

The following criteria should be considered in the selection and placement of a belt cleaning system:



Typical example of material carryback.



Carryback on idlers and pulleys can also cause the “handlebar effect”. The belt will always move and make contact with the side it touches first. Therefore it is essential that proper belt cleaners are installed and maintained to help eliminate this possibility.



Primary belt cleaner properly installed on this underground head pulley.

- Conveyor belt speed and width.
- Does the conveyor reverse?
- Material path on the conveyor belt: matching the material path with the cleaner blades reduces differential blade wear.
- The space available for the belt cleaners and ability for proper maintenance when required.
- The diameter of the head pulley and its condition.
- Belt speeds and tonnages conveyed.
- The product that is being conveyed:
 - Moisture content.
 - Size.
 - Percentage of fines.
 - Temperature.
- The current conditions of the conveyor belt:
 - Are there cuts and gouges in the top cover?
 - Are there mechanical or vulcanised splices and are they installed correctly with the leading edge recessed into the top cover?
 - Are there different belt (thicknesses) spliced into one conveyor?

Case study

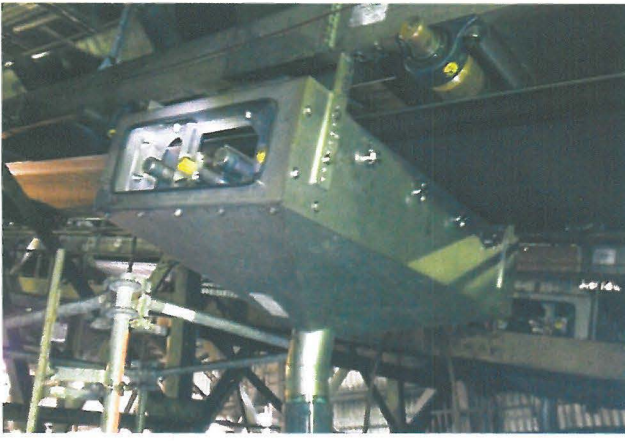
A coal-fired power plant in the Powder River Basin (PRB), US, was experiencing problems with the lack of maintenance being performed on the belt cleaning systems. This was due to a lack of manpower and time available to clean the belt. The conveyor also runs through a tunnel, which compounded the difficulties, making it difficult to clean underneath the conveyor. It also meant that a large amount of dust was generated, making it difficult to see and walk the conveyor. Walking the conveyor while it was running required a dust mask and a strong flashlight.

After surveying the conveyor with the plant engineer, the authors decided to install an ASGCO® wash box system right past the head snub pulley. This location would mean the belt was cleaned immediately after the coal leaves the chute area. As the belt enters the wash box, it comes into contact with the first spray bar that sprays water onto the belt (the spray helps loosen the coal away from the belt). Then the first ASGCO Razor-Back™ with tungsten carbon blades scrapes the belt. The belt then goes through a second spray bar and then another Razor-Back system. As the belt leaves the wash box, there is a rubber squeegee that helps take off any leftover water.

The system has been in service for about eight months and the customer is very pleased with the performance. Not only has it solved the carryback problem, it has also solved the dust problem in the tunnel. It is now possible to walk the conveyor while it is running, without needing to wear a dust mask.

The 11 essentials of belt cleaning

1. Belt conditions, material characteristics and climatic conditions are all important considerations when selecting belt cleaners, but the most important consideration is proper and regular maintenance. Select and install belt cleaners based on the ease of maintenance (e.g. installing the belt cleaner in the main



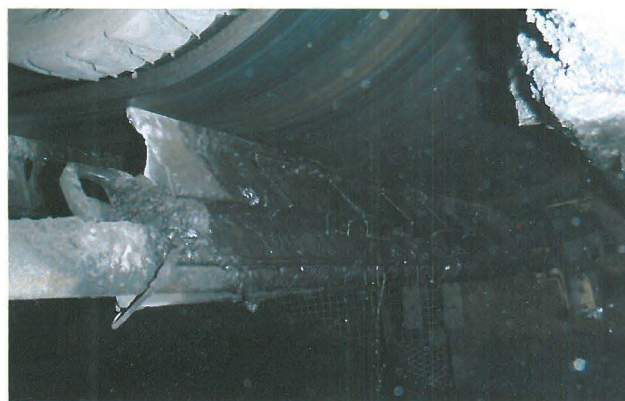
ASGCO wash box installed.



A series of water sprays and tungsten carbide belt cleaners ensure the conveyor belt is cleaned.



Underground coal mine head section with multiple (4) belt cleaners installed.



Razor-Back secondary belt cleaner installed at an underground coal mine in West Virginia.

- chute or another area that can easily be cleaned and maintained) and then make sure that maintaining belt cleaners becomes a priority, not an after-thought.
2. Cleaners work more efficiently within a system made up of multiple cleaners and inspection/access doors. Belt life is also improved with multiple lightly loaded cleaners, rather than one overloaded cleaner. With multiple cleaner installations, it may be necessary to add systems – e.g. an expanded dribble chute or a scavenger conveyor – to return the material removed by follow-up cleaners to the main material flow.
 3. Systems should minimise or eliminate any risk of damage to the belt, splices or to themselves. They should clean at low pressure and incorporate a method of relief for the passage of splices and other obstructions.
 4. A cleaning system should be engineered and designed to handle worst-case conditions and temperature fluctuations.
 5. When selecting a pre-cleaner, it is usually better to have blade coverage of only the width of the material being conveyed, not the full belt width.
 6. If there is no room to accommodate one or two secondary cleaners, which is often the case in older facilities, two pre-cleaners can be used or chute modifications made to accommodate secondary cleaners.
 7. Installation should be as close to the face of the head pulley as possible on the conveyor return to remove material close to the original material trajectory.
 8. The blade should be positioned out of the main flow of the material.
 9. Choose a tensioning system that can maintain tension throughout the life of the blade.
 10. A dual or multiple scraper system on the head pulley is the most common way to eliminate product carryback. A water spray on the belt cover, along with wiper blades, will effectively remove most products from sticking to the cover. Belt wash boxes are also an effective, fully-contained system to help in the reduction of carryback.
 11. Product build up on the return side pulleys is a major concern. If the belt is not effectively cleaned on the return run, then any bend pulley or head snub pulley that comes into contact with the carry side of the belt will accumulate product. When it comes to pulley and idler cleaning, all return side pulleys that come in contact with the carry cover can be lagged with a soft rubber, vulcanised to the pulley. The constant flexing action of the soft lagging will cause material to fall off and reduce material accumulation.

Conclusion

Belt cleaners are an essential part of any conveyor system, helping to remove product carryback and prevent it from falling off at various points along the return side of the belt. Excessive build-up causes various housekeeping and maintenance problems, leading to an unsafe work environment. ^WC